A Rational Emotive Behaviour Therapy Perspective on the Nature and Structure of Posttraumatic Stress Responses: The Mediating and Moderating Effects of Rational and Irrational Beliefs

Philip Hyland BA (Hons)

School of Psychology

Faculty of Life and Health Sciences

University of Ulster

Submitted for the degree of Doctorate of Philosophy

February 2014

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ACKNOWLEDGEMENTS

To my supervisors, Professor Mark Shevlin and Professor Gary Adamson, I send my sincerest thanks and gratitude. A Ph.D student could never hope to have been supervised by two better people, let alone academics. You were both an endless source of knowledge, inspiration, and hope. To have had the opportunity to have worked with and learnt from each of you at the beginning of one's career is unquantifiable in its importance and influence. If someday I may become a fraction of the academics, educators, and supervisors that you both are it will have been a career well spent.

I send unending thanks to all the men and women of the armed services, law enforcement agencies, and emergency services who volunteered their time and energy to participate in this study. This acknowledgement is written on the day it was reported that one veteran of the U.S. armed services commits suicide every hour; that one active-duty officer of the U.S. armed services commits suicide every day; and exactly eight days after Garda Adrian Donohoe was shot dead while on duty in Co. Louth, Ireland. We all live under the freedom defended and protected by these individuals and their sacrifices are what make it possible for work like this to even be considered, let alone completed. They are truly the best of us, and this work is a dedication to them and to their sacrifices, and is presented in the hope that it may have some small impact on improving the quality of their lives.

To my friend, my mentor, my colleague, my partner-in-crime, Daniel Boduszek, what can I say? The last three years on this journey together have been some of the most enjoyable, toughest, enlightening, and rewarding of my life. The things we've achieved together could never have been achieved alone. Thank you for your friendship.

Finally to my family and friends, I love you all more then I could ever express. There's no way a person makes it through something like this with his sanity intact without the support of family and friends. Thank you for making it possible for me to do this, and thank you for putting up with me through this thing. You know what it's been like!

If it's possible for a person to be judged by the company that he keeps, I hereby judge myself the luckiest of men.

Summary

Rational Emotive Behaviour Therapy (REBT: Ellis, 2001) represents the original cognitive-behavioural therapy (CBT) model of psychopathology. Although there is much empirical support for the basic theory of REBT (see David, Lynn, & Ellis, 2010), the model has never been tested in the context of posttraumatic stress responses to adverse life events.

The first empirical chapter of the thesis investigated the construct validity of the Attitudes and Belief Scale 2 (ABS-2: DiGiuseppe, Leaf, Exner, & Robin, 1988). This chapter employed traditional confirmatory factor analysis and confirmatory bifactor modelling to investigate the psychometric properties of the ABS-2. Results indicated that a bifactoral model conceptualisation was found to offer an adequate representation of the underlying factor structure of the scale. Based on these results, an abbreviated version of the ABS-2 with superior psychometric properties was thus constructed.

In the second empirical chapter confirmatory bifactor modelling and composite reliability analysis were employed to investigate the psychometric properties of the Profile of Emotional Distress (PED: Opris & Macavei, 2007). The PED was designed to capture the qualitative distinction between dysfunctional emotions, as predicted by REBT theory. Results indicated that the PED does not capture the distinction between functional and dysfunctional negative emotions, however a bifactor model inclusive of a single general distress factor, and four method factors was found to be an acceptable fit of the data.

The third empirical chapter utilised structural equation modelling to test the organisation of the irrational beliefs in the prediction of posttraumatic stress responses. A model consistent with the predictions of REBT theory was found to be a good fit of the data and explained a large percentage of variance in each symptom class of posttraumatic stress.

The fourth empirical chapter provided the first piece of empirical evidence that generalised irrational beliefs impact upon posttraumatic stress symptoms via trauma-specific irrational beliefs; a frequently hypothesised relationship which had hitherto

remained untested. Results of structural equation modelling offered support for this core hypothesis.

Subsequently, the fifth empirical chapter investigated the impact of trauma-specific irrational beliefs in the prediction of reporting posttraumatic stress symptoms while controlling for a number of important sociodemographic factors. Binary logistic regression analysis was employed and found that three irrational belief process positively predicted belong to the strongly symptomatic group.

Finally, the sixth empirical chapter employed sequential moderated multiple regression analysis to determine if rational beliefs could positively moderate the impact of irrational beliefs of posttraumatic stress symptoms. Rational beliefs were found to exert a negative, direct effect on posttraumatic stress symptoms, and to lessen the impact of irrational beliefs on posttraumatic stress responses.

Key Words: Rational Emotive Behavior Therapy (REBT), Posttraumatic Stress Symptoms (PTS), Irrational Beliefs; Rational Beliefs, Structural Equation Modelling (SEM), Confirmatory Factor Analysis (CFA), Bifactor Modelling.

LIST OF ABBREVIATIONS

A	Activating Event
ABS2	Attitudes and Belief Scale-2
ABS2-AV	Attitudes and Belief Scale-2-Abbreviated Version
ACC	Acceptance
AIC	Akaike Information Criterion
APA	American Psychiatric Association
AV	Avoidance
α	Cronbach's Alpha
B	Beliefs
B	Unstandardized Regression Weight
β	Standardized Regression Weight
C	Consequences
CAT	Catastrophizing
CBT	Cognitive Behaviour Therapy
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CI	Confidence Interval
CT	Cognitive Therapy
D	Disputing
DEM	Demandingness
DEP	Depreciation

D-NED	Dysfunctional Negative Emotional Distress
DSM-IV	Diagnostic and Statistical Manual of Mental Disorder IV
DYS	Dysphoria
df	Degree of Freedom
E	Efficient Beliefs
EFA	Exploratory Factor Analysis
F-NED	Functional Negative Emotional Distress
GABS	General Attitudes and Belief Scale
G-CAT	General Catastrophizing
G-DEM	General Demandingness
G-DEP	General Depreciation
G-IR	General Irrationality
G-LFT	General Low Frustration Tolerance
HFT	High Frustration Tolerance
HYP	Hyperarousal
IBT	Irrational Belief Test
IFI	Incremental Fit Index
INT	Intrusions
LFT	Low Frustration Tolerance
M	Mean
MLR	Robust Maximum Likelihood
η^2	Partial Eta Squared

NATs	Negative Automatic Thoughts
NCAT	Non-Catastrophizing
OR	Odds Ratio
P	Probability
PCA	Principal Component Analysis
PDS	Posttraumatic Stress Diagnostic Scale
PED	Profile of Emotional Distress
POMS-SV	Profile of Mood States-Short Version
PREF	Preferences
PTS	Posttraumatic Stress Symptomology
PTSD	Posttraumatic Stress Disorder
r	Correlation Coefficient
RBI	Rational Behaviour Inventory
REBT	Rational Emotive Behaviour Therapy
RMSEA	Root-Mean-Square Error of Approximation
SD	Standard Deviation
SE	Standard Error
SEM	Structural Equation Modelling
S-IR	Specific Irrationality
SIT	Social Identity Theory
SPSS	Statistical Package for the Social Sciences
SRMR	Standardized Root Mean-Square Residual

TLI	Tucker Lewis Index
TRIBS	Trauma Related Irrational Belief Scale
TS-CAT	Trauma-Specific Catastrophizing
TS-DEM	Trauma-Specific Demandingness
TS-DEP	Trauma-Specific Depreciation
TS-LFT	Trauma-Specific Low Frustration Tolerance
$\chi 2$	Chi-square
ρ_c	Composite Reliability
λ_{i}	Standardised Factor Loading
θ_{i}	Standardised Error Variance

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Philip Hyland

PUBLICATIONS ARISING FROM THE THESIS

Peer-reviewed publications

1. Hyland, P., & Boduszek, D. (2012). Resolving a difference between Cognitive Therapy and Rational Emotive Behaviour Therapy: Towards the development of an integrated CBT model of psychopathology. *Mental Health Review Journal, 17,* 104-116. doi 10.1108/13619321211270425
2. Hyland, P., & Boduszek, D. (2012). A unitary or binary model of emotions: A discussion on a fundamental difference between Cognitive Therapy and Rational Emotive Behaviour Therapy. *Journal of Humanistics and Social Sciences, 1*, 49-61.
3. Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2014). Modelling the factor structure of the Attitudes and Belief Scale 2: Toward the development of an abbreviated version. *Cognitive Behaviour Therapy, 43,* 60-71. doi:10.1080/16506073.2013.777467
4. Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2014 – in press). The factor structure and composite reliability of the Profile of Emotional Distress. *The Cognitive Behavior Therapist, 6,* e15. doi: http://dx.doi.org/10.1017/S1754470X13000214
5. Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2014). The organisation of irrational beliefs in posttraumatic stress symptomology: Testing the predictions of REBT theory using structural equation modelling. *Journal of Clinical Psychology, 70,* 48-59. doi: 10.1002/jclp.22009
6. Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2014 – in press). Irrational beliefs in posttraumatic stress responses: A rational emotive behaviour therapy approach. *Journal of Loss and Trauma: International Perspectives on Stress & Coping.* doi: 10.1080/15325024.2013.839772
7. Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2013). The role of trauma-specific irrational beliefs and sociodemographic risk factors in posttraumatic stress responses. *Journal of Rational-Emotive & Cognitive-Behaviour Therapy, 31,* 152-156. doi: 10.1007/s10942-013-0167-y

8. Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2014 – in press). The moderating role of rational beliefs in the relationship between irrational beliefs and posttraumatic stress symptomology. *Behavioural and Cognitive Psychotherapy*, available on CJO2013. doi:10.1017/S1352465813000064.

AWARDS ARISING FROM THE THESIS

1. *Literati Network Awards for Excellence 2013* ~ awarded for the following publication:

   Hyland, P., & Boduszek, D. (2012). Resolving a difference between Cognitive Therapy and Rational Emotive Behaviour Therapy: Towards the development of an integrated CBT model of psychopathology. *Mental Health Review Journal*, *17,* 104-116. doi 10.1108/13619321211270425

2. *Albert Ellis Award for Research 2013-2014* ~ awarded for the following publication:

   Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2014). The organisation of irrational beliefs in posttraumatic stress symptomology: Testing the predictions of REBT theory using structural equation modelling. *Journal of Clinical Psychology, 70,* 48-59. doi: 10.1002/jclp.22009

"*Don't demand that things happen as you wish, but wish that they happen as they do happen, and you will go on well.*"

Epictetus, The Enchiridion, 135 C.E.

Chapter 1

Theoretical Introduction

Two papers based on this chapter have been published in **Mental Health Review Journal** and the **Journal of Humanistics and Social Sciences**.

1. Hyland, P., & Boduszek, D. (2012). Resolving a difference between Cognitive Therapy and Rational Emotive Behaviour Therapy: Towards the development of an integrated CBT model of psychopathology. *Mental Health Review Journal*, *17,* 104-116. doi: 10.1108/13619321211270425

2. Hyland, P., & Boduszek, D. (2012). A unitary or binary model of emotions: A discussion on a fundamental difference between Cognitive Therapy and Rational Emotive Behaviour Therapy. *Journal of Humanistics and Social Sciences, 1*, 49-61.

1.1 Introduction

1.1.1 The Basics of Cognitive Behaviour Theory

Cognitive-behavioural theoretical conceptualizations of various psychological disorders have proven themselves to be the most thoroughly and rigorously investigated (Barlow, 2008; Chambless & Hollon, 1998) and empirically supported (Butler, Forman, Chapman, & Beck, 2006; Chambless & Ollindick, 2001; Engels, Garnefsky, & Diekstra, 1993; Epp & Dobson, 2010; Lyons & Woods, 1991) psychological models currently proposed. CBT based therapies are predicated upon the theory that psychological disorders are the result of dysfunctional cognitive processing (Ellis, 1962, 1994; Beck, 1976). David and Szentagotai (2006) explain that from the CBT perspective, complex human processes such as cognition, affect, and behaviour are considered to be 'cognitively penetrable'. This implies that such processes are the direct result of some form of conscious or unconscious cognitive processing, and that if changes are affected in a person's cognitive processes, either through direct or indirect means, changes can be brought about in an individual's cognitive, emotional and behavioural responses.

Within the CBT tradition there are numerous approaches including Cognitive-Behavioural Modification (Meichenbaum, 1977), Multimodal Therapy (Lazarus, 1976), Dialectical Behaviour Therapy (Linehan & Dimeff, 2001), Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 2003) and Reality Therapy (Glasser, 1965) (see Kuehlwein & Rosen, 1993 for a more detailed review). Two of the most influential and widely used approaches within the CBT tradition are Rational Emotive Behaviour Therapy (REBT: Ellis, 1958, 1962, 1994a) and Cognitive Therapy (CT: A. T. Beck, 1963, 1976; J. S. Beck, 2011).

Each approach within the CBT tradition is similar by virtue of the fact that there is a theoretical agreement that cognitive variables mediate the impact of stressful events on the development of cognitive, emotional, and behavioural distress (a diathesis-stress model). However, each approach within the CBT field has a unique and distinct diathesis-stress model related to the specific kinds of (dysfunctional) cognitions that are hypothesised to be the key etiopathogenetic mechanisms in the development of psychopathology (David & Szentagotai, 2006). This differential focus

on various types of cognitive variables means that each approach within the CBT field has a distinct model of psychopathology, and consequentially, a distinct clinical approach to the treatment of psychopathology.

1.1.2 The Theory of REBT

REBT's cognitive model of psychopathology is organised around Albert Ellis's (1958, 1962, 1994) "ABC(DE)" model of emotional disturbance. This model outlines the key tenet of REBT, and the wider field of CBT, that cognitions are the main mediators and determinants of a range of complex human responses including cognitive, emotional, behavioural, and certain physiological responses. According to the ABC model, 'A' represents the myriad of Activating events or Adversities which a person will face throughout their life in which some aspect of one's personal domain comes under threat or suffers a loss (see Beck, 1976). Subsequent to the experience of an Activating event (which can be an internal or external stimulus) a person is likely to experience a range of cognitive, emotional, behavioural, and physiological consequences, representing 'C' in the ABC model. These Consequences may be functional, adaptive, and healthy or they may be dysfunctional, maladaptive, and unhealthy. According to Ellis's model, the determining factor in whether a person will experience functional Consequences or dysfunctional Consequence subsequent to the experience of a negative Activating event depends upon the kinds of Beliefs ('B') a person holds about that Activating event.

The particular cognitive variables that the theory of REBT is organised around are rational and irrational beliefs and these beliefs represent specific kinds of evaluative or appraisal beliefs (David, Schnur, & Belloiu, 2002). Rational beliefs are beliefs which are empirically sound, logically coherent, and/or pragmatic. The characteristic nature of rational beliefs moreover is that they are flexible and non-extreme. Irrational beliefs, contrastingly, are beliefs which are not grounded in empirical reality, are logically incoherent, and/or are non-pragmatic. The characteristic nature of irrational beliefs is that they are rigid and extreme (Ellis, David, & Lynn, 2010; Dryden & Neenan, 2004)

According to REBT theory then, if a person responds to a negative activating event with a set of rational beliefs that person will likely experience functional

cognitive, healthy negative emotional, and adaptive behavioural consequences, respectively. On the other hand, when a person holds a set of irrational beliefs about the same negative activating event that person will likely experience dysfunctional cognitive, unhealthy negative emotional, and maladaptive behavioural responses, respectively. REBT works at relieving psychopathology by identifying these irrational beliefs and Disputing ('D') such beliefs so as to bring about a change in a person's belief system whereby they adopt a new set of rational and Efficient ('E') beliefs which will serve to eradicate their cognitive-emotional-behavioural disturbances.

REBT's theory of psychopathology is simple and parsimonious and avoids elaborate explanations for the development of psychological disturbance. Much of REBT theory diverges from many other counselling approaches by stressing more vigorously the role of biology rather than the role of the environment in influencing human cognition, emotion, and behaviour (Dryden & Neenan, 2004). It must be noted however that REBT theory does not ignore the role of the environment and fully recognises that the environment interacts with innate biological tendencies in the development of psychopathology (Ellis, 1994).

The central precept of REBT's theory of psychological disturbance is that humans have an innate tendency to exaggerate flexible preferences (rational beliefs) into rigid demands (irrational beliefs) (Ellis, 1994; Wallen, DiGiuseppe, & Dryden, 1992). REBT theory recognises that all humans are born as goal-seeking animals who strive to fulfil their general and idiosyncratic goals. As such, humans have an innate disposition to prefer and desire the achievement of one's ambitions. However, Ellis hypothesised that humans also have an innate tendency to transmute these flexible preferences and desires for the fulfilment of one's goals into rigid, absolutistic, and dogmatic demands. This process of raising one's preferences into demands is hypothesised to lie at the core of psychological disturbance (David, Lynn, & Ellis, 2010).

This process which Ellis termed Demandingness is considered the primary irrational appraisal mechanism in the development of psychopathology. These *rigid* Demandingness beliefs are said to give rise to a set of secondary irrational appraisal beliefs which are *extreme* in nature. Catastrophizing beliefs reflect a person's

evaluation that getting what they believe they must not get, or not getting what they believe they must get, is as bad a situation as anything could be; completely catastrophic. Low Frustration Tolerance beliefs reflect an individual's belief that one is incapable of tolerating not having what they believe they must have, or of being utterly incapable of experiencing any kind of happiness so long as their demands are not met. Depreciation beliefs reflect the global, overgeneralized, and negative evaluations a person makes of oneself, others, and/or the world in general when oneself, others, or the world fails to live up to the person's self-created or self-imposed demands. The interaction between these primary and secondary appraisal beliefs about a given activating event produces the specific kinds of cognitive distortions, unhealthy negative emotions, and maladaptive behavioural consequences that are characteristic of various forms of psychopathology (see David, 2003).

Irrational beliefs are evaluative or appraisal cognitive mechanisms, and hence are consistent with Ableson and Rosenberg's (1958) description of hot cognitions. Rational and irrational beliefs are ways of appraising or evaluating particular representations of reality in terms of their personal significance to a given individual. The theory of REBT posits that rigid, extreme, unrealistic, and illogical appraisals of automatic interpretations of life events gives rise to emotional disturbances (Walen, DiGiuseppe, & Dryden, 1992; Ellis, 1994; Ellis & Dryden, 2007). Given REBT's focus on hot cognitions as the primary causal cognitive mechanisms in the development of emotional reactions, the theory and clinical practice of REBT can therefore be said to be congruent with the appraisal theory of emotions (Folkman & Lazarus, 1988; Lazarus, 1991; Smith & Lazarus, 1993), the most contemporary and empirically validated model of emotions in cognitive psychology (David, 2003).

1.1.3 The Role of Irrational Beliefs in Psychopathology

Szentagotai and Freeman (2007) investigated the REBT hypothesis that evaluative cognitions (irrational beliefs) represent the proximate causes of emotional disturbance while representational cognitions (distorted automatic thoughts) reflect the more distal causes. Their study involved clinical patients suffering from major depressive disorder and assessed the impact of distorted automatic thoughts on the development of depressed mood. Results from the study showed that distorted automatic thoughts only

affected an individual's mood when such thoughts were experienced in the presence of an irrational belief. Consistent with REBT theory, cold cognitions (distorted automatic thoughts) were shown to be distal causes in changes to the participant's moods whereas hot cognitions (irrational beliefs) were shown to be the proximate causes of changes in mood.

A great deal of research evidence exists which indicates that irrational beliefs are implicated in a myriad of psychological disorders including; mood disorders (Macavei, 2005; Muran, Kassinove, Ross, & Muran, 1989; Nelson, 1977; Prud'homme & Barron, 1992; McDermutt, Haaga, & Bilek, 1997; Blatt, 1995), various anxiety disorders (Nieuwenhuijsen, Verbeek, Boer, Blonk, & van Dijk, 2010; Lupu & Iftene, 2009; DiLorenzo, David, & Montgomery, 2007; Montgomery, David, DiLorenzo, & Schnur, 2007; Lorcher, 2003), anger disorders (Jones & Towers, 2004; Martin & Dahlen, 2004; Silverman & DiGiuseppe, 2001; Bernard, 1998), symptoms of various general psychiatric disorders (Alden, Safran, & Weideman, 1978), lack of assertiveness (Alden et al., 1978), type A coronary prone behavior pattern (Smith & Brehm, 1981), trait anger, trait depression, and trait anxiety (Bernard, 1998), and state anger, state guilt, and state anxiety (David et al., 2002).

While these studies provide general support for REBT's theory that irrational beliefs are involved in various psychological disorders, much of this evidence is correlational in nature and therefore not entirely supportive of REBT's theory that irrational beliefs represent specific cognitive vulnerability factors for the development of psychopathology, and that activation of irrational beliefs during stressful situations actually gives rise to psychopathological responses. Solomon, Haaga, Brody, Kirk, and Friedman (1998) attempted to test this core hypothesis of REBT theory through the application of a research design which compared levels of irrational beliefs between a remitted-depression group and a never-depressed group. This design allowed the researchers to identify whether the presence of irrational beliefs posed a risk factor for the development of depression, or if irrational beliefs were merely a correlate of depression. Soloman et al. (1998) used two measures of irrational beliefs and a priming method to attempt to activate latent irrational beliefs. Results of the study indicated that no differences existed in the endorsement of irrational beliefs between the two groups suggesting that irrational beliefs fluctuate with depression

levels. This result stands in contradiction to the predictions of REBT theory. However, Soloman, Arnow, Gotlib, and Wind (2003) replicated the study, this time also using a measure of depression-specific Demandingness beliefs. In line with their predictions, Soloman et al. (2003) found that although there was no difference in the rates of endorsement of irrational beliefs between the remitted-depression group and the never-depressed group on a general measure of irrational beliefs, there were very large and statistically significant differences between the groups on the specific measure of Demandingness beliefs. The remitted-depression group were nine times more likely than the never-depressed group to hold at least one strong self-demand, and 70% of the remitted-depression group possessed at least one strong self-demand compared to just 20% of the never-depressed group. Soloman et al.'s (2003) findings support REBT's hypothesis that Demandingness beliefs are a core psychological construct in the development of depression (Ellis, 1987) and that irrational beliefs can act as cognitive vulnerability factors that lead to the development of psychopathology (Ellis, 1994).

Szentagotai, David, Lupu, and Cosman (2008) produced evidence to support the findings of Soloman et al. (2003) when they analysed the mechanisms of change that occurred during a randomized clinical trial comparing the efficacy of REBT, CT, and pharmacotherapy for the treatment of major depressive disorder (see David, Szentagotai, Lupu, & Cosman, 2008). All three treatment approaches were equally efficacious at post-test however at a six month follow-up REBT, but not CT, was found to be significantly better then medication at reducing levels of relapse (on one of two measures of depression). Their analyses showed that REBT proved more efficacious at reducing levels of implicitly held irrational beliefs then both CT and pharmacotherapy. The authors proposed that this factor accounted for REBT's significantly better results at the six-month follow up compared to pharmacotherapy. Although REBT proved significantly better at restructuring implicitly held irrational beliefs than CT, the rates of relapse in the REBT treatment group, while lower, were not statistically significantly lower than the CT treatment group. Szentagotai and colleagues suggested that the psychosocial skills acquired through CT served to protect patients from redeveloping clinical symptoms despite the presence of certain implicitly held irrational beliefs.

In an attempt to determine the algorithmic-representational nature of irrational beliefs as described by REBT theory, Szentagotai, Schnur, DiGiuseppe, Macavei, Kallay, and David (2005) performed a series of implicit and explicit memory recall quasi-experiments. It was hypothesised based on substantial prior research findings (e.g., Schawartzberg, 1997; Williams, Watts, MacLeod, & Mathews, 1988) that if any of the irrational belief processes (Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciation) were represented as schemas in the cognitive structure they would have a direct effect on the explicit memory tests. Specifically, schema-congruent information would be better recalled then schema-incongruent information. Results from the quasi-experiments showed that Demandingness and Depreciation beliefs are represented in the cognitive system as evaluative schemas as they were found to bias memory retrieval of both schema-congruent and schema-incongruent information (see also DiGiuseppe, 1996) while results showed that Catastrophizing and Low Frustration Tolerance beliefs had no impact on memory recall therefore these beliefs are more likely represented in the cognitive system as propositional networks (see also Dryden, 1984). There are two major implications from the results of this study which provide strong support for REBT theory.

Firstly, it was found that even when participant's self-report levels of Demandingness beliefs were low, once these beliefs were in the presence of high Catastrophizing, and/or high Low Frustration Tolerance, and/or high Depreciation beliefs, Demandingness beliefs still biased memory recall. Such a finding suggests that even when individuals are not consciously aware that they are holding Demandingness beliefs, these beliefs still impact upon one's cognitive processes. This finding supports Ellis' (1994) hypothesis that Demandingness beliefs always accompany the other irrational beliefs and that Demandingness beliefs are often stored within the implicit, rather than the explicit, memory system.

The second major implication that can be derived from the findings of Szentagotai and co-workers (2005) is in relation to the Depreciation belief process. Negative depreciation beliefs about oneself are well established to be an important core belief in certain forms of psychopathology including depression (Beck, 1976; Beck, Rush, Shaw, & Emery, 1979; Ellis, 1994), and depression is also known to bias memory retrieval (Williams, et al., 1988). Szentagotai et al.'s research findings

demonstrated that every time self-depreciation beliefs had an effect on memory recall there was also found to be a Demandingness-belief effect. The two processes are intimately linked in other words. Ellis (1987) has consistently argued that Beck's CT model of depression (Beck et al., 1979) is incomplete as it does not take into account the primary role played by Demandingness beliefs. Ellis (1987, 1994) argued that negative self-Depreciation beliefs always exist along with a primary self-directed Demandingness belief. This hypothesis brought about considerable criticism from those within the CT community. Marzillier (1987), and later Brown and Beck (1989), argued that although Demandingness beliefs were sometimes involved in depression, Demandingness beliefs were neither specific to, nor necessary for, the development and maintenance of depression. This finding from Szentagotai and co-workers, along with finding of Solomon et al. (2003) and Szentagotai et al. (2008), provide substantial empirical support for Ellis' (1987) and REBT's hypothesis that Demandingness beliefs are at the core of depression and are always present along with negative self-Depreciation beliefs. Furthermore, these results also provide general support for the REBT theory of psychopathology which posits Demandingness beliefs as the core psychological construct in the development and maintenance of psychopathology.

The core principle of REBT theory regarding the interrelations among the irrational beliefs, namely that Demandingness beliefs represent the primary appraisal mechanism in the development of psychopathology, while Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs are derivatives of Demandingness beliefs and thus represent secondary appraisal mechanisms, has only begun in recent years to receive direct empirical investigation despite the integral nature of this aspect of the theory.

Factor analytic research has supported the interrelations between the irrational beliefs, demonstrating that Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs are all associated with each other, and all three processes are related directly to Demandingness beliefs (Fulop, 2007; Bernard, 1998; DiGiuseppe, Leaf, Exner, Robin, 1988).

David et al. (2002), and David, Ghinea, Macavei, and Kallay (2005) examined the interrelations of the irrational beliefs within the paradigm of Lazarus's (1991)

Appraisal Theory of emotions and found that Demandingness beliefs were highly correlated with primary appraisals, and more strongly associated with primary appraisals than with Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs. Furthermore, Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs were highly related to secondary appraisals. The results of these two studies supported the primary appraisal role of Demandingness beliefs and indicated that the effect of Demandingness beliefs on the development of emotions is mediated by the secondary appraisal mechanisms of Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs as predicted by REBT theory.

This meditational relationship was then specifically tested by DiLorenzo et al. (2007) through the use of meditational analysis. The researchers examined the interrelations of the irrational beliefs on the development of exam-related distress at two time points (at the beginning of a college semester and immediately prior to the sitting of an important exam). Their results showed that at both time points each irrational belief process was significantly correlated with exam-related distress. At time 1, the effect of Demandingness on the development of distress was completely mediated by Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs. At time 2, the effect of Demandingness was completely mediated by Catastrophizing and Depreciation beliefs but not by Low Frustration Tolerance beliefs. These findings offer considerable empirical support that not only do irrational beliefs about specific events give rise to psychopathological responses but that the interrelations between the irrational beliefs are as hypothesised by REBT theory.

REBT theory has been criticised (Padesky & Beck, 2003) as an overly monolithic therapy that is not well suited to adequately conceptualising the unique cognitive features of specific disorders due its focus on just a few core irrational belief processes. David, Szentagotai, Kallay, and Macavei (2005) responded to this criticism by pointing out that while REBT theory fully incorporates the "cognitive content specificity hypothesis" of CT theory (see Riskind, 2004), the advantage of a reductionist approach favoured by REBT is an ability to explain the development of a range of psychological disorders in terms of the interactions between just a few irrational beliefs. David et al. (2005) point out that the REBT approach is similar to the approach to understanding psychopathology employed within the field of

neuroscience where various forms of psychopathology are explained in terms of a small group of neurotransmitters, and the interactions that take place between them. David (2003) has put forth a proposed model for the development of specific disorders based upon the interactions of the primary and secondary belief processes. Depression, for example, is hypothesised to involve Demandingness and self-Depreciation beliefs, while anxiety disorders are hypothesised to involve interactions between Demandingness beliefs and Catastrophizing and/or Low Frustration Tolerance beliefs. Research testing these individualised REBT models of psychopathology is unfortunately still in its infancy and little empirical research exists to either confirm or reject the predictions of David and his colleagues (2002, 2003).

1.1.4 The REBT Theory of Emotional Disturbance

Psychological science has predominately conceptualized emotions as a unitary entity (Russell & Carroll, 1999; Watson & Tellegen, 1999). However, the theory of REBT challenges this view and posits that emotional distress can be more accurately understood as a binary construct. The unitary model of emotional distress assumes that distress is experienced along a continuum which ranges from low levels of emotional distress to high levels of emotional distress, irrespective of the kind of emotion that is being measured, or whether one aggregates specific scores from various measures of discrete (negative) emotions into a score of general (negative) emotional distress (e.g., McNair, Lorr, & Droppleman, 1971). Currently within the psychological and CBT literature, the severity of emotional disturbance is considered to be a direct reflection of the intensity of the subjective level of negative emotional affect. If an individual experiences high levels of negative emotional affect such as high levels of sadness, anxiety, rage, irritation, shame, or regret, for example, that person is considered to be emotionally disturbed, while a person who experiences low levels of such emotions is considered to be emotionally healthy. Psychological measures of mood, and of specific disorders, such as the Beck Depression Inventory II (A. T. Beck, Steer, & Brown, 1996) and the shortened version of the Profile of Mood States (Shacham, 1983) have been developed based on this view. Within this framework no distinction is made between various negative emotions which may be conceptualized as functional or dysfunctional; rather the functionality or dysfunctionality of the

emotional experience is determined by the intensity with which any particular emotion is experienced.

David, Montgomery, Macavei, and Bovbjerg (2005) point out that within a unitary framework of emotions, different terms which are used to describe similar but apparently distinct emotional experiences, for example, concern as opposed to panic, or sadness as opposed to depression, could be considered from a number of perspectives. Firstly, labels such as concern or anxiety could be considered simply as synonyms: different labels describing an identical emotional experience. Secondly, such labels could describe differences in the intensity with which a person experiences the same underlying condition: concern represents low levels of anxiety whereas panic represents high levels of anxiety. Or thirdly, such labels could represent qualitatively different emotional responses: concern and panic are similar but distinct emotions, and their functionality depends upon the intensity with which each is experienced. According to this view, high levels of concern and/or high levels of panic would be considered unhealthy and dysfunctional while low levels of concern and/or low levels of panic would be considered functional and healthy.

Contrastingly, the binary model of emotional distress makes a qualitative rather than a quantitative distinction between functional and dysfunctional emotions. According to this view, an emotion such as panic is not merely "too much" concern, rather panic and concern are viewed as distinct emotions resulting from a radically different underlying cognitive architecture. In an important paper on the topic, Ellis and DiGiuseppe (1993) outlined in detail the REBT binary model of emotions, explaining that distinctions between functional and dysfunctional emotions (be they of a positive or a negative variety) cannot be made based upon arousal levels given that both functional and dysfunctional emotions can be experienced with low, medium, or high levels of intensity; that although emotions like rage or panic will usually produce maladaptive behavioural responses and are therefore usually considered "unhealthy", under certain circumstances such emotions may in fact lead to adaptive behavioural responses and thus in unique circumstances emotions such as depression or anxiety can be considered "healthy" (a view which is congruent with an evolutionary perspective of human emotions - Pelusi, 2003); and that functional and dysfunctional emotions are largely the product of rational and irrational beliefs, respectively.

Furthermore, the binary model of emotions does not preclude the possibility that a person can experience both healthy and unhealthy emotions simultaneously. In other words, a person can experience both low, medium, or high levels of concern and low, medium, or high levels of anxiety about the same event.

An implication of the binary model within the clinical setting is that not all forms of negative affect would be targeted for intervention. A clinical intervention would target only unhealthy negative emotional experiences (feelings of worthlessness or panic) while recognising the beneficial nature of healthy negative emotional experiences (feelings of concern or regret). The unitary model of emotions cannot make such a theoretical distinction between healthy and unhealthy emotions and thus any clinical intervention based upon the unitary framework would necessarily attempt to reduce all negative affect irrespective of its functionality; an approach which could well result in disadvantageous clinical outcomes.

1.1.5 An REBT Approach to Understanding Posttraumatic Stress Responses

The foregoing literature review provides substantial evidence to support the basic theoretical principles of REBT theory. The theory has been supported in the context of many different psychological/psychiatric disorders however one notable exception is the lack of data regarding the predictions of REBT theory in the context of posttraumatic stress disorder (PTSD). REBT theory appears very well suited to studying posttraumatic stress responses as the theory suggests that such responses should not arise simply as a result of experiencing a traumatic life event, as is suggested in the *Diagnostic and Statistical Manual of Mental Disorder 5* (American Psychiatric Association [APA], 2013), but rather that posttraumatic stress disorder will arise as a consequence of evaluating traumatic life events in a dysfunctional manner (Ellis, 2001). Demandingness beliefs, Catastrophizing beliefs, Low Frustration Tolerance beliefs, and Depreciation beliefs are therefore theorised to be critical cognitive vulnerability factors in the development and maintenance of severe and debilitating posttraumatic stress responses. Alternatively, the theory predicts that responding to such traumatic life events in a rational manner, exemplified by Preference beliefs, Non-Catastrophizing beliefs, High Frustration Tolerance beliefs,

and Acceptance beliefs, will mitigate against the onset of severe posttraumatic stress responses.

1.1.6 The Nature of PTSD

PTSD was classified within the DSM-IV-TR (APA, 2000) as an anxiety-disorder, and has undergone a revision in the newly published DSM-5 (APA, 2013) as a trauma- and stressor-related disorder. The nature of PTSD as a clinical construct is extremely complex, possessing many subtleties and idiosyncratic intricacies that distinguish it from other psychiatric disorders. This unique nature of PTSD, along with its relatively recent categorization as an officially accepted diagnostic entity, has led to considerable criticism within the mental health and medical communities as to the legitimacy of such a condition (see Brewin, 2003; Rosen, 2004).

PTSD is distinctive within the domain of psychiatric disorders in that it (along with its precursor Acute Stress Disorder) is the only condition that demands the occurrence of a definitive type of event to take place in order that a diagnosis can be made (Resick, Monson, & Rizvi, 2008). Diagnosis in DSM-5 requires that an individual be exposed to actual or threatened death, serious injury, or sexual violation (Criterion A). Exposure to a trauma may be directly experienced, as a witness to a traumatic event, learning of a traumatic event occurring to a loved one, or repeated experiences of first-hand experiences of traumatic events. The disturbance that follows the exposure to such a trigger must elicit clinically significant distress or impairment in the individual's social, occupational, or other areas of life functioning. In DSM-IV, the seventeen symptoms of PTSD were viewed as falling into three broad categories: symptoms which relate to reexperiencing of the trauma (Criterion B); symptoms which relate to experiences of avoidance of trauma-related stimuli and emotional numbing (Criterion C); and symptoms which relate to physiological hyperarousal (Criterion D). Three new symptoms have been added to the DSM-5 conceptualisation of PTSD and symptoms are now divided into four categories: (i) *Intrusions,* (ii) *Avoidance*, (iii) *Negative alterations in cognition and mood*, and (iv) *Reactivity*.

1.1.7 Prevalence of PTSD

Research regarding the prevalence of PTSD has revealed something important regarding the resiliency of the human psyche. Exposures to serious traumatic stressors are not at all uncommon events however rates of PTSD remain relatively low. Numerous epidemiological studies have investigated the rates of trauma exposure in various countries throughout the world along with the prevalence of PTSD. The most reliable findings for prevalence rates of PTSD come from studies which have drawn from large, nationally representative samples. Kessler, Sonnega, Bromet, Hughes, and Nelson (1995) conducted the first such study in the United States of America and found that more than half of the population experienced at least one serious traumatic stressor in their lifetime, with males being slightly more likely than females to experience such an event. Despite the fact that more than half the population were found to have experienced a major traumatic event, just 7.8% of the population suffered from PTSD. Kessler and colleagues (Kessler, Berglund, Demler, Jin, Merikangas, & Walters, 2005; Kessler, Chiu, Demler, Merikengas, & Walters, 2005) performed similar investigations in more recent nationally representative samples and again found a relatively low prevalence rate of 6.8%.

Comparable rates of trauma exposure have been found in other western countries. Creamer, Burgess, and McFarlane (2001) found that within a nationally representative sample of Australian adults, 50% of females, and 65% of males had experienced a minimum of one significant trauma during their life. Among nations that experience high levels of civil unrest and war, exposure to serious traumatic events are even higher with as many as 90% of the population found to have been exposed to a serious trauma in their lifetime (de Jong et al., 2001). In Algeria, 92% of the population reported experiencing a serious traumatic event, and within this population PTSD prevalence was found to be 37.4%.

1.1.8 Partial PTSD or Subsyndromal PTSD

Epidemiological studies suggest that development of severe psychological impairment following exposure to a traumatic life event is rare however such conclusions ought to be tempered by research findings on the prevalence of what has been referred to by Stein, Walker, Hazen, and Forde (1997) as “partial PTSD”. The DSM-IV-R (APA,

2000) sets strict guidelines regarding the number of symptoms that are necessary to be present in each of the three symptom groups in order for the PTSD threshold criteria to be met (1 Criterion B symptom, 3 Criterion C symptoms, and 2 Criterion D symptoms). Research findings from various authors has called into question the wisdom of such diagnostic guidelines and suggest that a significantly greater percentage of individuals who have experienced traumatic life events experience psychological injury than is suggested by the epidemiological research which abides by the strict DSM-IV-R guidelines. A study by Norris (1992) highlighted the importance of the PTSD diagnostic classification system as results from this study indicated that rates of PTSD would have as much as tripled if only two rather than three symptoms from Criterion C were required. The implication being that, at the very least, an equal number of people within the general population are suffering from subsyndromal PTSD as there is suffering from "full-blown" PTSD (Norris & Slone, 2007).

Stein et al.'s (1997) definition of partial PTSD requires the presence of one symptom from each of the three symptoms groups to be present, and using this diagnostic criterion it was reported that those experiencing partial PTSD exhibited substantial dysregulation and dysfunctioning in normal daily activities, as compared to those without PTSD. These results indicate that although official statistics suggest a lifetime prevalence rate of PTSD to be between 8 and 12% (Norris & Slone, 2007), the true figure of those suffering from posttraumatic stress in the form of full PTSD, subsyndromal PTSD, and partial PTSD is considerably higher.

1.1.9 The Structure of PTSD: Two-Factor Model

Since the publication of the DSM-IV (APA, 1994) the symptom groupings of reexperiencing, avoidance and emotional numbing, and hyperarousal has been seriously challenged by a large body of factor analytic research which has consistently failed to find support for this three-factor solution. The findings from this research have generally supported alternative multifactor solutions. These solutions have ranged from two to four factors, with two distinct four-factor models emerging as the most likely solution.

Horowitz (1979, 1986) first proposed a two-factor cognitive processing model of PTSD. In this model intrusive symptoms are related to the symptoms of emotional numbing and avoidance, as avoidance and emotional numbing processes are hypothesised to operate as dual processes with the goal of minimizing the total amount of exposure to reminders of the traumatic event. Horowitz, Wilner, and Alvarez (1979) developed a measure called the Impact of Events Scale (IES) to identify the symptoms of intrusion and avoidance which were hypothesised to occur subsequent to a traumatic incident.

From the time of its development, the IES has been used extensively to identify the presence of PTSD among numerous trauma populations who have experienced various traumatic events including man-made or natural catastrophes (Curie & Williams, 1996; Hodgkinson & Stewart, 1991; McFarlane. 1989), being involved in a life threatening situation (Cella, Mahon, & Donovan, 1990), threats to one's own psychological well-being (Amick-McMullan, Kilpatrick, Veronen, & Smith, 1989) as well as to the safety of others (Fullerton & Ursano, 1997).

The IES has been subjected to exploratory factor analysis (EFA) (Thatcher & Krikorian, 2005) and confirmatory factor analysis (CFA) (Shevlin, Hunt, & Robbins, 2000), both of which have provided support for the two-factor foundation upon which the measure is constructed. Weiss and Marmar (1997) developed a revised version of the IES, which was in line with the DSM-IV (APA, 1994) three-factor model of PTSD, however a CFA study carried out by Creamer, Bell, and Failia (2003) failed to support the three-factor model. An EFA was then carried out which suggested that a two-factor solution of intrusions and avoidance, consistent with Horowitz et al.'s (1979) original model, was a better fit of the data. The IES has not experienced total support however. Andrews, Shevlin, Troop, and Joseph (2004) carried out a comprehensive CFA of the IES and reported that a four-factor model (intrusion, avoidance, numbing, and sleep disturbance) with a second-order factor (general distress) was the best bit fit of the data. More recently King, Orazem, King, Lauterbach, Hebenstreit, and Shalev (2009) found that an alternative four-factor model (intrusion, avoidance-numbing, hyperarousal, and sleep) provided the best fitting model of data collected from a sample of 235 Israeli emergency room patients and 306 U.S. undergraduate students for the IES-R.

The two-factor model of PTSD as outlined originally by Horowitz (1979, 1986) and Horowitz et al. (1979) was developed prior to the official formulation of PTSD in the DSM-III (APA, 1980) which also included an additional factor of arousal. However, even since the introduction of the DSM three-factor model of PTSD, two-factor models of PTSD have received support on both theoretical and empirical grounds. In their description of PTSD, Foa, Zinbarg, and Rothbaum (1992) suggest that avoidance and numbing are distinct processes and are related to intrusions and arousal, respectively. Specifically, avoidance is said to be an effortful process carried out to avoid reexperiencing the traumatic event through intrusions, for example, while numbing is more of an automatic process that occurs as a result of uncontrollable arousal. These two processes produce two sets of symptoms and suggest that PTSD is most parsimoniously conceptualised as a two-factor model of intrusion/avoidance and numbing/hyperarousal.

Taylor, Kuch, Koch, Crockett, and Passay (1998), performed an EFA on two sets of data; the first was a sample of 103 motor vehicle accident victims, and the second was a sample of 419 United Nations (U.N.) Peacekeeper soldiers deployed in Bosnia. In both samples a two-factor solution consistent with the Intrusion/Avoidance and Numbing/Hyperarousal model was found. The results of this study were then replicated by Buckley, Blanchard, and Hickling (1998) in a sample of 217 motor vehicle accident victims using CFA.

Further support for this hierarchical two-factor model was found by Asmundson, Wright, McCreary, and Pedlar (2003) in two related studies involving 400 male U.N. peacekeepers. The first study employed CFA procedures to compare the hierarchical two-factor model suggested by Taylor et al. (1998) and Buckley et al. (1998), against a correlated four-factor model proposed by King, Leskin, King, and Weathers (1998), which has received significant empirical support. The results of the study showed that both models provided a good fit of the data. The second study attempted to determine the superior reliability of the competing models through the assessment of 427 U.N. peacekeepers suffering from chronic back pain, and 341 U.N. peacekeepers not suffering from chronic back pain. Results from the group comparisons of the confirmatory factor analyses showed that again, both the

hierarchical two-factor model and the inter-correlated four-factor model provided a good fit for the data in both the pain and non-pain groups.

Page, Kleiman, Asmundson, and Katz (2009) performed a similar study comparing individuals suffering from chronic pain (N=175) with pain-free (N=272) individuals. Results from the exploratory factor analysis supported the two-factor (intrusion/avoidance and numbing/hyperarousal) solution of PTSD within the pain-free group, however within the chronic pain group, a single factor solution was found to be the best fit of the data.

1.1.10 Three-Factor Model of PTSD

Evidence for the intercorrelated three-factor model of PTSD as outlined in the DSM-IV-R (APA, 2000) is sparse. Calbari and Anagnostopoulos (2010) carried out an EFA of the Greek version of the PTSD Checklist-Civilian Version (PCL-C; Weathers, Litz, Herman, Juska, & Keane, 1993) using a sample of 312 adults. Results suggested a three-factor solution consisting of reexperiencing, avoidance/numbing, and hyperarousal consistent with the DSM-IV-R model of PTSD.

In a study conducted by Cox, Mota, Clara, and Asmundson (2008), the DSM-IV-TR three-factor model of PTSD was compared to King et al.'s (1998) four-factor model and a second four-factor model of PTSD suggested by McWilliams, Cox, and Asmundson (2005), comprised of dysphoria, cued reexperiencing and avoidance, uncued reexperiencing and arousal, and trauma-related rumination. Cox et al. (2008) used CFA to compare the three PTSD models from a sample 588 individuals diagnosed with lifetime PTSD who were part of a National Comorbidity Replication Survey. The results of this study provided support for the DSM-IV-TR (APA, 2000) three-factor model as it was found to fit the data very well. Although the DSM-IV-TR model fit the data well, the King et al. (1998) four-factor model was found to be a significantly better fitting model.

Cordova, Studts, Hann, Jacobsen, and Andrykowski (2000) carried out a CFA on the three-factor DSM-IV-TR (APA, 2000) model of PTSD within a sample of 142 women suffering from breast cancer. Their results revealed that DSM-IV-TR model fit the data moderately well. This support for the three-factor model of PTSD is limited in

two major ways. Firstly, in their attempt to test the adequacy of the DSM-IV-TR model, Cordova et al. (2000) compared the fit of the three-factor model to an alternative model represented by a single PTSD factor. The literature with respect to the symptom structure of PTSD has provided essentially no empirical support for a single factor solution to PTSD therefore Cordova et al.'s (2000) finding only served to further demonstrate that the symptom structure of PTSD is better represented by a multifactor solution than a single-factor solution. It does not suggest that the most optimal multifactor solution is the three-factor model as described by the DSM-IV-TR. A more stringent test would have been to compare the three-factor model against alternative multifactor solutions to determine whether the three-factor model was the most parsimonious description of the latent structure of PTSD. Kassam-Adams, Marsac, and Cirilli (2010) also found that the DSM-IV-TR three-factor model of PTSD provided a reasonable fit for the data obtained in two samples of children and adolescents suffering from PTSD, however two alternative four-factor models proved to be a considerably better fit of the data; with one of the four-factor models separating avoidance and emotional numbing into distinct symptom clusters thus replicating the finding of Cox et al. (2008).

The second way in which support for the three-factor model as obtained by Cordova et al. (2000) is limited is due to the fact that the researchers were required to carry out a post-hoc modification of a correlated error between the two effortful avoidance symptoms in order for the model to provide an adequate fit of the data. This suggests that a four-factor model separating effortful avoidance and emotional numbing would likely have proven a better fit of the data then the three-factor model; congruent with the findings of Kassam-Adams et al. (2010), and Cox et al. (2008).

1.1.11 Four-Factor Model of PTSD

A model of PTSD which has received substantial empirical support is a four-factor model in which the DSM-IV-TR (APA, 2000) factor of avoidance and emotional numbing is split into two distinct symptom groups with avoidance, and emotional numbing, respectively, representing two distinct latent factors.

King et al. (1998) first found good empirical support for this model of PTSD by applying four alternative models of PTSD to confirmatory factor analysis. The first

model was the intercorrelated four-factor model in which re-experiencing, avoidance, emotional numbing, and hyperarousal constituted the four factors best representing the symptom structure of PTSD. The second model contained the same four factors but was representative of the two-factor, higher order model which was supported by Taylor et al. (1998) and Buckley et al. (1998). The third model included the four factors as specified in the first model, subsumed under a global higher order factor of PTSD. The fourth model proposed a single-factor, first order solution in which the seventeen symptoms of PTSD load onto a single PTSD factor.

King et al. (1998) tested these competing models using the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1990) among a sample of 524 male military veterans. The model found to best fit the obtained data was the first model of four correlated, but distinct factors of reexperiencing, avoidance, emotional numbing, and hyperarousal. Additionally, King et al. (1998) demonstrated that although the four factors were correlated, the lowest correlation existed between the avoidance factor and the emotional numbing factor which increases support for the distinction between these symptom groups.

Since the King et al. (1998) study, consistent support for this model of PTSD has been obtained. Morina, Bohme, Morina, and Asmundson (2010) carried out research on data obtained from 550 young Kosovan college students who had experienced and survived war related traumatic events as teenagers using the Posttraumatic Stress Diagnostic Scale (PDS; Foa, Cashman, Jaycox, & Perry, 1997). This study compared four different models of PTSD including the DSM-IV-TR model (APA, 2000), the King et al. (1998) model, and two other alternative four-factor models which have received empirical support. The results of this analysis supported the four-factor model advanced by King et al. (1998) as the most parsimonious solution.

Hoyt and Yeater (2010) tested eight models of PTSD between two ethnic groups comprised of 226 Hispanic students, and 278 white students, respectively. Data was obtained using the PCL–C (Weathers et al., 1993). Of the eight models, three distinct four-factor models including the model advanced by King et al. (1998) were found to provide a good fit of the data. The researchers then examined the three fitting

models for equivalence using multiple group CFA procedures. Hoyt and Yeater (2010) concluded that;

"These results suggest that the L. King and colleagues (1998) model may show the greatest invariance between ethnic groups, and may be the most applicable when measuring PTSD symptoms in both Hispanic and White groups." (p. 26).

McDonald, Beckham, Morey, Marx, Tupler, and Calhoun (2008) tested 6 competing models of PTSD across three samples of war veterans using the Davidson Trauma Scale (DTS; Davidson et al., 1997). The first sample was comprised of 814 Vietnam-era war veterans, 320 post-Vietnam-era war veterans, and 313 Operation Iraqi Freedom war veterans. Across the three samples the intercorrelated four-factors of reexperiencing, avoidance, emotional numbing, and hyperarousal was found to best describe the symptom structure of PTSD.

Cuevas et al. (2006), conducted a confirmatory factor analysis of three competing models of PTSD; a four-factor, second order model consistent with Buckley et al.'s (1998) model; the three-factor model of PTSD as described by the DSM-IV-R; and a first order, four-factor model consistent with the model supported by King et al. (1998). The data was obtained using the PCL-C (Weathers et al., 1993) from a sample of 224 adult participants diagnosed with HIV. The results of the confirmatory factor analysis revealed that both of four-factor models with or without a second order factor provided an excellent fit of the data with nearly identical fit indices. However the DSM-IV-TR three-factor solution was a poor fitting model.

Further support for King et al.'s (1998) model using an alternative model testing methodology has been found within diverse trauma groups including medical patients (Naifeh, Elhai, Kashdan, & Grubaugh, 2008), abused females (Scher, McCreary, Asmundson, & Resick, 2008; Palmieri & Fitzgerald, 2005), undergraduates (Elhai, Gray, Docherty, Kashdan, & Kose, 2007), elderly hurricane survivors (Schinka, Brown, Borenstein, & Mortimer, 2007), emergency personnel (Andrews, Joseph, Shevlin, & Troop, 2006), adult victims of community violence (Marshall, 2004), cancer patients (DuHamel et al., 2004), U.N. peacekeepers (Asmundson, Wright, McCreary, & Pedlar, 2003) and primary day care patients (Asmundson, Frombach, McQuaid, Pedrelli, Lenox, & Stein, 2000).

1.1.12 Alternative Four-Factor Model of PTSD

The four-factor model of PTSD advanced by King et al. (1998) remains very close to the DSM-IV-TR (APA, 2000) conceptualization, however an alternative four-factor model which deviates considerably from the DSM-IV-TR conceptualization has gathered substantial empirical support. In this model, put forth by Simms, Watson, and Doebbeling (2002), the symptoms of PTSD are proposed to be best explained in terms of four factors: reexperiencing, avoidance, dysphoria, and hyperarousal. The dysphoria factor includes eight symptoms (C3-D3) which theoretically are said to be non-specific symptoms of PTSD and are instead representative of general psychological distress. Of the nine remaining symptoms which are said to be specific to PTSD, five symptoms (B1-B5) remain indicative of the reexperiencing factor, two symptoms (C1 and C2) represent the avoidance factor, and two symptoms (D4 and D5) represent the hyperarousal factor. Simms et al. (2002) found support for this model by testing it against five other models of PTSD. Their sample consisted of 1,896 deployed Gulf War Veterans and a non-deployed control group of 1,799. The researchers used the PTSD Checklist–Military Version (PLC-M; Weathers et al., 1993) to measure levels of PTSD. The results of their analysis revealed that the four-factor dysphoria model provided the best fit for the data.

Since this initial support from Simms et al. (2002) the model has received significant support from different researchers. Elklit and Shevlin (2007) conducted a comprehensive CFA study of six competing models of PTSD from a large sample of 1,116 whiplash victims who were screened using the Harvard Trauma Questionnaire (HTQ: Mollica, Caspi-Yavin, Bollini, Truong, Tor, & Lavelle, 1992). Their analysis demonstrated that the Simms et al. (2002) model was a good fit of the data and superior to all other models, although the King et al. (1998) four-factor model did provide an acceptable fit for the data. Of particular interest in Elklit and Shevlin's (2007) study was their finding that although all four factors were significantly correlated, reexperiencing, avoidance, and arousal all correlated more strongly with each other than they did with dysphoria. The theoretical basis of the Simms et al. (2002) model is that symptoms comprising the dysphoria factor are non-specific to PTSD and Elklit and Shevlin's (2007) finding offer support for this hypothesis.

Recently a number of studies have provided additional empirical support for the dysphoria model of PTSD proposed by Simms and colleagues (2002). For example, Carragher, Mills, Slade, Teesson, and Silove (2010) performed a CFA on seven alternative models of PTSD using a sample of 2,677 members of the Australian population who met the diagnostic criteria for PTSD. The model that was found to best fit the data was the Simms et al. (2002) model of PTSD.

Armour and Shevlin (2010) compared the fit of the DSM-IV-TR (APA, 2000) model of PTSD, the King et al. (1998) model, and the Simms et al. (2002) model within a substantial sample of 591 individuals diagnosed with lifetime PTSD. Diagnosis was established via the use of the Composite International Diagnostic Interview (World Health Organisation, 1990). Results demonstrated that both the King et al. (1998) and Simms et al. (2002) models of PTSD represented good fitting models, however the DSM-IV-TR model was rejected as providing an unacceptable model fit. While King et al.'s (1998) model of PTSD was found to provide acceptable model fit the researchers demonstrated the superiority of the model advanced by Simms and colleagues. Furthermore, as with the findings of Elklit and Shevlin (2007), the Reexperiencing, Avoidance, and Arousal factors were all found to correlate most weakly with the Dysphoria factor. Additionally, none of the ten trauma experiences examined in this study shared any statistically significant association with the Dysphoria factor. These findings provide additional evidence for the nonspecific nature of the dysphoria symptoms of PTSD and thus support the theoretical basis of the model.

Elklit, Armour, and Shevlin (2010) used a combined multi-sample approach to test six competing models of PTSD. The first sample consisted of 633 parents who had suffered the death of an infant, sample two included 227 rape victims, and the third sample was comprised of 113 refugees residing in Denmark. This accounted for a total sample size of 973. Results from the CFA analysis again demonstrated that the models advanced by Simms et al. (2002) and King et al. (1998) provided acceptable model fit, however the four-factor model comprised of Reexperiencing, Avoidance, Dysphoria, and Arousal (Simms et al. 2002) provided the best fitting model. Unlike findings from previous studies already outlined (Elklit & Shevlin, 2007; Armour & Shevlin, 2010), Elklit et al. (2010) found a high correlation between the Dysphoria factor and the

Reexperiencing factor (r = .73), as well as with the other factors of Avoidance (r = .61) and Arousal (r = .43) suggesting a greater level of conceptual overlap between Dysphoria and the other factors of PTSD than would be expected based on theoretical predictions and previous empirical findings. These findings stand in contradiction to the hypothesis that the Dysphoria symptoms represent the non-specific components of PTSD. However, the researchers sought to test the robustness of the Dysphoria factor by controlling for levels of depression. It was hypothesised based on the theoretical formulation of the Simms et al. (2002) model that the symptoms comprising the Dysphoria factor should exhibit the greatest degree of attenuation when levels of depression were controlled for. In line with their initial hypothesis, this is exactly what Elklit et al. (2010) discovered. Interestingly, five additional symptoms (three from the Reexperiencing cluster, and one from both the Avoidance and Arousal clusters) showed magnitudes of attenuation suggesting that these symptoms in addition to those of the Dysphoria factor may well be non-specific to PTSD as a clinical disorder. However Elklit and colleagues stress that because these other symptoms share little in common with normally identified symptoms of depression they "*still retain a degree of conceptual, if not statistical, distinctiveness*" (p. 152). The correlations between all factors were reduced once depression was controlled for, and the associations between Arousal and Avoidance, and Arousal and Dysphoria became non-significant as a result. Elklit et al. (2010) point out that this indicates that another latent variable may be present which is influencing the indicators of PTSD. Consistent with the findings of Andrews et al. (2004) this latent variable may be best conceptualized as general psychological distress.

Additional support for the Dysphoria model of PTSD (Simms et al., 2002) has been found in numerous studies, for example, Baschnagel, O'Connor, Colder, and Hawk (2005) used the PDS (Foa et al., 1997) within a sample of undergraduate students subsequent to the attacks on the World Trade Centre in New York City; Krause, Kaltman, Goodman, and Dutton (2007) provided support for the model among survivors of intimate partner violence; Palmieri, Marshall, and Schell (2007) within a sample of Cambodian refugees; Ullman and Long (2008) among sex assault victims; Boelen, van den Hout, and van den Bout (2008) with bereaved individuals; Hetzel-Riggin (2009) among physically and/or sexually abused women; Olff, Sijbrandij,

Opmeer, Carlier, and Gersons (2009) within the general population; and Engdahl, Richardson, Elhai, and Freuh (2011) among war zone deployed military veterans.

Despite the wealth of support that this model of PTSD has received from numerous well-conducted CFA studies, the model has been challenged on theoretical grounds. Marshall, Schell, and Miles (2010) carried out a longitudinal study measuring levels of PTSD and general psychological distress at two time periods within two distinct samples; survivors of community violence and wildfire evacuees. The sample sizes were 294 and 234, respectively. The model advanced by Simms et al. (2002) states that eight symptoms of PTSD are non-specific and in fact measure general psychological distress, therefore the diagnostic criteria for PTSD could be substantially refined by excluding such symptoms. However, in contrast to what the Simms et al. (2002) model predicts, all seventeen symptoms of PTSD, at both time periods, were found to be significantly related with measures of general psychological distress. More importantly the Dysphoria symptoms themselves were not found to be any more strongly correlated to general psychological distress then the other nine symptoms.

1.1.13 New Directions

The previously outlined findings strongly suggests that the three factor model of PTSD as outlined in the DSM-IV-TR (APA, 2000) is inaccurate, with the overwhelming majority of empirical evidence supporting two distinct four-factor models of PTSD; an Emotional Numbing model presented by King and colleagues (1998) and a Dysphoria model presented by Simms and colleagues (2002). Findings from Yufik and Simms (2010) meta-analysis of the factor structure of PTSD, which included 14,827 participants drawn from forty independent studies, validates this picture. They found strong support for both the Emotional Numbing and the Dysphoria models, with the latter experiencing slightly greater support. This area of research has however become rather stagnant recently with a production line of studies being conducted, the majority of which carried out with the aim of determining which of the two four-factor models is a better description of the underlying symptom structure of PTSD, with findings repeatedly confirming the same picture; namely that a four-factor solution is a more parsimonious account of the latent structure of PTSD than any alternative single or

multifactor solution, and both four-factor models consistently yield good-to-excellent 'fit' statistics for the observed data.

More recent empirical findings (Shevlin & Elkit, 2012) are calling into question the wisdom of the current research practice of attempting to ascertain a single correct model of PTSD as this practice is predicated on the assumption that there is a single population group for whom a single symptom profile will be accurate regardless of any extraneous variables such as age, gender, trauma type, frequency of trauma exposure etc. This work is instead indicating that multiple types of PTSD may in fact exist, and a more advantageous approach toward gaining a greater understanding of the true nature of PTSD could be achieved through the identification of the various sub-types of PTSD that might exist and the different variables that can predict membership to these PTSD groups.

Shevlin, Armour, Murphy, Houston and Adamson (2011) investigated their hypothesis that there existed a psychotic subtype of PTSD among a sample of 591 participants with a lifetime diagnosis of PTSD. These participants were recruited as part of the U.K.'s National Comorbidity Survey. Shevlin et al. applied latent class analysis and their results identified four latent classes. One of these identified classes had a high probability of endorsing both PTSD and psychosis symptom indicators. These results are extremely important and have significant implications as they suggest a psychotic subtype of PTSD and indicate that many individuals who experience traumatic life events and meet the diagnostic criteria for PTSD also experience substantial psychotic symptoms which are not considered as relevant by the DSM's current guidelines regarding a diagnosis of PTSD.

Shevlin and Elklit (2012) then attempted to resolve the problem of why the two distinct four-factor models proposed by King et al. (1998) and Simms et al. (2002), respectively, consistently received dual empirical support. They hypothesised that the Emotional Numbing and Dysphoria models are representative of two distinct population groups. They tested their prediction using a confirmatory factor mixture model which tested their two-class model against the Dysphoria model, the Emotional Numbing model, and a model that allowed for cross factor loadings and thus incorporated both the Dysphoria and Emotional Numbing factors in a single, coherent

model (see Shevlin, McBride, Armour, & Adamson, 2009). Their results demonstrated that the two-class model was a good fit of the data and superior to the other three models tested. The results supported the hypothesis that the Emotional Numbing model and the Dysphoria model represent two discrete populations, a finding which suggests strongly that PTSD should no longer be conceptualized as a single diagnostic entity for which a single symptom profile remains constant for all individuals. These findings suggest the presence of two similar but discrete types of PTSD; one in which symptoms are better explained in terms reexperiencing, avoidance, emotional numbing, and hyperarousal symptoms, and another in which symptoms are better explained in terms of reexperiencing, avoidance, dysphoria, and hyperarousal symptoms.

Shevlin and Elklit (2012) also examined whether certain variables such as age, gender, or type of trauma could predict group membership. They found that membership of the Emotional Numbing group was associated with being young, male, and having experienced a rape, loss of a child, or being a refugee, as compared to being a whiplash victim. It could be inferred on the basis of these findings that experiencing a more severe trauma such as a rape, as compared to experiencing whiplash, could lead to a more crystallized constellation of symptoms as indicated by the Emotional Numbing model, whereas experience of less severe traumas tends to generate a symptom profile more indicative of general psychological distress (the Dysphoria model). Although logically derived from empirical findings this inference remains untested and requires empirical investigation. However, these results do imply that the factors which can predict group membership are likely complex and many, and probably include numerous psychological, social, and biological factors.

Chapter 2

Investigating the Factor Structure of the Attitudes and Belief Scale-2 and the Development and Validation of an Abbreviated Version

A paper based on this chapter has been published in **Cognitive Behaviour Therapy**.

Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2014). Modelling the factor structure of the Attitudes and Belief Scale 2: Toward the development of an abbreviated version. *Cognitive Behaviour Therapy, 43,* 60-71. doi:10.1080/16506073.2013.777467

Abstract

The Attitudes and Belief Scale 2 (ABS-2: DiGiuseppe, Leaf, Exner, & Robin, 1988) is a 72 item self-report measure of rational and irrational beliefs widely used in Rational Emotive Behaviour Therapy research contexts. An absence of psychometric evidence exists regarding the measure's construct validity. Furthermore, given the length of the ABS-2 there is a need for an abbreviated version that can be administered when there are time demands on the researcher, such as in clinical settings. This study sought to examine a series of theoretical models hypothesised to represent the latent structure of the ABS-2 within an alternative models framework using traditional confirmatory factor analysis as well as utilizing a bifactor modelling approach. This chapter also sought to develop a psychometrically sound abbreviated version of the ABS-2. Three hundred and thirteen (N = 313) active emergency service personnel completed the ABS-2. Results indicated that for each model the application of bifactor modelling procedures improved model fit statistics however the observed fit indices failed to satisfy commonly accepted standards. A 24-item abbreviated version was thus constructed and a novel intercorrelated eight-factor solution yielded satisfactory model fit statistics. Current results support the use of bifactor modelling procedures, but ultimately undermine the construct validity of the ABS-2. Contrastingly, results provide empirical support for the psychometric properties of the newly developed abbreviated version.

2.1 Introduction

The Attitudes and Belief Scale 2 (ABS-2: DiGiuseppe, Leaf, Exner, & Robin, 1988) is a self-report measure of evaluative beliefs that is frequently employed in research endeavours within the field of Cognitive Behavioural Therapy (CBT) generally, and Rational Emotive Behaviour Therapy (REBT), specifically. The measure was developed to accurately and comprehensively assess the fundamental cognitive processes hypothesised by REBT theory to be central in the development of psychological disturbance. As such, the ability to accurately measure these evaluative cognitions is a necessary condition for any reliable test of REBT theory to be undertaken. Without a valid and reliable means of assessing these beliefs validation or disconfirmation of the theory is impossible. Despite the breadth of application of this measure in the REBT research domain, little evidence exists regarding the underlying factor structure of the ABS-2. A primary aim of this chapter therefore is to empirically investigate the underlying factor structure of the ABS-2 through the use of an alternative models testing framework using confirmatory factor analysis. Additionally, the ABS-2 is long and unwieldy measure comprised of seventy-two items meaning that it is problematic to use within many research and clinical contexts. The development and validation of a psychometrically sound abbreviated version of the ABS-2 is a second aim of this chapter.

2.1.1 The Basics of REBT Theory

The fundamental theoretical principle of REBT is that cognition mediates the impact of internal or external activating events on the development of cognitive, affective, and behavioural responses (Ellis, 1958, 1962, 1994). What differentiates REBT from other schools within the field of CBT is the nature of the cognitive variables which are theorised to be the most proximate antecedents of psychological distress or disturbance; namely evaluative or appraisal cognitions (Ellis, 1994; Hyland & Boduszek, 2012; Walen, DiGiuseppe, & Dryden, 1992). According to REBT theory, these appraisal/evaluative beliefs can be held in either a rational (flexible and non-extreme) or an irrational (rigid and extreme) manner. REBT theory states that rational beliefs regarding negative activating events will produce functional and adaptive cognitive, affective, behavioural, and physiological responses, while irrational beliefs about

negative activating events will give rise to dysfunctional and maladaptive cognitive, affective, behavioural, and physiological responses (David & Szentagotai, 2006). The practice of REBT is predicated upon the principle that individuals who experience psychological disturbances can dispute their irrational beliefs and formulate new and alternative rational beliefs which will modulate their cognitive, affective, behavioural, and physiological experiences to more functional and adaptive ones.

In Ellis's (1962) original conceptualization of REBT theory, he proposed eleven key irrational beliefs which were proposed to be central in the development of various forms of neurotic disturbance. The theory later underwent significant revision (Walen et al., 1992; Ellis, 1994; David, 2003; David, Szentagotai, Kallay, & Macavei, 2005) and REBT theory now describes four main irrational evaluative belief *processes;* (i) Demandingness, (ii) Catastrophizing/Awfulizing, (iii) Low Frustration Tolerance, and (iv) Depreciations, along with their rational counterparts; (i) Preferences, (ii) Non-Catastrophizing/Non-Awfulizing, (iii) High Frustration Tolerance, and (iv) Acceptance.

2.1.2 The Historical Assessment of Irrational Beliefs

Early assessment tools used to measure irrational beliefs were developed according to Ellis's (1962) original theory of eleven key irrational beliefs. These instruments, although widely used up until the beginning of the 1990's, were plagued with theoretical and methodological problems (see Macavei & McMahon, 2010 for a full discussion) and received significant criticism from the scientific community (Smith, 1982). The most commonly used of these measures were the Irrational Beliefs Test (IBT; Jones, 1968) and the Rational Behavior Inventory (RBI; Shorkey & Whiteman, 1977) however Sutton-Simon (1981) identified more than fifteen different measures of irrational beliefs used in psychological research. Each of these measures was outdated from a theoretical perspective for two reasons. First, these measures were based on Ellis's original theory of REBT, and second, these measures exclusively targeted the measurement of irrational beliefs and made no attempt to measure rational beliefs.

Methodologically the measures were equally flawed. They failed to discriminate between the content and process of cognition, and included items which mixed cognitive, affective, and behavioural components thus leading to extremely poor

discriminant validity (Smith, 1982; Zurawski & Smith, 1987). This state of affairs meant that a new generation of irrational belief measures were needed that were both congruent with the current theory of REBT and methodologically sound. One of these new generation assessment tools was the General Attitude and Belief Scale (GABS; Burgess, 1986). The GABS is a ninety-six item measure of irrational beliefs which showed good discriminant validity (DiGiuseppe & Leaf, 1990; Shaw, 1989) however it did not include a distinction between the content and process of thought. DiGiuseppe et al. (1988) developed the ABS-2 from the GABS by reducing the measure to seventy-two items and attempted to separate the process of thought from the content of thought. The ABS-2 has become the most dominant second generation measure of rational and irrational beliefs.

2.1.3 The ABS-2

The ABS-2 (DiGiuseppe et al., 1988) contains seventy-two items measuring both rational and irrational belief processes identified by current REBT theory (David et al., 2005; Dryden & David, 2008). The items contained within the ABS-2 were constructed around a 4x3x2 theoretical matrix measuring (i) *cognitive processes,* (ii) *cognitive content,* and (iii) *cognitive modality.*

The first component of the ABS-2 (cognitive processes) measure the four key irrational appraisal beliefs outlined by REBT theory: Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciations. The second component relates to areas of content or contextual relevance: Comfort, Achievement, and Affiliation. The third component of the measure relates to the wording modality of each item and as such contains two discrete levels reflecting rationality and irrationality.

As described by DiGiuseppe, Robin, Leaf, and Gormon (1989), the scale allows for the derivation of 24 individual subscales containing a single item from each of the above outlined components (e.g., a cell reflecting a Demandingness/Achievement/Irrational type belief). However, the utility of the ABS-2 for both the researcher and the clinician stems from the proposed ability to derive scores for each of the rational (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance) or irrational (Demandingness, Low Frustration Tolerance,

Depreciation, and Catastrophizing) belief processes; as well as scores for both Irrationality and Rationality. However, the absence of psychometric data regarding the factor structure of the scale means that appropriate scoring is problematic.

The ABS-2 (DiGiuseppe et al., 1988) is claimed to overcome some of the theoretical and methodological drawbacks of previous irrational belief measures in that it allows for the measurement of both irrational and rational beliefs and the individual items are not polluted by affective phrasing (Macavei & McMahon, 2010; Fulop, 2007). Furthermore, the ABS-2 has been demonstrated to possess good internal consistency, with reliability levels ranging from 0.85 to 0.91 for the respective subscales, and 0.96 for the global measure (DiGiuseppe et al. 1989). Similar internal consistency results have been reported for the Romanian translation of the ABS-2 with levels ranging from 0.76 to 0.91 for the different subscales, and 0.92 for the measure as a whole (Fulop, 2007). The ABS-2 has also been demonstrated to possess excellent discriminant validity (Macavei, 2002). Despite these advancements, methodological flaws still exist. The most prescient of which relates to the failure of the ABS-2 to adequately discriminate between the process of belief (Demands, Low Frustration Tolerance etc.) and the context in which these beliefs are presented (Comfort, Achievement, and Approval).

2.1.4 Previous Tests of the Factor Structure of the ABS-2

The ABS-2 (DiGiuseppe et al., 1988) was developed upon a sound theoretical framework however there is a paucity of research investigating its underlying factor structure. DiGiuseppe et al. (1989) first attempted to identify the factor structure of the ABS-2 through the use of exploratory factor analysis (EFA) among a total sample of 1,135 participants which included participants drawn from clinical and non-clinical populations. The EFA results indicated that a twenty-four factor solution accounted for 66.5% of variance. Further analysis indicated that the twenty-four factors could be explained in terms of four higher-order factors termed ‘General rationality/irrationality’, ‘Rationality’, ‘Comfort’, and ‘Irrationality’. However, Fulop (2007) argued that the items comprising the General rationality/irrationality factor reflected the Depreciation beliefs and as such this factor could be better understood if termed ‘Depreciation’.

Bernard (1998) expanded the ABS-2 (DiGiuseppe et al., 1988) by introducing an additional twenty-four items in order to measure beliefs within the context of fairness. Like DiGiuseppe et al. (1989), Bernard (1998) sought to investigate the scale's factor structure through the use of EFA procedures. Bernard (1998) used a strict item-factor loading criteria of 0.40 for item retention and consequently retained fifty-five items for analysis. The EFA that was performed on the fifty-five item scale revealed seven factors, which Bernard (1998) termed; 'Rationality', 'Self-Downing' (equivalent to 'Self-Depreciation' beliefs), 'Need for Achievement', 'Need for Approval', 'Need for Comfort', 'Demands for Fairness', and 'Other-Downing' (equivalent to 'Other-Depreciation' beliefs).

The results of these studies are inconsistent in terms of identifying the correct number of latent variables that are needed to explain ABS-2 (DiGiuseppe et al., 1988) scores. This poses significant problems in terms of formulating an appropriate scoring scheme for the questionnaire. The inconsistency of the factor analytic findings may be largely attributable to the use of EFA. EFA is a method that allows for the reduction of a large body of data, however it does not allow for the testing or falsification of a particular model given that there are no objective statistical criteria to determine the solution with the optimal number of factors.

Only one study employing confirmatory factor analysis (CFA) could be identified within the psychological literature. Fulop (2007) carried out this analysis on the Romanian translation of the ABS-2 (Macavei, 2002) among a sample of three hundred Romanian undergraduate students. This analysis compared five potential models derived from theory and past research findings. Model 1 was a one-factor model in which all seventy-two items loaded onto a single latent variable of Global Irrationality. Model 2 specified a four-factor solution representing the four major irrational beliefs (Demandingness, Low Frustration Tolerance, Depreciation, and Catastrophizing). Model 3 reflected the domains of content and as such three latent variables were specified (Comfort, Achievement, and Affiliation). Model 4 related to the domain of wording modality for the evaluative processes and two latent factors were specified (Rationality and Irrationality). Model 5 represented the model discovered by DiGiuseppe and co-workers (1989). In this model the seventy-two items loaded onto

twenty-four first-order factors (reflecting the distinct three-item subscale cells), which were then specified to load onto four second-order latent variables (General Factor, Rationality, Comfort, Irrationality).

The results indicated that both the two-factor model of Rationality and Irrationality and the higher-order model proposed by DiGiuseppe et al. (1989) generated adequate model fit. Fulop (2007) concluded on the basis of these results that the DiGiuseppe et al. model was the better fitting model of the two. This conclusion could be questioned on the basis of a number of theoretical, statistical, and methodological issues. Firstly, although both models yielded adequate fit statistics Fulop (2007) did not report any information criterion indices which can be used in order to compare alternative models. Normally Akaike Information Criterion (AIC; Akaike, 1974) values and chi-square difference test values are reported which provide an empirical method of determining which of a series of alternative models is the best fit of the data. Secondly, it is the case when using CFA that as parameters are added to any model, model fit statistics will show an improvement. This is a consequence of more of the data being used up to estimate model parameters and thus less available data for use in testing the accuracy of the model. Models with a very large number of parameters, such as the DiGiuseppe et al. model, will tend to yield good fit statistics however the fact is that such a model is only indicated to be correct in as far as it cannot be shown to be wrong. The DiGiuseppe et al. (1989) model was the least parsimonious and given that such complex models tend to fit sample data better than simpler ones, statistical assessment of fit should consider and correct for differences in the relative complexity of alternative models, something that did not occur in Fulop's (2007) study. Finally, in addition to the methodological and statistical constraints associated with the model of DiGiuseppe and colleagues, the solution itself fails to make sense on purely theoretical grounds as it is in not congruent with the current theoretical formulation of REBT (David, Lynn, & Ellis, 2010).

2.1.5 Current Research

Given the widespread use of the ABS-2 (DiGiuseppe et al., 1988) in REBT/CBT research, the absence of a methodologically rigorous investigation of the measure's underlying latent structure is troubling. It is therefore essential that the underlying

factorial structure be investigated in a methodological sound manner. The first aim of the current chapter will attempt to determine the construct validity of the ABS-2 by testing a series of theoretically plausible factor structure models within an alternative models framework. These models include some of those previously investigated (Fulop, 2007) along with other theoretically plausible, though as yet, untested models. The dimensionality of the ABS-2 will be investigated through the use of conventional CFA techniques, along with the utilization of a bifactor (or hierarchical) modelling approach (Reise, Morizot, & Hays, 2007; Yung, Thissen, & McLeod, 1999) in order to control for the limitation of the ABS-2 to discriminate between the process of thought and the context of thought.

Bifactor modelling provides an empirically and conceptually distinct alternative to traditional higher-order solutions. In traditional higher-order models, observable covariation between latent factors is assumed to be explained in terms of a super-ordinate latent construct. However, within a bifactor modelling approach, covariation among observable indicators is assumed to be explained by both "general factors" and "nuisance factors" which exist at the same conceptual level. In the present case, the general factors refer to the psychological belief factors assumed to explain the item covariation, while the nuisance factors refer to the three context factors (Comfort, Achievement, and Approval) which also are assumed to contribute to additional item covariation. Both categories of latent factors provide sources of item covariation, therefore inclusion of the nuisance factors within a hierarchical solution should allow for a more accurate determination of the optimal number of psychological factors necessary to explain the dimensionality of the ABS-2 (Reise et al., 2007). Furthermore, while traditional CFA models and bifactor models can produce identical model fit, bifactor models are advantageous in that they provide a useful method of investigating a measures dimensionality in situations such as the ABS-2 where indicators of psychological processes are contaminated by unwanted factors such as contextual presentation. This study will therefore provide the most comprehensive examination of the potential underlying factor structure of the ABS-2 so far carried out.

In addition to the methodological and statistical limitations of the ABS-2 (DiGiuseppe et al., 1988), a significant problem with the measure relates to it length.

Comprised of seventy-two items, the ABS-2 is an extremely long measure that requires a substantial period of time to fully complete thus making its use problematic in many research and clinical contexts. Consequently, a second aim of the current chapter is to develop a psychometrically sound abbreviated version of the ABS-2 that will be available for use in future research endeavours.

2.2 Methods Section

2.2.1 Participants

The sample for the current study consisted of three hundred and thirteen (N = 313) trauma-exposed individuals employed in a range of front-line emergency services. The sample comprised an international group of soldiers (n = 81, 25.9%), police officers (n = 183, 58.5%), and associated emergency service personnel (n = 49, 15.7%). All participants were recruited from active-duty while serving in the Republic of Ireland and the Republic of Kosovo over a twelve month period (June 2011 – June 2012). The mean number of exposures to traumatic life events for the current sample was 2.75 (SD = 1.51, range 1-11). The most frequently cited traumatic life experience was being involved in, or witness to, a serious accident, fire, or explosion (60%, n = 189); followed by a non-sexual assault by a stranger (57%, n = 178); and military combat (43%, n = 133). The most infrequently reported traumatic life events was torture (1.6%, n = 5).

The sample consisted of 212 males (67.7%) and 101 females (32.3%). The participants ranged in age from 23 to 65 (M = 38.18, SD = 8.70). The majority of the participants resided in suburban areas (44.4%; n = 139), and urban areas (37.1%, 116), and the remainder indicated that they reside in rural areas (18.5%, n = 58). The majority of the sample participants possessed at least a secondary/high school level diploma (55.9%, n = 175) while 108 held a bachelors degree (34.5%), 28 participants possessed a masters degree (8.9%), and 2 individuals reported possessing a doctoral degree (0.6%). The majority of respondents were currently married (n= 154, 49.2%), while 19.5% reported their marital status to be single (n = 61), 21.4% were cohabiting with a partner (n = 67), and 9.9% of respondents were divorced (n = 31).

2.2.2 Procedures

The current sample was gathered in an opportunistic fashion in the Republic of Ireland and the Republic of Kosovo. Ethical approval was first granted from the Ethics committee of the University of Ulster, subsequently written approval was obtained by the principal researcher to approach members of the respective institutions that took part in the current study. Participants were informed of the nature of the study being under

taken either by a member of the research team or an assigned liaison for a particular organisation, and each participant's involvement in the research project was voluntary. No obligations were placed upon potential respondents nor were any inducements employed to recruit the sample. Each participant was assured about confidentiality and those who chose to take part in the research project had the option of completing either an anonymous self-administered paper-and-pencil version of the questionnaire or an electronic version which was delivered and returned via email. The majority of respondents chose the paper-and-pencil option (63.26%, n = 198).

2.2.3 Measure

The Attitudes and Belief Scale-2 (ABS-2; DiGiuseppe et al., 1988): The ABS-2 is a seventy-two item self-report measure of rational and irrational beliefs, as defined by current REBT theory (Ellis, 1994). The ABS-2 includes three core components. The first is a measure of cognitive processes that accounts for each of the four irrational belief processes which include *Demandingness* (e.g. "I must do well at important things, and I will not accept it if I do not do well."); *Catastrophizing* (e.g. "It's awful to have hassles in one's life and it is a catastrophe to be hassled."); *Low Frustration Tolerance* (e.g. "I can't stand being disliked by certain people, and I can't bear the possibility of their disliking me."); and *Depreciations* ("If important people dislike me, it is because I am an unlikable bad person."). The ABS-2 also measures the four rational belief processes including *Preferences* ("I very much want to be liked by certain people, but I realize I don't have to be liked by them."); *Non-Catastrophizing* ("It is disappointing if I'm not doing well at tasks that are important to me, but I realize it is not awful or the worst thing in the world if I do not perform well."); *High Frustration Tolerance* ("If someone important to me disapproves of me or rejects me, I realize I can tolerate and bear his/her disliking me."); and *Acceptance* ("When I fail at an important task, I can accept myself with my faults and limitations, and not condemn myself for failing."). The second component of the ABS-2 is a measure of three content/context areas which include rational or irrational beliefs related to areas of comfort, achievement, and affiliations. The third component of the ABS-2 relates to the lexical construction of the individual items; either rationally worded or irrationally worded.

Participants are requested to rate their level of agreement or disagreement with each statement along a five-point Likert scale: *Strongly Disagree (A), Somewhat Disagree (B), Neutral (C), Somewhat Agree (D), Strongly Agree (E).* The ABS-2 has previously been shown to possess excellent reliability (e.g., David, Schnur, & Belloiu, 2002; DiLorenzo, David, & Montgomery, 2007; DiGiuseppe et al., 1989).

2.2.4 Analysis

Eight alternative models were developed to explain the latent factor structure of the ABS-2 (DiGiuseppe et al., 1989). The models were specified and estimated using Mplus version 6.0 (Muthen & Muthen, 1998 – 2010) with robust maximum likelihood (MLR) estimation. The traditional CFA models restricted items to load onto a single factor, whereas within the bifactor models each item was allowed to load onto two factors (the relevant belief factor and the relevant nuisance context factor). In all cases, items measurement error terms were uncorrelated as suggested in previous research (Boduszek, Shevlin, Mallett, Hyland & O'Kane, 2012; Bollen, 1989; Brown, 2006).

Model 1 is a one-factor solution in which each of 72 items of the ABS-2 load on a single latent variable of Global Irrationality. Model 2 is a correlated two-factor model in which the two latent variables are represented by Rationality and Irrationality and 36 items load on each factor, respectively. Model 3 is an intercorrelated four-factor model in which the four factors reflect the four irrational belief processes; Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciation. Eighteen items load on the individual factors, respectively. Model 4 is a newly proposed eight-factor model in which the eight factors are represented by the four irrational belief processes (Demandingness, Catastrophizing, Low Frustration Tolerance, Depreciation) and the four rational belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, Acceptance), respectively. Nine items load onto each of the eight factors.

Each of these models was also specified within a bifactor model conceptualisation. For these bifactor models three nuisance factors were specified reflecting the three domains of context; Comfort, Achievement, and Approval. Twenty-four items loaded on each of the three nuisance factors, respectively, and these three

nuisance factors were included within each of the four specified models above when estimating the relevant bifactor solutions.

The comparisons between these specified models were adduced through the employment of a variety of goodness-of-fit statistics and observation of the relevant factor loadings. Goodness-of-fit indices allow for the determination of how well a covariance matrix predicted by a given specified model resembles the covariance matrix present in the data. A range of goodness-of-fit indices were chosen for the present analysis.

The chi-square ($\chi 2$) statistic investigates the difference between the empirical model and the actual model. A good fitting model is indicated by a non-significant result however the power of the chi-square test is proportional to the sample size such that large sample sizes tend to increase the likelihood of a significant finding while small sample sizes tend to increase the likelihood of non-significant findings. This often results in good fitting models being rejected therefore Tanaka (1987) has suggested that a model should not be rejected simply on this basis of a non-significant chi-square result. As such it is recommended that researchers examine the ratio of the chi-square value to the degrees of freedom (df), and according to Klein (1994) any model with a $\chi 2$-to-df ratio of less than 3:1 indicates a good fitting model.

The Comparative Fit Index (CFI; Bentler, 1990) and the Tucker Lewis Index (TLI; Tucker & Lewis, 1973) are measures of how much better the model fits the data compared to one where no relationships exits. For these indices, values above .90 indicate reasonable fit and values greater than .95 indicate good model fit (Bentler, 1990; Hu & Bentler, 1999). In addition, two more absolute indices are presented; the standardized root mean-square residual (SRMR - the average difference between the null and alternate models per element of the variance - covariance matrix) and the root mean-square error of approximation (RMSEA - estimates lack of fit compared to the saturated model). Ideally, these indices should be less than .05 however; values less than .08 also suggest adequate fit (Bentler, 1990; Hu & Bentler, 1999; Joreskog & Sorborn, 1993). Furthermore, Akaike Information Criterion (AIC; Akaike, 1974) was used to evaluate the alternative models, with the smaller value demonstrating the best

fitting model. The CFI, RMSEA and the AIC all have explicit penalties for model complexity.

2.3 Results Section

2.3.1 CFA Results

In order to identify the dimensionality of the ABS-2 (DiGisueppe et al., 1988) the four specified alternative models using standard CFA techniques were investigated. As can be observed in Table 2.1, all fit indices showed improvement for the intercorrelated eight-factor solution. All four models produced statistically significant $\chi 2$ results however rejection of the models on the basis of this fit index is unwarranted given that the sample size utilized in the current study would have increased the power of the test (Tanaka, 1987). Additionally, the eight-factor intercorrelated model produced the lowest $\chi 2$ result of the four, and its $\chi 2$-to-df ratio was less than 3:1, suggesting an acceptable model according to Klein's (1994) indications. The RMSEA and SRMR results also suggest an adequate fit, however the CFI and TLI values are below the recommended levels for adequate model fit. All models failed to produce satisfactory model fit across all indices.

A possible explanation for the less than satisfactory model fit statistics was thought to relate to the presence of three nuisance contextual factors. These three nuisance latent factors were subsequently modelled within each of the four distinct theoretical model solutions previously tested in order to create four alternative bifactor models which could serve to provide a more satisfactory solution to the underlying structure of the ABS-2. Table 2.1 also presents the incremental and absolute fit indices for the four alternative bifactor models of the ABS-2. All four models showed marked improvements compared to the standard CFA solutions, supporting the use of a bifactor modelling approach for the ABS-2.

Table 2.1

CFA and Bifactor Model Fit Indices for Four Alternative Models of the ABS-2

Model	χ^2	*df*	CFI	TLI	RMSEA	SRMR	AIC
CFA Models							
1 Factor Model	7556.795*	2485	.70	.70	.08	.11	62359.201
2 Factor Model	7224.048*	2484	.72	.71	.08	.10	61958.420
4 Factor Model	6621.378*	2478	.76	.75	.07	.07	61470.374
8 Factor Model	5846.597*	2456	.80	.79	.07	.07	60600.013
Bifactor Models							
1 Factor Model	6310.949*	2410	.71	.76	.07	.06	61125.463
2 Factor Model	5571.727*	2409	.81	.80	.07	.09	60343.983
4 Factor Model	5659.979*	2404	.81	.80	.07	.06	60404.801
8 Factor Model	5091.306*	2382	.84	.83	.06	.06	59778.160

Note. N = 310; χ^2 = chi square goodness of fit statistic; *df* = degrees of freedom; RMSEA = Root-Mean-Square Error of Approximation; AIC = Akaike Information Criterion; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; SRMR = Standardized Square Root Mean Residual. * Indicates χ^2 are statistically significant ($p < .001$).

The eight-factor solution with three nuisance factors provided the best fit of the data across all indices, as well as producing the lowest overall AIC value. Even with these improved model fit statistics, this model solution failed to produce satisfactory model fit across all indices with the CFI and TLI values again failing to reach the required cut-off criteria for acceptable model fit. Considered overall, current results serve to undermine the construct validity of the ABS-2, and thus greatly enhanced the importance of the

second aim of the current chapter which seeks to develop a psychometrically sound abbreviated version of the ABS-2.

In order to construct an abbreviated version, the guidelines of Bernard (1998) were followed for item retention. Three items with statistically significant factor loadings above .40 were selected from each of the eight belief factors identified from the relevant bifactor model solution for inclusion in the abbreviated version of the ABS-2. Indicators of each belief factor were selected from the bifactor solution as item factor loadings in the bifactor model provided a clearer indication of which items most accurately measured each belief process given that item covariation due to the nuisance contextual factors had been removed. Twenty-four items were thus retained for the abbreviated version, and five alternative models were compared using standard CFA techniques.

These five models included a one-factor solution in which all twenty-four items loaded on a single latent construct; an intercorrelated two-factor solution of Rationality and Irrationality; an intercorrelated four-factor solution representing the four irrational belief processes (Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciation); an intercorrelated eight-factor solution representing the four irrational belief processes and the four rational belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance); and finally a higher-order model in which the four rational belief factors are subsumed under a Rationality factor and the four irrational belief factors are subsumed under an Irrationality factor.

Table 2.2

Fit Indices for the Alternative Factor Models of the abbreviated version of the ABS-2

Model	χ^2	*df*	CFI	TLI	RMSEA	SRMR	AIC
CFA Models							
1 Factor Model	1334.263*	252	.74	.71	.12	.10	21905.520
2 Factor Model	1263.337*	251	.76	.73	.11	.10	21805.427
4 Factor Model	844.996*	246	.86	.84	.08	.09	21337.153
8 Factor Model	488.908*	224	.94	.92	.06	.05	20955.071
2nd Order Model	733.998*	243	.88	.87	.08	.08	21201.614

Note. N = 310; χ^2 = chi square goodness of fit statistic; *df* = degrees of freedom; RMSEA = Root-Mean-Square Error of Approximation; AIC = Akaike Information Criterion; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; SRMR = Standardized Square Root Mean Residual. * Indicates χ^2 are statistically significant ($p < .001$).

As detailed in Table 2.2, the eight-factor solution of the 24-item abbreviated version of the ABS-2 produced the lowest AIC value, and was the only model to exhibit satisfactory model fit across all indices. The χ^2-to-df ratio was approximately 2:1 and the SRMR value was .05 suggesting good model fit. The CFI, TLI, and RMSEA values, respectively, indicated an adequate fit of the data. The adequacy of this model can also be observed in relation to the parameter estimates. Table 2.3 reports the standardized and unstandardized factor loadings (along with standard errors) for each observed variable on its respective latent variable. All factor loadings were positive and statistically significant, and all items possessed factor loadings greater than .40 with the majority of indicators exhibiting factor loadings above .60 thus generally satisfying the strict recommendations of Hair, Anderson, Tatham, & Black (1998) for factor loading requirements.

Table 2.3

Standardized and Unstandardized Factor Loadings (and Standard Errors) for the Eight-Factor Model of the Abbreviated Version of the ABS-2

Table 2

Item	β	B	SE
Demandingness			
1. I must do well at important things, and I will not accept it if I do not do well.	.78	1.00	---
2. It's essential to do well at important jobs; so I must do well at these things.	.78	.97	.07
3. I must be successful at things that I believe are important, and I will not accept anything less than success.	.76	1.03	.07
Catastrophizing			
4. It's awful to be disliked by people who are important to me and it is a catastrophe if they don't like me.	.78	1.00	---
5. Sometimes I think the hassles and frustrations of everyday life are awful and the worst part of my life.	.76	.98	.06
6. If loved ones or friends reject me, it is not only bad, but the worst possible thing that could happen to me.	.74	.91	.06
Low Frustration Tolerance			
7. It's unbearable being uncomfortable, tense or nervous and I can't stand it when I am.	.76	1.00	---
8. It's unbearable to fail at important things, and	.62	.86	.09

I can't stand not succeeding at them.			
9. I can't stand being tense or nervous and I think tension is unbearable.	.83	1.10	.07
Depreciation			
10. If important people dislike me, it is because I am an unlikable bad person.	.92	1.00	---
11. If I do not perform well at tasks that are very important to me, it is because I am a worthless bad person.	.91	1.04	.03
12. When people I like reject me or dislike me, it is because I am a bad or worthless person.	.96	1.11	.03
Preferences			
13. I do not want to fail at important tasks but I realize that I do not have to perform well just because I want to.	.66	1.00	---
14. I want to perform well at some things, but I do not have to do well just because I want to.	.68	.96	.10
15. I want to do well at important tasks, but I realize that I don't have to do well at these important tasks just because I want to.	.71	1.13	.15
Non-Catastrophizing			
16. It is unfortunate when I am frustrated by hassles in my life, but I realize it's only disappointing and not awful to experience hassles.	.60	1.00	---
17. When life is hard and I feel uncomfortable, I realize it is not awful to feel uncomfortable or tense, only unfortunate and I can keep going.	.58	1.03	.22

18. It's bad to be disliked by certain people, but I realize it is only unfortunate to be disliked by them.	.57	1.00	.17
High Frustration Tolerance			
19. I do not like to be uncomfortable, tense or nervous, but I can tolerate being tense.	.58	1.00	---
20. I get distressed if I'm not doing well at important tasks, but I can stand the distress of failing at important tasks.	.43	.69	.14
21. It's only frustrating not doing well at some tasks, but I know I can stand the frustration of performing less than well.	.81	1.20	.13
Acceptance			
22. When people whom I want to like me disapprove of me, I know I am still a worthwhile person.	.91	1.00	---
23. Even when my life is tough and difficult, I realize that I am a person who is just as good as anyone else even though I have hassles.	.98	1.11	.03
24. When my life becomes uncomfortable, I realize that I am still a good person even though I am uncomfortable.	.90	.98	.04

Note. All factor loadings are statistically significant ($p < .001$).

The factor correlations for the abbreviated version were predominately within expected and acceptable levels with the majority of factors displaying moderate levels of association (see Table 2.4). However, there was one notable exception in the case of the factor correlation between Acceptance and Depreciation beliefs ($r = -.95$). These factor correlations suggested the possible presence of two higher order latent constructs. A two-factor higher-order model was thus investigated in which the four rational belief

factors loaded on a Rationality factor, and the four irrational belief factors loaded on an Irrationality factor. However, as detailed in Table 2.2, this solution was rejected as a poor fitting model.

Table 2.4

Correlations for the Eight-Factor Model of the Abbreviated Version of the ABS-2

Item	1	2	3	4	5	6	7	8
1. Demandingness	---							
2. Catastrophizing	.79	---						
3. Low Frustration Tolerance	.80	.78	---					
4. Depreciation	.57	.75	.73	---				
5. Preferences	-.63	-.48	-.67	-.48	---			
6. Non-Catastrophizing	-.44	-.35	-.47	-.49	.40	---		
7. High Frustration Tolerance	-.61	-.54	-.68	-.62	.86	.67	---	
8. Acceptance	-.60	-.71	-.75	-.95	.57	.58	.70	---

Note. All Factor correlations are statistically significant ($p < .001$).

2.3.2 Descriptive Statistics and Reliability Analysis

Descriptive statistics including means (M) and standard deviations (SD) for the ABS-2 (DiGiuseppe et al., 1988) and its subscales (Demandingness, Catastrophizing, Low Frustration Tolerance, Depreciation, Preferences, Non-Catastrophizing, Low Frustration Tolerance, and Acceptance) are presented in Table 2.5, together with internal reliability (Cronbach's Alpha) scores. Descriptive statistics and internal reliability (Cronbach's Alpha) scores are also presented for the Abbreviated Version. The descriptive statistics indicate that on both the ABS-2 and the Abbreviated Version of the ABS-2 the current sample exhibit moderate levels of each irrational belief process and moderate-to-high levels of each rational belief process, respectively.

The Cronbach alpha results indicate that both the ABS-2 and the Abbreviated Version possess satisfactory internal reliability. In terms of the ABS-2, Cronbach's alpha levels were greater than .80 for the eight subscales. With respect to the Abbreviated Version of the ABS-2, Cronbach's alpha levels were greater than .70 for the eight subscales (see Table 2.5)

Table 2.5

Descriptive statistics and Reliability for the ABS-2 and the AV-ABS2

Variables	**Measure**	**M**	**SD**	***Range***	***Possible Range***	***α***
Demandingness	ABS-2	23.98	9.62	9-45	9-45	.91
	AV	7.06	3.71	3-15	3-15	.88
Catastrophizing	ABS-2	23.20	10.20	9-45	9-45	.93
	AV	7.30	3.75	3-15	3-15	.86
LFT	ABS-2	23.87	9.37	9-43	9-45	.89
	AV	7.84	3.72	3-15	3-15	.84
Depreciation	ABS-2	19.81	11.68	9-45	9-45	.97
	AV	6.17	4.18	3-15	3-15	.95
Preferences	ABS-2	34.55	6.77	11-45	9-45	.84
	AV	11.64	2.92	3-15	3-15	.80
Non-Catastrophizing	ABS-2	33.40	7.13	15-45	9-45	.82
	AV	10.77	3.08	3-15	9-45	.73
HFT	ABS-2	33.03	7.50	11-45	9-45	.85
	AV	10.97	2.94	3-15	3-15	.70
Acceptance	ABS-2	34.05	10.97	10-45	9-45	.96
	AV	11.64	4.09	3-15	3-15	.95

2.4 Discussion

The current chapter set out to assess the dimensionality and construct validity of the ABS-2 (DiGiuseppe et al., 1988), a frequently used measure of rational and irrational beliefs in REBT research contexts, which has not been subjected to rigorous psychometric investigation. In order to identify the appropriate factor structure of the ABS-2 a series of alternative factor solutions were devised including a novel and original eight-factor solution that is congruent with contemporary REBT theory (David et al., 2010). Furthermore, given a methodological limitation associated with the ABS-2, namely that the individual items fail to appropriately discriminate between the process of belief and the context of belief, a bifactor modelling approach was concurrently applied which served to control for the presence of these nuisance contextual latent factors which were hypothesised to lead to misidentification of the appropriate factor structure. Bifactor modelling has predominately been applied within intelligence testing paradigms (e.g. Carroll, 1993; Gustafsson & Balke, 1993) or in situations where researchers are interested in identifying a unidimensional structure for a given measure (Reise et al., 2007). However, bifactor modelling approaches offer many advantages that make its use desirable when assessing the dimensionality of measures of various psychological constructs and such approaches are beginning to be adopted by researchers interested is psychological constructs other than intelligence (e.g. Patrick, Hicks, Nichol, & Kruger, 2007).

Initial results based on standard CFA model specifications indicated that an intercorrelated eight-factor solution consistent with current REBT theory represented the most accurate factorial solution. According to the $\chi 2$-to-df, RMSEA, and SRMR results, this model was deemed to be an adequate representation of the underlying factor structure of the ABS-2 however the CFI and TLI values were well below acceptable levels for adequate model fit. Based on these less than satisfactory model fit results, it was hypothesised that the presence of three contextual "nuisance" factors may have been contributing additional, and unwanted, item covariation which was leading to model misidentification. A bifactor modelling approach was thus adopted and the same four solutions were respecified with the inclusion of three nuisance factors.

Inclusion of these nuisance factors improved the model fit for all four models across all fit indices indicating that consideration of these nuisance context factors is necessary when assessing the factor structure of the ABS-2 (DiGiuseppe et al., 1989). This intercorrelated eight-factor solution again provided the best fit of the data, however despite the improvements in model fit obtained by utilizing a bifactoral solution, the CFI and TLI values again failed to reach acceptable levels. Although the inclusion of the nuisance contextual factors improved the model fit of the eight-factor conceptualization, these analyses failed to provide empirical support for the construct validity of the ABS-2.

The second objective of the current chapter was to develop a psychometrically sound abbreviated version of the ABS-2 for use in many research contexts where the application of a seventy-two item measure is impractical. Given that current findings failed to provide robust empirical support for the construct validity of the ABS-2 (DiGiuseppe et al., 1989), the development of an abbreviated version of the ABS-2 with sound psychometric properties was of the utmost importance. In order to select the relevant items for the abbreviated version of the ABS-2, item factor loadings for each of the eight belief factors as revealed in the relevant bifactor model solution were inspected. Since this model allowed items to load onto both the nuisance context factor and the appropriate psychological factor, it was possible for items that were the best indicators of the relevant rational and irrational belief processes to be selected. All items retained possessed statistically significant factor loadings above a value of .40.

Given that these indicators were selected after the effects of the nuisance factors were controlled for, it was possible to compare the alternative model solutions of the abbreviated versions of the ABS-2 using standard CFA techniques. Of the five alternative specified models, the intercorrelated eight-factor solution was the only model to obtain satisfactory model fit. The $\chi 2$-to-df ratio result indicated a good model, as did the SRMR result, while the RMSEA, CFI, and TLI values all indicated adequate model fit. It should be noted also that despite being less parsimonious that many of the other tested models, the AIC, CFI, and RMSEA indices all include explicit penalties for model complexity and the eight-factor solution still exhibited the most impressive values across all three indices, thus strongly suggesting that it is the most accurate

conceptualisation of the underlying factor structure of the measure. Furthermore, this factor solution derived additional support on the basis of the observed standardized factor loadings. The majority of the indicators exceeded Hair et al.'s (1998) strict cut-off criteria of 0.60, and those few indicators that did not still exhibited statistically significant factor loadings above 0.40.

As would be expected based on theoretical predictions, the eight latent factors all showed statistically significant associations, and these associations were predominately in the moderate-to-strong range, with the notable exception of the correlation between Acceptance and Depreciation beliefs (r = -.95) which was very high. Given that these beliefs are the rational and irrational counterparts of each other it suggests that they are either bipolar constructs, or that the indicators of each factor are failing to appropriately measure the distinctive constructs. Future research endeavours with the abbreviated version of the ABS-2 will be necessary to ascertain which of these possible explanations is more accurate. All four irrational latent factors and all four rational latent factors were positively and statistically significantly related to one another. These correlations suggested the possible presence of two second-order latent factors, Rationality and Irrationality, which could serve to explain the observed factor correlations however this second order model was found to be a poor representation of the data.

2.4.1 Limitations

As is the case with any research project, there are a number of limitations that need to be indicated. The current analysis was conducted within a sample of 313 participants drawn from a unique and specialised strata of the population (emergency service personnel) therefore these results are not widely generalizable. Future studies should preferably retest the factor structure of both the seventy-two item ABS-2 (DiGiuseppe et al., 1988) and the twenty-four item abbreviated version presented herein among more diverse population groups in order to develop a more robust picture of the factor structure of these measures. Future analyses should ideally utilize a bifactor modelling approach to control for the effects of context factors as present result indicate such bifactor models improve model fit. Additionally, construct validation studies are preferably conducted on larger sample sizes which can additionally facilitate

investigation of the factorial invariance of the measure between the sexes. However, given the extremely specialized nature of the current sample, this limitation was impossible to overcome.

2.4.2 Conclusion

In conclusion, this study has provided the most comprehensive and methodologically rigorous investigation of the psychometric properties of the ABS-2 (DiGiuseppe et al., 1988). Results from the current analysis support for the value of utilizing a bifactor modelling approach when assessing the dimensionality of the ABS-2, specifically, and provides general support for the utility for applying such a statistical methodology within scales displaying multidimensionality. Current results failed to provide robust evidence of the construct validity of the ABS-2 within this particular population, in spite of attempts to overcome a number of methodological limitations associated with the measure. In order to surmount the identified methodological and practical difficulties associated with the full version of the ABS-2, a twenty-four item abbreviated version was developed and psychometrically validated. An original and previously untested eight-factor intercorrelated solution, fully consistent with contemporary REBT theory, was demonstrated to provide satisfactory fit of the obtained data. The abbreviated version of the ABS-2 therefore provides a practical, theoretically consistent, and psychometrically validated measure of rational and irrational beliefs.

Chapter 3

The Latent Structure and Composite Reliability of the Profile of Emotional Distress

A paper based on this chapter has been accepted for publication in **The Cognitive Behaviour Therapist.**

Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2014 – in press). The factor structure and composite reliability of the Profile of Emotional Distress. *The Cognitive Behavior Therapist, 6*, e15. doi: http://dx.doi.org/10.1017/S1754470X13000214

Abstract

The current chapter assesses the latent structure and composite reliability of the Profile of Emotional Distress (PED: Opris & Macavei, 2007). The PED is a self-report measure of emotional distress based upon Rational Emotive Behaviour Therapy's (REBT) binary model of emotional distress. To date, the PED has been weakly conceptualised using both unitary and binary models of emotional distress. In this study, the dimensionality of the PED was examined within an alternative models framework using confirmatory factor analysis and bifactor modelling techniques. Three hundred and thirteen (N = 313) law enforcement, military, and related emergency service personnel completed the PED. Results indicated that a bifactor model conceptualisation was the best fit of the data. The bifactor model included a single general factor (Emotional Distress) and four grouping factors (Concern, Anxiety, Sadness, and Depression). Model parameter estimates indicated that the Emotional Distress factor accounts for the majority of covariance among the observable indicators. Low factor loadings were observed on each of the grouping factor thus subscale construction is not recommended. Composite reliability results demonstrated that the Emotional Distress factor possesses excellent internal reliability. The PED was found to be a reliable and valid measure of emotional distress.

3.1 Introduction

As a mode of psychotherapy Cognitive-Behavioural Therapy (CBT) has emerged from all others as the most empirically investigated and validated method of treating psychiatric and psychological disorders (Barlow, 2008; Butler, Forman, Chapman, & A. T. Beck, 2006; Chambless & Hollon, 1998; Chambless & Ollindick, 2001; Engels, Garnefsky, & Diekstra, 1993; Epp & Dobson, 2010; Lyons & Woods, 1991). The central theoretical precept of CBT, and from which it's clinical practice emerges, is that all psychological disturbances occur as a consequence of at least some form of dysfunctional cognitive information processing (A. T. Beck, 1976; Ellis, 1962, 1994). Complex emotional reactions are hypothesised to occur as a result of conscious or unconscious cognitive processing (David & Szentagotai, 2006). Dysfunctional, irrational, or unrealistic processing of internal stimuli (e.g., a pain in the chest) or external stimuli (e.g., receiving a low grade on an exam) are hypothesised to produce unhealthy or maladaptive emotional reactions, while functional, rational, or realistic processing of such information will produce healthy and adaptive emotional reactions (J. S. Beck, 2011; David & Szentagotai, 2006). This relationship between cognitions and emotions is among the most central of topics within not just psychotherapy but also cognitive psychology and psychological science as a whole. Cognitive Therapy (CT) and Rational Emotive Behaviour Therapy (REBT) are the primary CBT approaches and given their respective conceptualizations of the importance of cognition in the development of emotions, they are both to be considered very much a part of the cognitive approach to emotions (see David & Cramer, 2010). The distinctions between CT's and REBT's models of emotion can be best understood with reference to well established cognitive models of emotions.

3.1.1 The REBT Binary Model of Emotions

A key feature of the theory of REBT (Ellis, 1994) that serves to differentiate it from other cognitive-behaviour models such as CT theory (J.S. Beck, 2011) is in relation to its binary model of emotional distress (Ellis & DiGiuseppe, 1993). The binary model of emotional distress is distinct from the unitary model of emotional distress, which is the predominantly favoured conceptualization of emotional distress within the field of psychology and psychotherapy in that it hypothesises that functional and dysfunctional

emotions differ *qualitatively* rather than *quantitatively*. In other words, functional and dysfunctional emotions are not predicted to be distinguished on the basis of the physiological intensity with which the emotion is experienced but rather by the underlying cognitive architecture of the emotional response, along with the subjective phenomenological experience of the emotion, and the associated behavioural consequences of the emotion. According to REBT theory (Ellis, 1994; David, Lynn, & Ellis, 2010) emotional, behavioural, cognitive, and physiological responses or consequences (C) are not the direct product of the adverse activating events experienced in our internal or external environments (A), but are rather the result of our evaluative or appraisal beliefs (B) about these activating events. Evaluative or appraisal beliefs (cognition) are thus hypothesised to be the key mediating and etiopathogenetic variables in the development of cognitive-emotional-behavioural-physiological reactions.

REBT theory states that there are two main classes of evaluative beliefs; rational beliefs and irrational beliefs. Rational beliefs are flexible and non-extreme evaluations of the events we experience in our day-to-day lives, whereas irrational beliefs are rigid, absolutistic, and extreme evaluations of the events we encounter (Dryden & Neenan, 2004). REBT theory states that humans being are naturally goal-seeking animals and hypothesises that humans possess an innate tendency to exaggerate or escalate rational preferences and desires for goal achievement (Rational Beliefs) into rigid demands and insistences for goal achievement (Irrational beliefs) (see Ellis, 1994). This process of escalating one's flexible preferences into rigid, dogmatic demands is theorised to lie at the core of psychopathological disturbance.

Once a person has developed a set of rigid demands, that person is then prone to make a series of extreme conclusions if their demand is not met. These conclusions include beliefs referred to as "Catastrophizing/Awfulizing" beliefs, whereby an individual evaluates an event in the most extremely negative terms possible; "Low Frustration Tolerance" beliefs, in which a person terrifically underestimates his or her own ability to tolerate or cope with the discomfort of not having their demand met; and "Depreciation" beliefs, where a person makes extreme and global negative evaluations of the self, others, and/or the world as a consequence of not having their rigid demands met.

As outlined by David and Szentagotai (2006), Ellis (1994), and Ellis and Dryden (2007), REBT's binary model of emotional distress states that responding to an unpleasant activating event with a set of irrational beliefs gives rise to dysfunctional negative emotional consequences (along with associated maladaptive behaviours or behavioural tendencies, distorted automatic negative thoughts, and disturbing physiological arousal). Alternatively, responding to the same unpleasant activating event with a set of rational beliefs is predicted to give rise to functional negative emotional consequences (along with associated adaptive behaviours or behavioural tendencies, non-distorted automatic thoughts, and non-disturbing physiological arousal).

3.1.2 Distinguishing the Unitary and Binary Models of Emotion

Consequently, REBT theory makes a very clear distinction between functional and dysfunctional negative emotions on the basis of the fundamental cognitive architecture from which the emotion arose. REBT is not unique in this regard, and certainly not within the CBT domain. CT theory (A.T. Beck, 1976; J. S. Beck, 2011) also distinguishes functional from dysfunctional emotional responses. Clark and Beck (2010) in their treatment manual for the various anxiety disorders detail that functional and dysfunctional emotions can be distinguished on the basis of five criteria: (i) associated dysfunctional cognitions, (ii) impaired functioning, (iii) persistence, (iv) false alarm reactions, and (v) stimulus hypersensitivity. How the REBT and CT conceptualizations of functional and dysfunctional negative emotions differ is in the following regard. CT theory which follows a unitary approach views an emotion such as anxiety as a single entity along a single continuum. At one end of the continuum is low levels of anxiety that might otherwise be referred to as "concern", and these low levels of anxiety/concern are generally not viewed as dysfunctional, and in many instances functional if experienced in response to an actual threat or danger. At the other end of the continuum are high levels of anxiety that might otherwise be referred to as "anxiousness" or "panic". "Anxiousness" or "panic" is viewed then as a far more intense version of the same fundamental emotion. The dysfunctionality of the emotion is largely based on the intensity with which the emotion is subjectively experienced by the individual.

Alternatively, REBT theory views emotions such as "concern" and "anxiety" as qualitatively rather the quantitatively distinct emotions. Anxiety is not merely a more

intense emotional response to a perceived danger or threat than is concern, rather concern is an emotion that develops from a set of rational beliefs about a perceived dangerous or threatening activating event, and anxiety is an emotion that develops from a set of irrational beliefs about a perceived dangerous or threatening activating event. Concern and anxiety therefore exist along separate continuums and can both be experienced with varying levels of emotional intensity. From the perspective of REBT, very intense feelings of concern are not viewed as dysfunctional or clinically significant, whereas low intensity feelings of anxiety could be considered dysfunctional and clinically significant given that they are the product of a set of irrational beliefs.

3.1.3 Previous Research Findings

Over the past two decades research has begun to empirically test these competing models however research findings are minimal and not without their limitations. Cramer (1985) and his research associates (Cramer & Fong, 1991; Cramer & Kupshik, 1993; Cramer & Buckland, 1996; and Cramer, 2004, 2005) began the empirical investigations with a series of correlational and quasi-experimental designs, however much of this work possessed methodological and theoretical flaws (see David & Cramer, 2010). An alternative program of empirical investigations has been initiated in recent years with improved methodological and theoretical designs and generally provides empirical support for the binary model of emotional distress suggested by REBT theory (Ellis, 1994).

David, Schnur, and Belloiu (2002) tested the competing theoretical predictions of the unitary and binary models within the framework of the appraisal theory of emotions (Smith & Lazarus, 1993) and demonstrated that irrational beliefs generated dysfunctional negative emotions, while rational beliefs generated only functional negative emotions. Additional support for the binary model was obtained from findings that revealed that arousal levels could not differentiate functional from dysfunctional beliefs, a key prediction of the unitary model, and congruent with the prediction of the binary model. The results of this study were replicated by David, Ghinea, Macavei, and Kallay (2005a) among both clinical and non-clinical samples.

David, Schnur, and Birk (2004) tested the competing predictions of the binary and unitary models within another cognitive paradigm; the two-factor theory of

emotions (Schacter & Singer, 1962) using a quasi-experimental design. Results from this study provided additional support for the binary model. Participants who were primed with irrational beliefs reported experiencing both functional and dysfunctional emotions while those primed with a rational belief experienced only functional emotions (exactly as predicted by the binary model but not the unitary model). Consistent with the results from the other studies by David et al. (2002) and David et al. (2005a), arousal levels were unable to differentiate between functional and dysfunctional emotions.

David's research group again investigated the competing predictions within a factorial paradigm. David, Montgomery, Macavei, and Bovbjerg (2005b) tested the hypothesis of Ellis and DiGiuseppe (1993) that if the binary model was correct a principal component analysis (PCA) would reveal two principal components; one in which high levels of irrationality are positively associated with both functional and dysfunctional emotions, and a second component in which high levels of rationality are positively related to functional negative emotions and negatively correlated with dysfunctional negative emotions. David et al. (2005) found exactly this pattern emerge from data obtained from two culturally distinct clinical samples, providing further empirical support for the binary model.

Evidence supporting REBT's cognitive theory of emotions (Ellis & DiGiuseppe, 1993; Ellis, 1994) has been established from other researchers too. Zisook, Shuchter, Irwin, Darko, Sledge, and Resovsky (1994) carried out a study investigating the immune functioning of recently widowed women compared to married women. Although no significant difference was found in immune functioning between the widowed sample and the non-widowed sample, within the widowed group itself significant differences were found between those women who met the diagnostic criteria for depression compared to those who did not. Widows who were experiencing depression, compared to widows who were experiencing grief (sadness), showed lower levels of natural-killer cell activity and lower mitogen stimulation, revealing that depression, but not sadness, resulted in lower levels of immune functioning.

Harris, Davies, and Dryden (2006) experimentally tested a central hypothesis of REBT that irrational beliefs are at the core of psychological disturbance within the binary paradigm of emotions. The study involved a sample of 90 participants attending a

General Practitioner's office who had no history of mental illness. The participants were divided into three groups; a rational belief group, an irrational belief group, and an indifference belief group that served as a control group. Participant's blood pressure levels were monitored and instructed to sit as still as possible in front of a camera for 1 minute and 10 "behavioural experts" would scrutinize their video, looking for tiny facial movements, and would then give each person a score out of 100 for stillness.

The results of the experiment showed that participants in the irrational belief group experienced increased levels of anxiety (with corresponding increases in systolic blood pressure), while those in the rational belief group experienced increases in their levels of concern, but not anxiety (and a corresponding decrease in systolic blood pressure). Harris et al.'s (2006) study provides experimental support for REBT's binary model of emotion.

3.1.4 The Profile of Emotional Distress

To provide a method of investigating the predictions of the binary model of emotions, researchers developed the PED (Opris & Macavei, 2007). The PED is the first self-report measure of emotional distress constructed upon a binary model of emotional distress. Much of the previous research studies investigating the differential predictions of the competing models have employed the Shortened Version of the Profile of Mood States (POMS-SV: DiLorenzo, Bovbjerg, Montgomery, Valdimarsdottir, & Jacobsen, 1999). The POMS-SV is a forty-seven item mood adjective checklist with previous studies (e.g. David et al., 2005) tending to use just twenty-one items which relate directly to emotional mood states.

The development of the PED (Opris & Macavei, 2007) was based upon the POMS-SV (DiLorenzo et al., 1999), however the twenty-six items were chosen as the best approximation of emotional adjectives that are regarded as functional and dysfunctional by a panel of experts in REBT and CBT. The PED was designed to measure four emotional categories: (i) sadness, (ii) concern (both of which are regarded as functional negative emotions), (iii) anxiety, and (iv) depression (both of which are regarded as dysfunctional negative emotions). An advantage of the PED compared to other mood item measures is the relatively small number of items included in the scale.

Given the recent development of the PED (Opris & Macavei, 2007) it has not been widely used to date, and as such studies investigating its psychometric properties are not abundant. Opris and Macavei (2007) carried out a series of studies in order to examine the measure's psychometric properties and the results of these studies provide some initial support. Within a sample of the Romanian general population (N = 745) the PED was demonstrated to possess acceptable internal consistency. Cronbach's alpha for the global scale was .94, with each subscale possessing an internal reliability of above .75.

In another study involving 701 participants, the PED demonstrated satisfactory concurrent and discriminant validity. Strong, positive, statistically significant correlations were identified between the total PED scores and total POMS-SV scores (r = .74), as well as strong, positive, statistically significant correlations between total PED scores and the POMS-SV negative scales (r = .74 and r = .75, respectively). Furthermore, moderate, negative, statistically significant correlations were identified between the total PED scores and the POMS-SV positive scale (r = -.46). Correlations between total PED scores and scores on measures of rational beliefs and unconditional self acceptance were both negative and statistically significant (r = -.26 and r = -.19, respectively). Positive, statistically significant correlations were also found between total scores on the PED and a series of measures of dysfunctional cognitive processes including, dysfunctional attitudes (r = .26), negative automatic thoughts (r = .48), irrational beliefs (r = .27), and dysfunctional cognitive schemas (r = .40).

Opris and Macavei (2007) initially investigated the validity and reliability of the PED within a large sample (N = 701) of the Romanian general population. Results suggested that the PED possessed satisfactory internal reliability (Cronbach's alpha = .94 for the full scale and each of the four subscale demonstrated internal reliability values above .75). Subsequent analysis indicted good concurrent and discriminant validity. In an effort to establish the construct validity of the scale, the authors performed a principal component analysis (PCA) among both a clinical (N = 32) and a non-clinical (N = 122) sample with results revealing two factors. The first was termed "General distress" and included all items of both functional and dysfunctional distress, while the second factor was termed "Functional distress" and included only the functional negative distress items. A number of methodological issues undermine the

results of this study. For example, PCA is method that simply allows for the reduction of a large body of data, it does not allow for the testing or falsification of a particular model. Within a PCA framework there are no objective statistical criteria to determine the solution with the optimal number of factors (see Bolen, 1989). The small sample sizes employed for such analysis further undermines the reliability of such results.

Consequently, the latent structure of the PED has yet to be established and formulating an appropriate scoring system scheme for this questionnaire remains problematic. Moreover, given that the PED was developed to capture the qualitative distinctions between functional and dysfunctional emotions, and its intended use in research programs using this paradigm, it is necessary that a comprehensive evaluation of the underlying factor structure of PED be performed. Establishing the latent structure of the PED (Opris & Macavei, 2007) is therefore a prerequisite not only for identifying accurate assessments of validity and reliability, but also for establishing its use within a variety of research contexts. Research has demonstrated that treating a multidimensional measure as unidimensional can result in unstable estimates of reliability (Shevlin, Miles, Davies, & Walker, 2000).

3.1.5 Current Research

The primary aim of the current chapter therefore is to test a series of theoretically plausible factorial solutions within an alternative models framework using confirmatory factor analytic (CFA) techniques as well confirmatory bifactor modelling producers (see Reise, Moore, & Haviland, 2010; Reise, Morizot, & Hays, 2007; Yung, Thissen, & McLeod, 1999). Confirmatory bifactor modelling is a conceptually distinct alternative to traditional CFA models in which the covariance among PED items are explained in terms of a single general Emotional Distress factor reflecting the overlap across all items, and independent (uncorrelated) method-factors reflecting the unique covariance that occurs among a particular groups of items (Concern, Sadness, Anxiety, and Depression). Reise et al. (2010) argue that bifactor models should always be used as a baseline comparison model rather than the traditional one-factor model given that a bifactor model is capable of retaining a unidimensional conceptualisation while also acknowledging the unintended and meaningless covariance that can occur between particular items in a scale due to wording effects and can thus present spurious evidence

of multidimensionality. Additionally, the current study will also seek to better establish the reliability of the PED through the use of composite reliability analysis.

3.2 Methods Section

3.2.1 Participants

The sample for the current study consisted of three hundred and thirteen (N = 313) trauma-exposed individuals employed in a range of front-line emergency services. The sample comprised an international group of soldiers (n = 81, 25.9%), police officers (n = 183, 58.5%), and associated emergency service personnel (n = 49, 15.7%). All participants were recruited from active-duty while serving in the Republic of Ireland and the Republic of Kosovo over a twelve month period (June 2011 – June 2012). The mean number of exposures to traumatic life events for the current sample was 2.75 (SD = 1.51, range 1-11). The most frequently cited traumatic life experience was being involved in, or witness to, a serious accident, fire, or explosion (60%, n = 189); followed by a non-sexual assault by a stranger (57%, n = 178); and military combat (43%, n = 133). The most infrequently reported traumatic life events was torture (1.6%, n = 5).

The sample consisted of 212 males (67.7%) and 101 females (32.3%). The participants ranged in age from 23 to 65 (M = 38.18, SD = 8.70). The majority of the participants resided in suburban areas (44.4%; n = 139), and urban areas (37.1%, 116), and the remainder indicated that they reside in rural areas (18.5%, n = 58). The majority of the sample participants possessed at least a secondary/high school level diploma (55.9%, n = 175) while 108 held a bachelor's degree (34.5%), 28 participants possessed a master's degree (8.9%), and 2 individuals reported possessing a doctoral degree (0.6%). The majority of respondents were currently married (n= 154, 49.2%), while 19.5% reported their marital status to be single (n = 61), 21.4% were cohabiting with a partner (n = 67), and 9.9% of respondents were divorced (n = 31).

3.2.2 Procedures

The current sample was gathered in an opportunistic fashion in the Republic of Ireland and the Republic of Kosovo. Ethical approval was first granted from the Ethics committee of the University of Ulster, subsequently written approval was obtained by the principal researcher to approach members of the respective institutions that took part in the current study. Participants were informed of the nature of the study being under

taken either by a member of the research team or an assigned liaison for a particular organisation, and each participant's involvement in the research project was voluntary. No obligations were placed upon potential respondents nor were any inducements employed to recruit the sample. Each participant was assured about confidentiality and those who chose to take part in the research project had the option of completing either an anonymous self-administered paper-and-pencil version of the questionnaire or an electronic version which was delivered and returned via email. The majority of respondents chose the paper-and-pencil option (63.26%, n = 198).

3.2.3 Measure

The Profile of Emotional Distress (PED: Opris & Macavei, 2007): The PED is a twenty-six item self-report measure of emotional distress built upon Ellis' (1994) binary cognitive model of emotional distress. The PED was designed in order to measure functional and dysfunctional emotions within two major categories: concern/anxiety and sadness/depression. Six adjective items are used to measure *concern* (tense, worried, concerned, alarmed, strained, and restless), *anxiety* (anxious, terrified, frightened, nervous, panicky, and scared) and *sadness* (sad, blue, miserable, sorrowful, gloomy, and upset) while eight items are employed to measure *depression* (hopeless, useless, depressive, depressed, hurt, shattered, desperate, and helpless). Participants are asked to rate how often they experienced each emotion in the past month by selecting either "Not at all", "A little", "Moderately", "Quite a bit", and "Extremely". Responses are assigned a value from 1 (Not at all) to 5 (Extremely), and possible scores range from 26 to 130, with higher scores indicating higher emotional distress.

3.2.4 Analysis

The dimensionality of the PED (Opris & Macavei, 2007) was investigated through the use of conventional CFA techniques, along with the utilization of a confirmatory bifactor modelling approach (see Chen, West, & Sousa, 2006; Reise et al., 2010; Reise et al., 2007; Yung et al., 1999).

Model 1 is a one-factor model in which all twenty-six items load on a single latent Emotional Distress variable. Model 2 is an intercorrelated four-factor solution measuring Concern (6 items), Anxiety (6 items), Sadness (6 items), and Depression (8

items). This model represents the intended structure of the scale and is congruent with the binary model. Model 3 is a two-factor model represented by a functional negative emotional distress (F-NED) factor and a dysfunctional negative emotional distress (D-NED) factor. This model is also in-line with theoretical predictions of the binary model and within this model 12 items load onto the F-NED factor (items measuring sadness and concern) and 14 items load onto the D-NED factor (items measuring anxiety and depression). Model 4 is consistent with a unitary model of emotions and reflects an alternative two-factor solution. This model includes an Anxiety factor (12 items measuring concern and anxiety) and a Depression factor (14 items measuring sadness and depression). Model 5 is a bifactor conceptualisation in which all 26 items load onto a single Emotional Distress factor. This model also includes four grouping factors (Concern (6 items), Anxiety (6 items), Sadness (6 items), and Depression (8 items)) which exist at the same conceptual level as the general Emotional Distress factor.

The overall fit of each model and the relative fit between models were assessed using a range of goodness-of-fit statistics and assessment of the appropriateness of the model parameters. The chi-square ($\chi 2$) statistic assessed the sample and implied covariance matrix and a good fitting model is indicated by a non-significant result. However the chi-square statistic is strongly associated with sample size, and as such good models tend to be over-rejected. Therefore Tanaka (1987) suggested that a model should not be rejected simply on the basis of a significant chi-square result. Accordingly, it is recommended that researchers examine the ratio of the chi-square value to the degrees of freedom (df), and according to Klein (1994), any model with a $\chi 2$-to-df ratio of less than 3:1 indicates a good fitting model. The Comparative Fit Index (CFI; Bentler, 1990) and the Tucker Lewis Index (TLI; Tucker & Lewis, 1973) are measures of how much better the model fits the data compared to a baseline model where all variables are uncorrelated. For these indices values above .90 indicate reasonable fit while values above .95 indicated good model fit (Bentler, 1990; Hu & Bentler, 1999). In addition, two more absolute indices are presented; the standardized root mean square residual (SRMR: Joreskog & Sorborn, 1981) and the root mean-square error of approximation (RMSEA: Steiger, 1990). Ideally these indices should be less than .05 however values less than .08 also suggest adequate fit (Bentler, 1990; Hu & Bentler, 1999; Joreskog & Sorborn, 1993). Furthermore, Akaike Information

Criterion (AIC; Akaike, 1974) was used to evaluate the alternative models, with the smaller value indicating the best fitting model. The CFI, RMSEA and the AIC all have explicit penalties for model complexity. These models were specified and estimated using Mplus version 6.0 (Muthen & Muthen, 1998 – 2010) with robust maximum likelihood (MLR) estimation.

3.3 Results Section

The mean PED score for the entire sample was 53.53 (*SD* = 24.96). Scores ranged from 26 to 129.

3.3.1 CFA and Bifactor Model Results

Table 3.1 reports the fit indices for the five alternative models. On the basis of the $\chi 2$-to-df ratio, CFI, TLI, RMSEA, and SRMR results, Model 5 (the bifactor model) was found to be the most accurate representation of the underlying latent structure of the PED (see Figure 3.1). The $\chi 2$-to-df ratio of 3:1 and SRMR value of .05 indicate good model fit while and RMSEA value of .08 and CFI and TLI values above .90 suggest an adequate fitting model. This model also displayed the lowest AIC value further indicating its statistical superiority.

Table 3.1

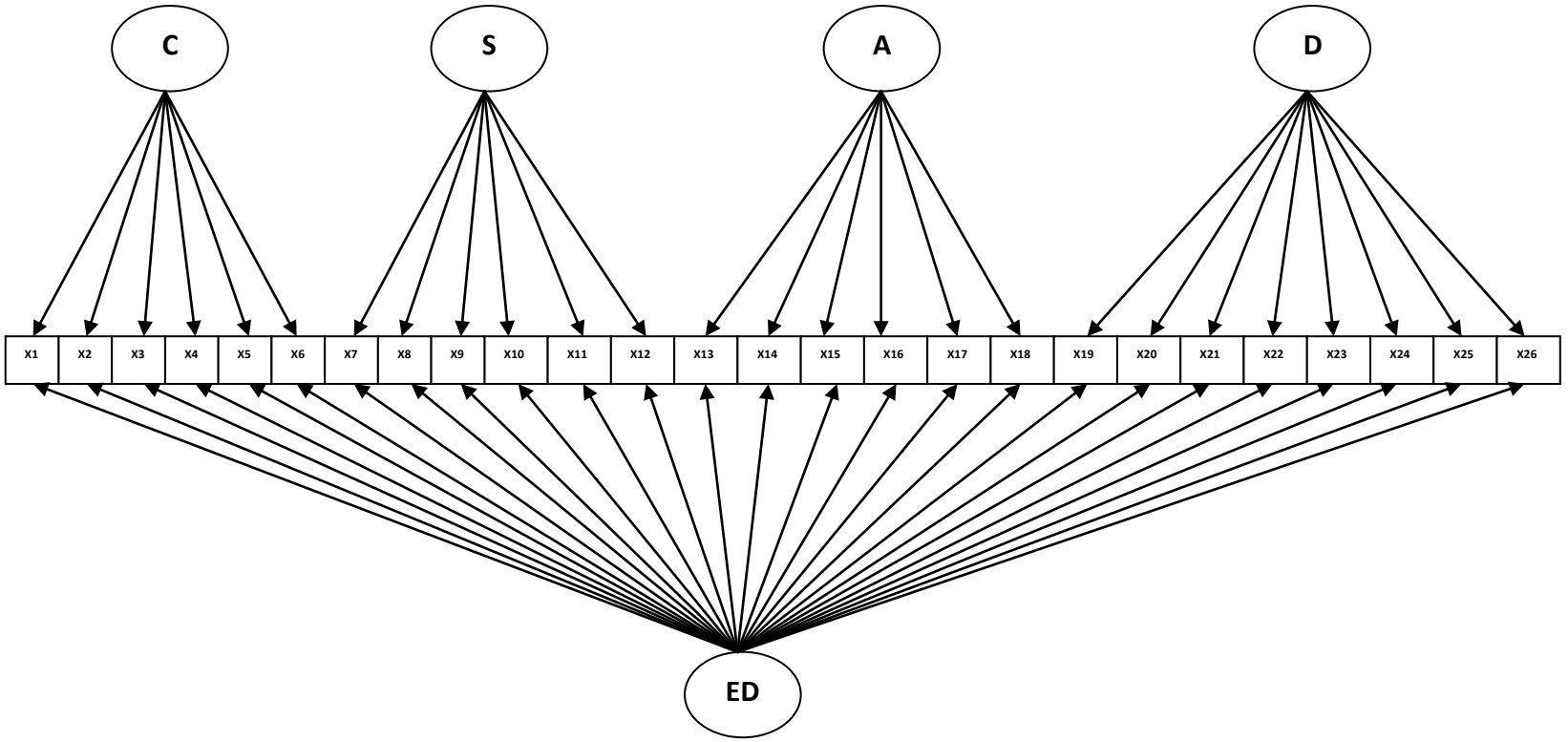
CFA and Bifactor Model Fit Indices for Five Alternative Models of the PED

Model	χ^2	***df***	**CFI**	**TLI**	**RMSEA**	**SRMR**	**AIC**
CFA Models							
Unidimensional	1488.625*	299	.83	.82	.11	.06	17058.003
F-NED/D-NED	1475.646*	298	.83	.82	.11	.06	17039.976
Binary	1033.504*	293	.90	.89	.09	.04	16440.743
Unitary	1061.136*	298	.89	.88	.09	.04	16471.362
Bifactor	840.476*	274	.92	.91	.08	.05	16189.658

Note. N = 313; χ^2 = chi square goodness of fit statistic; *df* = degrees of freedom; RMSEA = Root-Mean-Square Error of Approximation; AIC = Akaike Information Criterion; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; SRMR = Standardized Square Root Mean Residual. * Indicates χ^2 are statistically significant ($p < .001$).

Figure 3.1

Bifactor Model of the Profile of Emotional Distress Scale



Note: C = Concern; S = Sadness; A = Anxiety; D = Depression; ED = Emotional Distress; x1-x26 = items of the PED

The adequacy of this model can also be determined in relation to its parameter estimates. Table 3.2 reports the standardized and unstandardized factor loadings (along with standard errors) for each observed variable on its respective latent variables. Hair, Anderson, Tatham, and Black (1998) have suggested that when conducting CFA, standardized factor loadings should be 0.60 and above in order to verify that an observed variable identified a priori is represented by a specified latent variable. As can be seen in Table 3.2 all twenty-six items displayed positive and statistically significant ($p < .001$) factor loadings on the general emotional distress factor. Moreover, all items yielded robust loadings on this factor suggesting strongly the presence of a single latent emotional distress variable. Further inspection of the factor loadings for each of the grouping factors (concern, anxiety, sadness, and depression) provides critical information regarding the appropriateness of including these factors in the scoring of the PED. Reise et al. (2010) advise that when items load strongly onto a general factor, and comparatively weaker on each of the grouping factors, this provides overwhelming support for consideration of a unidemsional scoring scheme. Alternatively when items load as strongly, or more strongly, onto each of the respective grouping factors than they do the general factor, creation of subscales is appropriate.

As outlined in Table 3.3, factor loadings for each grouping factor were markedly lower as compared to the general emotional distress factor. A number of items displayed non-significant loadings on their respective grouping factors; in the case of the depression grouping factors two negative, statistically significant factor loadings were observed; and the overwhelming majority of all items displayed factor loadings of below .40. These results demonstrate that there is little value in considering the distinct grouping factors as meaningful. Rather the PED is best considered as a unidimensional measure of emotional distress, once the effects of item heterogeneity have been controlled for.

Table 3.2

Standardized and Unstandardized Factor Loadings (and Standard Errors) for each PED item on the Emotional Distress Factor

Item	***β***	**B**	**SE**
Emotional Distress			
Tense	.67	.79	.05
Sad	.78	.86	.05
Blue	.88	1.09	.05
Hopeless	.92	1.26	.05
Useless	.90	1.07	.06
Worried	.72	0.73	.04
Miserable	.92	1.19	.05
Anxious	.79	.98	.05
Depressive	.94	1.07	.05
Concerned	.60	.59	.05
Frightened	.79	.83	.06
Depressed	.95	1.13	.05
Sorrowful	.88	1.06	.06
Strained	.76	.98	.06
Gloomy	.86	1.01	.05
Terrified	.82	.82	.06
Nervous	.69	.76	.05
Hurt	.65	.64	.05

Alarmed	.66	.61	.05
Panicky	.77	.88	.06
Upset	.78	.93	.05
Shattered	.85	1.16	.06
Desperate	.91	1.24	.06
Restless	.49	.49	.05
Scared	.76	.75	.06
Helpless	.92	1.19	.05

Note. All Factor loadings are statistically significant ($p < .001$).

Table 3.3

Standardized and Unstandardized Factor Loadings (and Standard Errors) for the Four Grouping Factors of the PED

Item	***β***	**B**	**SE**
Concern			
Tense	.37**	.42	.06
Worried	.34**	.35	.07
Concerned	.47**	.46	.06
Strained	.15*	.19	.08
Alarmed	.38**	.35	.05
Restless	.49**	.49	.07
Sadness			
Sadness	.63**	.69	.03

Blue	.13**	.16	.05
Miserable	.02	.02	.03
Sorrowful	.08*	.10	.03
Gloomy	.06	.07	.04
Sad	.31**	.37	.05
Anxiety			
Anxious	.30**	.37	.05
Frightened	.43**	.45	.05
Terrified	.43**	.43	.05
Nervous	.40**	.45	.04
Panicky	.41**	.46	.05
Scared	.43**	.43	.05
Depression			
Hopeless	.19**	.26	.06
Useless	.07	.08	.05
Depressive	-.27**	-.31	.05
Depressed	-.24**	-.28	.06
Hurt	-.04	-.04	.06
Shattered	.22**	.30	.06
Desperate	.16**	.22	.06
Helpless	.16**	.21	.06

Note. *Factor loadings are statistically significant ($p < .01$), ** ($p < .001$).

3.3.2 Composite Reliability

The use of traditional measures of internal reliability such as Cronbach's alpha have been criticised within a latent variable modelling context given the propensity to over- or under-estimate scale reliability (see Raykov, 1998). In order to provide a more rigorous assessment of the internal reliability of the PED (Opris & Macavei, 2007) the current study investigated the composite reliability of the measurement properties of the scale. Composite reliability was calculated using the formula

$$\rho_c = \frac{\left(\sum_{i=1}^{m} \lambda_i\right)^2}{\left(\sum_{i=1}^{m} \lambda_i\right)^2 + \left(\sum_{i=1}^{m} (\theta_i)\right)}$$

Where ρ_c = reliability of the factor score, λ_i = standardized factor loading, and θ_i = standardised error variance. Values greater than .60 are generally considered acceptable (Bagozzi & Yi, 1988; Diamantopoulos & Siguaw, 2000). The results show that the Emotional Distress factor exhibited excellent composite reliability (ρ_c = .98). In contrast, the composite reliability for the four grouping factors were lower, and in the case of the sadness and depression factors, the reliabilities were unacceptably low (concern, ρ_c = .66; anxiety, ρ_c = .80; sadness, ρ_c = .25; depression, ρ_c = .55). These results provide further indications that the distinct grouping factors are of little relevance, and that the PED is best conceptualised as a unidimensional measure of emotional distress.

3.4 Discussion Section

In order to investigate the factor structure of the PED (Opris & Macavei, 2007) five theoretically plausible models were estimated and investigated using traditional CFA techniques and confirmatory bifactor modelling procedures within an alternative models framework. The PED scale was constructed upon a multidimensional foundation and was intended to capture the qualitative distinctions between functional (concern and sadness) and dysfunctional (anxiety and depression) negative emotional responses. Since the scale had never before been subjected to a thorough investigation of its underlying latent structure it remained unknown whether the PED was effectively capturing the hypothesised qualitative distinctions among the negative emotions, or whether a factorial solution consistent with the unitary approach to emotions that stresses quantitative distinctions between functional and dysfunctional emotions would offer a more parsimonious account of the latent structure of the PED. This statistical approach offered a unique and original method of testing the competing predictions of the unitary and binary models of emotion. Although certain findings had offered support for REBT's binary model of emotions (David et al., 2002; David et al., 2004; David et al., 2005a; David et al., 2005b), it has proved extremely difficult to produce unequivocal evidence of the superiority of one model over the other.

The results of the current study succeeded in offering support for the construct validity of the PED, but failed to produce evidence that could be brought to bear on the current debate regarding the distinctions between the unitary and binary models of emotion. Based upon the CFA results Model 1 (a one factor solution) was rejected as a poor representation of the observed data with none of the fit indices satisfying criteria for acceptable model fit. Model 2 was a two-factor solution comprising a functional negative emotional distress construct (representing items from the sadness and concern subscales) and a dysfunctional negative emotional distress construct (representing items from the depression and anxiety subscales). This model too yielded poor model fit statistics and was therefore rejected as an inadequate factorial solution.

Models 3 and 4 were developed to be consistent with the predictions of the binary and unitary models of emotions, respectively. Both models produced very similar model fit statistics and indistinguishable AIC values. Surprisingly, both models failed to

provide an acceptable fit of the data. Model 4 (the unitary model) displayed a χ^2-to-df ratio greater than 3:1 and failed to reach minimum standards for adequate model fit on the CFI, TLI, and RMSEA indices. Model 3 (the binary model) was also rejected as a poor approximation of the data given that it also produced a χ^2-to-df ratio greater than 3:1, and the TLI and RMSEA values failed reach acceptable levels for adequate model fit.

That the unitary and binary models produced extremely similar fit results is generally consistent with the overall empirical literature in this area. Previous authors (DiLorenzo, David, & Montgomery, 2011) have discussed the difficulties that are associated in finding suitable investigative methods of distinguishing between the two models. The current results represent the first instance in which latent variable modelling procedures have been applied in order to find a solution.

Many researchers (Chen et al., 2006; Reise et al., 2010) have argued that a significant limitation of factor analytic research is the use of a traditional one-factor model when attempting to assess unidimensionality. This type of model structure is rarely expected or discovered to adequately explain the covariation among the observable indicators of a scale given the necessity of using heterogeneous item sets in order to capture the diverse aspects of a single psychological variable. Using a one-factor solution as the foundational model in any comparative work is believed to be misguided. Thus, Chen et al. and Reise et al. have recommended that a bifactor model be considered a baseline model of unidimensionality given the ability of a bifactor conceptualisation to model unidimensionality while also accounting for appearances of multidimensionality. The basis for this is homogeneous item sets developed to capture the diverse elements of the latent variable of interest. Bifactor modelling therefore has the capacity to determine whether these grouping factors have any statistical relevance or whether they are better conceptualised as rather unimportant method effects.

In line with these recommendations, a bifactor model conceptualisation was investigated as a possible explanation of the latent structure of the PED (Opris & Macavei, 2007). This model included a general factor of Emotional Distress in which all 26 items load onto this factor, and four grouping factors (concern, anxiety, sadness, and depression) reflecting the distinct item sets. Each item therefore was allowed to load

onto the Emotional Distress factor and its respective grouping factor. This bifactor model emerged as the only viable factorial solution exhibiting acceptable model fit values across all fit indices (see Table 3.1).

Inspection of the model parameters provided considerable evidence for a unidimensional conceptualisation of the PED (Opris & Macavei, 2007). All twenty-six items loaded strongly onto the emotional distress factor, with the majority of items displaying factor loadings in excess of .60, thus generally satisfying the strict criteria outlined by Hair et al. (1998). Contrastingly, factor loadings for each of the four grouping factors were consistently low, with a number of items not reaching the level of statistical significance. These results provide unequivocal evidence that a large proportion of the variation within each of the observable indicator is attributable to a single emotional distress latent variable, rather than as a result of any of the four grouping factors (concern, anxiety, sadness, and depression). It is therefore strongly recommended that the PED be considered a unidimensional measure of emotional distress with four grouping or method factors also present, and therefore researchers should avoid the construction of subscales in the scoring of the PED in future research efforts.

This recommendation is strengthened by the obtained composite reliability results. Composite reliability is a superior method of establishing the internal reliability of a congeneric set of observable indicators within a latent variable modelling context than more traditional methods such as Cronbach's alpha coefficient, which has been demonstrated to both over- and under-estimate scale reliability (see Raykov, 1998). The Emotional Distress factor was found to possess extremely good internal reliability while the four grouping factors displayed noticeably lower reliability values, and in the case of both the sadness and depression factors, reliability was poor. These results provide further indication that within the current sample, the development of subscales would be unwarranted.

3.4.1 Limitations

As is the case with any research project, there are limitations that need to be indicated. The current analysis was conducted within a sample of 313 participants drawn from a unique and specialised population (combat, law enforcement, and related emergency

service personnel) therefore these results are not widely generalizable. Future studies will need to retest the factor structure of the PED (Opris & Macavei, 2007) among more diverse population groups in order to develop a more robust picture of the true underlying latent structure of this measure. Additionally, construct validation studies are preferably conducted on far larger sample sizes which can additionally facilitate investigation of the factorial invariance of the measure between the sexes. However, given the extremely specialized nature of the current sample, this limitation was impossible to overcome.

3.4.2 Conclusion

In conclusion, the current study provides initial evidence of the underlying factor structure of the PED and suggests that the PED is best conceptualised as a unidimensional measure of emotional distress which includes four grouping/method factors that exist due to item heterogeneity. These findings indicate that the PED is not a valid method of capturing the qualitative distinctions between functional and dysfunctional negative emotions as described in REBT theory and its use is therefore questioned when investigating predictions of the binary model of emotions. However, the PED does appear to be a valid measure of emotional distress, possessing excellent internal reliability, and of good practical value given its short length and ease of completion.

Chapter 4

The Interrelations of Irrational Beliefs in Posttraumatic Stress Symptomology: An Empirical Investigation of REBT Theory using Structural Equation Modelling

A paper based on this chapter has been published in the **Journal of Clinical Psychology**

Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2014). The organisation of irrational beliefs in posttraumatic stress symptomology: Testing the predictions of REBT theory using structural equation modelling. *Journal of Clinical Psychology, 70*, 48-59. doi: 10.1002/jclp.22009

Abstract

This study directly tests a central prediction of Rational Emotive Behaviour Therapy (REBT) that has received little empirical attention regarding the core and intermediate beliefs in the development of posttraumatic stress symptoms. A theoretically consistent REBT model of posttraumatic stress symptomology (PTS) was examined using structural equation modelling techniques among a sample of 313 trauma-exposed military and law enforcement personnel. The REBT model of PTS provided a good fit of the data ($\chi 2$ = 599.173, df = 356, p < .001; RMSEA = .05 (CI = .04 - .05); SRMR = .04; CFI = .95; TLI = .95). Results demonstrated that Demandingness beliefs indirectly impacted the various symptom groups of PTS through a set of secondary irrational beliefs that include Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs. Results were consistent with the predictions of REBT theory and provide strong empirical support that the cognitive variables described by REBT theory are critical cognitive constructs in the prediction of posttraumatic stress symptomology.

4.1 Introduction

Approaches informed by the theoretical formulations of Cognitive Behavioural Therapy (CBT) to the conceptualization and treatment of various psychological disorders have proven themselves to be among the most thoroughly investigated (Barlow, 2001; Chambless & Hollon, 1998) and empirically supported treatments available (Butler, Forman, Chapman, & Beck, 2006; Chambliss & Ollindick, 2001; Engels, Garnefsky, & Diekstra, 1993; Lyons & Woods, 1991). CBT based therapies are predicated upon the theory that psychological disorders are the result of dysfunctional cognitive processing (Ellis, 1962, 1994; Beck, 1976). David and Szentagotai (2006) explain that from the CBT perspective, complex human processes such as cognition, affect, and behaviour are considered to be 'cognitively penetrable'. This implies that such processes are the direct result of some form of conscious or unconscious cognitive processing, and that if changes are affected in a person's cognitive processes, either through direct or indirect means, changes can be brought about in an individual's cognitive, emotional and behavioural responses.

Within the CBT tradition there are numerous approaches including Cognitive-Behavioural Modification (Meichenbaum, 1977), Multimodal Therapy (Lazarus, 1976), Dialectical Behaviour Therapy (Linehan & Dimeff, 2001), Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 2003) and Reality Therapy (Glasser, 1965) (see Kuehlwein & Rosen, 1993 for a full review). Two of the most influential and widely used approaches within the CBT tradition are Rational Emotive Behaviour Therapy (REBT: Ellis, 1958, 1962, 1994a) and Cognitive Therapy (CT: A. T. Beck, 1963, 1976; J. S. Beck, 1995).

Each approach within the CBT tradition is similar by virtue of the fact that there is a theoretical agreement that cognitive variables mediate the impact of stressful events on the development of cognitive, emotional, and behavioural distress (a diathesis-stress model). However, each approach within the CBT field has a unique and distinct diathesis-stress model related to the specific kinds of (dysfunctional) cognitions that are hypothesised to be the key etiopathogenetic mechanisms in the development of psychopathology (David & Szentagotai, 2006). This differential focus on various types of cognitive variables means that each approach within the CBT field has a distinct

model of psychopathology, and consequentially, a distinct clinical approach to the treatment of psychopathology.

4.1.1 The Theory of REBT

Rational Emotive Behaviour Therapy (REBT; Ellis, 1994) is the original cognitive-behavioural model of psychopathology. REBT theory built upon Ellis' 'ABC' model of emotional distress which states that cognitive-emotional-behavioural-physiological responses or Consequences (C) are not the direct product of the adverse Activating events experienced in our internal or external environments (A), but are rather the result of our evaluative or appraisal Beliefs (B) about these Activating events. According to REBT theory there are two main classes of evaluative beliefs; rational beliefs and irrational beliefs.

Rational beliefs reflect flexible and non-extreme evaluations of the events we experience in our day-to-day lives whereas irrational beliefs reflect rigid, absolutistic, and extreme evaluations of various kinds of activating events (Dryden & Neenan, 2004). REBT theory predicts that if a person responds to a negative activating event with a set of rational beliefs, a series of functional and adaptive cognitive-emotional-behavioural-psychological consequences will arise. Alternatively, if a person holds a set of irrational beliefs about a given negative activating event then a series of dysfunctional and maladaptive cognitive-emotional-behavioural-physiological responses will develop.

Contemporary REBT theory (see David, Ellis, & Lynn, 2010) describes four basic irrational belief processes which are hypothesised to interact with each other in a specific manner to bring about a psychopathological response. According to the model, the core psychological process in the emergence of psychopathology is the transformation of flexible 'preferences' for goal fulfilment (Rational Beliefs) into rigid 'demands' (Irrational Beliefs) (Ellis, 1994; Wallen, DiGiuseppe, & Dryden, 1992). This process of escalating flexible Preference beliefs (e.g., "*I want to succeed at this task*") into rigid Demandingness beliefs (e.g., "*I must succeed at this task*") is hypothesised to represent the core psychological process in the development of psychopathology (David et al., 2010; Soloman, Arnow, Gotlib, & Wind, 2003). Demandingness beliefs as such are viewed as the primary irrational belief process and are predicted to give rise to a set of secondary irrational appraisal beliefs which are *extreme* in nature. These include

"Catastrophizing" beliefs which describe the process of evaluating an event in the most extremely negative manner possible; "Low Frustration Tolerance" beliefs, which involve a person terrifically underestimating his or her own ability to tolerate or cope with the distress of not having their demand met; and "Depreciation" beliefs, which involve a person making overgeneralized, global negative evaluations of the self, others, and/or the world. REBT theory is explicit in stating that Demandingness beliefs should impact upon various states of psychopathology indirectly through Catastrophizing, Low Frustration Tolerance, and/or Depreciation beliefs (David et al. 2010; Ellis, 1994).

4.1.2 An Empirical Review of the Organisation of the Irrational Beliefs

Solomon, Haaga, Brody, Kirk, and Friedman (1998) attempted to test the REBT hypothesis that Demandingness beliefs represent the core psychological process in psychopathology through the application of a research design which compared levels of Demandingness beliefs between a remitted-depression group and a never-depressed group. This design allowed the researchers to identify whether the presence of irrational beliefs posed a risk factor for the development of depression, or if irrational beliefs were merely a correlate of depression. Soloman et al. (1998) used two measures of irrational beliefs and a priming method to attempt to activate latent irrational beliefs. Results of the study indicated that no differences existed in the endorsement of irrational beliefs between the two groups suggesting that irrational beliefs fluctuate with depression levels. This result stands in contradiction to the predictions of REBT theory.

However, Soloman, Arnow, Gotlib, and Wind (2003) replicated the study, this time also using a measure of irrational beliefs that would identify the specific and idiosyncratic kinds of Demandingness beliefs held by depressed clients that REBT theory hypothesises are at the core of psychopathological disorders including depression. In line with their predictions, Soloman et al. (2003) found that although there was no difference in the rates of endorsement of irrational beliefs between the remitted-depression group and the never-depressed group on a general measure of irrational beliefs, there were very large and statistically significant differences between the groups on the specific measure of Demandingness beliefs. The remitted-depression group were nine times more likely than the never-depressed group to hold at least one strong self-demand, and 70% of the remitted-depression group possessed at least one strong self-demand compared to just 20% of the never-depressed group. Soloman et

al.'s (2003) findings support REBT's hypothesis that Demandingness beliefs are a core psychological construct in the development of depression (Ellis, 1987) and that irrational beliefs represent cognitive vulnerability factors that can lead to the development of psychopathology (Ellis, 1994).

Factor analytic research has provided some support for the interrelations between the irrational beliefs, demonstrating that Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs are all associated with each other, and all three processes are related directly to Demandingness beliefs (Fulop, 2007; Bernard, 1998; DiGiuseppe, Leaf, Exner, Robin, 1988).

David et al. (2002), and David, Ghinea, Macavei, and Kallay (2005) attempted a more direct examination of the interrelations of the irrational beliefs within the paradigm of Lazarus's (1991) Appraisal Theory of emotions among a variety clinical and non-clinical samples. In both studies and among all samples it was found that Demandingness beliefs were highly correlated with primary appraisals, and more strongly associated with primary appraisals than with Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs. Furthermore, Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs were highly related to secondary appraisals. The results of these two studies support the primary appraisal role of Demandingness beliefs and demonstrated that the effect of Demandingness beliefs on the development of emotions is likely mediated by the secondary appraisal mechanisms of Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs as predicted by REBT theory.

This meditational relationship was then specifically tested by DiLorenzo et al. (2007) through the use of meditational analysis. The researchers examined the interrelations of the irrational beliefs on the development of exam-related distress at two time points (at the beginning of a college semester and immediately prior to the sitting of an important exam). Their results showed that at both time points each irrational belief process was significantly correlated with exam-related distress. At time 1, the effect of Demandingness on the development of distress was completely mediated by Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs. At time 2, the effect of Demandingness was completely mediated by Catastrophizing and Depreciation beliefs but not by Low Frustration Tolerance beliefs. These results provide strong empirical support that not only do irrational beliefs about specific events give rise to

psychopathological responses but that the interrelations between the irrational beliefs are as hypothesised by REBT theory.

4.1.3 Current Study

Past research findings offer support for the predictions of REBT theory regarding the organisation of the irrational belief processes however given the central nature of this prediction to REBT theory and therapy, far greater research is warranted. The purpose of the current chapter is to directly test this key prediction of REBT theory within a sample of trauma-exposed participants who are experiencing posttraumatic stress symptoms, utilizing latent variable modelling techniques. No empirical work could be found that has directly assessed the role of irrational beliefs, as outlined in REBT theory, in the development or maintenance of PTS. Given that these cognitive variables are unique and distinct from the types of cognitive variables described in the field of CT (see Hyland & Boduszek, 2012) which have informed current cognitive models of PTSD (e.g. Ehlers & Clark, 2000; Clark & Beck, 2011), the current study will add valuable and unique data to the scientific literature regarding the importance of irrational beliefs in PTS. Additionally, the current study will be the first to utilize latent variable modelling procedures to assess the organisation of the irrational beliefs and their direct and indirect effects on psychopathological outcomes.

4.2 Methods Section

4.2.1 Participants

The sample for the current study consisted of three hundred and thirteen (N = 313) trauma-exposed individuals employed in a range of front-line emergency services. The sample comprised an international group of soldiers (n = 81, 25.9%), police officers (n = 183, 58.5%), and associated emergency service personnel (n = 49, 15.7%). All participants were recruited from active-duty while serving in the Republic of Ireland and the Republic of Kosovo over a twelve month period (June 2011 – June 2012). The mean number of exposures to traumatic life events for the current sample was 2.75 (SD = 1.51, range 1-11). The most frequently cited traumatic life experience was being involved in, or witness to, a serious accident, fire, or explosion (60%, n = 189); followed by a non-sexual assault by a stranger (57%, n = 178); and military combat (43%, n = 133). The most infrequently reported traumatic life events was torture (1.6%, n = 5).

The sample consisted of 212 males (67.7%) and 101 females (32.3%). The participants ranged in age from 23 to 65 (M = 38.18, SD = 8.70). The majority of the participants resided in suburban areas (44.4%; n = 139), and urban areas (37.1%, 116), and the remainder indicated that they reside in rural areas (18.5%, n = 58). The majority of the sample participants possessed at least a secondary/high school level diploma (55.9%, n = 175) while 108 held a bachelor's degree (34.5%), 28 participants possessed a master's degree (8.9%), and 2 individuals reported possessing a doctoral degree (0.6%). The majority of respondents were currently married (n= 154, 49.2%), while 19.5% reported their marital status to be single (n = 61), 21.4% were cohabiting with a partner (n = 67), and 9.9% of respondents were divorced (n = 31).

4.2.2 Procedures

The current sample was gathered in an opportunistic fashion in the Republic of Ireland and the Republic of Kosovo. Ethical approval was first granted from the Ethics committee of the University of Ulster, subsequently written approval was obtained by the principal researcher to approach members of the respective institutions that took part in the current study. Participants were informed of the nature of the study being under taken either by a member of the research team or an assigned liaison for a particular

organisation, and each participant's involvement in the research project was voluntary. No obligations were placed upon potential respondents nor were any inducements employed to recruit the sample. Each participant was assured about confidentiality and those who chose to take part in the research project had the option of completing either an anonymous self-administered paper-and-pencil version of the questionnaire or an electronic version which was delivered and returned via email. The majority of respondents chose the paper-and-pencil option (63.26%, n = 198).

4.2.3 Materials

The Posttraumatic Stress Diagnostic Scale (PDS: Foa, Cashman, Jaycox, & Perry, 1997) is a 49-item self-report measure of the severity of posttraumatic stress symptomology related to a particular traumatic event. The PDS assess all aspects of a posttraumatic stress disorder diagnosis from Criteria A to F as outlined in the Diagnostic and Statistical Manual of Mental Disorders IV (American Psychiatric Association, 1994). The PDS measures the nature of the traumatic experience, the duration of the experienced symptoms, the impact of the experienced symptoms on daily functioning, and the severity of the symptoms. Seventeen items measure each of the identified symptoms of PTSD along a four-point Likert scale. Respondents rate the severity of each symptom from a score of 0 ("not at all or only one time") to 3 ("5 or more times a week / almost always"). This produces a total range of scores from 0-51 with higher scores indicating higher levels of posttraumatic stress symptomology. Scores from 0-10 reflect mild symptoms of PTSD; scores from 11-20 reflect moderate symptoms of PTSD; scores from 21-35 reflect moderate-to-severe symptoms of PTSD; while scores from 36-51 reflect severe symptoms of PTSD. Within the current sample 59% (n = 181) of respondents reported mild symptoms, 15.3% (n = 47) reported moderate symptoms, 24.4% (n = 75) reported moderate-severe symptoms, and 1.3% (n = 4) reported severe symptoms. The PDS possesses strong psychometric properties with Griffin, Uhlmansiek, Resick, and Mechanic (2004) demonstrating that it shares a strong correlation with the Clinician-Administered PTSD scale (Blake et al., 1995). Cronbach alpha levels for each subscale of the PDS are reported in Table 4.1.

The Abbreviated Version of the Attitudes and Belief Scale 2 (AV-ABS2: Hyland, Shevlin, Adamson, & Boduszek, 2013) is a 24-item self-report measure of rational and irrational beliefs, as defined by current REBT theory (David et al., 2010).

The AV-ABS2 measures all four irrational belief processes (Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciation) and their corresponding four rational belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance). Each subscale is measured via three items. Items of the AV-ABS2 include, "*I must do well at important things, and I will not accept it if I do not do well*" (Demandingness); "*It's awful to be disliked by people who are important to me, and it is a catastrophe if they don't like me*" (Catastrophizing); "*Its unbearable being uncomfortable, tense or nervous and I can't stand it when I am*" (Low Frustration Tolerance); and "*If I do not perform well at tasks that are very important to me, it is because I am a worthless bad person*" (Depreciation). The AV-ABS2 produces total scores on each of the individual rational and irrational belief processes. Item are scored along a five-point Likert scale from 1 ("Strongly Disagree") to 5 ("Strongly Agree"), with higher scores in each case indicating higher levels of the respective variable. Possible scores for each subscale range from 3-15 with higher scores indicative of higher levels of each belief process. The AV-ABS2 exhibited satisfactory internal consistency with all subscales recording a Cronbach's Alpha level above .80 (see Table 4.1).

4.2.4 Analysis

As can be seen in Figure 4.1, the model under investigation in the current study represents the predictions of REBT theory in which Demandingness beliefs are modelled as the primary irrational belief process, and exert an indirect impact on PTS via Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs. Structural equation modelling (SEM) techniques were utilized to test this model. SEM is a combination of two analytical procedures; confirmatory factor analysis (CFA) which assesses the measurement component of a theoretical model, and path analysis which assesses the relationship between latent variables. Within an SEM framework, the structural and measurement elements of analysis are estimated simultaneously (McCallum & Austin, 2000). A number of other features make the use of SEM procedures appropriate for the current analysis. These include controlling for systematic and random measurement error and the ability to simultaneous test for both direct and indirect effects within a model (Bollen, 1989; Kline, 2005). The SEM analysis was conducted in Mplus version 6.0 (Muthen & Muthen, 1998 – 2010) with Robust Maximum Likelihood (MLR) estimation.

The overall fit of each model and the relative fit between models were assessed using a range of goodness-of-fit statistics and assessment of the appropriateness of the model parameters. The chi-square ($\chi 2$) statistic assessed the sample and implied covariance matrix and a good fitting model is indicated by a non-significant result. However the chi-square statistic is strongly associated with sample size, and as such good models tend to be over-rejected. Therefore Tanaka (1987) suggested that a model should not be rejected simply on the basis of a significant chi-square result. Accordingly, it is recommended that researchers examine the ratio of the chi-square value to the degrees of freedom (df), and according to Klein (1994), any model with a $\chi 2$-to-df ratio of less than 3:1 indicates a good fitting model. The Comparative Fit Index (CFI; Bentler, 1990) and the Tucker Lewis Index (TLI; Tucker & Lewis, 1973) are measures of how much better the model fits the data compared to a baseline model where all variables are uncorrelated. For these indices values above .90 indicate reasonable fit while values above .95 indicate good model fit (Bentler, 1990; Hu & Bentler, 1999). In addition, two more absolute indices are presented; the standardized root mean-square residual (SRMR: Joreskog & Sorborn, 1981) and the root mean-square error of approximation (RMSEA: Steiger, 1990). Ideally these indices should be less than .05 however values less than .08 also suggest adequate fit (Bentler, 1990; Hu & Bentler, 1999; Joreskog & Sorborn, 1993). Furthermore, Akaike Information Criterion (AIC; Akaike, 1974) was used to evaluate the alternative models, with the smaller value indicating the best fitting model. The CFI, RMSEA and the AIC all have explicit penalties for model complexity.

4.3 Results Section

4.3.1 Descriptive Statistics and Correlations

Descriptive statistics including means (M), standard deviations (SD), and range for all variables are presented in Table 4.1, together with Cronbach's Alpha reliability results (Cronbach, 1951). Correlations between all variables are also presented. Results suggest that the current sample experienced relatively low-to-moderate levels of posttraumatic stress symptoms overall. Furthermore, moderate levels of each of the irrational belief process were observed among the current sample. Correlations between all measured variables were positive, statistically significant, and ranged from moderate to strong.

Table 4.1

Descriptive statistics, Cronbach Alpha, and Correlations between Demandingness, Catastrophizing, Low Frustration Tolerance, Depreciation, Intrusions, Avoidance, Dysphoria, Hyperarousal

Item	1	2	3	4	5	6	7	8
1. Demandingness	---							
2. Catastrophizing	.81	---						
3. Low Frustration Tolerance	.84	.80	---					
4. Depreciation	.81	.81	.73	---				
5. Intrusions	.73	.71	.69	.69	---			
6. Avoidance	.51	.56	.53	.52	.63	---		
7. Dysphoria	.69	.69	.68	.67	.79	.60	---	

8. Hyperarousal	.63	.63	.59	.60	.76	.54	.71	---
Means	7.06	7.30	7.84	6.17	3.52	1.34	5.12	1.44
SD	3.71	3.75	3.72	4.18	3.28	1.62	5.41	1.78
Range	3-15	3-15	3-15	3-15	0-14	0-6	0-21	0-6
Possible Range	3-15	3-15	3-15	3-15	0-15	0-6	0-24	0-6
Cronbach Alpha	.88	.86	.84	.95	.86	.77	.90	.88

Note. All correlations are statistically significant ($p < .001$).

4.3.2 Measurement Models

Anderson and Gerbing (1988) state that it is necessary to determine the appropriate factor structure of any measure used in a study prior to investigating the structural model.

Based on extensive findings regarding the factor structure of posttraumatic stress indicators (Yufik & Simms, 2010), three alternative model conceptualizations of the PDS (Foa et al., 1997) were specified and tested using CFA techniques. Model 1 is a four-factor solution (Intrusions, Avoidance, Emotional Numbing, and Hyperarousal) first suggested by King, Leskin, King, and Weathers (1998): Model 2 is an alternative four-factor solution (Intrusions, Avoidance, Dysphoria, Hyperarousal) first suggested by Simms, Watson, and Doebbeling (2002): and Model 3 is the DSM-IV's three-factor solution (Intrusions, Avoidance and Emotional Numbing, and Hyperarousal). As outlined in Table 4.2, the Simms et al. 'Dysphoria' model was found to be most accurate model solution demonstrating the most impressive fit statistics and the lowest AIC value.

Table 4.2

Fit Indices for Factor Models of the PDS and AV-ABS2

Measure	χ^2	***df***	**CFI**	**TLI**	**RMSEA**	**SRMR**	**AIC**
PDS							
King et al.	208.115*	113	.96	.95	.05	.04	10357.414
Simms et al.	152.937*	113	.98	.98	.03	.03	10257.512
DSM-IV	269.955*	116	.93	.92	.07	.05	10439.115
AV-ABS2							
8 Factor Model	488.908*	224	.94	.92	.06	.05	20955.071
4 Factor Model	844.996*	246	.86	.84	.08	.09	21337.153
2nd Order Model	733.998*	243	.88	.87	.08	.08	21201.614

Note. χ^2 = chi square goodness of fit statistic; *df* = degrees of freedom; RMSEA = Root-Mean-Square Error of Approximation; AIC = Akaike Information Criterion; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; SRMR = Standardized Square Root Mean Residual. * Indicates χ^2 are statistically significant ($p < .001$).

Additionally all items, bar one item measuring Dysphoria, exhibited positive, statistically significant factor loadings above 0.60 satisfying the criteria recommended by Hair, Anderson, Tatham, & Black. (1998). Item 8 which measures trauma related amnesia, was the only item with a factor loading below .60 recording a positive, statistically significant factor loading of .44. This finding is consistent with the wider literature that finds this item a generally weak indictor of Dysphoria (Breslau, Reboussin, Anthony, & Storr, 2005) (see Table 4.3).

Table 4.3

Standardized and Unstandardized Factor Loadings (and Standard Errors) for the Four-Factor Model of the PDS

Item	***β***	**B**	**SE**
Factor 1 (Intrusions)			
Upsetting thoughts	.80	1.00	--
Nightmares	.72	.76	.06
Relieving the trauma	.73	.89	.07
Emotionally upset upon reminders	.70	.88	.06
Physical reactions to reminders	.80	.96	.06
Factor 2 (Avoidance)			
Not thinking/talking of the trauma	.76	1.00	--
Avoiding trauma related activities/places/people	.82	1.09	.09
Factor 3 (Dysphoria)			
Trauma amnesia	.44	1.00	--
Loss of interest	.82	2.10	.34
Feeling cut-off from others	.85	2.52	.41
Emotionally numb	.66	1.66	.27
Thinking future plans will not come true	.81	2.50	.42
Trouble falling asleep	.71	2.14	.38
Feeling irritable	.79	2.24	.38
Trouble Concentrating	.75	2.16	.37

Factor 4 (Hyperarousal)			
Overly alert	.85	1.00	--
Jumpy and easily startled	.91	1.08	.06

Note. All Factor loadings are statistically significant ($p < .001$).

Three distinct factor models of the AV-ABS2 were compared using CFA. Model 1 is an eight-factor model representing the four irrational belief processes and the four rational belief processes with each factor comprised of three items. Model 2 is a four-factor phenomenon comprised of each of the four irrational belief types with six items loading onto each factor. In this model the three items measuring the opposing rational beliefs are expected to load onto their opposite irrational belief. Model 3 is a second order variation of Model 1 in which the four irrational belief factors load onto a single Irrationality factor, and the four rational belief factors load onto a single Rationality factor.

Table 4.2 reports the fit indices for the three alternative models of the AV-ABS2. As can be observed the eight-factor solution (Model 1) demonstrated satisfactory model fit, and superior fit statistics to the alternative conceptualizations. Additionally, the eight-factor solutions possessed the lowest AIC value further indicating it as the best model solution. Table 4.4 reports the standardized and unstandardized factor loadings (with standard errors) for each observed variable on their latent variable (factor). All factor loadings were positive and statistically significant, and all items possessed a factor loading greater than .40 with the majority of indicators exhibiting factor loadings above .60 thus generally satisfying the strict recommendations of Hair et al. (1998) for factor loading requirements.

Table 4.4

Standardized and Unstandardized Factor Loadings (and Standard Errors) for the Eight-Factor Model of the AV-ABS2

Item	***β***	**B**	**SE**
Factor 1 (Demandingness)			
1. I must do well at important things, and I will not accept it if I do not do well.	.78	1.00	--
2. It's essential to do well at important jobs; so I must do well at these things.	.78	.97	.07
3. I must be successful at things that I believe are important, and I will not accept anything less than success.	.76	1.03	.07
Factor 2 (Catastrophizing)			
4. It's awful to be disliked by people who are important to me, and it is a catastrophe if they don't like me.	.78	1.00	--
5. Sometimes I think the hassles and frustrations of everyday life are awful and the worst part of my life.	.76	.98	.06
6. If loved ones or friends reject me, it is not only bad, but the worst possible thing that could happen to me.	.74	.91	.06
Factor 3 (Low Frustration Tolerance)			
7. Its unbearable being uncomfortable, tense or nervous and I can't stand it when I am.	.76	1.00	--
8. It's unbearable to fail at important things, and I can't stand not succeeding at them.	.62	.86	.09
9. I can't stand being tense or nervous and I think tension is unbearable	.83	1.10	.07
Factor 4 (Depreciation)			

10. If important people dislike me, it is because I am an unlikable bad person.	.92	1.00	--
11. If I do not perform well at tasks that are very important to me, it is because I am a worthless bad person.	.91	1.04	.03
12. When people I like reject me or dislike me, it is because I am a bad or worthless person.	.96	1.11	.03
Factor 5 (Preferences)			
13. I do not want to fail at important tasks but I realize that I do not have to perform well just because I want to.	.68	1.00	--
14. I want to perform well at some things, but I do not have to do well just because I want to.	.68	.93	.09
15. I want to do well at important tasks, but I realize that I don't have to do well at these important tasks just because I want to.	.69	1.04	.13
Factor 6 (Non-Catastrophizing)			
16. It is unfortunate when I am frustrated by hassles in my life, but I realize it's only	.60	1.00	--
17. When life is hard and I feel uncomfortable, I realize it is not awful to feel uncomfortable or tense, only unfortunate and I can keep going.	.56	.99	.21
18. It's bad to be disliked by certain people, but I realize it is only unfortunate to be disliked by them.	.59	1.05	.17
Factor 7 (High Frustration Tolerance)			
19. I do not like to be uncomfortable, tense or nervous, but I can tolerate being tense.	.57	1.00	--
20. I get distressed if I'm not doing well at important tasks, but I can stand the distress of failing at important tasks.	.45	.74	.15

21. It's only frustrating not doing well at some tasks, but I know I can stand the frustration of performing less than well.	.79	1.22	.14
Factor 8 (Acceptance)			
22. When people whom I want to like me disapprove of me, I know I am still a worthwhile person.	.92	1.00	--
23. Even when my life is tough and difficult, I realize that I am a person who is just as good as anyone else even though I have hassles.	.98	1.12	.03
24. When my life becomes uncomfortable, I realize that I am still a good person even though I am uncomfortable.	.91	.99	.03

Note. All Factor loadings are statistically significant ($p < .001$).

4.3.3 Structural Model

The REBT model of PTS (Figure 4.1) was developed based upon the results obtained from the previous CFA analyses and included eight latent variables: *Demandingness, Catastrophizing, Low Frustration Tolerance, Depreciation, Intrusions, Avoidance, Dysphoria, and Hyperarousal.* The REBT based model of PTS produced satisfactory model fit statistics: $\chi 2$ = 599.173, df = 356, $p < .001$; RMSEA = .05 (CI = .04 - .05); SRMR = .04; CFI = .95; TLI = .95, and explained 67% of the variance in Intrusions, 50% of variance in Avoidance, 67% of variance in Dysphoria, and 56% of variance in Hyperarousal.

Figure 4.1

REBT model of Posttraumatic Stress Symptomology

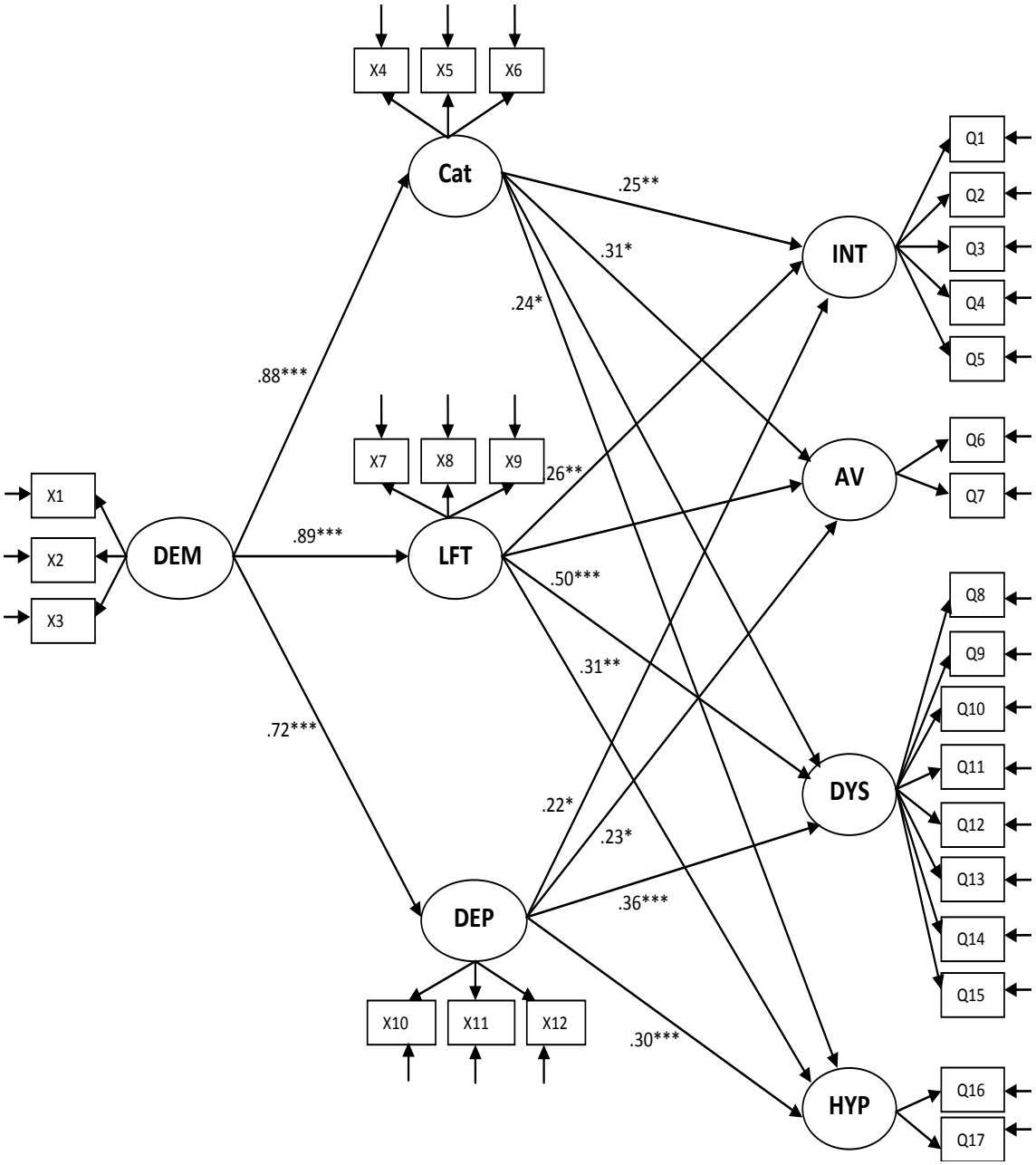


Figure 1 Legend:

Note: DEM = Demandingness, CAT = Catastrophizing, LFT = Low Frustration Tolerance, DEP = Depreciation, INT = Intrusions, AV = Avoidance, DYS = Dysphoria, HYP = Hyperarousal. X1- X12 = items included in the Abbreviated Version of the Attitudes and Belief Scale 2, Q1- Q17 = items included in Posttraumatic Diagnostic Scale. Statistical significance: * $p < .05$; ** $p < .01$; *** $p < .001$

Table 4.5 displays the standardized and unstandardized (direct and indirect) regression weights for the specified REBT structural equation model of PTS. As can be noted Demandingness beliefs had a strong, direct effect on Catastrophizing beliefs ($\beta = .89$, $p < .001$), Low Frustration Tolerance beliefs ($\beta = .89$, $p < .001$), and Depreciation beliefs ($\beta = .72$, $p < .001$). In terms of the direct impact of the secondary belief processes on Intrusions, Catastrophizing beliefs ($\beta = .25$, $p < .01$), Low Frustration Tolerance beliefs ($\beta = .26$, $p < .01$), and Depreciation beliefs ($\beta = .22$, $p < .05$) were all found to make positive, statistically significant contributions. With respect to Avoidance symptoms, Catastrophizing beliefs ($\beta = .31$, $p < .05$), and Depreciation beliefs ($\beta = .23$, $p < .05$) both exerted a weak-to-moderate direct effect. In terms of symptoms of Dysphoria, Low Frustration Tolerance beliefs ($\beta = .50$, $p < .001$), and Depreciation beliefs ($\beta = .36$, $p < .001$) were identified as strong and moderate direct predictors, respectively. Finally, Catastrophizing beliefs ($\beta = .24$, $p < .05$), Low Frustration Tolerance beliefs ($\beta = .31$, $p < .01$), and Depreciation beliefs ($\beta = .30$, $p < .001$) all directly impacted Hyperarousal symptoms to a weak-to-moderate degree.

A number of positive, statistically significant, indirect effects were also observed. An indirect relationship existed between Demandingness beliefs and Intrusions via Catastrophizing beliefs ($\beta = .22$, $p < .01$), Low Frustration Tolerance beliefs ($\beta = .23$, $p < .01$), and Depreciation beliefs ($\beta = .30$, $p < .001$). Statistically significant indirect effects were also observed between Demandingness beliefs and Avoidance via Catastrophizing beliefs ($\beta = .28$, $p < .05$), and Depreciation beliefs ($\beta = .16$, $p < .05$). Additionally, statistically significant indirect effects were observed between Demandingness beliefs and Dysphoria via Low Frustration Tolerance beliefs ($\beta = .44$, $p < .001$), and Depreciation beliefs ($\beta = .26$, $p < .001$). And finally, statistically significant indirect effects were identified between Demandingness beliefs and Hyperarousal via Catastrophizing beliefs ($\beta = .21$, $p < .05$), Low Frustration Tolerance beliefs ($\beta = .27$, $p < .01$), and Depreciation beliefs ($\beta = .21$, $p < .001$).

Table 4.5

Standardized and unstandardized regression weights (with Standard Errors) for the REBT-based structural equation model of posttraumatic stress symptoms

Variables	***β***	**B**	**SE**
Direct Influence			
Demandingness ==> Catastrophizing	.89***	.91	.05
Demandingness ==> Low Frustration Tolerance (LFT)	.89***	.94	.04
Demandingness ==> Depreciation	.72***	1.01	.05
Catastrophizing ==> Intrusions	.25**	.27	.18
LFT ==> Intrusions	.26**	.16	.15
Depreciation ==> Intrusions	.22*	.08	.06
Catastrophizing ==> Avoidance	.31*	.26	.15
LFT ==> Avoidance	.26	.09	.16
Depreciation ==> Avoidance	.23*	.06	.08
Catastrophizing ==> Dysphoria	.05	.02	.08
LFT ==> Dysphoria	.50***	.15	.06
Depreciation ==> Dysphoria	.36***	.05	.03
Catastrophizing ==> Hyperarousal	.24*	.34	.23
LFT ==> Hyperarousal	.31**	.08	.18
Depreciation ==> Hyperarousal	.30***	.09	.09
Indirect Influence			
Demandingness ==> Intrusions via Catastrophizing	.22**	.14	.05
Demandingness ==> Intrusions via LFT	.23**	.15	.06
Demandingness ==> Intrusions via Depreciation	.30***	.20	.04
Demandingness ==> Avoidance via Catastrophizing	.28*	.18	.09

Demandingness ==> Avoidance via LFT	.23	.15	.08
Demandingness ==> Avoidance via Depreciation	.16*	.11	.05
Demandingness ==> Dysphoria via Catastrophizing	.04	.01	.02
Demandingness ==> Dysphoria via LFT	.44***	.13	.03
Demandingness ==> Dysphoria via Depreciation	.26***	.08	.02
Demandingness ==> Hyperarousal via Catastrophizing	.21*	.16	.07
Demandingness ==> Hyperarousal via LFT	.27**	.21	.08
Demandingness ==> Hyperarousal via Depreciation	.21***	.16	.05

R^2

Intrusions R^2 = .67, SE = .04, p < .001; Avoidance R^2 = .50, SE = .06, p < .001; Dysphoria R^2 = .67, SE = .04, p < .001; Hyperarousal R^2 = .56, SE = .06, p < .001;

Fit Indices

$\chi 2$ = 599.173, df = 356, p < .001; RMSEA = .05 (CI = .04 - .05); SRMR = .04; CFI = .95; TLI = .95)

Note. Statistical significance: * p < .05; ** p < .01; *** p < .001

4.4 Discussion

The primary objective of the current chapter was to investigate the theoretical predictions of REBT theory with regards to the organisation of the irrational beliefs hypothesised to be crucial in the pathogenesis of psychopathological symptoms. Moreover, the current study was performed to assess for the first time the importance of the cognitive variables outlined in REBT in the experience of posttraumatic stress symptoms.

In order to test REBT's theoretical model it was necessary to first establish the dimensionality and construct validity of both the PDS (Foa et al., 1997) and the AV-ABS2 (Hyland et al., 2013) using CFA techniques. This analysis was conducted in order to accommodate the required variables within an appropriate latent variable framework. Results of the CFA indicated that the PDS was best represented by the Simms et al. (2002) four-factor model, a finding consistent with the overall literature regarding the symptom structure of PTSD (Yufik & Simms, 2010). The AV-ABS2 was found to be most accurately explained by an eight-factor solution comprised of the four irrational belief processes (Demandingness, Catastrophizing, Low Frustration Tolerance, Depreciation) and the four rational belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, Acceptance). For the purposes of the current study however only the four irrational beliefs were included within the respective structural model as the current chapter was concerned with establishing the organisation of these variables in the emergence of posttraumatic stress symptomology.

Results of the SEM analysis demonstrated that the REBT model of PTS was a good fit of the data. The $\chi 2$-to-df ratio was less than 2:1, and the CFI, TLI, RMSEA, and SRMR results were all within ranges indicative of good model fit. This REBT model explained an impressive amount of variance in each of the four PTS symptom groups. The irrational beliefs were found to explain 67% of variance in Intrusive symptoms, 50% of variance in Avoidance symptoms, 67% of variance in Dysphoria symptoms, and 56% of variance in Hyperarousal symptoms. These findings strongly suggest that the cognitive factors described by REBT are critical cognitive constructs in the development and maintenance of PTSD symptomology.

In addition to identifying the importance of irrational beliefs in the prediction of posttraumatic stress symptomology, this study was primarily interested in identifying the organisation of the irrational beliefs by investigating the indirect pathways between Demandingness beliefs and the various symptom clusters of PTS. Multiple indirect effects were observed from Demandingness beliefs to Intrusions, Avoidance, Dysphoria, and Hyperarousal.

In the case of the relationships between Demandingness beliefs and the Intrusions and Hyperarousal symptom clusters, respectively, indirect effects were observed for all three secondary irrational belief processes. Whereas in the relationship between Demandingness beliefs and Avoidance symptoms, indirect effects were observed for Catastrophizing and Depreciation beliefs, and in the relationship between Demandingness beliefs and Dysphoria symptoms, indirect effects were observed for Low Frustration Tolerance and Depreciation beliefs. These results are consistent with the predictions of REBT theory (David et al., 2010; Ellis, 1994; Wallen et al., 1992) and are generally in line with previous research findings.

Current results lend support to the view that Demandingness beliefs appear to be the primary irrational belief process and impact on the various symptom groups of PTSD in an indirect manner via a variety of the secondary belief process. DiLorenzo et al. (2007) previously found the Catastrophizing and Depreciation beliefs served to mediate the relationship between Demandingness beliefs and exam-related anxiety. Past and current results thus indicate that the relationship between Demandingness beliefs and various psychopathological states will likely not always be mediated via all three secondary irrational belief processes, but rather unique and distinct patterns of relationships between the primary and secondary are likely to exist depending upon the nature of the psychological distress under investigation. David et al. (2002) have previously presented theoretical predictions of the nature of the relationship between the irrational beliefs in the development of anxiety and depressive disorders and current results offer novel evidence that each of the four irrational belief types are critical cognitive variables in posttraumatic stress symptomology. Identification of the critical irrational beliefs in the prediction of psychopathology has important clinical implications as clinical strategies can be focused on only the most relevant irrational belief processes. Based on current results alleviation of Intrusions and Hyperarousal

symptoms would be aided by the targeted modification of Demandingness beliefs, and all three secondary irrational belief processes, while treatment of Avoidance symptoms should be focused on Demandingness, Catastrophizing, and Depreciation beliefs, and levels of Dysphoria could be best modulated by reducing levels of Demandingness, Low Frustration Tolerance, and Depreciation beliefs.

Ellis (1987, 1994) consistently argued that Demandingness beliefs lie at the core of all forms of psychological disturbances and should impact upon various states of psychopathology through Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs. This hypothesis courted considerable criticism from many within the CBT community (e.g., Brown & Beck, 1989; Padesky & Beck, 2003) who asserted that while Demandingness beliefs can sometimes play a role in the emergence of some forms of psychopathology, Demandingness beliefs by no means represent a core psychological construct in all types of psychopathology. Little evidence currently exists to either support or refute this rather grand claim, however Soloman et al. (2003) previously produced evidence to support the primacy of Demandingness beliefs in the major depressive disorder, and current results provide tentative evidence for the importance of conceptualizing Demandingness beliefs as a critical core psychological construct in PTS.

Currently cognitive models of PTSD (e.g. Clark & Beck, 2010; Ehlers & Clark, 2000; Resick & Schnicke, 1993) and measures of specific cognitions relevant to PTSD (e.g. Foa, Ehlers, Clark, Tolin, & Orsillo, 1999; Najavits, Gotthardt, Weiss, & Epstein, 2004; Vogt, Shipherd, & Resick, 2012) make no explicit accommodation of Demandingness beliefs. Since empirically validated CBT treatment protocols derive directly from these theoretical models, current results suggest the possibility of improving theoretical understandings and potentially developing more efficacious treatment approaches if consideration of Demandingness cognitions were included within relevant theoretical and therapeutic models of PTSD, however substantially greater research would be required to better establish the validity of this possibility.

4.4.1 Limitations

The current study contains a number of limitations which ought to be considered. The nature of the sample is limited to a very specific strata of the population (law

enforcement, military, and emergency service personnel), thus generalisations of current findings to the wider population is problematic. In particular the professions from which the sample were drawn may have influenced the level of Demandingness beliefs observed, therefore future research efforts should seek to replicate the current study among more diverse population groups in order to develop more robust and reliable conclusions. Additionally, a self-report measure of PTSD symptomology was used and although self-report measures of PTSD such as the PDS (Foa et al., 1997) used in the current study have been shown to highly correspond with clinician-administered measures (Griffin et al., 2004), clinician based measures would have been preferable as they are considered the gold standard method of assessing PTSD symptomology. Given the cross-sectional design of the current study, it was possible only to investigate indirect effects rather than testing mediational pathways which REBT theory specifically states. While current findings provide good support for the REBT model, longitudinal research designs will be necessary to more fully eatablish the mediational effects of Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs in the relationship between Demandingness beliefs and PTSD.

4.4.2 Conclusions

In conclusion, this study substantially contributes to the scientific literature in a number of important ways. The current study is the first of its kind to apply latent variable modelling techniques to determine the organisation and interrelations of the irrational beliefs described in REBT theory, and as such offer additional and methodologically rigorous support for the core predictions of REBT theory. These findings are also the first to provide empirical support for REBT theory regarding the importance of the irrational beliefs in posttraumatic stress responses. Findings from the present study also offer the possibility that theoretical and clinical improvements to current CBT models of PTSD might be obtained by considering the important role played by Demandingness beliefs in the development and maintenance of posttraumatic stress symptoms.

Chapter 5

The Role of Trauma-Specific Irrational beliefs in the Relationship between General Irrational Beliefs and Posttraumatic Stress: A Rational Emotive Behaviour Therapy Approach

A paper based on this chapter has been accepted for publication in the **Journal of Loss & Trauma**

Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2014 – in press). Irrational beliefs in posttraumatic stress responses: A rational emotive behaviour therapy approach. *Journal of Loss and Trauma: International Perspectives on Stress & Coping.* doi: 10.1080/15325024.2013.839772

Abstract

Although a core theoretical prediction of Rational Emotive Behaviour Therapy (REBT) is that disorder-specific irrational beliefs should act as a mediator between generalised irrational beliefs and various forms of psychopathology very little research has tested this hypothesis. The current study aimed to test a key theoretical prediction of REBT theory by assessing the role of general and trauma-specific irrational beliefs in the prediction of posttraumatic stress responses. A sample (N = 313) of trauma-exposed emergency service workers participated in the study. Structural equation modelling results demonstrated that an REBT-based model provided satisfactory model fit and explained 89% of variance in posttraumatic stress symptomology. Theoretical predictions were supported with results demonstrating that generalised irrationality indirectly impacted posttraumatic stress responses via a set of trauma-specific irrational beliefs. Results indicate the importance of irrational beliefs in predicting posttraumatic stress responses. Findings of the current chapter provide an empirical response to recent criticisms of REBT theory from within the Cognitive Therapy community, and suggest a new method of developing the field of REBT.

5.1 Introduction

Substantial empirical evidence has been obtained to support both the efficacy and effectiveness of trauma-focused cognitive-behavioural therapy (TF-CBT) for posttraumatic stress disorder (PTSD; Bisson, Ehlers, Matthews, Pilling, Richards & Turner, 2007; Hofmann, Asnaani, Vonk, Sawyer & Fang, 2012). Therapeutic strategies for treating PTSD derive directly from theoretical cognitive models. In Ehlers and Clark's (2000) highly influential model of PTSD two cognitive processes are deemed critical in the development and maintenance of the disorder. First, there is an overly negative interpretation of the traumatic event and its sequelea, and second, there is a poor elaboration of the memory of the traumatic incident and insufficient integration of the trauma memory within one's autobiographical memory.

5.1.1 The Theory of Cognitive Therapy (CT)

The CT model of psychopathology as outlined by A. T. Beck (1976), J. S. Beck (2011), and Leahy (2003), among many others, is a schema-based, information-processing model of psychopathology. According to Beck, Freeman, and associates (1990, p. 4), "*Schemas are the cognitive structures that organize experience and behavior; beliefs and rules represent the content of the schemas and consequently determine the content of thinking, affect and behaviour*". In other words, schemas are particular kinds of cognitive structures which are comprised of an organised set of beliefs which, when activated, can influence a person's cognitive processes, including memory retrieval and focus of attention (Segal, 1988; Williams, Watts, MacLeod, & Mathews, 1997), ultimately leading to distortions in conscious thought which in turn impacts upon affective and behavioural responses. Maladaptive schemas are hypothesised to usually develop during childhood and adolescence, but can develop later in life too. As a result, these schemas represent very stable cognitive patterns within an individual, which can lead to faulty information processing, and cause a person to make negative interpretations of life events that are congruent with the content of the maladaptive schema (A. T. Beck, 1972, 1987). Schemas which are of a dysfunctional and negative nature represent cognitive vulnerability factors for the development of psychopathology. Vulnerability has been defined as an "*endogenous, stable characteristic that remains latent until activated by a precipitating event*" (Clark & Beck, 2010, p. 102).

According to J. S. Beck (2011) the specific content of these schemas are comprised of a person's 'Core' and 'Intermediate' beliefs. Core beliefs are fixed, global, overgeneralized, unconditional, and absolutistic beliefs that a person holds about oneself, others, and/or the world in general. These core beliefs are hypothesised to represent the core cognitive variables in the development and maintenance of psychopathology. According to the cognitive model people generally form both positive and negative core beliefs early in life and these core beliefs become hugely influential in determining how a person interacts with the world. During emotional distress, negative core beliefs become activated and information is then processed in a biased fashion which serves to reinforce the activated negative core belief (Neenan & Dryden, 2011). J. S. Beck (2005) has posited that negative core beliefs about the self relate to three main areas; helplessness, unlovability, and worthlessness.

CT theory posits that as a result of a person's core beliefs, a number of 'Intermediate Beliefs' are formed (J. S. Beck, 2011). Leahy (2003), and Neenan and Dryden (2011), explain intermediate beliefs as the various rules, assumptions, or attitudes that a person holds and directs towards themselves, others, or the world in general. Like core beliefs, intermediate beliefs also tend to be rigid, absolutistic, overgeneralized, and overinclusive. Maladaptive assumptions or dysfunctional attitudes often take the form of conditional "If....then...." or "Unless....then..." statements while a person's 'Rules for Living' tend to be expressed within very rigid 'must', 'have to', 'ought to' and 'should' statements. Beck, Emery, & Greenberg (1985) have suggested that intermediate beliefs relate to three broad categories; acceptance, competence, and control. These rules and assumptions are intimately linked with the underlying core beliefs and if the terms of these rigid rules or assumptions are violated, the underlying core belief becomes activated.

Once activated, core and intermediate beliefs lead to specific and identifiable cognitive distortions which Beck (1976) termed 'Negative Automatic Thoughts' (NATs). These are thoughts which enter into consciousness automatically, reflecting certain negative biases or distortions in thought, which are accepted as valid and true by the individual, and contribute to disturbed emotions and maladaptive behaviours (Leahy, 2003). Automatic thoughts tend to be situational specific, unlike intermediate and core beliefs, which are more general in nature.

The CT theory of psychopathology therefore is a multilevel model of psychopathology. At the most conscious, surface level of analysis, are negative automatic thoughts such as "If I go to the party nobody will talk to me". The emotional and potentially maladaptive behavioural consequences of negative automatic thoughts are related to the person's deeper level cognitions such as their intermediate beliefs "I must be liked and approved of by everyone I meet", and their core beliefs, "I'm unlovable". In other words, negative automatic thoughts are evaluated with respect to intermediate beliefs which develop from, and are linked to, core beliefs. Dysfunctional schemas, comprised as they are of core and intermediate beliefs, once activated, give rise to the distortions and biases in conscious thought by influencing a variety of cognitive processes such that only information congruent with the content of the dysfunctional schema is processed and recognised (Leahy, 2003; J. S. Beck, 2011). One final and important aspect of Beck's cognitive model of psychopathology is that the presence of a dysfunctional schema is a necessary condition for the development of psychopathology but it is not a sufficient condition. Some kind of relevant activating stimuli is necessary to trigger the activation of the dysfunctional schema which then leads to distorted thinking, disturbed emotional reactions, and maladaptive behavioural responses (Kovacs & A. T. Beck, 1978; J. S. Beck, 2011).

5.1.2 Distinctions between REBT and CT Theory

While CT theory proposes that NATs are proximate cognitive antecedents of psychopathological responses, REBT theory states that NATs alone are insufficient to produce a psychopathological response. Rather, such NATs must be evaluated/appraised via a set of specific-level irrational beliefs before any psychopathological response can emerge (Szentagotai & Freeman, 2007).

According to contemporary REBT theory (David, Lynn, & Ellis, 2010) irrational beliefs are rigid and extreme appraisal beliefs. The activation of a set of general-level irrational beliefs in response to an adverse activating event is hypothesised to produce a range of situational specific NATs. These NATs are viewed as the distal antecedents of psychopathological responses and if evaluated via a set of specific-level irrational beliefs (which themselves are connected to, and arise from, general-level irrational

beliefs) then, and only then, can a psychopathological response develop (Dryden 2000, 2009).

REBT theory states that the primary or core irrational belief process in the emergence of psychopathology is “Demandingness” beliefs, which refer to absolutistic and rigid insistences for how things “must be”, “should be”, “have to be” etc. (David et al., 2010; Ellis, 1994; Walen, DiGiuseppe, & Dryden, 1992). These rigid primary irrational beliefs are predicted to give rise to a set of secondary irrational belief processes which include; “Catastrophizing” beliefs whereby an event is appraised in the most extremely negative fashion possible; “Low Frustration Tolerance” beliefs in which a person fantastically underestimates their own ability to tolerate, withstand, or experience happiness as a consequence of not having their demand satisfied; and “Depreciation” beliefs which involve the person formulates extreme, global, and over-inclusive negative conclusions about oneself, others, and/or the world in general.

David and Szentagotai (2006) have described this crucial distinction between REBT’s and CT’s respective theories of psychopathology in terms of Abelson and Rosenberg’s (1958) distinction of “hot” and “cold” cognitions. Abelson and Rosenberg (1958) define cold cognitions as those that are reflective of the processes of representation, description, or knowing, whereas hot cognitions are defined as those that are reflective of the process of appraisal or evaluation. In other words, CT theory postulates that cold cognitions are the proximate causes of psychopathological responses while REBT theory views cold cognitions as distal causes of psychopathological responses and hot cognitions as the proximate causes of such responses. REBT’s theory of psychopathology is therefore congruent with Lazarus’ (1991) Appraisal Theory of Emotions which states that although representational cognitions contribute to appraisal, it is only the process of appraisal itself which gives rise to emotions. REBT theory is as such consistent with what is currently the most accepted model of emotions in cognitive psychology (Smith, Haynes, Lazarus, & Pope, 1993; David, 2003).

5.1.3 Cognitive Models of PTSD

Clark and Beck (2010) have presented an updated cognitive model of PTSD in which traumatic experiences are hypothesised to interact with pre-existing schematic

vulnerability factors. This gives rise to a range of maladaptive beliefs about the self, others, the world, the future, and the traumatic event itself. The presence of these belief systems has a negative impact on a number of cognitive processes leading to faulty trauma memories and attentional cognitive biases towards threatening stimuli. Such processes are hypothesised to produce the characteristic intrusive and hyperarousal symptoms which are consequently appraised in a negative manner leading to maladaptive behavioural control strategies which involve avoidance and emotion control/suppression efforts.

A range of psychometrically validated measures of specific cognitions relevant to PTSD derived from these theoretical models have been developed (e.g., Foa, Ehlers, Clark, Tolin & Orsillo, 1999; Vogt, Shipherd & Resick, 2012). In a recent study based upon the Ehlers and Clark (2000) model of PTSD, Kleim et al. (2013), utilizing sophisticated latent growth modelling procedures, demonstrated for the first time that changes in dysfunctional cognitions (as measured by a shortened version of the Posttraumatic Cognition Inventory) significantly predicted subsequent reductions in PTSD symptomology. These findings strongly support the role of dysfunctional cognitions as key mechanisms of change in PTSD symptomology.

These cognitive models of PTSD are all based upon the general theoretical foundation of Beck's Cognitive Therapy model of psychopathology (e.g. J. S. Beck, 2011). In contrast to CT theory, Ellis' (2001) REBT model of psychopathology has received substantially less empirical investigation in the context of PTSD and consequently the unique cognitive variables (irrational beliefs) outlined in REBT theory have not been integrated into contemporary CBT based models of PTSD. Investigating the role of trauma-specific and generalised irrational beliefs as outlined in REBT theory offers the possibility of identifying additional critical dysfunctional cognitions associated with PTSD symptomology.

5.1.4 Specific Irrational Beliefs in Psychopathology

Substantial evidence exists supporting the basic theoretical predictions of REBT theory (David, Schnurr, & Belloiu, 2002; David, Szentagotai, Kallay, & Macavei, 2005; DiLorenzo, David, & Montgomery, 2007; Solomon, Arnow, Gotlib, & Wind, 2003; Szentagotai, David, Lupu, & Cosman, 2008; Szentagotai & Freeman, 2007) however

the majority of the evidence that exists in support of the predictions of REBT theory has been obtained through empirical research which has examined irrational beliefs at a general-level. REBT theory however predicts that specific-level irrational beliefs should mediate the impact of general-level irrational beliefs on emotional distress (Dryden, 2000, 2009). Unfortunately very little research has been undertaken within the REBT domain to explore (i) the direct effects of specific-level irrational beliefs on various psychopathological outcomes, (ii) the hypothesised mediating role of specific-level irrational beliefs in the relationship between general-level irrational beliefs and psychological distress, and (iii) whether general-level irrational beliefs can directly impact psychological distress outcomes when specific-level irrational beliefs are considered. Given the central nature of these questions to the core predictions of REBT theory, the lack of relevant empirical investigation is a serious problem.

DiLorenzo, David, and Montgomery (2011) investigated the differential contributions of general-level and specific-level irrational beliefs in the emergence of exam related distress among 86 female students at two time periods. They found that specific-level irrational beliefs were a better predictor of exam related distress than general-level irrational beliefs when distress was measured immediately prior to the taking of an exam. When exam-related distress was measured at Time 1 (at the start of the semester) neither general-level nor specific-level irrational beliefs had an independent effect on distress. These results suggest that specific-level irrational beliefs make a contribution to the explanation of distress beyond the contribution of general-level irrational beliefs.

Moldovan (2009) attempted to examine the mediating role of specific illness related irrational beliefs in the relationship between general-level irrational beliefs and emotional distress. This study included a small sample of 56 cancer and type-II diabetes patients. Moldovan's results found that specific-level irrational beliefs fully mediated the relationship between the general-level irrational beliefs and depression, anxiety, and stress levels, respectively. Although these findings are consistent with the predictions of REBT theory, the low sample size and use of a cross-sectional research design in the establishment of mediation undermine the reliability of these findings.

5.1.5 Criticisms of REBT Theory

REBT theory has been criticised (Padesky & Beck, 2003) as an overly monolithic therapy that is not well suited to adequately conceptualising the unique cognitive features of specific disorders due its focus on just a few core Irrational Belief processes. David et al. (2005) responded to this criticism by pointing out that while REBT theory fully incorporates the "cognitive content specificity hypothesis" of CT theory (Riskind, 2004), the advantage of a reductionist approach favoured by REBT is an ability to explain the development of a range of psychological disorders in terms of the interactions between just a few irrational belief processes. David et al. (2005) point out that the REBT approach is similar to the approach to understanding psychopathology employed within the field of neuroscience where various forms of psychopathology are explained in terms of a small group of neurotransmitters, and the interactions that take place between them. David et al. (2002) and David (2003) have put forth a proposed model for the development of specific disorders based upon the interactions of the primary (Demandingness) and secondary (Catastrophizing, Low Frustration Tolerance, and Depreciation) general-level irrational belief processes. Depression, for example, is hypothesised to involve Demandingness and self-Depreciation beliefs, while anxiety disorders are hypothesised to involve interactions between Demandingness beliefs and Catastrophizing and/or Low Frustration Tolerance beliefs. Research testing these individualised REBT models of psychopathology is still in its infancy and little empirical research exists to either confirm or reject the predictions of David and his colleagues (2002, 2003). Another plausible route towards the development of disorder-specific REBT models of psychopathology is the inclusion of disorder-specific variants of the irrational beliefs within a respective theoretical model.

There is no question that the REBT research community has failed to keep pace with the CT community in terms of developing disorder-specific cognitive models of psychopathology. CT theory is replete with both disorder specific models of posttraumatic stress disorder (PTSD) (e.g. Clark & Beck, 2010; Ehlers & Clark, 2000; Resick & Schnicke, 1993) and psychometrically validated measures of specific cognitions relevant to PTSD (e.g. Foa, Ehlers, Clark, Tolin, & Orsillo, 1999; Najavits, Gotthardt, Weiss, & Epstein, 2004; Vogt, Shipherd, & Resick, 2012). While these models and measures are enormously valuable from both clinical and research

perspectives, they generally fail to capture the types of evaluative/appraisal beliefs described in REBT theory. There is however a certain degree of overlap between the two models. In recent years a good deal of empirical work has indicated the importance of 'distress intolerance' beliefs in posttraumatic stress responses (Marshall-Berenz, Vujanovic, Bonn-Miller, Bernstein, & Zvolensky, 2010; Vujanovic, Bonn-Miller, Potter, Marshall-Berenz, & Zvolensky, 2011), a cognitive variable that has much in common with Low Frustration Tolerance beliefs described in REBT theory. Although this work offers a degree of empirical support for the predictions of REBT theory, a more focused body of work is necessary to provide an adequate test of REBT theory.

5.1.5 Current Study

The current study includes two primary objectives. The first is to test a central theoretical prediction of REBT theory regarding the indirect relationship between general-level irrational beliefs and posttraumatic stress responses via a set of trauma-specific irrational beliefs. The second objective is to provide evidence to the wider CBT community regarding the important role of irrational beliefs, as described by REBT theory, in posttraumatic stress responses. The hypothesised indirect relationship between general-level irrational beliefs and posttraumatic stress symptoms via trauma-specific irrational beliefs will be investigated using structural equation modelling (SEM) techniques. Two alternative models will be tested; the first is a fully indirect model while the second assumes both a direct effect of general-level irrational beliefs on posttraumatic stress symptomology along with an indirect effect through trauma-specific irrational beliefs.

5.2 Methods Section

5.2.1 Participants

The sample for the current study consisted of three hundred and thirteen (N = 313) trauma-exposed individuals employed in a range of front-line emergency services. The sample comprised an international group of soldiers (n = 81, 25.9%), police officers (n = 183, 58.5%), and associated emergency service personnel (n = 49, 15.7%). All participants were recruited from active-duty while serving in the Republic of Ireland and the Republic of Kosovo over a twelve month period (June 2011 – June 2012). The mean number of exposures to traumatic life events for the current sample was 2.75 (SD = 1.51, range 1-11). The most frequently cited traumatic life experience was being involved in, or witness to, a serious accident, fire, or explosion (60%, n = 189); followed by a non-sexual assault by a stranger (57%, n = 178); and military combat (43%, n = 133). The most infrequently reported traumatic life events was torture (1.6%, n = 5).

The sample consisted of 212 males (67.7%) and 101 females (32.3%). The participants ranged in age from 23 to 65 (M = 38.18, SD = 8.70). The majority of the participants resided in suburban areas (44.4%; n = 139), and urban areas (37.1%, 116), and the remainder indicated that they reside in rural areas (18.5%, n = 58). The majority of the sample participants possessed at least a secondary/high school level diploma (55.9%, n = 175) while 108 held a bachelor's degree (34.5%), 28 participants possessed a master's degree (8.9%), and 2 individuals reported possessing a doctoral degree (0.6%). The majority of respondents were currently married (n= 154, 49.2%), while 19.5% reported their marital status to be single (n = 61), 21.4% were cohabiting with a partner (n = 67), and 9.9% of respondents were divorced (n = 31).

5.2.2 Procedures

The current sample was gathered in an opportunistic fashion in the Republic of Ireland and the Republic of Kosovo. Ethical approval was first granted from the Ethics committee of the University of Ulster, subsequently written approval was obtained by the principal researcher to approach members of the respective institutions that took part in the current study. Participants were informed of the nature of the study being under

taken either by a member of the research team or an assigned liaison for a particular organisation, and each participant's involvement in the research project was voluntary. No obligations were placed upon potential respondents nor were any inducements employed to recruit the sample. Each participant was assured about confidentiality and those who chose to take part in the research project had the option of completing either an anonymous self-administered paper-and-pencil version of the questionnaire or an electronic version which was delivered and returned via email. The majority of respondents chose the paper-and-pencil option (63.26%, n = 198).

5.2.3 Measures

The Posttraumatic Stress Diagnostic Scale (PDS: Foa, Cashman, Jaycox, & Perry, 1997) is a 49-item self-report measure of the severity of posttraumatic stress symptomology related to a particular traumatic event. The PDS assess all aspects of a posttraumatic stress disorder diagnosis from Criteria A to F as outlined in the Diagnostic and Statistical Manual of Mental Disorders IV (American Psychiatric Association, 1994). The PDS measures the nature of the traumatic experience, the duration of the experienced symptoms, the impact of the experienced symptoms on daily functioning, and the severity of the symptoms. Seventeen items measure each of the identified symptoms of PTSD along a four-point Likert scale. Respondents rate the severity of each symptom from a score of 0 ("not at all or only one time") to 3 ("5 or more times a week / almost always"). This produces a total range of scores from 0-51 with higher scores indicating higher levels of posttraumatic stress symptomology. Scores from 0-10 reflect mild symptoms of PTSD; scores from 11-20 reflect moderate symptoms of PTSD; scores from 21-35 reflect moderate-to-severe symptoms of PTSD; while scores from 36-51 reflect severe symptoms of PTSD. Within the current sample 59% (n = 181) of respondents reported mild symptoms, 15.3% (n = 47) reported moderate symptoms, 24.4% (n = 75) reported moderate-severe symptoms, and 1.3% (n = 4) reported severe symptoms. The PDS possesses strong psychometric properties with Griffin, Uhlmansiek, Resick, and Mechanic (2004) demonstrating that it shares a strong correlation with the Clinician-Administered PTSD scale (Blake et al., 1995).

The Abbreviated Version of the Attitudes and Belief Scale 2 (AV-ABS2: Hyland, Shevlin, Adamson, & Boduszek, 2013) is a 24-item self-report measure of

rational and irrational beliefs, as defined by current REBT theory (David et al., 2010). The AV-ABS2 measures all four irrational belief processes (Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciation) and their corresponding four rational belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance). Each subscale is measured via three items. Items of the AV-ABS2 include, "*I must do well at important things, and I will not accept it if I do not do well*" (Demandingness); "*It's awful to be disliked by people who are important to me, and it is a catastrophe if they don't like me*" (Catastrophizing); "*Its unbearable being uncomfortable, tense or nervous and I can't stand it when I am*" (Low Frustration Tolerance); and "*If I do not perform well at tasks that are very important to me, it is because I am a worthless bad person*" (Depreciation). The AV-ABS2 produces total scores on each of the individual rational and irrational belief processes. Item are scored along a five-point Likert scale from 1 ("Strongly Disagree") to 5 ("Strongly Agree"), with higher scores in each case indicating higher levels of the respective variable. Possible scores for each subscale range from 3-15 with higher scores indicative of higher levels of each belief process. The AV-ABS2 exhibited satisfactory internal consistency with all subscales recording a Cronbach's Alpha level above .80.

In order to measure trauma-specific variants of each of the four irrational belief processes a new scale called the *Trauma-Related Irrational Belief Scale* (TRIBS) was constructed for the current study. The TRIBS is an 8-item self-report measure of irrational beliefs specifically related to the experience of a traumatic life event. The scale was constructed in accordance with guidelines set forth by Montgomery et al. (2007) in the development of their 'Exam-Related Belief Scale' which was used to capture rational and irrational beliefs specifically related to the context of exam-related distress. The TRIBS includes sub-scales for each of the four irrational belief processes and each belief process is measured via two items. Items of the TRIBS are scored along a five-point Likert scale from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). Items 4 and 6 included in the scale were scored in a reverse direction. Scores on each subscale range from 2-10 with higher scores reflecting higher levels of irrationality. Internal consistency for the full scale was satisfactory ($\alpha = .95$), and each of the subscales also yielded acceptable results with all alpha levels exceeding .80.

5.2.4 Analysis

Descriptive statistics and preliminary analysis were conducted within Statistical Package for the Social Sciences (SPSS) 20. The theoretical models illustrated in Figures 5.1 and 5.2, respectively, were analysed using structural equation modelling (SEM) techniques. SEM is a combination of two analytical procedures; confirmatory factor analysis (CFA) which assesses the measurement component of a theoretical model, and path analysis which assesses the relationship between latent variables. Within an SEM framework, the structural and measurement elements of analysis are estimated simultaneously (McCallum & Austin, 2000). A number of other features make the use of SEM procedures appropriate for the current analysis. These include controlling for systematic and random measurement error and the ability to simultaneous test for both direct and indirect effects within a model (Bollen, 1989; Byrne, 1998; Kline, 2005). The SEM analysis was conducted in Mplus version 6.0 (Muthen & Muthen, 1998 – 2010) with Robust Maximum Likelihood (MLR) estimation.

The overall fit of each model and the relative fit between models were assessed using a range of goodness-of-fit statistics and assessment of the appropriateness of the model parameters. The chi-square ($\chi 2$) statistic assessed the sample and implied covariance matrix and a good fitting model is indicated by a non-significant result. However the chi-square statistic is strongly associated with sample size, and as such good models tend to be over-rejected. Therefore Tanaka (1987) suggested that a model should not be rejected simply on the basis of a significant chi-square result. Accordingly, it is recommended that researchers examine the ratio of the chi-square value to the degrees of freedom (df), and according to Klein (1994), any model with a $\chi 2$-to-df ratio of less than 3:1 indicates a good fitting model. The Comparative Fit Index (CFI; Bentler, 1990) and the Tucker Lewis Index (TLI; Tucker & Lewis, 1973) are measures of how much better the model fits the data compared to a baseline model where all variables are uncorrelated. For these indices values above .90 indicate reasonable fit while values above .95 indicate good model fit (Bentler, 1990; Hu & Bentler, 1999). In addition, two more absolute indices are presented; the standardized root mean-square residual (SRMR: Joreskog & Sorborn, 1981) and the root mean-square error of approximation (RMSEA: Steiger, 1990). Ideally these indices should be less than .05 however values less than .08 also suggest adequate fit (Bentler, 1990; Hu

& Bentler, 1999; Joreskog & Sorborn, 1993). Furthermore, Akaike Information Criterion (AIC; Akaike, 1974) was used to evaluate the alternative models, with the smaller value indicating the best fitting model. The CFI, RMSEA and the AIC all have explicit penalties for model complexity.

5.3 Results Section

5.3.1 Descriptive Statistics and Factor Correlations

The mean level of posttraumatic stress symptomology (PTS) for the entire sample was 11.40 (SD = 10.77; scores ranged from 0-41). The mean scores for general irrationality was 28.32 (SD = 14.16; scores ranged from 12-60) and the mean scores for trauma-specific irrationality was 18.39 (SD = 10.44; score ranged from 8-40). All correlations between the latent variables were positive and statistically significant. General irrationality ($r = .86$, $p < .001$) and trauma-specific irrationality ($r = .94$, $p < .001$), were both strongly associated with levels of PTS. General irrationality and trauma-specific irrationality were also highly correlated ($r = .91$, $p < .001$).

5.3.2 Measurement Models

Based on extensive findings regarding the factor structure of posttraumatic stress indicators (e.g., Yufik & Simms, 2010), three alternative models of the PDS (Foa et al., 1997) were investigated. Model 1 is a four-factor solution (Intrusions, Avoidance, Emotional Numbing, and Hyperarousal) first suggested by King, Leskin, King and Weathers (1998); Model 2 is an alternative four-factor solution (Intrusions, Avoidance, Dysphoria, Hyperarousal) first suggested by Simms, Watson and Doebbeling (2002); and Model 3 is the DSM-IV-TR's three-factorial solution. The Simms et al. 'Dysphoria' model was found to be the best fitting model yielding the most impressive fit statistics ($\chi 2 = 152.94$, df = 113, $p < .001$; CFI = .98; TLI = .98, RMSEA = .03; SRMR = .03) along with the lowest AIC value. These four subscales were consequently used as measured variables within the full structural model in order to construct a posttraumatic stress (PTS) latent variable.

5.3.3 Structural Model

The REBT fully indirect model of PTS (Figure 5.1) was thus developed and included three latent variables: (i) General Irrationality measured via the four general-level irrational belief subscales of the AV-ABS2; (ii) Trauma-Specific Irrationality measured via the four trauma-specific irrational belief subscales of the TRIBS; and (iii) PTS measured via Intrusions, Avoidance, Dysphoria, and Hyperarousal. Factor loadings for

each measured variable on their respective latent variable were all statistically significant, positive, and greater than 0.60 (see Table 5.1 for full details).

Table 5.1

Standardized and Unstandardized Factor Loadings (and Standard Errors) for Posttraumatic Stress Symptoms (PTS), General Irrational beliefs, and Trauma-Specific Irrational beliefs

Item	***β***	**B**	**SE**
Posttraumatic Stress Symptoms (PTS) by			
Intrusions	.90	1.00	--
Avoidance	.61	.39	.03
Dysphoria	.88	1.61	.08
Hyperarousal	.81	.49	.03
General Irrational beliefs (G-IB) by			
General Demandingness	.92	1.00	--
General Catastrophizing	.90	.99	.03
General Low Frustration Tolerance	.87	.95	.03
General Depreciation	.88	1.07	.04
Trauma-Specific Irrational beliefs (S-IB) by			
Trauma-specific Demandingness	.94	1.00	--
Trauma-specific Catastrophizing	.86	.98	.03
Trauma-specific Low Frustration Tolerance	.83	.80	.04
Trauma-Specific Depreciation	.89	.96	.03

Note. All Factor loadings are statistically significant ($p < .001$).

The fully indirect REBT model of PTS produced satisfactory model fit statistics ($\chi 2$ = 84.80, df = 52, p = .003; RMSEA = .05 (CI 90% = .03/.06); SRMR = .02; CFI = .99; TLI = .98; AIC = 20145.69) and explained 89% of the variance in posttraumatic stress symptoms. As can be seen in Figure 5.1, General Irrationality had a statistically significant, positive, and strong direct impact on Trauma-Specific Irrationality (β = .91, p < .001), while Trauma-Specific Irrationality also displayed a statistically significant, positive, and strong direct effect on PTS (β = .94, p < .001). Additionally, a statistically significant, positive, and strong indirect effect was observed between General Irrationality and PTS via Trauma-Specific Irrationality (β = .86, p < .001).

Table 5.2

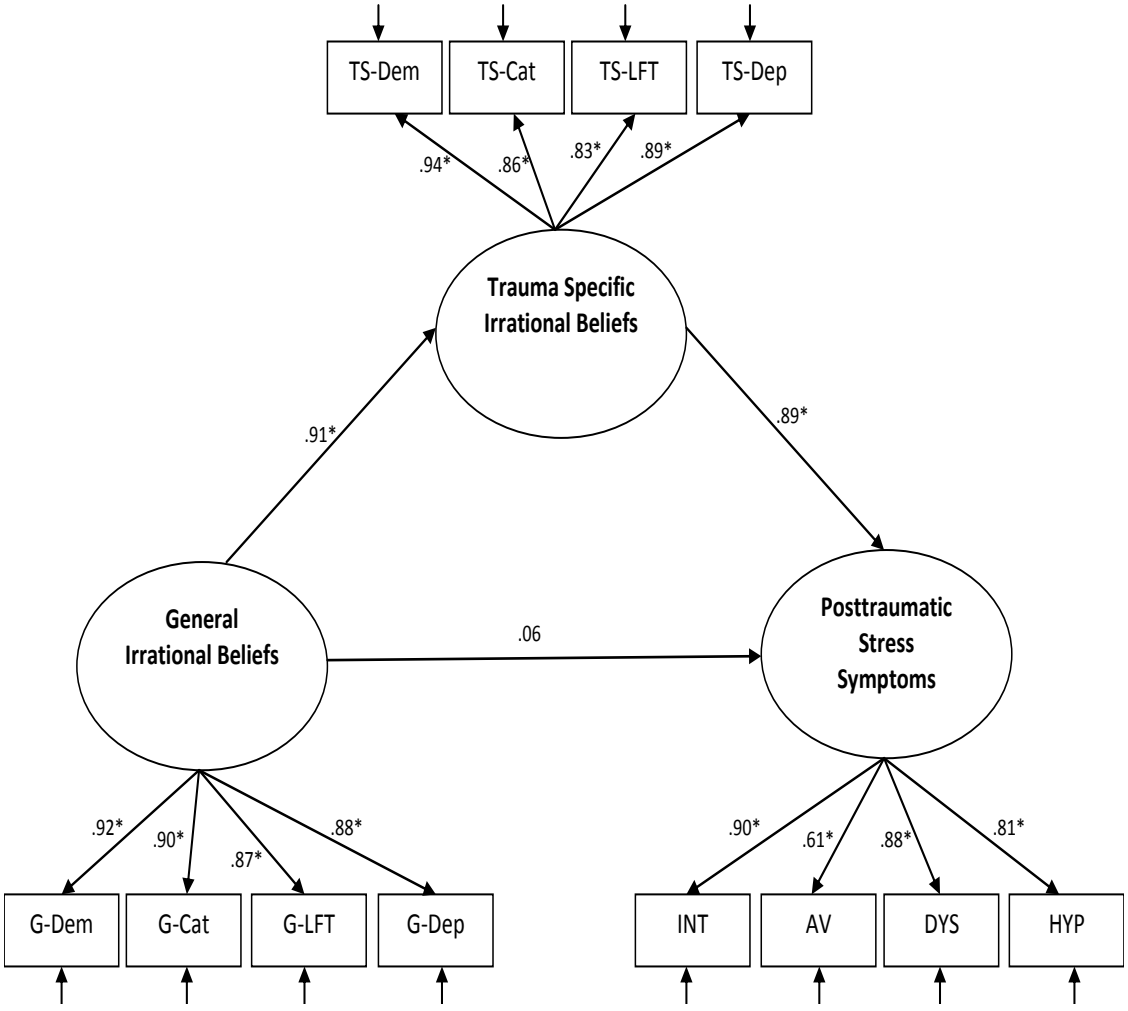
Standardized and unstandardized regression weights (with Standard Errors) for the REBT fully indirect model of posttraumatic stress symptoms (PTS)

Variables	***β***	**B**	**SE**
Direct Influence			
G-Irrationality ==> S-Irrationality	.91	.72	.03
S-Irrationality ==> PTS	.94	1.03	.05
Indirect Influence			
G-Irrationality ==> PTS via S-Irrationality	.86	.74	.04
R^2			
S-Irrationality R^2 = .83, SE = .03, p < .001; Posttraumatic Stress Symptoms R^2 = .89, SE = .03, p < .001			
Fit Indices			
$\chi 2$ = 84.798, *df* = 52, p = .003; RMSEA = .05 (CI = .03 - .06); SRMR = .02; CFI = .99; TLI = .98, AIC = 15401.72			

Note. All regression weights are statistically significant (p < .001).

Figure 5.1

Fully Indirect REBT model of Posttraumatic Stress Symptoms



Note: G-DEM = General Demandingness, G-CAT = General Catastrophizing, G-LFT = General Low Frustration Tolerance, G-DEP = General Depreciation, TS-DEM = Trauma-Specific Demandingness, TS-CAT = Trauma-Specific Catastrophizing, TS-LFT = Trauma-Specific Low Frustration Tolerance, TS-DEP = Trauma-Specific Depreciation, INT = Intrusions, AV = Avoidance, DYS = Dysphoria, HYP = Hyperarousal. Statistical significance: * $p < .001$

The direct and indirect model REBT model PTS produced similar fit statistics to the fully indirect model ($\chi 2$ = 84.926, df = 51, p = .003; RMSEA = .05 (CI 90% = .03-.06); SRMR = .02; CFI = .98; TLI = .98; AIC = 20149.20) accounted for 88% of the variance in levels of PTS. As can be seen in Figure 5.2, General Irrationality had a statistically significant, positive, direct, and strong impact on Trauma-Specific Irrationality (β = .91, p < .001), while Trauma-Specific Irrationality again was found to have a statistically significant, positive, strong, direct impact on PTS (β = .86, p < .001). Importantly however, no statistically significant direct effect was observed between General Irrationality and PTS. The indirect effect remained statistically significant between General Irrationality and PTS via Trauma-Specific Irrationality, however this relationship was slightly lower than within the fully indirect model (β = .81, p < .001).

Table 5.3

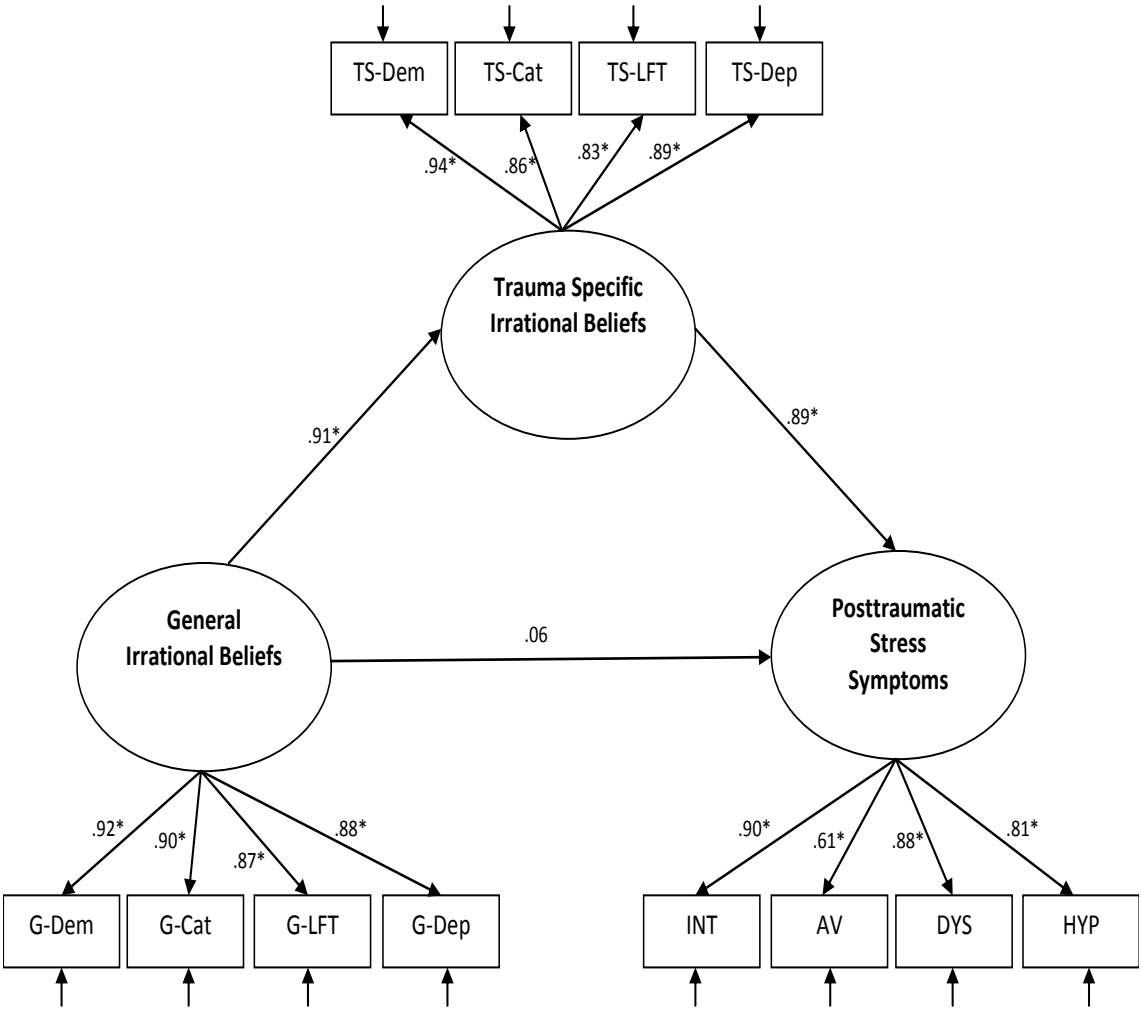
Standardized and unstandardized regression weights (with Standard Errors) for the REBT direct and indirect model of posttraumatic stress symptoms (PTS)

Variables	***β***	**B**	**SE**
Direct Influence			
G-Irrationality ==> S-Irrationality	.91	.71	.03
G-Irrationality ==> PTS	.06	.05	.11
S-Irrationality ==> PTS	.89	.97	.14
Indirect Influence			
G-Irrationality ==> PTS via S-Irrationality	.81	.69	.11
R^2			
S-Irrationality R^2 = .83, SE = .04, p < .001; Posttraumatic Stress Symptoms R^2 = .88, SE = .03, p < .001			
Fit Indices			
$\chi 2$ = 84.926, *df* = 51, p = .003; RMSEA = .05 (CI = .03 - .06); SRMR = .02; CFI = .98; TLI = .98, AIC = 15403.34			

Note. All regression weights are statistically significant (p < .001).

Figure 5.2

REBT Direct and Indirect REBT model of Posttraumatic Stress Symptoms



Note: G-DEM = General Demandingness, G-CAT = General Catastrophizing, G-LFT = General Low Frustration Tolerance, G-DEP = General Depreciation, TS-DEM = Trauma-Specific Demandingness, TS-CAT = Trauma-Specific Catastrophizing, TS-LFT = Trauma-Specific Low Frustration Tolerance, TS-DEP = Trauma-Specific Depreciation, INT = Intrusions, AV = Avoidance, DYS = Dysphoria, HYP = Hyperarousal. Statistical significance: * $p < .001$

5.4 Discussion

The current study was performed in order to substantially develop PTSD-based research within the REBT community specifically, and to contribute evidence to the wider scientific community regarding the role of irrational beliefs as potentially important dysfunctional cognitions in posttraumatic stress responses. REBT theory is explicit in predicting that context-specific variants of each irrational belief process should not only directly influence various psychopathological outcomes (Ellis, 2001), but that they should also serve as a mediator between more generalised forms of irrational beliefs and psychopathological responses (Dryden, 2009).

In order to empirically test this hypothesis, two theoretically derived REBT models of posttraumatic stress symptomology were developed. The first model was in-line with REBT theory (Dryden, 2009) and predicted that general-level irrationality would impact upon posttraumatic stress symptoms indirectly via a set of trauma-specific irrationality. The second model reflected a slightly modified version of REBT theory and assumed a direct relationship between general irrationality and posttraumatic stress symptomology, along with the expected indirect relationship via trauma-specific irrationality.

The results of the SEM analysis indicated that both the models of posttraumatic stress responses were a good fit of the data. It was difficult to identify a superior model based upon the incremental and absolute model fit statistics. The fully indirect model was found to be superior only on the basis of the TLI results. AIC values which are used to compare alternative models also suggested both that models were practically indistinguishable however the fully indirect model did record a marginally lower value suggesting it to be statistically superior. On the basis of these results in addition to the fact that the fully indirect model possesses fewer model parameters and is consistent with the general REBT model of psychopathology, the fully indirect model was preferred on the grounds of parsimony and theoretical consistency.

Dryden (2009) has theorised that the activation of general-level irrational beliefs during an activating event biases information processing leading to the development of dysfunctional automatic thoughts, which are then evaluated by means of context-specific irrational beliefs. These context-specific irrational beliefs are expected to derive

from more general-level irrational beliefs that are already a component of one's cognitive architecture. In others words, general-level irrational beliefs are viewed as critical factors in the development and maintenance of psychopathological responses however these beliefs are hypothesised to indirectly impact psychopathological responses by leading to the creation of context-specific irrational beliefs. This general REBT theoretical formulation shares much in common with Clark and Beck's (2010) updated cognitive model of PTSD.

Results of the current study are in line with Dryden's (2009) predictions as general-level irrationality was found to exert a strong direct effect on trauma-specific irrationality, but no direct effect was observed between general-level irrationality and posttraumatic stress symptomology. The direct effect between trauma-specific irrationality and posttraumatic stress symptomology was found to be very strong, supporting Ellis' (2001) argument that context-specific versions of the various irrational belief processes offer a potent predictor of psychologically distressing outcomes.

The current findings suggest that the presence of general-level irrational beliefs (Demandingness beliefs, Catastrophizing beliefs, Low Frustration Tolerance beliefs, and Depreciation beliefs) within an individual's cognitive architecture represent important cognitive vulnerability factors for the development of posttraumatic stress reactions, while the more context-specific variants of these cognitive processes (associated with the individual's traumatic experience) appear to be a more proximate predictor of such psychopathological responses.

The fully indirect REBT model was found to explain 89% of variance in posttraumatic stress symptoms, thus providing strong evidence that the irrational beliefs, as outlined in REBT theory, play a crucially important role in posttraumatic stress responses. REBT theory states that Demandingness beliefs represent the core psychological construct in the emergence of psychological distress, and that their impact on psychopathological responses is mediated through the secondary irrational belief processes of Catastrophizing, Low Frustration Tolerance, and/or Depreciation beliefs. This contention has drawn criticism from many within the Cognitive Therapy community (e.g., Padesky & Beck, 2003) however recently empirical work has provided support for this core REBT hypothesis (David et al., 2002; David et al., 2005;

Soloman et al., 2003; and Szentagotai et al., 2008). Results from the current analysis add additional support to previous findings demonstrating the accuracy of the theoretical predictions of REBT in general, and also add original evidence to the scientific literature regarding the importance of irrational beliefs in explaining posttraumatic stress responses, specifically.

Current findings lend considerable empirical support for our suggestion that REBT theory can convincingly overcome the reasonable criticisms of Padesky and Beck (2003) that REBT is an overly monolithic approach that is incapable of formulating individualized and disorder-specific models of psychopathology. While REBT theory has generally always favoured a more transdiagnostic approach to conceptualising psychopathology, the current study suggests that it is possible for the REBT community to substantially develop its theoretical base through the development of more disorder-specific models of psychopathology by placing an emphasis on conceptualizing, measuring, and evaluating the role of disorder-specific irrational beliefs in the development and maintenance of various forms of psychopathology. In doing so, not only can the field of REBT flourish but the wider scientific community can be enriched by such theoretical advancements and discoveries.

Although there is considerable evidence attesting to the importance of each irrational belief process described by REBT theory in a range of psychopathologies (Browne, Dowd & Freeman, 2010; Dryden & David, 2008), these cognitive constructs have generally not yet been integrated within mainstream cognitive-behavioural models of PTSD. Current results suggest that these irrational belief processes have an important role to play in the development and maintenance of posttraumatic stress reactions therefore greater consideration of both general-level and trauma-specific irrational beliefs could potentially yield greater theoretical understandings of the cognitive architecture upon which posttraumatic stress responses rest, and lead to more efficacious treatment interventions. Substantially more evidence is certainly required before any firm conclusions can be drawn regarding the importance of the irrational beliefs in predicting the development of PTSD. These studies are limited considerably due to the cross-sectional nature of the study designs and future work should ideally seek to replicate the design of Kleim and colleagues (2013) in evaluating the role of irrational belief in PTSD symptomology.

5.4.1 Limitations

As with any research endeavour, the current study contains a number of limitations which need to be considered. The most salient limitation of the current study relates to the attempt to test predictions of mediation with the use of cross-sectional data. Given that the current study was cross-sectional in nature it was impossible to ascertain whether trauma-specific irrationality mediated the relationship between general-level irrationality and posttraumatic stress symptomology due to the temporal assumptions inherent in determining causality which mediation implies. Although results of the current study are in-line with the predictions of REBT theory the possibility remains that the development of trauma-specific irrationality in the immediate aftermath of a trauma could generalise and lead to the emergence of more general-level irrationality. Although this is contrary to theoretical prediction such an occurrence is plausible and cannot be ruled out within cross-sectional designs therefore future research efforts should ideally seek to utilize longitudinal data in order to test this possibility. Furthermore, a self-report measure of posttraumatic stress symptoms was employed and although self-report measures of PTSD, such as the PDS (Foa et al., 1997) used in the current study, have been shown to highly correspond with clinician-administered measures (Griffin et al., 2004), clinician-based measures would have been preferable as they are considered the gold standard method of assessing PTSD symptomology.

5.4.2 Conclusions

In conclusion, this study originally contributes to both the trauma and REBT literature in a number of important ways. The current study is the first of its kind to apply latent variable modelling techniques to determine the direct and indirect effects of trauma-specific irrational beliefs among a sample of participants experiencing posttraumatic stress symptoms. Given the strength of the direct effects observed between trauma-specific irrationality and posttraumatic stress symptomology, as well as the level of variance explained in such symptoms due to both general and trauma-specific irrational beliefs, this study has highlighted the importance of a set of cognitive variables that are currently ignored within current cognitive-behavioural models of PTSD.

Chapter 6

The Role of Trauma-Specific Irrational Beliefs and Sociodemographic Risk Factors in Posttraumatic Stress Responses

A paper based on this chapter has been published in the **Journal of Rational-Emotive & Cognitive-Behavior Therapy**

Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2013). The role of trauma-specific irrational beliefs and sociodemographic risk factors in posttraumatic stress responses. *Journal of Rational-Emotive & Cognitive-Behaviour Therapy, 31,* 152-156. doi: 10.1007/s10942-013-0167-y

Abstract

Posttraumatic stress responses have been linked to a range of social-cognitive and sociodemographic factors. Rational Emotive Behaviour Therapy (REBT) suggests that responding to a traumatic life event with a set of irrational beliefs should play a crucial role in predicting the development of posttraumatic stress disorder (PTSD: Ellis, 2001). The current study assessed the role of trauma-specific irrational beliefs in the prediction of clinically relevant posttraumatic stress responses, while controlling for a range of important sociodemographic factors. A sample of 313 trauma-exposed military and law enforcement personnel took part in the current study and was divided into two groups according to the intensity of reported posttraumatic stress symptomology. Results of the binary logistic regression indicated that trauma-specific Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs, respectively, significantly predicted belonging to the group reporting strong posttraumatic stress symptoms compared to those reporting mild posttraumatic stress symptoms. These results provide important evidence of the role of irrational beliefs in posttraumatic stress responses and highlight the importance of considering context-specific variants of each irrational belief process.

6.1 Introduction

Posttraumatic stress disorder (PTSD) is an anomalous psychiatric condition as it, along with its precursor Acute Stress Disorder, are the only disorders listed within the *Diagnostic and Statistical Manual of Mental Disorders, 5* (DSM-5: American Psychiatric Association [APA], 2013) that require the presence of a specific etiological variable for a diagnosis to be made; namely the direct or indirect experience of an extremely stressful event. The psychological response to an extreme stressor is expected to give rise to a multitude of cognitive, emotional, behavioural, and physiological symptoms that are classified as falling into four distinct symptom categories reflecting *Intrusions,* (ii) *Avoidance*, (iii) *Negative alterations in cognition and mood*, and (iv) *Reactivity*.. These symptoms must persist for a period of one month and lead to marked impairment in the daily functioning of the individual.

6.1.1 Controversies Surrounding PTSD

Despite a great deal of empirical literature on the subject, there is much controversy surrounding many of the theoretical and clinical features of PTSD (Rosen, Spitzer, & McHugh, 2008). Much of this controversy concerns two major issues. Firstly, an enormous body of factor analytic research invalidated the DSM-IV-TR's (APA, 2000) three factor conceptualisation of the symptom structure of PTSD with the overwhelming majority of evidence supporting alternative four-factor solutions (see Yufik & Simms, 2010). This body of research led to the recent reconceptualisation of the symptom structure of PTSD in the newly published DSM-5 (APA, 2013). Secondly, it is apparent that an "extreme stressor" is not necessary for the development of PTSD as many individuals can develop clinically relevant symptoms following routine life events such as loss of employment, divorce, social upheaval, and bereavement (Rosen & Lilienfeld, 2008). Furthermore, evidence of a dose-response relationship is inconsistent with findings suggesting that increasingly severe traumatic experiences are not always related to more intense traumatic reactions (e.g., McNally, 2003; Rosen & Lilienfeld, 2008).

Large-scale national epidemiological surveys reveal that anywhere between 60-90% of western populations will experience at least one traumatic event in their lifetime (Bresslau et al., 1998; Creamer, Burgess, & McFarlane, 2001; Kessler, Sonnega,

Bromet, Hughes, & Nelson, 1995). Exposure to traumatic experience does not appear to be evenly distributed throughout the population. Inner city dwellers seem to experience greater community-related violence (Norris & Slone, 2007) while employees in front-line emergency service occupations such as military personnel, law enforcement officers, paramedics and fire-fighters are exposed to traumatic incidents at a far higher rate than the general population (Corneil, Beaton, Murphy, Johnson, & Pike, 1999). Despite the frequency with which individuals within the population are exposed to traumatic life events, relatively few people actually go on to develop clinically significant symptoms of PTSD.

Successive national comorbidity surveys conducted in the United States has suggested prevalence rates of 7.8% (Kessler et al., 1995) and 6.8% (Kessler, Berglund, Demler, Jin, Merikangas, & Walters, 2005; Kessler, Chiu, Demler, Merikengas, & Walters, 2005). Comparable rates of trauma exposure have been found in other western countries, for example, Creamer et al. (2001) found that with a nationally representative sample of Australian adults 50% of females, and 65% of males had experienced a minimum of one significant trauma during their life. Among nations that experience high levels of civil unrest and war, exposures to serious traumatic events are even higher with as many as 90% of the population found to have been exposed to a serious trauma in their lifetime (de Jong et al., 2001). In Algeria, 92% of the population reported experiencing a serious traumatic event, and within this population PTSD prevalence was found to be 37.4%. Given the clear discrepancy between the high frequency with which individuals are exposed to extremely stressful life events, and the comparatively lower levels of PTSD in the population, psychologists have investigated numerous psychosocial and sociodemographic vulnerability factors for the development of PTSD.

6.1.2 Social-Cognitive Models of PTSD

Social-cognitive models of PTSD generally focus on the effect that experience of a traumatic stressful event has on an individual's existing belief system. Horowitz (1986) developed one of the first cognitive models of PTSD which described an information processing mechanism that he termed "completion tendency", which reflects the need to integrate newly learnt information with existing belief systems. Horowitz suggested that

a trauma exposed individual experiences conflict between the need to assimilate newly learnt information within one's own historical narrative and the desire to avoid the emotional pain and turmoil that comes with doing so. This conflict means that the trauma remains in one's active memory and generates the characteristics symptoms of PTSD until such time as the conflict is resolved.

More contemporary cognitive models are mainly derived from the theoretical perspective of Cognitive Therapy (CT). A number of influential cognitive models of PTSD have been developed (e.g., Clark & Beck, 2010; Ehlers & Clark, 2000; Resick & Schnicke, 1993). In Ehlers & Clark's (2000) model of PTSD, two cognitive processes are deemed critical in the development and maintenance of the disorder. First, there is an overly negative interpretation of the traumatic event and its sequelea, and second there is a poor elaboration of the memory of the traumatic incident and insufficient integration of the trauma memory within one's autobiographical memory. Clark and Beck (2010) have presented an updated cognitive model of PTSD in which traumatic experiences are hypothesised to interact with pre-existing schematic vulnerability factors. This gives rise to a range of maladaptive beliefs about the self, others, the world, the future, and the traumatic event itself. The presence of these beliefs systems has a negative impact on a number of cognitive processes leading to faulty trauma memories and attentional cognitive biases towards threatening stimuli. This process gives rise to the characteristic intrusive and hyperarousal symptoms which are consequently appraised in a negative manner leading to maladaptive behavioural control strategies involving avoidance and emotion control/suppression efforts. A range of psychometrically validated measures of specific cognitions relevant to PTSD derived from these theoretical models have been developed (e.g. Foa, Ehlers, Clark, Tolin, & Orsillo, 1999; Najavits, Gotthardt, Weiss, & Epstein, 2004; Vogt, Shipherd, & Resick, 2012).

From the perspective of REBT theory, these cognitive models are incomplete. Contemporary REBT theory (David, Lynn, & Ellis, 2010; Ellis, 2001; Hyland & Boduszek, 2012) describes four main irrational belief processes: (i) Demandingness beliefs which are rigid imperatives for how things "must be", "have to be", "ought to be", or "absolutely should be"; (ii) Catastrophizing beliefs which are extreme negative evaluations of unpleasant life events; (iii) Low Frustration Tolerance beliefs which

involve appraisals of a negative event as unbearable and intolerable; and (iv) Depreciation beliefs which reflect global negative evaluations of the self, others, and of life events. Demandingness beliefs represent the core cognitive construct in the emergence and maintenance of psychopathological responses and their impact on such outcomes will be mediated through the secondary irrational belief processes of Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs (David, Schnur, & Belloiu, 2002; DiLorenzo, David, & Montgomery, 2007). Considerable evidence exists demonstrating that these irrational belief processes are critical cognitive variables in a range of psychological disorders (see Browne, Dowd, & Freeman, 2010 for a full review) however no evidence currently exists examining the role of these cognitive variables in PTSD.

REBT theory (Dryden, 2000, 2009) states that the presence of generalised irrational beliefs represent cognitive vulnerability factors for the development of psychopathology as activation of these belief systems during specific activating events bias information processing in a manner congruent with the activated belief systems. An individual is then prone to making a number of inaccurate misinterpretations of daily events. These distorted thoughts and beliefs are the types of cognitions currently emphasised in cognitive models of PTSD derived from the theory of CT. REBT theory predicts however that these distorted representations while necessary cognitions for the development of psychopathological responses, they are by themselves insufficient. In order for a psychopathological response to develop, such distorted inferential cognitions must be evaluated by means of specific set of irrational beliefs. Empirical evidence relating to the role of disorder specific variations of the irrational beliefs is generally sparse in the REBT literature and is non-existent in the context of PTSD.

6.1.3 Sociodemographic Factors in PTSD

Beyond the cognitive and behavioural factors predictive of posttraumatic stress responses, researchers have investigated a multitude of sociodemographic factors crucial in the development and maintenance of PTSD. Population-based research designs and conditional risk studies indicate that although males are exposed to a greater number of traumatic events, females are more likely than males to experience posttraumatic stress responses (Breslau et al., 1998; Galea et al., 2007; Kessler et al.,

1995). It has been suggested that females exhibit greater levels of posttraumatic stress symptomology due to the higher incidence of exposure to particularly toxic traumas such as sexual abuse (Creamer et al., 2001; Kessler et al., 1995), as well as an increased history of other anxiety and depressive disorders that increase their vulnerability.

PTSD is especially prevalent during adolescence to mid-adulthood. In the United States' national comorbidity survey, the median age of onset of PTSD was 23 (Kessler, Berglund, et al., 2005). Children and adolescents are by no means immune to exposure to traumatic life events with research indicating that the majority of the population experience traumatic life events by the time they reach adolescence (Breslau, Lucia, & Alvarado, 2006). Breslau and colleagues (2006) found that 8.3% of trauma-exposed 17 year olds met the diagnostic criteria for PTSD, consistent with the wider literature on the prevalence rates on PTSD in the entire population. Certain early life events such as childhood sexual trauma and physical abuse are well documented to increases the likelihood of developing PTSD in adulthood (Norris & Slone, 2007). Interestingly, it is quite rare to identify new cases of PTSD in persons above the age of 50. Prevalence of PTSD symptomology appears to decease with age even when trauma exposure continues (Kessler et al., 1995; Kessler, Berglund, et al., 2005).

Lack of social support subsequent to experiencing a trauma has been found repeatedly to be related to a diagnosis of PTSD (e.g. Ozer, Best, Lipsey, & Weiss, 2003; Ullman, Filipas, Townsend, & Starzynski., 2007). In a large scale meta-analysis Brewin, Andrews, & Valentine (2000) found a moderate relationship ($r = .40$) between lack of social support and PTSD, while Ozer and colleagues (2003) identified weaker but still robust relationship of $r = .28$ between the two variables.

6.1.4 Current Study

The objective of the current chapter is to substantially contribute to the empirical literature in the REBT community by investigating the direct effect of trauma-specific irrational beliefs on the prediction of reporting strong levels of posttraumatic stress symptoms along with a range of important sociodemographic factors including number or reported traumatic experiences, age, gender, occupation type, and current marital status. This study will therefore provide the first piece of empirical data regarding the

role of the cognitive variables described by REBT theory in posttraumatic stress responses, while controlling for a range of critical sociodemographic risk factors.

6.2 Methods Section

6.2.1 Participants

The sample for the current study consisted of three hundred and thirteen (N = 313) trauma-exposed individuals employed in a range of front-line emergency services. The sample comprised an international group of soldiers (n = 81, 25.9%), police officers (n = 183, 58.5%), and associated emergency service personnel (n = 49, 15.7%). All participants were recruited from active-duty while serving in the Republic of Ireland and the Republic of Kosovo over a twelve month period (June 2011 – June 2012). The mean number of exposures to traumatic life events for the current sample was 2.75 (SD = 1.51, range 1-11). The most frequently cited traumatic life experience was being involved in, or witness to, a serious accident, fire, or explosion (60%, n = 189); followed by a non-sexual assault by a stranger (57%, n = 178); and military combat (43%, n = 133). The most infrequently reported traumatic life events was torture (1.6%, n = 5).

The sample consisted of 212 males (67.7%) and 101 females (32.3%). The participants ranged in age from 23 to 65 (M = 38.18, SD = 8.70). The majority of the participants resided in suburban areas (44.4%; n = 139), and urban areas (37.1%, 116), and the remainder indicated that they reside in rural areas (18.5%, n = 58). The majority of the sample participants possessed at least a secondary/high school level diploma (55.9%, n = 175) while 108 held a bachelor's degree (34.5%), 28 participants possessed a master's degree (8.9%), and 2 individuals reported possessing a doctoral degree (0.6%). The majority of respondents were currently married (n= 154, 49.2%), while 19.5% reported their marital status to be single (n = 61), 21.4% were cohabiting with a partner (n = 67), and 9.9% of respondents were divorced (n = 31).

6.2.2 Procedures

The current sample was gathered in an opportunistic fashion in the Republic of Ireland and the Republic of Kosovo. Ethical approval was first granted from the Ethics committee of the University of Ulster, subsequently written approval was obtained by the principal researcher to approach members of the respective institutions that took part in the current study. Participants were informed of the nature of the study being under

taken either by a member of the research team or an assigned liaison for a particular organisation, and each participant's involvement in the research project was voluntary. No obligations were placed upon potential respondents nor were any inducements employed to recruit the sample. Each participant was assured about confidentiality and those who chose to take part in the research project had the option of completing either an anonymous self-administered paper-and-pencil version of the questionnaire or an electronic version which was delivered and returned via email. The majority of respondents chose the paper-and-pencil option (63.26%, n = 198).

6.2.3 Materials

The Posttraumatic Stress Diagnostic Scale (PDS: Foa, Cashman, Jaycox, & Perry, 1997) is a 49-item self-report measure of the severity of posttraumatic stress symptomology related to a particular traumatic event. The PDS assess all aspects of a PTSD diagnosis from Criteria A to F as outlined in the DSM-IV (APA, 1994). The PDS measures the nature of the traumatic experience, the duration of the experienced symptoms, the impact of the experienced symptoms on daily functioning, and the severity of the symptoms. Seventeen items measure each of the identified symptoms of PTSD along a four-point Likert scale. Respondents rate the severity of each symptom from a score of 0 ("not at all or only one time") to 3 ("5 or more times a week / almost always"). This produces a total range of scores from 0 to 51 with higher scores indicating higher levels of posttraumatic stress symptomology. Scores from 0-10 reflect mild symptoms of PTSD; scores from 11-20 reflect moderate symptoms of PTSD; scores from 21-35 reflect moderate-to-severe symptoms of PTSD; while scores from 36-51 reflect severe symptoms of PTSD. Within the current sample 59% (n = 181) of respondents reported mild symptoms, 15.3% (n = 47) reported moderate symptoms, 24.4% (n = 75) reported moderate-severe symptoms, and 1.3% (n = 4) reported severe symptoms. Given the relatively unequal distribution of participants in each classification, for the purposes on the current study participants were classified into one of two groups: a "mildly symptomatic" group who reported scores on the PDS from 0-10 (n = 181, 59%) and the "strongly symptomatic" group who reported scores on the PDS from 11-51 (n = 126, 41%). The PDS possess strong psychometric properties with Griffin, Uhlmansiek, Resick, and Mechanic (2004) demonstrating that it shares a strong correlation (r = .71) with the Clinician-Administered PTSD scale (Blake et al., 1995).

The PDS demonstrated satisfactory internal reliability among the current sample with the full scale recording a Cronbach's Alpha value of 0.95.

In order to measure context-specific variants of each of the four irrational belief processes a new scale called the *Trauma-Related Irrational Belief Scale* (TRIBS) was constructed. The TRIBS is an 8-item self-report measure of irrational beliefs specifically related to the experience of a traumatic life event. The scale was constructed in accordance with guidelines set forth by Montgomery, David, DiLorenzo, and Schnur (2007) in the development of their 'Exam-Related Belief Scale' which was used to capture rational and irrational beliefs specifically related to the context of exam-related distress. The TRIBS includes sub-scales for each of the four irrational belief processes and each belief process is measured via two items. Examples from each belief process include; "I absolutely should have acted differently than I did during the traumatic event that I experienced" (Demandingness); "The traumatic event that I experienced was completely awful and catastrophic; the worst thing that could have happened" (Catastrophizing); "I can't stand the fact that I had to experience this traumatic event and I find it hard to experience any kind of happiness as a result" (Low Frustration Tolerance); and "I think that life is less worthwhile because of what happened during the traumatic event" (Depreciation). Items of the TRIBS are scored along a five-point Likert scale from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). Items 4 and 6 included in the scale were scored in a reverse direction (i.e., strongly disagree = 5 and strongly agree = 1). Scores on each subscale range from 2-10, while a total composite score of irrationality can be obtained by summating all eight items. Total scores for the TRIBS can therefore range between 8 and 40. In every case higher scores reflect higher levels of irrationality. Internal consistency for the full scale was satisfactory ($\alpha = .95$), and each of the subscales also yielded acceptable results with all alpha levels exceeding .80.

Table 6.1

Frequencies for the current sample of military and emergency service officers on each demographic variable (N = 313)

Variable	Frequency	Valid Percentage
Gender		
Male	212	67.7
Female	101	32.3
Job		
Police/Emergency Services	232	74.1
Military	81	25.9
Marital Status		
Married	282	90.1
Divorced	31	9.9
Groups		
Mildly symptomatic	181	59
Strongly symptomatic	126	41

6.3 Results

6.3.1 Descriptive Statistics, Correlations and Group Differences

Table 6.2 presents group differences (between those trauma-exposed military and law enforcement officers who reported symptoms of PTSD and those who did not report symptoms of PTSD) for trauma-specific Demandingness, Catastrophizing, Low Frustration Tolerance (LFT), and Depreciation beliefs, along with number of reported traumatic experiences. Independent samples t-test results suggest that those individuals reporting symptoms of PTSD (M = 7.49, SD = 2.23) and those who did not report any PTSD symptoms (M = 3.85, SD = 1.86) significantly differed ($t_{(305)}$ = -15.07, $p < .001$, η^2 = .43) with regards to the scores on trauma-specific Demandingness beliefs with higher scores reported by those experiencing symptoms of PTSD. Furthermore, those experiencing PTSD symptomology (M = 6.90, SD = 2.36) scored significantly higher ($t_{(305)}$ = -15.92, $p < .001$, η^2 = .45) than those who were not (M = 3.19, SD = 1.36) on levels of trauma-specific Catastrophizing beliefs. Similarly, data suggests that those individuals reporting symptoms of PTSD (M = 6.77, SD = 2.76) tend to report increased levels of trauma-specific Low Frustration Tolerance beliefs ($t_{(305)}$ = -17.01, $p < .001$, η^2 = .49) comparing to those not experiencing PTSD symptoms (M = 2.41, SD = 0.97). Finally, symptomatic respondents (M = 6.81, SD = 2.39) were found to possess higher levels of trauma-specific Depreciation beliefs ($t_{(304)}$ = -15.29, $p < .001$, η^2 = .44) than the non-symptomatic group (M = 3.20, SD = 1.38). In terms of number of experienced traumas, results from the independent samples t-tests did not indicate any significant differences between groups. Partial eta squared values (η^2) indicated that the magnitude of difference between the two groups on each of the respective irrational belief processes was large.

Table 6.2

Group differences between individuals with mild and strong symptoms of PTSD for irrational beliefs and number of traumas

	Group	***N***	***M***	***SD***	***t***	η^2
Demandingness	Mild	181	3.85	1.86	-15.07*	.43
	Strong	126	7.49	2.23		
Catastrophizing	Mild	181	3.19	1.36	-15.92*	.45
	Strong	126	6.90	2.36		
Low Frustration Tolerance	Mild	181	2.41	0.97	-17.01*	.49
	Strong	126	6.77	2.76		
Depreciation	Mild	181	3.20	1.38	-15.29*	.44
	Strong	126	6.81	2.39		
Number of Traumas	Mild	181	2.69	1.44	-1.25	.01
	Strong	126	2.91	1.56		

Note. Statistical significance: *$p < .001$

Table 6.3

Descriptive statistics, correlations, and reliability between all continuous predictor variables

Variables	1	2	3	4	5	6
1. Demandingness	1					
2. Catastrophizing	.61*	1				
3. Low Frustration Tolerance	.66*	.76*	1			
4. Depreciation	.80*	.59*	.75*	1		
5. Age	-.04	-.06	-.06	-.03	1	
6. Number of Traumas	.04	.00	.01	.04	.18*	1
Mean	5.33	4.72	4.18	4.67	38.18	2.75
Standard Deviation	2.69	2.58	2.87	2.57	8.70	1.51
Range	2-10	2-10	2-10	2-10	23-65	1-11
Cronbach Alpha	.81	.81	.96	.81	n/a	n/a

Note. Statistical significance: *$p < .001$

6.3.2 Binary Logistic regression

Direct binary logistic regression analysis was performed to assess the impact of trauma-specific Demandingness beliefs, Catastrophizing beliefs, Low Frustration Tolerance beliefs, and Depreciation beliefs, respectively, along with number of traumas experienced, age, gender, occupation type, and marital status on the likelihood of reporting symptoms of PTSD following exposure to at least one trauma. The correlations amongst all continuous predictor variables included in the study were examined (see Table 6.3). Each of the four irrational belief processes were positively related to one another, and to a moderately-strong degree with r values ranging between

.59, p < .001 and .80, p < .001. Although some of these correlations were strong, investigation of the Tolerance and VIF statistics demonstrated that these associations did not exceed recommended levels indicating that multicollinearity was unlikely to be a problem (see Tabachnick & Fidell, 2007).

A test of the full model containing all predictor variables against a constant-only model was statistically significant, $\chi 2(9, 302) = 273.617$, $p < .001$, indicating that the model was able to distinguish between individuals who reported experiencing symptoms of PTSD and those that did not report experiencing any such symptoms. The model as a whole explained between 60% (Cox and Snell R square) and 80% (Nagelkerke R square) of the variance in PTSD status, and displayed satisfactory positive predictive value correctly classifying 89.7% of cases.

As shown in Table 6.4, only three of the variables in the model made a unique statistically significant contribution to the model (trauma-specific Catastrophizing beliefs, trauma-specific Low Frustration Tolerance beliefs, and trauma-specific Depreciation beliefs). The strongest predictor of belonging to the PTSD symptomology group was trauma-specific Depreciation beliefs recording an odds ratio of 1.77 (OR = 1.77, p < .01). This result indicates that for every unit increase in Depreciation beliefs related to a traumatic experience, an individual was 1.77 times more likely to belong to the PTSD symptomology group than those who displayed lower levels of Depreciation beliefs, controlling for all other factors in the model. Trauma-specific Catastrophizing beliefs (OR = 1.71, p < .01), and trauma-specific Low Frustration Tolerance beliefs (OR = 1.70, p < .01) exhibited similar results, suggesting that individuals scoring higher on both variable were approximately 1.70 times more likely to belong to the PTSD symptomology group than those individuals with lower levels of each belief process, controlling for all other factors in the model.

Table 6.4

Binary Logistic Regression analysis predicting likelihood of reporting strong symptoms of PTSD

Variable	**B**	**S.E.**	**Exp(B) with 95% C.I.**
Demandingness	.23	.13	1.26 (0.99 / 1.62)
Catastrophizing	.53	.14	**1.71*** (1.29 / 2.25)
Low Frustration Tolerance	.53	.16	**1.70*** (1.24 / 2.33)
Depreciation	.57	.16	**1.77*** (1.28 /2.44)
Age	.03	.03	1.03 (.97 / 1.09)
Number of Trauma	.11	.15	1.12 (.83 / 1.49)
Gender			
Female			1
Male	.54	.51	1.71 (0.63 / 4.68)
Group			
Police			1
Military	.11	.57	1.12 (0.37 / 3.40)
Marital Status			
Married			1
Divorced	.19	.72	1.21 (0.29 / 4.96)

Note. Significance level: * $p < .01$

6.4 Discussion

The primary aim of the current chapter was to provide initial evidence of the role of trauma-specific irrational beliefs (as described by REBT theory) in the likelihood of reporting strong posttraumatic stress symptoms, while controlling for a range of important sociodemographic risk factors. This research was undertaken in order to contribute to the field of REBT by evaluating the importance of each irrational belief process in distinguishing between those trauma-exposed individuals who develop high levels of posttraumatic stress and those who develop mild symptoms. Furthermore, the current study was performed in order to highlight to the wider cognitive-behavioural therapy community the importance of the specific types of dysfunctional cognitions described in REBT theory in the predictions of posttraumatic stress symptomology.

Initial investigations revealed very large differences between the strongly-symptomatic and mildly-symptomatic groups on each of the irrational belief processes. In each case the strongly-symptomatic group exhibited substantially higher levels of each irrational belief process than the mildly-symptomatic group. These results although striking are generally unsurprising in that they indicate that those participants displaying strong symptoms of posttraumatic stress symptomology display far high levels of irrationality compared to those who reported mild levels of posttraumatic stress symptomology. An interesting finding was that trauma-specific Demandingness beliefs were the most strongly endorsed irrational belief process among the strongly-symptomatic group. These beliefs are hypothesised to represent the core cognitive variables in the emergence of PTSD according to REBT theory (Ellis, 2001) and current results indicate a high endorsement rate among the current sample.

Results from the binary logistic regression analysis produced strong support for the theoretical model, with nearly 90% of participants correctly classified, a substantial improvement over the nearly 60% of correctly classified cases in the constant only model. The results of this analysis identified three predictor variables that made a unique, statistically significant contribution to the prediction of reporting strong symptoms of posttraumatic stress. These three predictors were the secondary irrational belief processes: Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs. Notably, once the effects of the cognitive factors were controlled for, none of the

sociodemographic variables included in this study (age, number of trauma's experienced, gender, marital status, and occupation type) made a statistically significant contribution to the prediction of reporting strong symptoms of posttraumatic stress. Although previous studies have identified these factors as important in the prediction of PTSD itself, current findings suggest that these variables do little to differentiate those who display high levels of posttraumatic stress symptomology from those who display mild symptoms, and as such are far less important in understanding the development of more severe symptoms of posttraumatic stress compared to the role of irrational beliefs.

Each of the three irrational belief processes identified as statistically significant predictors of belonging to the stong symptomology group yielded similar odds ratio levels, however trauma-specific Depreciation beliefs did emerge as the strongest predictor. Individuals who reported ever increasing levels of negative self-evaluative beliefs related to their traumatic experience were increasingly likely to report strong posttraumatic stress symptoms. This finding is generally consistent with previous work applying the PTCI (Foa et al., 1999) which found that the latent factor reflecting negative views of the self was most strongly associated with developing PTSD (Daie-Gabai et al., 2011; Foa & Rauch, 2004). Current results therefore provide additional evidence that negative evaluations of the self are a critical cognitive vulnerability factor in the development and maintenance of posttraumatic stress responses.

Catastrophizing and Low Frustration Tolerance beliefs displayed near identical odds ratio values with results indicating that the more extreme a person's evaluations of the badness of the traumatic event, and the more one evaluates himself or herself as being unable to cope with, or withstand, the effects of the traumatic incident, the greater their likelihood of reporting strong posttraumatic stress symptoms. Although approaching the level of statistical significance, Demandingness beliefs did not make a unique contribution to the prediction of reporting strong symptoms of posttraumatic stress despite being the most strongly endorsed irrational belief process among the symptomatic group. This result is generally consistent with the predictions of REBT theory which states that Demandingness beliefs will not exert a direct influence on psychopathological outcomes but should instead indirectly impact psychological distress via the secondary irrational belief processes, all of which were identified as statistically significant predictors.

These results have a number of important implications to the REBT literature and the wider scientific literature regarding the cognitive constructs integral to the development and maintenance of posttraumatic stress responses. According to REBT theory, various psychopathological outcomes result from differential interactions between the primary irrational belief process and the various secondary irrational belief processes (David et al., 2002). Anxiety disorders are predicted to arise as a consequence of an interaction between Demandingness beliefs and Catastrophizing and/or Low Frustration Tolerance beliefs. Results of the current study are partially supportive of this prediction in that both Catastrophizing and Low Frustration Tolerance were identified as important predictors of posttraumatic stress responses. Additionally, Depreciation beliefs, which are hypothesised to be more relevant to depressive disorders (David et al., 2002), were also found to be a significant factor in the prediction of PTSD symptomology. PTSD and depression are well established to share a high degree of comorbidity (Kessler, et al., 1995; Zlotnick, Johnson, Kohn, Vicente, Rioseco, & Saldiva, 2006) and based on current and previous findings (e.g. Daie-Gabai et al., 2011; Foa & Rauch, 2004) it is possible that the comorbidity between these disorders is the result of the operation of the same basic cognitive process, namely negative evaluations of the self. Alternatively, given the cross-sectional nature of the studies from which these findings arise, it is possible that the consistent finding of a relationship between negative self-evaluative beliefs and posttraumatic stress responses is a consequence of failing to control for the presence of depressive symptomology. Future studies should seek to investigate the effect of trauma-specific irrational beliefs, specifically Depreciation belief, on posttraumatic stress symptomology while controlling for the effect of depression, in order to more fully investigate this possibility. It is also interesting to note that in the new DSM-5 PTSD is no longer listed as an anxiety disorder, and is now rather included as a trauma- and stressor-related disorder. Current findings may therefore indicate a development of David and colleagues (2002) model and suggest that trauma- and stressor-related disorders arise as consequence of interactions between Demandingness beliefs and all three secondary belief processes. Furthermore current results indicate that trauma-specific variants of the irrational beliefs are effective in differentiating strong from mild posttraumatic stress responses, while also considering a range of important sociodemographic factors.

6.4.1 Limitations

As with any research endeavour the current study contains a number of limitations which ought to be considered. The nature of the sample is limited to a specific strata of the population (law enforcement and military personnel), thus generalisations of current findings to the wider population is problematic. Additionally, a self-report measure of PTSD symptomology was used and although self-report measures of PTSD such as the PDS (Foa et al., 1997) used in the current study have been shown to highly correspond with clinician-administered measures (Griffin et al., 2004), clinician based measures would have been preferable as they are considered the gold standard method of assessing PTSD symptomology. Additionally correlations among the various irrational belief processes were rather high which may well have accounted for the non-significant effect of Demandingness beliefs, however this is a perennial issue in REBT research given that the irrational beliefs are expected to share a high degree of association with each other and particularly in relationship to Demandingness beliefs. The continued development of ever more refined psychometic instruments with improved discriminant validity is clearly required.

6.4.2 Conclusion

In conclusion, this article has provided the first piece of empirical evidence demonstrating the direct effect of trauma-related irrational beliefs as outlined in REBT theory in the prediction of posttraumatic stress responses. Specifically, findings from the current study demonstrated that higher levels of trauma-related Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs all predict a greater probability of reporting strong posttraumatic stress responses, while controlling for the effects of a range of key sociodemographic factors. These results thus provide a substantial contribution to the wider scientific literature regarding the types of cognitive variables involved in posttraumatic stress responses, and contribute additional empirical support for the predictions of REBT theory in the context of a psychiatric disorder that has not been widely investigated by the field.

Chapter 7

The Moderating Role of Rational Beliefs in the Relationship between Irrational Beliefs and Posttraumatic Stress Symptomology

Part of this chapter has been published in **Behavioural and Cognitive Psychotherapy**.

Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2014 – in press). The moderating role of rational beliefs in the relationship between irrational beliefs and posttraumatic stress symptomology. *Behavioural and Cognitive Psychotherapy,* available on CJO2013. doi:10.1017/S1352465813000064.

Abstract

Rational Emotive Behaviour Therapy (REBT) hypothesises that rational beliefs act as cognitive protective factors against the development of psychopathology however little empirical evidence exists regarding the nature of the possible protective effects offered by rational beliefs. The current chapter tests both the direct and moderating effects of rational beliefs on posttraumatic stress symptomology (PTS). Three hundred and thirteen (N = 313) active-duty law enforcement, military, and related emergency service personnel took part in the current study. Sequential moderated multiple regression analysis was employed to investigate (i) the direct impact of irrational beliefs on PTS, (ii) the direct impact of rational beliefs on PTS, (iii) the moderating effects of rational beliefs in the relationship between irrational beliefs and PTS. Irrational beliefs, in particular Depreciation beliefs, were found to positively predict posttraumatic stress symptomology. Rational beliefs (Preferences and Acceptance beliefs) were found to have a direct, negative impact on levels of PTS. With respect to the moderating effects of rational beliefs, Acceptance beliefs moderated the impact of Catastrophizing beliefs on levels of reported PTS, such that higher levels of Acceptance led to a reduction in the positive association between Catastrophizing and PTS. Results of the current chapter offer important insights into the protective role played by rational beliefs in the regulation of posttraumatic stress symptoms.

7.1 Introduction

Rational Emotive Behavior Therapy (REBT) is the original form of Cognitive Behaviour Therapy (CBT) (see Ellis, 1958, 1962). The general theory of REBT is built upon Ellis' (1962, 1994) 'ABC' model. This model presents the core theoretical principle of CBT that beliefs (B) mediate the relationship between activating events in our internal of external environments (A) and a range of cognitive-emotional-behavioural-physiological consequences (C) that can be experienced. REBT theory is distinguished from other CBT models in that it hypothesises that evaluative/appraisal beliefs represent the most proximate cognitive antecedents of cognitive-emotional-behavioural-physiological responses (Hyland & Boduszek, 2012).

Contemporary REBT theory discusses two general belief groups, namely irrational beliefs, and rational beliefs (David, Lynn, & Ellis, 2010). Within both belief groups, REBT theory discusses four types of belief processes. The primary irrational belief process is stated to be Demandingness beliefs. These beliefs are rigid, absolutistic insistences for how things "must be", "ought to be", "should be", "have to be" etc. (e.g., "*I must be loved at all times by my partner*."). The secondary irrational belief processes include; Catastrophizing beliefs which refer to beliefs that an individual holds where unpleasant events are evaluated in the most extremely negative fashion possible (e.g., "*If my partner stops loving me, it would be the worst thing that could happen*."); Low Frustration Tolerance beliefs, which are beliefs that reflect a person's evaluation that they are completely incapable of withstanding, tolerating, or being capable of experiencing any kind of happiness should they not get what they demand they must get, or get what they demand they must not get (e.g., "*I couldn't bare it if my partner ever stopped loving me*."); and Depreciation beliefs in which a person makes overgeneralized and all encompassing negative conclusions about themselves, others, or the world when they do not live up to their self-imposed demands (e.g., "*If my partner ever stopped loving me, it would mean I am an unlovable, worthless person*."). REBT theory therefore predicts that Demandingness beliefs, as the primary irrational belief process, impacts upon various forms of emotional distress and psychopathology through the secondary irrational belief processes of Catastrophizing beliefs, Low Frustration Tolerance beliefs, and/or Depreciation beliefs. Various studies have been undertaken to investigate the organisation and interrelations between the irrational beliefs and there is

substantial evidence supporting the predictions of REBT theory (David, Schnur, & Belloiu, 2002; David, Ghinea, Macavei, & Kallay, 2005; DiLorenzo, David, & Montgomery, 2007, 2011; Moldovan, 2009).

7.1.1 Rational Beliefs

Each irrational belief processes is hypothesised to share an alternative rational belief. The rational alternative to Demandingness beliefs are Preference beliefs. Preference beliefs reflect flexible beliefs about how a person wants, desires, or prefers something to be (e.g., "*I want my partner to continue to love me, but obviously there is no reason why I have to be loved just because I want to be*."). The secondary rational belief processes include; Non-Catastrophizing beliefs whereby an individual evaluates negative events in realistic terms (e.g., "*My partner ceasing to love me would be very bad, but it wouldn't be the end of the world*."); High Frustration Tolerance beliefs whereby a person believes that they can tolerate and withstand difficulties or discomforts in life (e.g., "*It would be very unpleasant to no longer be loved by my partner but I could stand the unpleasantness and continue to lead a happy existence*."); and Acceptance beliefs whereby an individual does not make a global evaluation of one's own or another's worth on the basis of a single behaviour, rather the person legitimately rates one's behaviour but not their whole self (e.g., "*My partner may no longer love me, but I can accept myself as a fallible human being that sometimes acts in an unloving manner*.").

7.1.2 Rational Beliefs as Cognitive Protective Factors

There is a large body of empirical evidence which demonstrates that irrational beliefs are critical cognitive variables in the emergence of various forms of psychopathology including mood disorders (Macavei, 2005; Muran, Kassinove, Ross, & Muran, 1989; Nelson, 1977; Prud'homme & Barron, 1992; McDermutt, Haaga, & Bilek, 1997; Blatt, 1995), major depressive disorder (Szentagotai, David, Lupu, & Cosman, 2008), various anxiety disorders (Nieuwenhuijsen, Verbeek, Boer, Blonk, & van Dijk, 2010; Lupu & Iftene, 2009; DiLorenzo, et al., 2007; Montgomery, David, DiLorenzo, & Schnur, 2007; Lorcher, 2003), anger disorders (Jones & Towers, 2004; Martin & Dahlen, 2004; Silverman & DiGiuseppe, 2001; Bernard, 1998), symptoms of various general psychiatric disorders (Alden, Safran, & Weideman, 1978), lack of assertiveness (Alden et al., 1978), type A coronary prone behavior pattern (Smith & Brehm, 1981), trait

anger, trait depression, and trait anxiety (Bernard, 1998), and state anger, state guilt, and state anxiety (David et al., 2002).

While a great deal of research has examined the role of irrational beliefs as cognitive vulnerability factors in the emergence and maintenance of psychopathology, comparatively little is known about the role played by rational beliefs. There is evidence that activation of rational beliefs during activating events gives rise to non-distorted automatic thoughts, functional and healthy emotional responses, and various adaptive behavioural and physiological responses (see David et al., 2010 for a full review). This seems to suggest that rational beliefs may serve as cognitive protective factors against the development of psychological distress. Additionally, rational beliefs are also theorised not to represent bipolar manifestations of their irrational counterparts but rather they are believed to represent a unique and distinct cognitive construct. While there has been little effort to directly investigate the nature of the relationship between rational and irrational beliefs, what evidence does exist provides tentative support for the hypothesis that rational and irrational beliefs are not bipolar cognitive constructs. Bernard (1998) found a moderate, negative statistically significant correlation of -0.44 between rational beliefs and irrational beliefs in a study of the latent structure of the General Attitudes and Belief Scale. In another study of the underlying factor structure of the Romanian version of the Attitudes and Belief Scale-2 (Macavei, 2002), rational beliefs and irrational beliefs were found to possess a weak, negative, statistically significant correlation of -0.32 (Fulop, 2007). Additionally, DiLorenzo et al. (2011) found similar levels of association between the various rational and irrational beliefs under investigation (correlations ranged from -0.29 to -0.34). These findings suggest that although a person may report high levels of irrational beliefs, this does not necessarily indicate low levels of rational beliefs.

7.1.3 Current Study

The aim of the current chapter is to add to the existing REBT literature with regards to possible protective role of rational beliefs in the emergence of psychopathology in a unique and novel way by investigating whether or not the presence of rational beliefs can serve to moderate the impact of the various irrational belief processes on levels of posttraumatic stress symptomology (PTS). This investigation will therefore serve to

further elucidate the role played by both rational and irrational beliefs in psychopathology by investigating for the first time the direct impact of the various rational and irrational beliefs on levels of PTS, as well as to assess whether the presence of rational beliefs can serve to moderate the impact of irrational beliefs on symptoms of PTS. The current study will consequently provide additional evidence regarding the nature of the relationship between rational and irrational beliefs.

7.2 Methods Section

7.2.1 Participants

The sample for the current study consisted of three hundred and thirteen (N = 313) trauma-exposed individuals employed in a range of front-line emergency services. The sample comprised an international group of soldiers (n = 81, 25.9%), police officers (n = 183, 58.5%), and associated emergency service personnel (n = 49, 15.7%). All participants were recruited from active-duty while serving in the Republic of Ireland and the Republic of Kosovo over a twelve month period (June 2011 – June 2012). The mean number of exposures to traumatic life events for the current sample was 2.75 (SD = 1.51, range 1-11). The most frequently cited traumatic life experience was being involved in, or witness to, a serious accident, fire, or explosion (60%, n = 189); followed by a non-sexual assault by a stranger (57%, n = 178); and military combat (43%, n = 133). The most infrequently reported traumatic life events was torture (1.6%, n = 5).

The sample consisted of 212 males (67.7%) and 101 females (32.3%). The participants ranged in age from 23 to 65 (M = 38.18, SD = 8.70). The majority of the participants resided in suburban areas (44.4%; n = 139), and urban areas (37.1%, 116), and the remainder indicated that they reside in rural areas (18.5%, n = 58). The majority of the sample participants possessed at least a secondary/high school level diploma (55.9%, n = 175) while 108 held a bachelor's degree (34.5%), 28 participants possessed a master's degree (8.9%), and 2 individuals reported possessing a doctoral degree (0.6%). The majority of respondents were currently married (n= 154, 49.2%), while 19.5% reported their marital status to be single (n = 61), 21.4% were cohabiting with a partner (n = 67), and 9.9% of respondents were divorced (n = 31).

7.2.2 Procedures

The current sample was gathered in an opportunistic fashion in the Republic of Ireland and the Republic of Kosovo. Ethical approval was first granted from the Ethics committee of the University of Ulster, subsequently written approval was obtained by the principal researcher to approach members of the respective institutions that took part in the current study. Participants were informed of the nature of the study being under

taken either by a member of the research team or an assigned liaison for a particular organisation, and each participant's involvement in the research project was voluntary. No obligations were placed upon potential respondents nor were any inducements employed to recruit the sample. Each participant was assured about confidentiality and those who chose to take part in the research project had the option of completing either an anonymous self-administered paper-and-pencil version of the questionnaire or an electronic version which was delivered and returned via email. The majority of respondents chose the paper-and-pencil option (63.26%, n = 198).

7.2.3 Measures

The Posttraumatic Stress Diagnostic Scale (PDS: Foa, Cashman, Jaycox, & Perry, 1997) is a 49-item self-report measure of the severity of posttraumatic stress symptomology related to a particular traumatic event. The PDS assess all aspects of a posttraumatic stress disorder diagnosis from Criteria A to F as outlined in the Diagnostic and Statistical Manual of Mental Disorders IV (American Psychiatric Association, 1994). The PDS measures the nature of the traumatic experience, the duration of the experienced symptoms, the impact of the experienced symptoms on daily functioning, and the severity of the symptoms. Seventeen items measure each of the identified symptoms of PTSD along a four-point Likert scale. Respondents rate the severity of each symptom from a score of 0 ("not at all or only one time") to 3 ("5 or more times a week / almost always"). This produces a total range of scores from 0-51 with higher scores indicating higher levels of posttraumatic stress symptomology. Scores from 0-10 reflect mild symptoms of PTSD; scores from 11-20 reflect moderate symptoms of PTSD; scores from 21-35 reflect moderate-to-severe symptoms of PTSD; while scores from 36-51 reflect severe symptoms of PTSD. Within the current sample 59% (n = 181) of respondents reported mild symptoms, 15.3% (n = 47) reported moderate symptoms, 24.4% (n = 75) reported moderate-severe symptoms, and 1.3% (n = 4) reported severe symptoms. The PDS possesses strong psychometric properties with Griffin, Uhlmansiek, Resick, and Mechanic (2004) demonstrating that it shares a strong correlation with the Clinician-Administered PTSD scale (Blake et al., 1995).

The Abbreviated Version of the Attitudes and Belief Scale 2 (AV-ABS2: Hyland, Shevlin, Adamson, & Boduszek, 2014) is a 24-item self-report measure of

general-level Rational and Irrational beliefs, as defined by current REBT theory (David et al., 2010). The AV-ABS2 measures all four irrational belief processes (Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciation) and their corresponding four rational belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance). Each subscale is measured via three items. Items of the AV-ABS2 measuring irrational beliefs include; "*I must do well at important things, and I will not accept it if I do not do well*" (Demandingness); "*It's awful to be disliked by people who are important to me, and it is a catastrophe if they don't like me*" (Catastrophizing); "*Its unbearable being uncomfortable, tense or nervous and I can't stand it when I am*" (Low Frustration Tolerance); and "*If I do not perform well at tasks that are very important to me, it is because I am a worthless bad person*" (Depreciation). Items of the AV-ABS2 measuring rational beliefs include; "*I want to perform well at some things, but I do not have to do well just because I want to*" (Preferences); "*It's bad to be disliked by certain people, but I realize it is only unfortunate to be disliked by them*" (Non-Catastrophizing); "*I get distressed if I'm not doing well at important tasks, but I can stand the distress of failing at important tasks*" (High Frustration Tolerance); and "*When people whom I want to like me disapprove of me, I know I am still a worthwhile person*" (Acceptance).

The AV-ABS2 produces total scores on each of the individual Rational and Irrational Belief processes. Item are scored along a five-point Likert scale from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). Possible scores for each subscale range from 3-15 with high scores in each case indicating higher levels of rational and irrational beliefs, respectively. The AV-ABS2 exhibited satisfactory internal consistency with all subscales recording a Cronbach's Alpha level above .70 (see Table 7.1).

7.3 Results

7.3.1 Descriptive Statistics and Correlations

The descriptive statistics shown in Table 7.1 indicate that the current sample of 313 police officers, military personnel, and related emergency service workers demonstrated relatively low levels of PTS, on average. In terms of the irrational belief processes, moderate levels of Demandingness beliefs, Catastrophizing beliefs, and Low Frustration Tolerance beliefs were reported while low-to-moderate levels of Depreciation beliefs were reported. In terms of the rational belief processes, moderate levels of each of the four rational belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance) were indicated.

Table 7.1

Descriptive statistics, Cronbach Alpha, and Correlations between all measured variables

Item	1	2	3	4	5	6	7	8	9
1. PTS	---								
2. Demandingness	.60**	--							
3. Catastrophizing	.67**	.64**	---						
4.Low Frustration Tolerance	.69**	.67**	.62**	---					
5. Depreciation	.73**	.50**	.66**	.60**	---				
6. Preferences	-.07	-.12*	.05	-.07	-.04	---			
7. Non-Catastrophizing	-.28**	-.31**	-.24**	-.29**	-.38**	.00	---		

8. High Frustration Tolerance	-.53**	-.45**	-.35**	-.47**	-.45**	.25**	.47**	---	
9. Acceptance	-.75**	-.54**	-.64**	-.65**	-.90**	-.00	.46**	.52**	---
Means	11.40	9.72	8.24	8.41	6.17	9.58	11.62	10.54	11.64
SD	10.77	3.48	3.75	3.54	4.18	1.92	2.59	2.87	4.09
Range	0-41	3-15	3-15	3-15	3-15	3-15	3-15	3-15	3-15
Possible Range	0-51	3-15	3-15	3-15	3-15	3-15	3-15	3-15	3-15
Cronbach Alpha	.95	.81	.81	.78	.95	.80	.73	.70	.95

Note: ** is significant at the .01 level; * is significant at the .05 level

Table 7.1 also reports the correlations amongst the predictor variables (Demandingness, Catastrophizing, Low Frustration Tolerance, Depreciations Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance) included in the study. Of the correlations between the predictor variables that were statistically significant, these correlations generally ranged from weak to moderate indicating multicollinearity was unlikely to be a problem (see Tabachnick & Fidell, 2007). However, one correlation was strong and reached a level that indicated a possible violation of multicollinearity. This correlation was between Depreciation and Acceptance beliefs ($r = .90$, $p < .001$), however investigation of the Tolerance and VIF statistics demonstrated that although high, these levels did not exceed an acceptable level. On the basis of these VIF and Tolerance values, and the fact that these beliefs are the rational and irrational counterparts of each other, it was decided to retain these two variables rather than collapse them into a single variable.

Furthermore all predictor variables were significantly correlated with PTS with the exception of Preference beliefs. These correlations with the dependent variable (PTS) ranged from weak to strong, ranging from $r = -.28$, $p < .001$ between Non-Catastrophizing and PTS to $r = -.75$, $p < .001$ between Acceptance beliefs and PTS.

These results indicate that the data was suitably correlated with the dependent variable for examination through multiple linear regression analysis to be reliably undertaken.

7.3.2 Sequential Moderated Multiple Regressions

A sequential moderated multiple regression analysis as the recommended method for testing interaction effects (Cohen & Cohen, 1983) was applied in order to investigate the predictive relationship between the irrational belief processes (Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciations) and PTS while examining the moderating role of each of the four rational belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance). Four separate models were thus specified and empirically tested with all predictor and moderator variables being centred as suggested by Aiken and West (1991).

The first model considered the moderating role of Preference beliefs. In the first step of sequential moderated multiple regression, five predictors were entered: Demandingness beliefs, Catastrophizing beliefs, Low Frustration Tolerance beliefs, Depreciation beliefs, and Preference beliefs. This model was statistically significant $F(5, 298) = 116.82$; $p < .001$ and explained 66.2% of variance in levels of PTS (see Table 7.2). All variables with the exception of Demandingness beliefs were statistically significant predictors of levels of PTS however the strongest predictor of PTS was Depreciation beliefs ($\beta = .40$ $p < .001$). The final step consisted of entering the interaction terms coding interactions between Preference beliefs and all four irrational belief processes. After the entry of the interaction effects the model as a whole explained 66.5% of variance in PTS symptomology $F(9, 294) = 64.80$; $p < .001$. The addition of the interaction effects at Step 2 only accounted for an additional 0.3% of variance in levels of PTS and this changes was not statistically significant (R^2 Change = .003; $F(4, 294) = .582$; $p = .676$). The results at this step indicated that Demandingness beliefs ($\beta = .11$, $p = .043$), Catastrophizing beliefs ($\beta = .18$, $p = .001$), Low Frustration Tolerance beliefs ($\beta = .27$, $p < .001$), and Depreciation beliefs ($\beta = .41$, $p < .001$) were all significant predictors of levels of PTS. Additionally, no empirical evidence was found that Preference beliefs directly impacts levels of PTS or moderates the impact of any of the irrational beliefs on PTS.

Table 7.2

Regression model of PTS with Preference beliefs as a moderator

	R	R^2	B	SE	*β*	*t*
Step 1	.814	.662**				
Demandingness			.28	.16	.09	1.84
Catastrophizing			.53	.15	.19**	3.58
Low Frustration Tolerance			.81	.16	.27**	5.25
Depreciation			1.03	.12	.40**	8.48
Preference			-.39	.19	-.07*	-2.02
Step 2	.815	.665**				
Demandingness (Dem)			.32	.16	.11*	2.03
Catastrophizing (Cat)			.51	.15	.18**	3.35
Low Frustration Tolerance (LFT)			.81	.16	.27**	5.17
Depreciation (Dep)			1.05	.12	.41**	8.46
Preference (Pref)			-.37	.21	-.07	-1.81
Dem x Pref			-.03	.08	-.02	-.40
Cat x Pref			-.00	.08	-.00	-.02
LFT x Pref			.04	.07	.02	.49
Dep x Pref			-.07	.07	-.06	-1.01

Note: ** is significant at the .01 level; * is significant at the .05 level

The second model considered the moderating role of Non-Catastrophizing beliefs. In the first step of sequential moderated multiple regression, five predictors were entered: Demandingness beliefs, Catastrophizing beliefs, Low Frustration Tolerance beliefs, Depreciation beliefs, and Non-Catastrophizing beliefs. This model was statistically significant $F (5, 298) = 114.61$; $p < .001$ and explained 65.8% of variance in levels of PTS (see Table 7.3). All predictor variables at this step with the exception of Non-Catastrophizing beliefs were statistically significant predictors of levels of PTS with Depreciation beliefs identified as the strongest predictor of PTS ($\beta = .40$, $p < .001$). The

final step consisted of entering the interaction terms coding interactions between Non-Catastrophizing beliefs and all four irrational belief processes. After the entry of the interaction effects the model as a whole explained 65.9% of variance in PTS symptomology F (9, 294) = 63.21; p < .001. The addition of the interaction effects at Step 2 only accounted for an additional 0.1% of variance in levels of PTS and this change was unsurprisingly not statistically significant (R^2 Change = .001; F (4, 294) = .299; p = .879). These results indicated that Demandingness beliefs (β = .11, p = .034), Catastrophizing beliefs (β = .18, p = .001), Low Frustration Tolerance beliefs (β = .27, p < .001), and Depreciation beliefs (β = .40, p < .001) were all significant predictors of levels of PTS. Additionally, no empirical evidence was found that Non-Catastrophizing beliefs directly impact levels of PTS or moderates the impact of the various irrational belief groups on levels of PTS.

Table 7.3

Regression model of PTS with Non-Catastrophizing beliefs as a moderator

	R	**R^2**	**B**	**SE**	***β***	***t***
Step 1	.811	.658**				
Demandingness			.35	.16	.11*	2.24
Catastrophizing			.49	.15	.17**	3.27
Low Frustration Tolerance			.83	.16	.27**	5.33
Depreciation			1.04	.13	.40**	8.19
Non-Catastrophizing			.09	.15	.02	.56
Step 2	.812	.659**				
Demandingness (Dem)			.35	.16	.11*	2.13
Catastrophizing (Cat)			.51	.15	.18**	3.34
Low Frustration Tolerance (LFT)			.83	.16	.27**	5.22
Depreciation (Dep)			1.02	.13	.40**	7.73
Non-Catastrophizing (Ncat)			.08	.17	.02	.49

Dem x Ncat	-.01	.07	-.01	-.16
Cat x Ncat	-.05	.06	-.05	-.84
LFT x Ncat	.04	.06	.03	.56
Dep x Ncat	.00	.05	.01	.07

Note: ** is significant at the .01 level; * is significant at the .05 level

The third model considered the moderating role of High Frustration Tolerance beliefs. In the first step of sequential moderated multiple regression, five predictors were entered: Demandingness beliefs, Catastrophizing beliefs, Low Frustration Tolerance beliefs, Depreciation beliefs, and High Frustration Tolerance beliefs. This model was statistically significant $F (5, 299) = 125.12$; $p < .001$ and explained 67.7% of variance in levels of PTS (see Table 7.4). All predictor variables with the exception of Demandingness beliefs were statistically significant predictors of levels of PTS and the strongest predictor of PTS at this step was again Depreciation beliefs ($\beta = .35$, $p < .001$). The final step consisted of entering the interaction terms coding interactions between High Frustration Tolerance beliefs and all four irrational belief processes. After the entry of the interaction effects the model as a whole explained 69.3% of variance in PTS symptomology $F (9, 295) = 65.84$; $p < .001$. The addition of the interaction effects at Step 2 accounted for an additional 1.7% of variance in levels of PTS and this change in explained variance was statistically significant (R^2 Change = .017; $F (4, 295) = 3.98$; $p = .004$). These results indicated that Demandingness beliefs ($\beta = .13$, $p = .014$), Catastrophizing beliefs ($\beta = .18$, $p < .001$), Low Frustration Tolerance beliefs ($\beta = .24$, $p < .001$), Depreciation beliefs ($\beta = .30$, $p < .001$), and High Frustration Tolerance beliefs ($\beta = -.13$, $p = .002$) were all significant predictors of levels of PTS. Additionally, no empirical evidence was found that High Frustration Tolerance beliefs serve to moderate the impact of the various irrational belief groups on levels of PTS.

Table 7.4

Regression model of PTS with High Frustration Tolerance beliefs as a moderator

	R	**R^2**	**B**	**SE**	***β***	***t***
Step 1	.823	.677**				
Demandingness			.21	.15	.07	1.35
Catastrophizing			.55	.15	.19**	3.79
Low Frustration Tolerance			.73	.15	.24**	4.76
Depreciation			.90	.12	.35**	7.42
High Frustration Tolerance			-.62	.15	-.16*	-4.20
Step 2	.833	.693**				
Demandingness (Dem)			.39	.16	.13**	2.47
Catastrophizing (Cat)			.53	.15	.18**	3.57
Low Frustration Tolerance (LFT)			.73	.15	.24**	4.75
Depreciation (Dep)			.76	.13	.30**	6.04
High Frustration Tolerance (HFT)			-.48	.15	-.13*	-3.11
Dem x HFT			-.09	.06	-.09	-1.54
Cat x HFT			-.04	.06	-.04	-.72
LFT x HFT			-.05	.06	-.05	-.89
Dep x HFT			.02	.04	.02	.38

Note: ** is significant at the .01 level; * is significant at the .05 level

The fourth model considered the moderating role of Acceptance beliefs. In the first step of sequential moderated multiple regression, five predictors were entered: Demandingness beliefs, Catastrophizing beliefs, Low Frustration Tolerance beliefs, Depreciation beliefs, and Acceptance beliefs. This model was statistically significant $F(5, 298) = 121.89$; $p < .001$ and explained 67.2% of variance in levels of PTS (see Table 7.5). All variables with the exception of Demandingness beliefs were statistically significant predictors of levels of PTS and the strongest predictor of PTS was Acceptance ($\beta = -.29$, $p < .001$). The final step consisted of entering the interaction

terms coding interactions between Acceptance beliefs and all four irrational belief processes. After the entry of the interaction effects the model as a whole explained 68.9% of variance in PTS symptomology F (9, 294) = 72.38; p < .001. The addition of the interaction effects at Step 2 accounted for an additional 1.7% of variance in levels of PTS and this additional variance explained was statistically significant (R^2 Change = .017; F (4, 294) = 4.12; p = .003). These results indicated that Demandingness beliefs (β = .13, p = .029), Catastrophizing beliefs (β = .20, p < .001), Low Frustration Tolerance beliefs (β = .25, p < .001), and Acceptance beliefs (β = -.23, p = .006) were all significant predictors of levels of PTS.

One statistically significant moderating effect was observed for the interaction between Catastrophizing beliefs and Acceptance beliefs (β = -.13, p = .03) indicating that the impact of Catastrophizing beliefs on levels of PTS depends upon the levels of Acceptance beliefs. Simple slopes for the relationship between Acceptance beliefs and PTS were investigated for low (-1 SD below the mean), medium (mean), and high (+1 SD above the mean) levels of Acceptance beliefs (see Cohen & Cohen, 1983; Jaccard, Turrisi, & Wan, 1990). Each of the simple slope tests indicated a positive association between Catastrophizing beliefs and PTS, however Catastrophizing beliefs were most weakly associated with levels of PTS when levels of Acceptance beliefs were high (see Figure 7.1).

Table 7.5

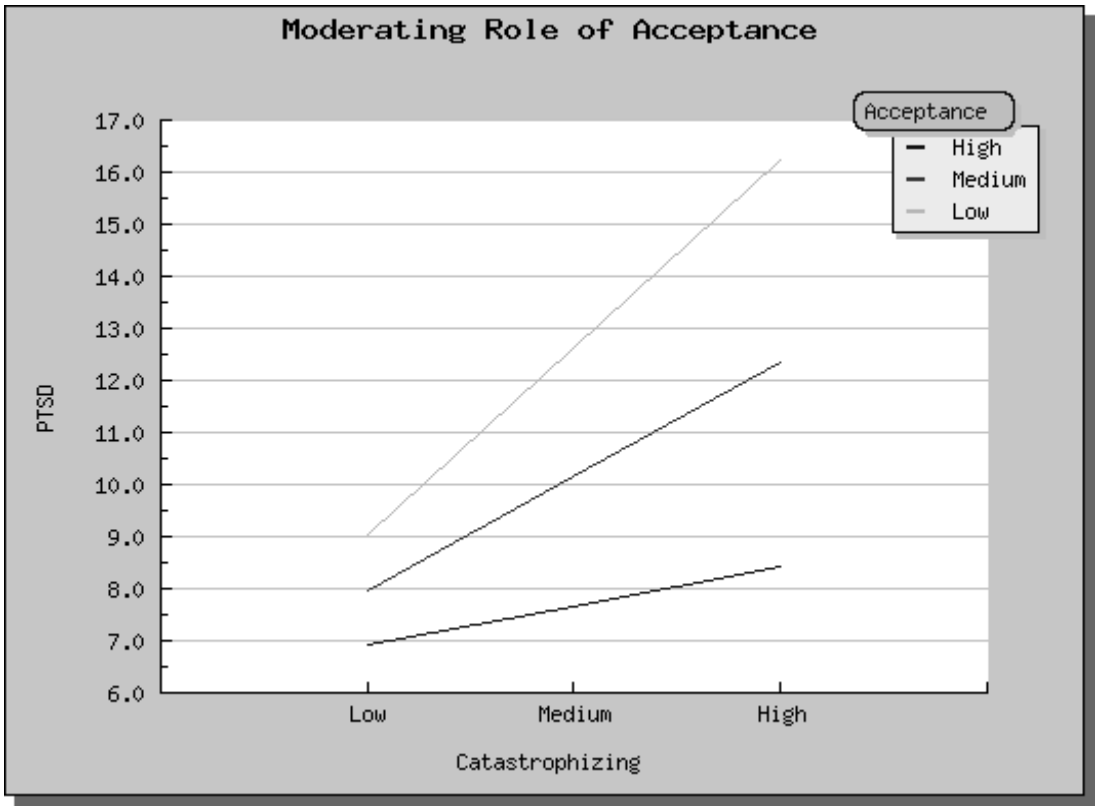
Regression model of PTS with Acceptance beliefs as a moderator

	R	**R^2**	**B**	**SE**	***β***	***t***
Step 1	.820	.672**				
Demandingness			.28	.15	.09	1.86
Catastrophizing			.50	.15	.18**	3.44
Low Frustration Tolerance			.72	.16	.24**	4.60
Depreciation			.42	.21	.16**	2.00
Acceptance			-.77	.22	-.29**	-3.57
Step 2	.830	.689**				
Demandingness (Dem)			.40	.18	.13**	2.19
Catastrophizing (Cat)			.58	.15	.20**	3.87
Low Frustration Tolerance (LFT)			.76	.16	.25**	4.73
Depreciation (Dep)			.17	.25	.07	.68
Acceptance (Acc)			-.61	.22	-.23*	-2.79
Dem x Acc			-.03	.06	-.04	-.53
Cat x Acc			-.09	.04	-.13*	-2.17
LFT x Acc			-.07	.04	-.08	-1.53
Dep x Acc			.03	.04	.07	.78

Note: ** is significant at the .01 level; * is significant at the .05 level

Figure 7.1

Relationship between Catastrophizing beliefs and PTS moderated by Acceptance beliefs



7.4 Discussion

The current chapter was carried out in order to provide additional empirical evidence to the REBT literature with regards to the hypothesised protective role of rational beliefs in the development of psychopathology by conducting the first empirical investigation of the moderating role of rational beliefs in the relationship between irrational beliefs and psychopathology. This study also sought to assess, for the first time, the direct impact of the various irrational and rational beliefs on levels of PTS, as well as to further investigate whether rational and irrational beliefs are best conceptualised as bipolar constructs or whether they represent qualitatively distinct cognitive constructs.

As can be seen in Table 7.1, findings of the current study provide equivocal indications regarding the relationship of irrational beliefs to rational beliefs. No statistically significant associations were observed between the primary rational and irrational belief processes (Preference and Demandingness beliefs), while a weak, negative association was identified between Non-Catastrophizing and Catastrophizing beliefs, and a weak-to-moderate negative association was discovered between High Frustration Tolerance and Low Frustration Tolerance beliefs. These results strongly suggest that these three rational and irrational belief processes are not bi-polar constructs. Contrastingly, there was a strong, negative association identified between Acceptance and Depreciation beliefs, indicating that these variables are bipolar constructs of each other. Given that none of the other rational and irrational belief process approached this level of association, it is possible that the strong (negative) relationship observed between Acceptance and Depreciation beliefs is a consequence of an inability of the AV-ABS2 to properly discriminate between these constructs. Additional research utilizing generalised, and ideally, disorder-specific measures of rational and irrational beliefs will be required to gain better insight into whether or not these particular belief processes are bipolar constructs. Overall, current results support previous indications (Bernard, 1998) that rational and irrational beliefs represent separate cognitive constructs.

In order to investigate the unique direct effects of rational and irrational beliefs on PTS, and the interaction effects of the four rational belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance beliefs), four distinct

models were estimated and tested. In the first model the direct impact of each of the irrational belief processes (Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciations) along with Preference beliefs were assessed. The results indicated that Preferences had a very weak, negative direct impact on levels of PTS, suggesting that those who have higher levels of Preference beliefs tend to experience lower levels of PTS. Additionally, Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs all positively influenced levels of PTS, with Depreciation beliefs being the strongest predictor of PTS. Catastrophizing and Low Frustration Tolerance beliefs have been predicted to be important variables in the emergence of anxiety disorders, in general, (see David, 2003) and the present results provide support for this prediction of REBT theory.

It is interesting to note that Depreciation beliefs, which are normally more commonly observed as key cognitive variables in the development of mood disorders, were the strongest predictor of PTS among the current sample. Posttraumatic stress disorder (PTSD) and depression have been well established to share a high degree of comorbidity (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Zlotnick, Johnson, Kohn, Vicente, Rioseco, & Saldiva, 2006) and this may well account for the discovery that self-depreciatory beliefs were consistently identified as the strongest predictor of PTS. Also of interest is that Demandingness beliefs were not a statistically significant predictor of levels of PTS. REBT theory predicts that Demandingness beliefs should exert their influence on psychological distress through the secondary irrational belief processes, thus the observation of no direct influence of Demandingness beliefs on PTS is understandable in light of theoretical predictions. Within this model, Preference beliefs did not serve to moderate the relationship of any of the four irrational beliefs with levels of PTS.

A very similar pattern of results emerged from the next two models which assessed the direct and moderating effects of Non-Catastrophizing, and High Frustration Tolerance beliefs, respectively. Again it was observed that Depreciation beliefs were the strongest predictor of PTS, and in both cases neither rational belief process had a direct impact on levels of PTS, nor did either belief process exhibit a moderating effect for any of the irrational beliefs on levels of PTS.

The final model considered the direct and moderating role of Acceptance beliefs. In this case, Acceptance beliefs demonstrated a weak but statistically significant direct effect on levels of PTS, suggesting that higher levels of Acceptance beliefs are associated with lower levels of PTS. Moreover, Acceptance beliefs were found to moderate the impact of Catastrophizing beliefs on levels of PTS. These results indicate that Acceptance beliefs serve as important cognitive protective factors in the emergence of PTS, not only directly as would be expected, but also by modulating in a positive direction the impact that Catastrophizing beliefs can have on levels of PTS symptoms.

These results provide strong empirical support for REBT theory within the context of a psychiatric disorder not yet examined by the REBT community. Current results demonstrated that the irrational beliefs hypothesised as crucial in the emergence and maintenance of psychopathology by REBT theory, are indeed very important predictors of PTS, and served to explain a substantial percentage of variance in levels of PTS symptomology. Furthermore, current results indicate that Preference and Acceptance beliefs directly impacted levels of PTS such that higher levels of each of these rational beliefs contributed to lower levels of PTS. Additionally, Acceptance beliefs were found to moderate the impact of Catastrophizing beliefs on levels of PTS symptoms. These results provide additional and unique support for the cognitive protective role played by rational beliefs.

Findings from the current study are not limited to REBT theory, but can be viewed as having significance to the wider CBT community. As a consequence of REBT being the original cognitive-behavioural model, many of the important functional and dysfunctional cognitive processes first described within REBT theory have been adopted and incorporated into distinct CBT models. For example, Catastrophizing beliefs are an integral component of contemporary Cognitive Therapy models of PTSD, as well as panic disorder and generalized anxiety disorder (see Clark & Beck, 2010). Low Frustration Tolerance beliefs are synonymous with “distress intolerance” beliefs which are a key component of Dialectical Behavioural Therapy’s theory of borderline personality disorder (Linehan, 1993). More recently distress intolerance beliefs have been demonstrated to be important predictors of PTSD (Marshall-Berenz, Vujanovic, Bonn-Miller, Bernstein, & Zvolensky, 2010; Vujanovic, Bonn-Miller, Potter, Marshall-Berenz, & Zvolensky, 2011). Additionally, Acceptance beliefs share a certain degree of

similarity to the concept of acceptance described in Acceptance and Commitment Therapy (Hayes, Strosahl, Bunting, Twohig, & Wilson, 2004) and within other mindfulness-based disciplines (e.g., Mindfulness-Based Stress Reduction, and Mindfulness-Based Cognitive Therapy). Although REBT theory and mindfulness-based models talk of acceptance there are important distinctions. The mindfulness-based approaches encourage fully attending to, and non-judgemental acceptance of, all contents of consciousness however pleasant or unpleasant, and desirable or undesirable they may be. Contrastingly in REBT theory Acceptance beliefs involve an active process in which the contents of consciousness (thoughts, emotions, physical sensations), as well as the realities of the external world, are explicitly judged as being undesirable, unpleasant, painful, etc., but are accepted because that is the nature of reality in that moment. Moreover, in REBT theory Acceptance is the process of evaluating internal and external occurrences without making illogical overgeneralisations (e.g., not judging a person totally, based upon one moment of poor behaviour). Current findings consequently can be viewed as not only providing empirical support for a number of important predictions of REBT theory, but as widely supportive of the more general CBT model of psychopathology.

7.4.2 Limitations

As with any research endeavour there are a number of limitations associated with the current study that ought to be considered. The nature of the sample is limited to a very specific strata of the population (law enforcement, military, and emergency service personnel) experiencing symptoms of PTS, thus generalisations of current findings to the other contexts is not possible. Future research should seek to replicate this study within populations who experience other psychological maladies in order to generate more robust and reliable conclusions. The current study also employed a measure of general rational and irrational beliefs however it would have been preferable to examine the role of disorder specific rational and irrational beliefs, as disorder-specific beliefs would likely provide a clearer indication of the true role played by these cognitions in PTS. Additionally, a self-report measure of PTSD symptomology was used and although self-report measures of PTSD such as the PDS (Foa et al., 1997) used in the current study have been shown to highly correspond with clinician-administered

measures (Griffin et al., 2004), clinician-based measures would have been preferable as they are considered the gold standard method of assessing PTSD symptomology.

7.4.3 Conclusions

In conclusion, this study substantially contributes to the scientific literature in a number of important ways. The current study is the first of its kind to investigate the role of rational or irrational beliefs in the context of symptoms of PTS symptomology. As such this study has established the important cognitive vulnerability role of irrational beliefs, and the important cognitive protective role of rational beliefs, in PTS responses. This provides important additional evidence in support of REBT theory. Moreover, this study provides the first piece of empirical evidence that rational beliefs can serve to moderate the impact of irrational beliefs on psychological distress, although in the current analysis the protective role appears to be limited to Acceptance beliefs specifically. Current results therefore provide a new perspective on the protective role played by rational beliefs and thus opens up a new area of research for those within the REBT community to further explore in the context of a variety of other forms of psychopathology.

Chapter 8

Conclusion

8.1 Overview of Chapters, Aims, and Findings

8.1.1 Chapter One

Chapter 1 provided an overview of the cognitive-behavioural theory (CBT) of psychopathology, with a special emphasis on describing the theoretical model of Rational Emotive Behaviour Therapy (REBT). The nature of posttraumatic stress disorder (PTSD) was subsequently described, along with an in-depth review of the empirical evidence regarding the symptom structure of PTSD. The first section of chapter 1 outlined the basic principles of CBT theory (Beck, 1963; Ellis, 1958) and described the many and varied theoretical approaches that can be encapsulated within the CBT framework. This section described the fundamental premise of cognitive-behavioural theories, namely that dysfunctional cognitive processing of one's experiences is the key etiopathogenetic mechanism in the development and maintenance of psychopathology.

This chapter then proceeded to present a comprehensive introduction to the theoretical foundations of REBT theory (Ellis, 1994, 2001). REBT theory was discussed in relation to being the original cognitive-behavioural model of psychopathology and its ability to systematically and parsimoniously offer a coherent theoretical model of psychopathology. Weaknesses associated with current REBT research were outlined, with particular attention paid to the fact that the REBT community have failed to keep pace with other cognitive-behavioural models, particularly the field of Cognitive Therapy. Despite this limitation, a thorough review of the empirical literature provided strong support for the basic predictions of REBT theory. In particular, that the irrational beliefs described by the theory play an integral role in a range of psychopathological conditions (Brown, Dowd, & Freeman, 2010), and that the organisation of the irrational beliefs in psychopathological responses are as hypothesised (David, Schnur, & Belloiu, 2002; DiLorenzo, David, & Montgomery, 2007). It was noted however that no empirical research could be identified which has directly evaluated the contribution of the cognitive variables described by REBT theory in the development and/or maintenance of posttraumatic stress responses, and that consideration of these cognitive constructs could improve current understandings of the dysfunctional belief processes relevant to PTSD.

Chapter 1 also paid particular attention to a key distinguishing feature of REBT theory which relates to its binary model of emotional distress (Ellis & DiGiuseppe, 1993). The binary model of emotional distress was explained in contrast to the unitary model of emotional distress which is the predominantly favoured approach in psychology. The binary model views the distinction between functional and dysfunctional emotions as a qualitative rather than a quantitative difference. REBT theory states that the key distinction between functional and dysfunctional emotional responses rests on the unique underlying cognitive processes of the emotional response. The relevant empirical literature was presented and it was noted that although recent findings provide support for the predictions of REBT's binary model of emotional distress, there are many methodological difficulties associated with investigating the competing predictions of the unitary and binary theories of emotion which makes it difficult to draw any firm conclusion regarding the validity of one model over the other.

Chapter 1 then advanced to describe the nature of PTSD as a clinical disorder. Many of the controversies and limitations of the current diagnostic criteria for PTSD were described. An especially salient limitation was associated with the current conceptualisation of the symptom structure of PTSD. This chapter provided a thorough review of the relevant empirical literature regarding the underlying symptom structure of PTSD. A range of alternative model solutions were presented along with empirical findings. It was discussed that the current three-factor model outlined in the *Diagnostic and Statistical Manual of Mental Disorders-IV*, possess little or no empirical support, and instead results from a multitude of factor analytic research supports two alternative four-factor conceptualisations. Finally, limitations with this area of research were noted and recommendations based upon recent findings (e.g., Shevlin & Elklit, 2012) were advanced.

8.1.2 Chapter Two

The Attitudes and Belief Scale-2 (ABS-2: DiGiuseppe, Leaf, Exner, & Robin, 1988) is a 72-item self-report measure of evaluative beliefs that is frequently employed in research endeavours within the field of CBT, generally, and REBT, specifically. The ABS-2 was designed in order to measure the various cognitive processes (rational and irrational beliefs) described in contemporary REBT theory. Previous research in the REBT field

has failed to provide robust evidence of the construct validity of the ABS-2. Various studies employing exploratory factor analytic procedures have produced inconsistent findings, and model structures that bear little resemblance to the theoretical descriptions of REBT upon which the measure was designed. In addition to the lack of psychometric evidence in support of the measure, the ABS-2 is a time-consuming and lengthy measure making its use problematic within many research and clinical contexts. The lack of a valid and reliable means of assessing the cognitive constructs central to REBT theory means that validation or disconfirmation of the theory is impossible. Establishing the underlying factor structure of the ABS-2 was therefore a necessary pre-requisite prior to investigating the theoretical models which constitute the body of this research program. Three hundred and thirteen (N = 313) trauma-exposed, active-duty, military personnel, law enforcement officers, and related emergency services workers completed the 72-item ABS2.

A series of alternative factor models were conceptualised, including a newly described eight-factor model consistent with current REBT theory, and subjected to confirmatory factor analysis (CFA). Results of the analysis indicated that the eight-factor model was the best fit of the data among the alternative models investigated however the fit of this model was unsatisfactory. Items of the ABS-2 measuring the various cognitive processes are contaminated by contextual wording therefore a series of confirmatory bifactor models were estimated which controlled for three contextual 'nuisance' factors. The bifactor models all showed substantial improvements in model fit and the theoretically consistent eight-factor model was the only solution that exhibited acceptable model fit; however the fit of this model was still less than satisfactory.

In order to overcome many of the practical and methodological problems with the ABS-2, an abbreviated version was constructed. The ABS2-AV was constructed in order to measure the four rational, and four irrational cognitive processes respectively. Items for the ABS2-AV were selected on the grounds of not being contaminated by the contextual nuisance factors, thus overcoming a serious methodological limitation of the full 72-item version. Again, a series of theoretically derived models were subjected to CFA procedures. Results indicated that an eight-factor solution comprised of factors measuring each of the rational and irrational belief process was a satisfactory fit of the

data, and all items demonstrated positive, statistically significant factor loadings greater than .40 with the majority of indicators exhibiting factor loadings above .60.

Results of Chapter 2 marked the first methodologically robust study of the factor structure of the ABS-2 indicating that researchers ought to control for the presence of three nuisance contextual factors, and that a newly proposed eight-factor model is the most accurate conceptualization. Furthermore, Chapter 2 offers researchers a more practically applicable and psychometrically sound abbreviated version for use in future research endeavours.

8.1.3 Chapter Three

A key feature of the theory of REBT which serves to distinguish it from other theories in psychology and psychotherapy is in relation to its binary model of emotional distress. The binary model of emotional distress is distinct from the unitary model of emotional distress, which is the predominantly favoured conceptualization of emotional distress in that it hypothesises that functional and dysfunctional emotions differ qualitatively rather than quantitatively. Investigating the competing predictions of the unitary and binary models of emotions has proved highly challenging however research findings have offered support for the predictions of the binary model of emotions. The Profile of Emotional Distress (PED: Opris & Macavei, 2007) is a 26-item self-report measure of functional and dysfunctional emotions built upon the theoretical predictions of the binary model of emotions. Given the measures recent development very little evidence exists regarding the measures construct validity. Chapter 3 sought to investigate the construct validity of the PED through an alternative models framework utilizing CFA and bifactor modelling procedures. This approach had the added advantage of making it possible to conceptualise models consistent with both the unitary and binary models of emotions thus offering an original method of contributing to the relevant psychological literature.

CFA results indicated that models consistent with the unitary and binary models of emotions exhibited indistinguishable model fit statistics and both models represented poor approximations of the data. A bifactor model conceptualisation including a single Emotional Distress factor and four grouping (or method) factors representing items measuring concern, anxiety, sadness, and depression, was found to be the best

representation of the underlying factor structure of the PED. Model parameter results indicated that the observable indicators loaded more strongly onto the general factor than they did the grouping factors, strongly suggestion the PED is best thought of as a measure of emotional distress which possesses four method factors. The internal reliability of the measure was established through the use of composite reliability analysis, with results indicating that the PED's Emotional Distress factor possesses excellent internal consistency.

This chapter provided the first methodologically robust investigation of the factor structure of the PED, and contributed additional data with regards to its internal reliability. The results of this chapter suggest that the PED is not a valid method of capturing the qualitative distinctions between functional and dysfunctional emotions.

8.1.4 Chapter Four

The primary theoretical prediction of REBT theory is that an irrational cognitive process termed 'Demandingness beliefs' represent the core psychological construct in the emergence of psychopathological responses. Demandingness beliefs are hypothesised to give rise to a series of secondary irrational belief processes including Catastrophizing beliefs, Low Frustration Tolerance beliefs, and Depreciation beliefs. Demandingness beliefs are therefore predicted to impact upon psychopathological outcomes indirectly via the secondary processes of Catastrophizing, Low Frustration Tolerance, and/or Depreciation beliefs. Previous research findings have supported the proposed interrelations of the irrational beliefs however no previous studies have explored the organisation of these cognitive processes within a latent variable modelling paradigm. Moreover no empirical research could be identified examining the role of these cognitive processes in the emergence of posttraumatic stress responses. Chapter 4 was carried in order to investigate REBT's core theoretical prediction of the interrelations of the irrational beliefs in posttraumatic stress responses using structural equation modelling (SEM) techniques.

Results of the SEM analysis provided good empirical support for the predictions of REBT theory. The overall model was found to be a very good fit of the data, and the various irrational belief processes explained an impressive percentage of variance in each of the posttraumatic stress symptom categories. Statistically significant indirect

effects were observed between Demandingness beliefs and each of the posttraumatic stress symptom categories via all three secondary irrational belief processes.

These findings offer additional empirical support for the fundamental predictions of REBT theory derived from a methodologically rigorous research design, and contribute original findings regarding the role of these irrational belief processes in posttraumatic stress responses.

8.1.5 Chapter Five

REBT theory states that disorder-specific irrational beliefs should act as a mediator between general-level irrational beliefs and various forms of psychopathology, however very little research evidence exists which has directly tested this hypothesis. REBT theory has failed to produce disorder specific models of psychopathology and individualised measures that capture the disorder-specific nature of each of the irrational (and rational) belief processes. This has led to considerable criticism from many other approaches within the CBT community. Chapter 5 was carried out as an effort to redress this deficiency in the REBT literature by investigating whether general-level irrational beliefs would impact upon posttraumatic stress responses indirectly via trauma-specific irrational beliefs.

SEM procedures found the REBT model of posttraumatic stress responses was a good fit of the data and that a fully indirect relationship existed between general-level irrational beliefs and posttraumatic stress responses via trauma-specific irrational beliefs. Furthermore trauma-specific irrational beliefs were found to have a strong, positive, and direct effect on symptoms of posttraumatic stress.

The results of Chapter 5 provided evidence in support of REBT theory regarding the indirect relationship between generalised irrational beliefs and psychopathological outcomes via disorder-specific irrational beliefs. Additionally, results of this chapter provided the first indications that trauma-specific irrational beliefs can play a role in the prediction of posttraumatic stress responses. These results provide a framework for considerably advancing the field of REBT research by moving toward the development of disorder specific theoretical models, and measures of disorder specific irrational beliefs.

8.1.6 Chapter Six

As chapter 5 had established that trauma-specific irrational beliefs strongly predicted posttraumatic stress symptomology, the aim of chapter six was to more fully investigate the predictive relationships between the individual irrational beliefs (trauma-specific Demandingness, trauma-specific Catastrophizing, trauma-specific Low Frustration Tolerance, and trauma-specific Depreciation beliefs), and the likelihood of reporting symptoms of PTSD. In chapter 6, participants were classified into two groups depending upon levels of posttraumatic stress symptomology: a mildly symptomatic group and a strongly-symptomatic group. In addition to exploring the predictive utility of the trauma-specific irrational beliefs, the current chapter also considered the role of a variety of sociodemographic factors indicated by previous research findings to be important predictors of PTSD responses. These sociodemographic variables included age, gender, number of traumas experienced, occupation type, and marital status.

Results from the binary logistic regression analysis indicated that only trauma-specific Catastrophizing, trauma-specific Low Frustration Tolerance, and trauma-specific Depreciation beliefs significantly predicted belonging to the symptomatic group. These results are consistent with the predictions of REBT theory in that Demandingness beliefs are not expected to directly predict psychopathological outcomes but rather exert their influence indirectly through Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs. Moreover results indicate that important sociodemographic factors fail to predict PTSD symptomology once the effects of the psychological factors have been controlled for. These results demonstrate the importance of considering irrational beliefs, as described by REBT theory, in understanding posttraumatic stress responses.

8.1.7 Chapter Seven

In REBT theory two general classes of evaluative beliefs are described: rational and irrational beliefs. Irrational beliefs are viewed as cognitive vulnerability factors for the development of psychopathology while rational beliefs are viewed as cognitive protective factors against the development of psychopathology. Additionally, REBT theory assumes that rational and irrational beliefs are not bipolar constructs but represent separate continua. As such it is possible that a person could hold a set of

rational beliefs within their cognitive architecture simultaneously with a set of irrational beliefs. Although prior research findings do lend support to the notion of considering rational and irrational belief as distinct cognitive constructs, little is known about the protective role of rational beliefs. Chapter 7 was interested in assessing whether rational beliefs (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance) had a direct effect on levels posttraumatic stress symptomology, and whether rational beliefs would moderate the relationship between any of the irrational beliefs (Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciations) and posttraumatic stress responses.

Sequential moderated multiple regression analysis was carried out in order to identify any potential direct and moderating influences of the rational beliefs. Results indicated the unique, positive, direct effects of each of the irrational belief processes on posttraumatic stress symptomology. With respect to the rational beliefs, direct, negative effects were observed in the case of Preference beliefs, High Frustration Tolerance beliefs, and Acceptance beliefs, respectively. Additionally, Acceptance beliefs moderated the impact of Catastrophizing beliefs on posttraumatic stress symptomology. Specifically, Catastrophizing and posttraumatic stress symptomology were highly associated for those individuals who possessed low levels of Acceptance beliefs, while Catastrophizing and posttraumatic stress symptomology were very weakly associated for those individuals who possessed higher levels of Acceptance beliefs.

The results of this chapter provide a highly original contribution to the REBT literature with regards to the cognitive protective mechanisms of rational beliefs. Preference and Acceptance beliefs were found to directly predict lower symptoms of posttraumatic stress, and Acceptance beliefs were found to reduce the effect of Catastrophizing beliefs on posttraumatic stress symptoms.

8.2 Limitations, Strengths and Further Directions

As is the case with any research endeavour, a number of limitations could be identified with the current thesis which should be considered when drawing conclusions, and addressed in future research pursuits.

Although a sufficient sample was obtained in order to reliably conduct CFA procedures in order to investigate the psychometric properties of the ABS-2, ABS2-AV, and the PED, it would have been preferable to conduct these investigations among a much larger sample, however obtaining access to active-duty, trauma-exposed law enforcement and military personnel is inherently difficult and precluded the ability to obtain far larger sample sizes. Importantly, these validation studies were conducted among a very unique and specialized sample of the population, therefore it is unknown whether the factor structure of the various measures revealed in this work would remain consistent when assessed within alternative populations. Future research work with more diverse population groups is clearly necessary before drawing any firm conclusions regarding the construct validity of the ABS-2, AV-ABS2, and the PED.

A second important limitation of the current study is associated with the use of a self-report measure of posttraumatic stress symptomology. Although the Posttraumatic Stress Diagnostic Scale (PDS: Foa, Cashman, Jaycox, & Perry, 1997) has been demonstrated to possess excellent reliability and validity, the Clinician-Administered PTSD scale (CAPS: Blake et al., 1995) is regarded as the gold-standard method of measuring posttraumatic stress responses. However, empirical findings have suggested that the PDS corresponds highly with data obtained from the CAPS (Griffin, Uhlmansiek, Resick, & Mechanic, 2004) mitigating this limitation considerably.

This research project contained a number of significant advantages. The use of an active-duty sample of military, police, and emergency service personnel who had all been exposed to at least one traumatic incident is a uniquely suitable sample to investigate the aims of the research project. Furthermore, never before in the REBT literature have the roles of rational and irrational beliefs been investigated among trauma-exposed individuals experiencing symptoms of posttraumatic stress disorder. This research program as such represents an original and important contribution to the existing scientific literature.

An additional advantage of the current study is the use of latent variable modelling procedures which allowed for the incorporation and empirical testing of the nature of various associations between latent and observed variables within a single structural equation model. However, in order to improve the reliability of the

investigated structural equation models employed in the respective chapters, future research efforts will need to replicate these designs with larger sample sizes.

8.3 Contribution of this Research

The current research project contributes substantially to the existing scientific literature in a number of important ways. Through the use of latent variable modelling techniques, and other sophisticated multivariate statistical analytic procedures, a number of important contributions and discoveries to the REBT and CBT literature were achieved. In Chapter 2 a confirmatory bifactor modelling procedure was conducted which established for the first time the presence of a number of important nuisance contextual factors that are impacting upon the identification of a theoretically consistent model. This procedure also allowed for the development and validation of an abbreviated measure that is now available for use in future research efforts. Prior to the current study, the REBT community lacked a psychometrically sound measure of rational and irrational beliefs. This was a very serious problem given that the first and most necessary requirement of a test of any theory is an ability to reliably and validly measure the variables of interest for that test. That the current project has contributed a reliable and valid measure to the REBT community, in the form of the abbreviated version of the ABS2 is a very valuable contribution.

In Chapters 4 and 5 application of structural equation modelling techniques allowed for a comprehensive assessment of two of the core theoretical predictions of REBT theory: first, in relation to the organisation and interrelations of the irrational beliefs, and second, with respect the role of disorder-specific irrational beliefs in the relationship between general irrational beliefs and posttraumatic stress responses. Findings from this study provided strong support for conceptualizing Demandingness beliefs as a primary irrational appraisal mechanism, that the impact of these beliefs on posttraumatic stress symptomology is an indirect one via the secondary evaluative irrational belief processes of Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs. Moreover, current results provide support for the hypothesised mediating role of trauma-specific irrational beliefs in the relationship between general irrational beliefs and posttraumatic stress responses.

In Chapters 5 and 6, the direct effects of trauma-specific irrational beliefs were established. These findings present important evidence for the utility of considering disorder-specific variations of the respective irrational belief processes. These chapters present the possibility of entirely new avenue of research for the REBT community. By developing and validating disorder specific measures of rational and irrational beliefs, the REBT community will be capable of developing and testing disorder-specific models of various forms of psychopathology. This has the very real possibility of allowing the REBT research community to flourish through the discovery of greater understandings of the cognitive bases of different forms of psychological distress, and in the process, potentially developing more effective and efficient therapeutic methods of intervention.

Unfortunately research within the field of REBT has generally failed to keep pace with the recent advances in statistical analytical methodologies. This thesis sought to make use of a range of sophisticated statistical analytical procedures in order to obtain the clearest possible picture regarding the relationships between the specified variables in this study, and ultimately to produce the most reliable findings possible. The use of a range of advanced, multivariate statistical procedures has allowed for one of the most comprehensive and rigorous investigations of REBT theory to date.

This current research project was constructed around the ambitious goal of carrying out a comprehensive and methodologically rigorous investigation of the original cognitive-behavioural model of psychopathology, namely Rational Emotive Behaviour Therapy. The current thesis aimed to overcome a number of substantial limitations currently associated with the field of REBT by making a number of original contributions including: (i) the validation of an existing measure of rational and irrational beliefs and the development of a psychometrically valid, and practically applicable, measure of rational and irrational beliefs congruent with contemporary REBT theory; (ii) investigating the binary model of emotions which remains one of the key differentiating theoretical precepts of REBT theory; (iii) testing the core REBT theory regarding the organisation and interrelations of the irrational belief processes in posttraumatic stress symptomology; (iv) establishing the role of disorder-specific irrational beliefs in the relationship between generalised irrational beliefs and posttraumatic stress symptomology; (v) the direct predictive effects of each of the

trauma-specific irrational belief processes in the acquisition of posttraumatic stress symptomology; and (vi) the protective role offered by rational beliefs against the development of posttraumatic stress symptoms.

This thesis has proved to be successful in its initial objectives and each of these advances individually and collectively provides a rich landscape for future research to explore, and in this pursuit there exist the exciting possibility that fascinating and exciting new horizons will be discovered and explored.

REFERENCES

Abelson, R. P., & Rosenberg, M. J. (1958). Symbolic psycho-logic: A model of attitudinal cognition. *Behavioral Science, 3*, 1-13.

Addis, J., & Bernard, M. E. (2002). Marital adjustment and irrational beliefs. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 2,* 3-13.

Aiken, L. S. & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.

Akaike, H. (1973). Information theory and an extension of the maximum likelihood principle. In B. N. Petrov & F. Csaki (Eds.), *Second international symposium on information theory* (pp. 267-281). Budapest: Academiai Kiado.

Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control, 19*, 716–723.

Alden, L., & Safran, J. (1978). Irrational beliefs and nonassertive behavior. *Cognitive Therapy and Research, 2*, 357–364.

Alden L., Safran, J. & Weideman, R. (1978). A comparison of cognitive and skills training strategies in the treatment of unassertive clients. *Behavior Therapy, 9*, 843–846.

American Psychiatric Association (1980). *Diagnostic and statistical manual of mental disorders*. (3rd ed.). Washington, DC: Author.

American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders*. (4th ed.). Washington, DC: Author.

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders*. (4th ed., rev.). Washington, DC: Author.

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders*. (5th ed.). Washington, DC: Author.

Amick-McMullan, A., Kilpatrick, D. G., Veronen, L. J., & Smith, S. (1989). Family survivors of homicide victims: Theoretical perspectives and an exploratory study. *Journal of Traumatic Stress, 2,* 21-35.

Anderson, K.J. (1994). Impulsivity, caffeine, and task difficulty: A within-subjects test of the Yerkes- Dodson law. *Personality and Individual Differences, 6*, 813–829.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*, 411–423.

Andrews, L., Shevlin, M., Troop, N., & Joseph, S. (2004). Multidimensionality of intrusion and avoidance: Alternative factor models of the Impact of Events Scale. *Personality and Individual Differences, 36*, 431-446.

Andrews, L., Joseph, S., Shevlin, M., & Troop, N. (2006). Confirmatory factor analysis of posttraumatic stress symptoms in emergency personnel: An examination of seven alternative models. *Personality and Individual Differences, 41*, 213–224.

Armour, C. & Shevlin, M. (2010). Testing the dimensionality of PTSD and the specificity of the dysphoria factor. *Journal of Loss and Trauma, 15*, 11-27.

Asmundson, G. J. G., Frombach, I., McQuaid, J., Pedrelli, P., Lenox, R., & Stein, M. B. (2000). Dimensionality of posttraumatic stress symptoms: A confirmatory factor analysis of DSM-IV symptom clusters and other symptom models. *Behaviour Research and Therapy, 38*, 203–214.

Asmundson, G. J. G., Wright, K. D., McCreary, D. R., & Pedlar, D. (2003). Post-traumatic stress disorder symptoms in United Nations peacekeepers: An examination of factor structure in peacekeepers with and without chronic pain. *Cognitive Behaviour Therapy, 32*, 26-37.

Bagozzi, R. P., & Phillips, L. W. (1982). Representing and testing organizational theories: A holistic construal. *Administrative Science Quarterly, 27*, 459-489.

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science, 16*, 74–94.

Bard, J. (1980). *Rational-emotive therapy in practice*. Champaign, IL: Research Press.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182.

Barlow, D. H. (2008). *Clinical handbook of psychological disorders. A step-by-step treatment manual*. (4th ed.). London: The Guilford Press.

Baschnagel, J. S., O'Connor, R. M., Colder, C. R., & Hawk, L. W. (2005). Factor structure of posttraumatic stress among Western New York undergraduates following the September 11th terrorist attack on the World Trade Centre. *Journal of Traumatic Stress, 18*, 677–684.

Beck, A. T. (1963). Thinking and depression: Idiosyncratic content and cognitive distortions. *Archives of General Psychiatry, 9*, 324– 333.

Beck, A. T. (1972). *Depression: Causes and treatments*. Philadelphia: University of Pennsylvania Press. (Original work published 1967).

Beck, A. T. (1976). *Cognitive therapy for emotional disorders*. New York: International University Press.

Beck, A. T. (1987). Cognitive models of depression. *Journal of Cognitive Psychotherapy, 1*, 5-37.

Beck, J. S. (2011). *Cognitive behaviour therapy: Basics and beyond* (2nd ed.). London: The Guilford Press.

Beck, A. T., & Dozois, D. J. A. (2011). Cognitive therapy: Current status and future directions. *Annual Review of Medicine, 62*, 2.1-2.13.

Beck, A. T., Emery, G., & Greenberg, R. L. (1985). *Anxiety disorders and phobias: A cognitive perspective*. New York: Basic Books.

Beck, A. T., Freeman, A., & Associates (1990). *Cognitive therapy of personality disorders*. London: The Guilford Press.

Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy for depression*. London: The Guilford Press.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for Beck Depression Inventory II (BDI-II).* San Antonio, TX: Psychology Corporation.

Bentler, P. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107,* 238-246.

Bernard, M. E. (1998). Validation of the general attitudes and belief scale. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 16,* 183-196.

Bisson, J. I., Ehlers, A., Matthews, R., Pilling, S., Richards, D., & Turner, S. (2007). Psychological treatments for chronic post-traumatic stress disorder. *The British Journal of Psychiatry, 190,* 97–104.

Blake, D., Weathers, F., Nagy, L., Kaloupek, D., Klauminzer, G., Charney, D., et al. (1995). A clinician rating scale for assessing current and lifetime PTSD: The CAPS-1. *Behavior Therapist, 13*, 187–188.

Blatt, S. J. (1995). The destructiveness of perfectionism. *American Psychologist, 50,* 1003-1020.

Bloom, S. L. (2000). Our hearts and our hopes are turned to peace: Origins of the International Society for Traumatic Stress Studies. In A. Y. Shalev, R. Yehuda, & A. C. McFarlane (Eds.), *International handbook of human responses to trauma* (pp. 27-50). New York: Kluwer Academic/Plenum Press.

Boduszek, D., Shevlin, M., Mallett, J., Hyland, P. & O'Kane, D. (2012). Dimensionality and Construct Validity of the Rosenberg Self-Esteem Scale within a Sample of Recidivistic Prisoners. *Journal of Criminal Psychology, 2,* 19-25.

Boelen, P. A., van den Hout, M. A., & van den Bout, J. (2008). The factor structure of posttraumatic stress disorder symptoms among bereaved individuals: a confirmatory factor analysis study. *Journal of Anxiety Disorders, 22,* 1377–1383.

Bollen, K. A. (1989). *Structural equations with latent variables.* New York: Wiley.

Breslau, N., Kessler, R. C., Chilcoat, H. D., Schultz, L. R., Davis, G. C., & Andreski, P. (1998). Trauma and posttraumatic stress disorder in the community: The 1996 Detroit Area Survey of Trauma. *Archives of General Psychiatry, 55*, 626-632.

Breslau, N., Lucia, V. C., & Alvarado, G. F. (2006). Intelligence and other predisposing factors in exposure to trauma and posttraumatic stress disorder. *Archives of General Psychiatry, 63*, 1238-1245.

Brewin, C. R. (2003). *Posttraumatic stress disorder: Malady or myth?* New Haven, CT: Yale University Press.

Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology, 68*, 748-766.

Brown, G. B., & Beck, A. T. (1989). The role of imperatives in psychopathology: A reply to Ellis. *Cognitive Therapy and Research, 13*, 315–321.

Browne, M. W., & Cudeck, R. (1989). Single sample cross-validation indices for covariance structures. *Multivariate Behavioral Research, 24,* 445-455.

Browne, C. M., Dowd, E. T., & Freeman, A. (2010). Rational and irrational beliefs and psychopathology. In David, D., Lynn, S. J., & Ellis, A. *Rational and irrational beliefs: Research, theory, and clinical practice* (p. 3-22). Oxford: Oxford University Press.

Buckley, T. C., Blanchard, E. B., & Hickling, E. J. (1998). A confirmatory factor analysis of posttraumatic stress symptoms. *Behaviour Research and Therapy, 36*, 1091–1099.

Burgess, A. W., & Holmstrom, L. L. (1973). The rape victim in the emergency ward. *American Journal of Nursing, 73*, 1740-1745.

Burgess, A. W., & Holmstrom, L. L. (1974). Rape trauma syndrome. *American Journal of Psychiatry, 131*, 981-986.

Butler, A. C., Chapman, J. E., Forman, E., M., & Beck, A. T. (2006). The empirical status of cognitive-behavioural therapy: A review of the meta-analyses. *Clinical Psychology Review, 26,* 17-31.

Byrne, B. N. (1998). *Structural equation modeling with Lisrel, Prelis, and Simplis: Basic concepts, applications, and programming*. London: Routledge.

Calbari, E., & Anagnostopoulos, F. (2010). Exploratory factor analysis of the Greek adaptation of the PTSD Checklist-Civilian Version. *Journal of Loss and Trauma, 15*, 339-350.

Campbell, I. (1988). The psychology of homosexuality. In A. Ellis, & M. E. Bernard (Eds.). *Clinical applications of rational-emotive therapy*, (pp. 153-180). New York: Plenum.

Carragher, N., Mills, K., Slade, T., Teesson, M., & Silove, D. (2010). Factor structure of posttraumatic stress disorder symptoms in the Australian general population. *Journal of Anxiety Disorders, 24*, 520-527.

Cella, D. F., Mahon, S. M., & Donovan, M. 1. (1990). Cancer recurrence as a traumatic event. *Behavioral Medicine. 16,* 15-22.

Chambless, D. L., & Ollendick, T. H. (2001). Empirically supported psychological interventions: Controversies and evidence. *Annual Review of Psychology, 52,* 685–716.

Chambless, D. L., & Hollon, S. D. (1998). Defining empirically supported treatments. *Journal of Consulting and Clinical Psychology, 66,* 7–19.

Clark, D. A., & Beck, A. T. (2010). *Cognitive therapy of anxiety disorders*. London: The Guilford Press.

Cohen, J., & Cohen, P. (1983). Applied multiple regression/correlation analysis for the behavioral sciences (2nd ed.). Hillsdale, NJ: Erlbaum.

Cordova, M., Studts, J., Hann, D., Jacobsen, P., & Andrykowski, M. (2000). Symptom structure of PTSD following breast cancer. *Journal of Traumatic Stress, 13,* 301–319.

Corneil, W., Beaton, R., Murphy, S., Johnson, C., & Pike, K. (1999). Exposure to traumatic incidents and prevalence of posttraumatic stress symptomology in urban firefighters in two countries. *Journal of Occupational Health Psychology, 4*, 131-141.

Cox, B. J., Mota, N., Clara, I., & Asmundson, G. J. G. (2008). The symptom structure of posttraumatic stress disorder in the National Comorbidity Replication Survey. *Journal of Anxiety Disorders, 22*, 1523-1528.

Cramer, D. (1985). Irrational beliefs and strength versus inappropriateness of feelings. *British Journal of Cognitive Psychotherapy, 3*, 81–92.

Cramer, D. (1993). Are inappropriate or dysfunctional feelings in rational-emotive therapy qualitative or quantitative? A response to Ellis and DiGiuseppe. *Cognitive Therapy and Research, 5*, 479-481.

Cramer, D. (2004). Effect of destructive disagreement belief on relationship satisfaction with a romantic partner or closest friend. *Psychology and Psychotherapy, 77*, 121-133.

Cramer, D. (2005). Effect of four aspects of rational statements on expected satisfaction with a close relationship. *British Journal of Guidance & Counselling, 33*, 227-238.

Cramer, D., & Buckland, N. (1996). Effect of rational and irrational statements and demand characteristics on task anxiety. *The Journal of Psychology, 129*, 269-275.

Cramer, D., & Fong, J. (1991). Effect of rational and irrational beliefs on intensity and "inappropriateness" of feelings: A test of rational-emotive theory. *Cognitive Therapy and Research, 4*, 319–329.

Cramer, D., & Kupshik, G. (1993). Effect of rational and irrational statements on intensity and "inappropriateness" of emotional distress and irrational beliefs in psychotherapy patients. *British Journal of Clinical Psychology, 32*, 319–325.

Creamer, M., Burgess, P. M., & McFarlane, A. C. (2001). Posttraumatic stress disorder: Findings from the Australian National Survey of Mental Health and Well-Being. *Psychological Medicine, 31(7),* 1237-1247.

Creamer, M., Bell, R., & Faila, S. (2003). Psychometric properties of the Impact of Events Scale-Revised. *Behaviour Research and Therapy, 41,* 1489-1496.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16,* 297-334.

Cuevas, C. A., Bollinger, A. R., Veilhauer, M. J., Morgan, E. E., Sohler, N. L., Brief, D. J., et al. (2006). HIV/AIDS cost study: Construct validity and factor structure of the PTSD checklist in dually diagnosed HIV-Seropositive adults. *Journal of Trauma Practice, 5,* 29-51.

Curie, C. E., & Williams, C. (1996). Post-traumatic stress reactions in children: Gender differences in the incidence of trauma reactions at two years and examination of factors influencing adjustment. *British Journal of Clinical Psychology, 35.* 297-309.

David, D. (2003). Rational emotive behavior therapy; the view of a cognitive psychologist. In W. Dryden (Ed.), *Theoretical developments in REBT*. London: Brunner/Routledge.

David, D. & Cramer, D. (2010). Rational and irrational beliefs in human feelings and psychopathology. In Ellis, A., David, D., & Lynn, S. J. *Rational and irrational beliefs: Research, theory, and clinical practice* (p. 99-112). Oxford: Oxford University Press.

David, D., Ghinea, C., Macavei, B., & Kallay, E. (2005). A search for "hot" cognitions in a clinical and non-clinical context: Appraisal, attributions, core relational themes, irrational beliefs, and their relations to emotion. *Journal of Cognitive and Behavioral Psychotherapies, 5,* 1-42.

David, D., Kangas, M., Schnur, J. B., & Montgomery, G. H. (2004). *REBT depression manual; Managing depression using rational emotive behavior therapy*. Babes-Bolyai University (BBU), Romania.

David, D., Lynn, S. J., & Ellis, A. (2010) *Rational and irrational beliefs: Research, theory, and clinical practice*. Oxford: Oxford University Press.

David, D., Miclea, M., & Opre, A. (2003). The information processing approach to the human mind: Basic and beyond. *Journal of Clinical Psychology, 4,* 353–369.

David, D., Montgomery, G. H., Macavei, B., & Bovbjerg, D. H. (2005). An empirical investigation of Albert Ellis's binary model of distress. *Journal of Clinical Psychology, 61,* 499-516.

David, D., Schnur, J., & Belloiu, A. (2002). Another search for the "hot" cognitions: Appraisal, irrational beliefs, attributions, and their relation to emotion. *Journal of Rational-Emotive and Cognitive-Behavior Therapy, 15,* 93–131.

David, D., Schnur, J., & Birk, J. (2004). Functional and dysfunctional feelings in Ellis' cognitive theory of emotion: An empirical analysis. *Cognition and Emotion, 18,* 869–880.

David, D., & Szentagotai, A. (2006). Cognition in cognitive-behavioral psychotherapies (CBT): Toward an integrative model. *Clinical Psychology Review, 3,* 284–298.

David, D., Szentagotai, A., Lupu, V., & Cosman, D. (2008). Rational-emotive behaviour therapy versus cognitive therapy versus medication in the treatment of major depressive disorder: A randomized clinical trial. *Journal of Clinical Psychology, 6,* 728–746.

David, D., Szentagotai, A., Kallay, E., & Macavei, B. (2005). A synopsis of rational-emotive behavior therapy (REBT): Fundamental and applied research. *Journal of Rational-Emotive and Cognitive-Behavior Therapy, 23,* 175–221.

de Jong, J. T., Komproe, I. H., Van Ommeren, M., El Masri, M., Araya, M., Khaled, N., et al. (2001). Lifetime events and posttraumatic stress disorder in 4 postconflict settings. *Journal of the American Medical Association, 286(5),* 555-562.

Diamantopoulos, A., & Winklhofer, H. M. (2001). Index construction with formative indicators: An alternative to scale development. *Journal of Marketing Research,* 38, 269-277.

DiGiuseppe, R. (1996). The nature of irrational and rational beliefs: progress in rational emotive behavior theory. *Journal of Rational-Emotive and Cognitive-Behavior Therapy, 4*, 5-28.

DiGiuseppe, R., & Leaf, R. (1990). The endorsement of irrational beliefs in a general clinical population. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 8*, 235-247.

DiGiuseppe, R., Leaf, R., Exner, T., & Robin, M.V. (1988). *The development of a measure of rational / irrational thinking.* Paper presented at the World Congress of Behavior Therapy, Edinburgh, Scotland.

DiGiuseppe, R., Robin, M.W., Leaf, R., & Gormon, B. (1989). *A discriminative validation and factor analysis of a measure of rational / irrational beliefs.* Paper presented at the World Congress of Cognitive Therapy, Oxford, UK.

DiLorenzo, T. A., Bovbjerg, D. H., Montgomery, G. H., Valdimarsdottir, H., & Jacobsen, P. B. (1999). The application of a shortened version of the Profile of Mood States in a sample of breast cancer chemotherapy patients. *British Journal of Health Psychology, 4,* 315–325.

DiLorenzo, T. A., David, D., & Montgomery, G. H. (2007). The interrelations between irrational cognitive processes and distress in stressful academic settings. *Personality and Individual Differences, 42*, 765-777.

DiLorenzo, T. A., David, D., & Montgomery, G. H. (2011). The impact of general and specific rational and irrational beliefs on exam distress; a further investigation of the binary model of emotional distress as an emotional regulation model. *Journal of Cognitive and Behavioural Psychotherapies, 11*, 121-142.

Dryden, W. (1984). *Rational-emotive therapy: Fundamentals and innovations.* Kent: Croom Helm.

Dryden, W. (2000). *Overcoming anxiety.* London: Sheldon Press.

Dryden, W. (2003). *Rational emotive behaviour therapy: Theoretical developments*. London: Brunner/Routledge.

Dryden, W. (2009). *Understanding emotional problems: The REBT perspective*. London: Routledge.

Dryden, W., & David, D. (2008). Rational emotive behavior therapy: Current status. *Journal of Cognitive Psychotherapy: An International Quarterly, 22*, 195-209.

Dryden, W. & Neenan, M. (2004). *Rational emotive behavioural counselling in action* (3rd ed.). London: Sage.

DuHamel, K. N., Ostroff, J., Ashman, T., Winkel, G., Mundy, E. A., Keane, T. M., et al. (2004). Construct validity of the posttraumatic stress disorder checklist in cancer survivors: Analyses based on two samples. *Psychological Assessment, 16*, 255–266.

Ehlers, A., & Clark, D. M. (2000). A cognitive model of persistent posttraumatic stress disorder. *Behaviour Research and Therapy, 38*, 319-345.

Elhai, J., Gray, M., Docherty, A., Kashdan, T., & Kose, S. (2007). Structural validity of the Posttraumatic Stress Disorder Checklist among college students with a trauma history. *Journal of Interpersonal Violence, 22,* 1471–1478.

Elklit, A., Armour, C., & Shevlin, M. (2010). Testing alternative factor models of PTSD and the robustness of the dysphoria factor. *Journal of Anxiety Disorders, 24*, 147–154.

Elklit, A., & Shevlin, M. (2007). The structure of PTSD symptoms: a test of alternative models using confirmatory factor analysis. *British Journal of Clinical Psychology, 46*, 299–313.

Ellis, A. (1958). Rational psychotherapy. *Journal of General Psychology, 59*, 35-49.

Ellis, A. (1962). *Reason and emotion in psychotherapy.* New York: Lyle Stuart.

Ellis, A. (1987). A sadly neglected cognitive element in depression. *Cognitive Therapy and Research, 11*, 121–145.

Ellis, A. (1994). *Reason and emotion in psychotherapy* (rev. ed.). Secaucus, NJ: Birch Lane.

Ellis, A. (2001). *Overcoming destructive beliefs, feelings, and behaviours: New directions for rational emotive behaviour therapy*. Amherst, New York: Prometheus Books.

Ellis, A., & Dryden, W. (2007). *The practice of rational emotive behaviour therapy* (2nd ed.). New York: Springer Publishing Company.

Ellis, A., David, D., & Lynn, S. J. (2010). A historical and conceptual perspective. In David, D., Lynn, S. J., & Ellis, A. *Rational and irrational beliefs: Research, theory, and clinical practice* (pp. 3-22). Oxford: Oxford University Press.

Ellis, A., & DiGiuseppe, R. (1993). Are inappropriate or dysfunctional feelings in rational-emotive therapy qualitative or quantitative? *Cognitive Therapy and Research, 5*, 471– 477.

Ellis, A., & Dryden, W. (2007). *The practice of rational emotive behaviour therapy* (2nd ed.). New York: Springer Publishing Company.

Ellis, A., & Harper, R. A. (1961). *A guide to rational living*. Englewood Cliffs, NJ: Prentice Hall.

Ellis, A., & Harper, R. A. (1975). *A new guide to rational living*. North Hollywood, CA: Wilshire Books.

Ellis, A., & Harper, R. A. (1997). *A guide to rational living* (3rd ed.). Chatsworth, CA: Wilshire Books.

Engels, G. I., Garnefsky, N., & Diekstra, R. F. W. (1993). Efficacy of rational-emotive therapy: A quantitative analysis. *Journal of Consulting and Clinical Psychology, 61*, 1083–1091.

Engdahl, R. M., Elhai, J. D., Richardson, J. D., & Frueh, B. C. (2011). Comparing posttraumatic stress disorder's symptom structure between deployed and non-deployed veterans. *Psychological Assessment, 23*, 1-6.

Epp, A., & Dobson, K. S. (2010). The evidence base for cognitive-behavioral therapy. In Dobson, K. S. *Handbook of Cognitive-Behavioral Therapies* (pp. 39–73). London: Guilford.

Folkman, S., & Lazarus, R. (1988). Coping as a mediator of emotion. *Journal of Personality and Social Psychology, 54,* 466-475.

Foa, E.B., Cashman, L., Jaycox, L.H., & Perry, K. (1997). The validation of a self-report measure of posttraumatic stress disorder: the Posttraumatic Diagnostic Scale. *Psychological Assessment, 9*, 445–451.

Foa, E. B., Ehlers, A., Clark, D. M., Tolin, D. F., & Orsillo, S. M. (1999). The Posttraumatic Cognitions Inventory (PTCI): Development and validation. *Psychological Assessment, 11*, 303–314.

Fullerton, C. S., & Ursanu, R. J, (1997). Posttraumatic responses in spouse/significant others of disaster workers. Tn C. S. Fullerton & R. J. Ursano (Eds.), *Posttraumatic stress disorder Acute and long-term responses to trauma and disaster* (pp. 59-75). Washington, DC: American Psychiatric Press.

Fulop, I. E. (2007). A confirmatory factor analysis of the attitude and belief scale 2. *Journal of Cognitive and Behavioral Psychotherapies, 7,* 159-170.

Galea, S., Brewin, C. R., Gruber, M., Jones, R. T., King, D. W., King, L. A., et al. (2007). Psychological sequelae of the September 11 terrorist attacks in New York City. *New England Journal of Medicine, 346*, 982-987.

Glasser, W. (1965). *Reality therapy: A new approach to psychiatry*. New York: Harper & Row.

Gray, J. D., Cutler, C. A., Dean, J. G., & Kempe, C. H. (1977). Prediction and prevention of child abuse and neglect. *Child Abuse and Neglect, 1*, 45-58.

Griffin, M. G., Uhlmansiek, M. H., Resick, P. A., & Mechanic, M. B. (2004). Comparison of the Posttraumatic Diagnostic Scale versus the Clinician-Administered Posttraumatic Stress Disorder Scale in domestic violence survivors. *Journal of Traumatic Stress, 17*, 497-503.

Gutner, C., Rizvi, S. L., Monson, C. M., & Resick, P. A. (2006). Changes in coping strategies, relationships to the perpetrator, and posttraumatic stress disorder in female crime victims. *Journal of Traumatic Stress, 19*, 813-823.

Hair, J. F., Jr., R. E. Anderson, R. L. Tatham, & W. C. Black (1998). *Multivariate data analysis with readings.* (5th ed.). Englewood Cliffs, NJ: Prentice Hall.

Harris, S., Davies, M. F., & Dryden, W. (2006). An experimental test of a core REBT hypothesis: Evidence that irrational beliefs lead to physiological as well as psychological arousal. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 24*, 101-111.

Hayes , S. C., Strosahl, K. D., Bunting, K., Twohig, M., & Wilson, K. G. (2004). What is acceptance and commitment therapy? In S. C. Hayes & K. D. Strosahl (Eds.), *A practical guide to acceptance and commitment therapy* (pp. 1–30). New York: Springer-Verlag.

Hayes, S. C., Strosahl, K. C., & Wilson, K. G. (2003). *Acceptance and commitment therapy: An experiential approach to behavior change*. London: The Guilford Press.

Hetzel-Riggin, M. D. (2009). A test of structural invariance of posttraumatic stress symptoms in female survivors of sexual and/or physical abuse or assault. *Traumatology, 15*, 46–59.

Hodgkinson, P., & Joseph. S. (1995). Factor-analysis of the Impact of Event Scale with female bank staff following an armed raid. *Personality and Individual Differences. 19*, 773-775.

Hofman, S. G., Asnaani, A., Vonk, I. J. J., Sawyer, A. T., & Fang, A. (2012). The efficacy of cognitive behavioral therapy: A review of meta-analyses. *Cognitive Therapy and Research, 36*, 427-440.

Horowitz, M. (1979). Psychological response to serious life events. In V. Hamilton & D. M. Warburton (Eds.), *Human stress and cognition: An information processing approach*. New York: Wiley.

Horowitz, M. J. (1986). *Stress response syndromes* (2nd ed.). New York: Aronson.

Horowitz, M., Wilner, N., & Alvarez, W. (1979). Impact of event scale: A measure of subjective stress. *Psychosomatic Medicine, 41*, 209–218.

Hoyt, T., & Yeater, E. A. (2010). Comparison of posttraumatic stress disorder symptom structure models in Hispanic and White college students. *Psychological Trauma: Theory, Research, Practice, and Policy, 2*, 19-30.

Hu, L., & Bentler, P. (1998). Fit indices in covariance structural modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods, 3*, 424- 453.

Hu, L., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6,* 1-55.

Hyland, P., & Boduszek, D. (2012). Resolving a Difference between Cognitive Therapy and Rational Emotive Behaviour Therapy: Towards the Development of an Integrated CBT Model of Psychopathology. *Mental Health Review Journal, 17*, 104-116.

Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2013). Modelling the factor structure of the Attitudes and Belief Scale 2: Toward the development of an abbreviated version. *Cognitive Behaviour Therapy* (in press) DOI:10.1080/16506073.2013.777467

Jablensky, A. (1985). Approaches to the definition and classification of anxiety and related disorders in European psychiatry. In A. H. Tuma & J. D. Maser (Eds.), *Anxiety and the anxiety disorders* (pp. 735-758). Hillsdale, NJ: Erlbaum.

Jaccard, J., Turrisi, R., & Wan, C. K. (1990). *Interaction effects in multiple regression*. Newbury Park, CA: Sage.

Jones, R. (1968). A factored measure of Ellis' irrational belief system with personality maladjustment correlates. *Dissertation Abstracts International, 29(II-B),* 4379-4380.

Jones, J. & Towers, P. (2004). Irrational and evaluative beliefs in individuals with anger disorders. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 22,* 153-169.

Jöreskog, K., & Sorbom, D. (1981). *LISREL V: Analysis of linear structural relationships by the method of maximum likelihood.* Chicago: National Educational Resources.

Jöreskog, K., & Sörbom, D. (1993). *LISREL 8: Structural Equation Modeling with the SIMPLIS Command Language*. Chicago, IL: Scientific Software International Inc.

Jöreskog, K., & Sörbom, D. (2004). *Interactive Lisrel (8,72)*. Scientific SoftwareInternational. Inc.

Kassam-Adams, N., Marsac, M. L., & Cirilli, C. (2010). Posttraumatic stress disorder symptom structure in injured children: Functional impairment and depression symptoms in a confirmatory factor analysis. *Journal of the American Academy of Child & Adolescent Psychiatry, 49,* 616-625.

Kassinove, H., Eckhardt, C. I., & Endes, R. (1993). Assessing the intensity of "appropriate" and "inappropriate" emotions in rational-emotive therapy. *Journal of Cognitive Psychotherapy: An International Quarterly, 7,* 227-238.

Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 52,* 1048-1060.

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62,* 593-602.

Kessler, R. C., Chiu, W. T., Demler, O., Merikangas, K. R., & Walters, E. E. (2005). Prevalence, severity, and Comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*, 617-627.

King, D., Leskin, G., King, L., & Weathers, F. (1998). Confirmatory factor analysis of the clinician administered PTSD Scale: Evidence for the dimensionality of posttraumatic stress disorder. *Psychological Assessment, 10*, 90–96.

King, D. W., Orazem, R. J., King, L. A., Lauterbach, D., Hebenstreit, C. L., & Shalev, A. Y. (2009). Factor structure of posttraumatic stress disorder as measured by the Impact of Events Scale-Revised: Stability across cultures and time. *Psychological Trauma: Theory, Research, Practice, and Policy, 1*, 173-187.

Kleim, B., Grey, N., Wild, J., Nussbeck, F. W., Scott, R., Hackmann, A....Ehlers, A. (2013). Cognitive change predicts symptom reduction with cognitive therapy for posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology, 81*, 383-393.

Kline, P. (1994). *An easy guide to factor analysis*. London: Routledge.

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). London: The Guilford Press.

Kovacs, M., & Beck, A. T. (1978). Maladaptive cognitive structures in depression. *American Journal of Psychiatry, 135*, 525-533.

Kuehlwein, K. T., & Rosen, H. (Eds.). (1993). *Cognitive therapies in action: Evolving innovative practice* (pp. 173–204). San Francisco: Jossey-Bass.

Krause, E. D., Kaltman, S., Goodman, L. A., & Dutton, M. A. (2007). Longitudinal factor structure of posttraumatic stress symptoms related to intimate partner violence. *Psychological Assessment, 19*, 165–175.

Lazarus, A. (1976). *Multimodal behaviour therapy*. New York: Springer.

Lazarus, R. (1991). *Emotion and adaptation*. Oxford: Oxford University Press.

Leahy, R. L. (2003). *Cognitive therapy techniques: A practitioner's guide*. London: The Guilford Press.

Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York: Guilford.

Linehan, M. M. & Dimeff, L. (2001). Dialectical behaviour therapy in a nutshell. *The California Psychologist, 34,* 10-13.

Lorcher, P. S. (2003). Worry and irrational beliefs: A preliminary investigation. *Individual Differences Research, 1*, 73-76.

Lupu, V., & Iftene, F. (2009). The impact of rational emotive behaviour education on anxiety in teenagers. *Journal of Cognitive and Behavioral Psychotherapies, 1*, 95-105.

Lyons, L. C., & Woods, P. J. (1991). The efficacy of rational-emotive therapy: A quantitative review of the outcome research. *Clinical Psychology Review, 11*, 357–369.

Macavei, B. (2002). Scala de Atitudini si Convingeri II (ABS II): date preliminare pentru populatia de limba româna. *Romanian Journal of Cognitive and Behavioral Psychotherapies, 2,* 105-122.

Macavei, B. (2005). The role of irrational beliefs in the rational emotive behavior theory of depression. *Journal of Cognitive and Behavioral Psychotherapies, 5*, 73–83.

Macavei, B., & McMahon, J. The Assessment of Rational and Irrational Beliefs (2010). In David, D., Lynn, S. J., & Ellis, A. *Rational and irrational beliefs: Research, theory, and clinical practice* (p. 3-22). Oxford: Oxford University Press.

MacCallum, R. C., & Austin, J. T. (2000). Applications of structural equation modeling in psychological research. *Annual Review of Psychology, 51,* 201–226.

Marshall, G. N. (2004). Posttraumatic Stress Disorder Symptom Checklist: Factor structure and English–Spanish measurement invariance. *Journal of Traumatic Stress, 17,* 223–230.

Marshall, G. N., Schell, T. L., & Miles, J. N. V. (2010). All PTSD symptoms are highly associated with general distress: Ramifications for the dysphoria symptom cluster. *Journal of Abnormal Psychology, 119,* 126-135.

Marshall-Berenz, E. C., Vujanovic, A. A., Bonn-Miller, M. O., Bernstein, A., & Zvolensky, M. J. (2010). Multi-method study of distress tolerance and PTSD symptom severity in a trauma-exposed community sample. *Journal of Traumatic Stress, 23,* 623–630.

Martin, R. C., & Dahlen, E. R. (2004). Irrational beliefs and the experience and expression of anger. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 22,* 3-20.

Marzillier, J. (1987). A sadly neglected cognitive element in depression: A reply to Ellis. *Cognitive Therapy and Research, 11,* 147–151.

McDermutt, J. F., Haaga, D. A. F., & Bilek, L. A. (1997). Cognitive bias and irrational beliefs in major depression and dysporia. *Cognitive Therapy & Research, 21,* 459-476.

McDonald, S. D., Beckham, J. C., Morey, R., Marx, C., Tupler, L. A., & Calhoun, P. S. (2008). Factorial invariance of posttraumatic stress disorder symptoms across three veteran samples. *Journal of Traumatic Stress, 21,* 309-317.

McFarlane, A. C. (1989). The etiology of post-traumatic morbidity; Predisposing, precipitating and perpetuating factors. *British Journal of Psychiatry, 154,* 221-228.

McNair, D. M., Lorr, M., & Droppleman, L. F. (1971). *EITS Manual for the Profile of Mood States.* San Diego, CA: Educational and Industry Testing Service.

McNally, R. J. (2003). Progress and controversy in the study of posttraumatic stress disorder. *Annual Review of Psychology, 54,* 229-252.

McWilliams, L. A., Cox, B. J., & Asmundson, G. J. G. (2005). Symptom structure of posttraumatic stress disorder in a nationally representative sample. *Journal of Anxiety Disorders, 19*, 626–641.

Meichenbaum, D. (1977). *Cognitive-behavior modification: An integrative approach*. New York: Plenum Press.

Moldovan, R. (2009). An analysis of the impact of irrational beliefs and illness representations in predicting distress in cancer and type II diabetes patients. *Cognition, Brain, Behaviour: An Interdisciplinary Journal*, *13*, 179-193.

Mollica, R. F., Caspi-Yavin, Y., Bollini, P., Truong, T., Tor, S., & Lavelle, J. (1992). The Harvard trauma questionnaire: Validating a cross-cultural instrument for measuring torture, trauma and posttraumatic stress disorder in Indochinese refugees. *Journal of Nervous and Mental Disease, 180*, 111–116.

Montgomery, G. H., David, D., DiLorenzo, T. A., & Schur, J. B. (2007). Response expectancies and irrational beliefs predict exam-related distress. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 25*, 17-34.

Morina, N., Bohme, H. F., Morina, L., & Asmundson, G. J. G. (2010). The structure of post-traumatic stress symptoms in young survivors of war. *Psychiatry Research, 186*(2), 306-309.

Muran, J. C., Kassinove, H., Ross, S., & Muran, E. (1989). Irrational thinking and negative emotionality in college students and applications for mental health services. *Journal of Clinical Psychology, 45*, 188-193.

Muthen, L. K., & Muthen, B. O. (1998 - 2010). *Mplus – Statistical Analysis with Latent Variables. User's Guide (6th Ed)*. Muthen and Muthen: Los Angeles.

Najavits, L. M, Gotthardt, S., Weiss, R. D., & Epstein, M. (2004).Cognitive distortions in the dual diagnosis of PTSD and substance use disorder. *Cognitive Therapy and Research*, 28, 159-172.

Naifeh, J., Elhai, J., Kashdan, T., & Grubaugh, A. (2008). The PTSD Symptom Scale's latent structure: An examination of trauma-exposed medical patients. *Journal of Anxiety Disorders, 22*, 1355–1368.

Neenan, M., & Dryden, W. (2011). *Cognitive therapy in a nutshell*. London: Sage.

Nelson, E. (1977). Irrational beliefs in depression. *Journal of Consulting and Clinical Psychology, 45*, 1190-1191.

Nieuwenhuijsen, K., Verbeek, J. H. A. M., Boer A. G. E. M., Blonk, R. W. B., & van Dijk, F. J. H. (2010). Irrational beliefs in employees with an adjustment, a depressive, or an anxiety disorder: A prospective cohort study. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 28*, 57-72.

Norris, F. H. (1992). Epidemiology of trauma: Frequency and impact of different potentially traumatic events on different demographic groups. *Journal of Consulting and Clinical Psychology, 60(3)*, 409-418.

Norris, F. H., & Slone, L. B. The epidemiology of trauma and PTSD (2007). In M. J. Friedman, T. M. Keane, & P. A. Resick. *Handbook of PTSD: Science and Practice* (Eds.). London: The Guildford Press.

Olff, M., Sijbrandij, M., Opmeer, B. C., Carlier, I. V., & Gersons, B. P. (2009). The structure of acute posttraumatic stress symptoms: 'reexperiencing', 'active avoidance', 'dysphoria', and 'hyperarousal'. *Journal of Anxiety Disorders, 23*, 656–659.

Opris, D., & Macavei, B. (2007). The profile of emotional distress: Norms for the Romanian population. *Journal of Cognitive and Behavioral Psychotherapies, 7*, 139-158.

Ozer, E., Best, S., Lipsey, T., & Weiss, D. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin, 129*, 52-73.

Padesky, C. A., & Beck, A. T. (2003). Science and philosophy: comparison of cognitive therapy and rational emotive behaviour therapy. *Journal of Cognitive Psychotherapy, 17*, 211–224.

Page, G. M., Kleiman, V., Asmundson, G. J. G., & Katz, J. (2009). Structure of posttraumatic stress disorder symptoms in pain and pain-free patients scheduled for major surgery. *The Journal of Pain, 10*, 984-991.

Palmieri, P. A., & Fitzgerald, L. F. (2005). Confirmatory factor analysis of posttraumatic stress symptoms in sexually harassed women. *Journal of Traumatic Stress, 18*, 657-666.

Palmieri, P. A., Marshall, G. N., & Schell, T. L. (2007). Confirmatory factor analysis of posttraumatic stress symptoms in Cambodian refugees. *Journal of Traumatic Stress, 20*, 207–216.

Patrick, C. J., Hicks, B. M., Nichol, P. E., & Kruger, R. F. (2007). A bifactor approach to modelling the structure of the Psychopathy Checklist. *Journal of Personality Disorders, 21*, 118-141.

Pelusi, N. M. (2003). Evolutionary psychology and rational emotive behaviour therapy. In Dryden W. (Ed.), *Theoretical developments in REBT*. London: Brunner/Routledge.

Prud'homme, L., & Barron, P. (1992). The pattern of irrational beliefs associated with major depressive disorder. *Social Behavior and Personality, 20*, 199-212.

Raykov, T. (1998). Coefficient alpha and composite reliability with interrelated nonhomogeneous items. *Applied Psychological Measurement, 22*, 375-385.

Reise, S. P., Moore, T. M., & Haviland, M. G. (2010). Bifactor models and rotations: Exploring the extent to which multidimensional data yield univocal scale scores. *Journal of Personality Assessment, 92*, 544–559.

Reise, S. P., Morizot, J., & Hays, R. D. (2007). The role of the bifactor model in resolving dimensionality issues in health outcomes measures. *Quality of Life Research, 16*, 19-31.

Resick, P. A., Monson, C. M., & Rizvri, S. L. (2008). Posttraumatic stress disorder. In Barlow, D. H. *Clinical handbook of psychological disorders: A step-by-step treatment manual* (4th ed.). London: The Guilford Press.

Riskind, J. H. (2004). Cognitive theory and research on generalized anxiety disorder. In Leahy R. L. (Ed.), *Contemporary cognitive therapy: Theory, research, and practice*. London: The Guilford Press.

Rock, D. A., Werts, C. E., & Flaugher, R. L. (1978). The use of analysis of covariance structures for comparing the psychometric properties of multiple variables across populations. *Multivariate Behavioral Research, 13,* 403–418.

Rosen, G. M. (2004). *Posttraumatic stress disorder: Issues and controversies*. Chichester, UK: Wiley.

Rosen, G. M., Spitzer, R. L., & McHugh, P. R. (2008). Problems with the posttraumatic stress disorder diagnosis and its future in DSM-V. *British Journal of Psychiatry, 192,* 3-4.

Rosen, G. M., & Lilienfeld, S. O. (2008). Posttraumatic stress disorder: An empirical evaluation of core assumptions. *Clinical Psychology Review, 28,* 837-868.

Rothbaum, B. O., & Foa, E. B. (1993). Subtypes of posttraumatic stress disorder and duration of symptoms. In J. R. T. Davidson & E. B. Foa (Eds.), *Posttraumatic stress disorder: DSM-IV and beyond* (pp. 23-35). Washington, DC: American Psychiatric Press.

Russell, J.A., & Carroll, J.M. (1999). On the bipolarity of positive and negative affect. *Psychological Bulletin, 1,* 30–30.

Schachter, S., & Singer, J.E. (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review, 69,* 379–399.

Scheeringa, M. S., Zeanah, C. H., & Cohen, J. A. (2011). PTSD in children and adolescents: Toward an empirically based algorithm. *Depression and Anxiety, 28,* 770–782.

Scher, C., McCreary, D., Asmundson, G., & Resick, P. (2008). The structure of post-traumatic stress disorder symptoms in three female trauma samples: A comparison of interview and self-report measures. *Journal of Anxiety Disorders, 22,* 1137–1145.

Schinka, J., Brown, L., Borenstein, A., & Mortimer, J. (2007). Confirmatory factor analysis of the PTSD Checklist in the elderly. *Journal of Traumatic Stress, 20,* 281–289.

Schmitt, B. D., & Kempe, C. H. (1975). Prevention of child abuse and neglect. *Current Problems in Paediatrics, 5*, 35-45.

Schwartzberg, S. (1997). Cognitive functioning in depressed elderly patients. *Dissertations Abstracts International, 57,* (8-B), 5353.

Segal, Z. V. (1998). Appraisal of the self-schema construct in cognitive models of depression. *Psychological Bulletin, 103,* 147-162.

Shacham, N. (1983). A shortened version of the profile of mood states. *Journal of Personality Assessment, 47,* 305–306.

Shaw, E. (1989). *The assessment of rationality/irrationality: The psychometric properties of the Attitudes and Belief Scale in a student population.* Unpublished master's thesis, University of Melbourne, Australia.

Shevlin, M., Armour, C., Murphy, J., Houston, J. E., & Adamson, G. (2011). Evidence for a psychotic posttraumatic stress disorder subtype based on the National Comorbidity Survey. *Social Psychiatry and Psychiatric Epidemiology, 46*(11), 1069-1078.

Shevlin, M. & Elklit, A. (2012). The latent structure of posttraumatic stress disorder: Different models or different populations? *Journal of Abnormal Psychology,* 121, 610-615.

Shevlin, M., Hunt, N., & Robbins, I. (2000). A confirmatory factor analysis of the impact of event scale using a sample of world war two and Korean war veterans. *Psychological Assessment, 12*, 414–417.

Shevlin, M., McBride, O., Armour, C., & Adamson, G. (2009). Reconciling the differences between the King et al. (1998) and Simms et at. (2002) factor models of PTSD. *Journal of Anxiety Disorders, 23,* 995 – 1001.

Shorkey, C. T., & Whiteman, V. L. (1977). Development of the rational behaviour inventory: Initial validity and reliability. *Educational and Psychological Measurement, 37*, 527-534.

Silverman, S., & DiGiuseppe, R. (2001). Cognitive-behavioral constructs and children's behavioural and emotional problems. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 19,* 119-134.

Simms, L. J., Watson, D., & Doebbeling, B. N. (2002). Confirmatory factor analyses of posttraumatic stress symptoms in deployed and nondeployed veterans of the Gulf war. *Journal of Abnormal Psychology, 111*, 637–647.

Smith, T. W. (1982). Irrational beliefs in the cause and treatment of emotional distress. A critical review of the rational-emotive model. *Clinical Psychology Review, 2,* 505-522.

Smith, C. A., Haynes, K. N., Lazarus, R. S., & Pope, L. K. (1993). In search of the "hot" cognitions: Attributions, appraisals and their relation to emotion. *Journal of Personality and Social Psychology, 65*, 916–929.

Smith, C. A., & Lazarus, R. (1993). Appraisal components, core relational theme, and the emotions. *Cognition and Emotion, 7*, 233-269.

Solomon, A., Arnow, B.A., Gotlib, I.H., & Wind, B. (2003). Individualized measurement of irrational beliefs in remitted depressives. *Journal of Clinical Psychology, 59*, 439–455.

Solomon, A., Haaga, D. A. F., Brody, C. F., Kirk, L., & Friedman, D. G. (1998). Priming irrational beliefs in recovered-depressed people. *Journal of Abnormal Psychology, 107*, 440-449.

Steiger, J. H. (1990). Structural model evaluation and modification: an interval estimation approach. *Multivariate Behavioral Research, 25*, 173–180.

Stein, M. B., Walker, J. R., Hazen, A. L., & Forde, D. R. (1997). Full and partial posttraumatic stress disorder: Findings from a community survey. *American Journal of Psychiatry, 154(8),* 1114-1119.

Sutton-Simon, K. (1981). Assessing belief systems: Concepts and strategies. In P. C. Kendall and S. D. Hollon (Eds.), *Assessment strategies for cognitive-behavioural interventions*. New York: Academic Press.

Szentagotai, A., David, D., Lupu, V., & Cosman, D. (2008). Rational-emotive behaviour therapy versus cognitive therapy versus medication in the treatment of major depressive disorder: Mechanisms of change analysis. *Psychotherapy Theory, Research, Practice, 4*, 523–538.

Szentagotai, A., & Freeman, A. (2007). An analysis of the relationship between irrational beliefs and automatic thoughts in predicting distress. *Journal of Cognitive and Behavioural Psychotherapies, 7*, 1-9.

Szentagotai, A., Schnur, J., DiGiuseppe, R., Macavei, B., Kallay, E., & David, D. (2005). The organization and the nature of irrational beliefs: Schemas or appraisal? *Journal of Cognitive and Behavioral Psychotherapies, 2*, 139–158.

Tabachnik, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Pearson Education.

Tanaka, J. S. (1987). "How big is big enough?" Sample size and goodness of fit in structural equation models with latent variables. *Child Development, 58,* 134–146.

Taylor, S., Kuch, K., Koch,W. J., Crockett, D. J., & Passey, G. (1998). The structure of posttraumatic stress symptoms. *Journal of Abnormal Psychology, 107,* 154–160.

Thatcher, D. L., & Krikorian, R. (2005). Exploratory factor analysis of two measures of posttraumatic stress disorder (PTSD) symptoms in non-clinical sample of college students. *Journal of Anxiety Disorders, 19*, 904-918.

Tucker, L. R., & Lewis, C. (1973). The reliability coefficient for maximum likelihood factor analysis. *Psychometrika, 38*, 1-10.

Ullman, S. E., Filipas, H. H., Townsend, S. M., & Starzynski, L. L. (2007). Psychosocial correlates of PTSD symptom severity in sexual assault survivors. *Journal of Traumatic Stress, 20*, 821-831.

Ullman, S. E., & Long, S. M. (2008). Factor structure of PTSD in a community sample of sexual assault survivors. *Journal of Trauma and Dissociation, 9*, 507–524.

Vandenberg, R. J. (2002). Toward a further understanding of an improvement in measurement invariance methods and procedures. *Organizational Research Methods, 5*, 139-158.

Vogt, D. S., Shipherd, J. C., & Resick, P. A. (2012). Posttraumatic maladaptive beliefs scale: Evolution of the personal beliefs and reactions scale. *Assessment, 9*, 308-317.

Vujanovic, A. A., Bonn-Miller, M. O., Potter, C. M., Marshall-Berenz, E. C., & Zvolensky, M. J. (2011). An evaluation of the association between distress tolerance and posttraumatic stress within a trauma-exposed sample. *Journal of Psychopathology and Behavioral Assessment, 33*, 129–135.

Walker, L. E. (1979). *The battered woman*. New York: Harper & Row.

Wallen, S., DiGiuseppe, R., & Dryden, W. (1992). *A practitioner's guide to rational-emotive therapy*. New York: Oxford Press.

Watson, D., & Tellegen, A. (1999). Issues in the dimensional structure of affect—Effects of descriptors, measurement error, and response formats: Comment on Russell and Carrol (1999). *Psychological Bulletin, 5*, 601– 610.

Weathers, F. W., Litz, B. T., Herman, D. S., Huska, J. A., & Keane, T. M. (1993). *The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility.* Paper presented at the International Society for Traumatic Stress Studies, San Antonio, TX.

Weiss, D. S., & Marmar, C. R. (1997). The Impact of Event Scale-Revised. In J. P. Wilson & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (pp. 399–411). New York: Guilford Press.

Wessler, R. A., & Wessler, R. L. (1980). *The principles and practice of rational-emotive therapy*. San Francisco, CA: Jossey-Bass.

Williams, J. M. G., Watts, F. N., MacLeod, C., & Mathews, A. (1988). *Cognitive psychology and emotional disorders.* Chichester: Wiley.

Yufik, T., & Simms, L. J. (2010). A meta-analytic investigation of the structure of posttraumatic stress disorder symptoms. *Journal of Abnormal Psychology, 119(40),* 764-776.

Yung, Y., Thissen, D., & McLeod, L. D. (1999). On the relationship between the higher-order factor model and the hierarchical factor model. *Psychometrika, 64*, 113–128.

Zisook, S., Shuchter, S. R., Irwin, M., Drako, D. F., Sledge, P., & Resovsky, K. (1994). Bereavement, depression, and immune function. *Psychiatry Research, 52,* 1-10.

Zlotnick C., Johnson, J., Kohn, R., Vicente, B., Rioseco, P., & Saldiva, S. (2006). Epidemiology of trauma, post-traumatic stress disorder (PTSD) and co-morbid disorders in Chile. *Psychological Medicine, 36,* 1523-1533.

Zurawski, R. M., & Smith, T. W. (1987). Assessing irrational beliefs and emotional distress: Evidence and implications of limited discriminant validity. *Journal of Counselling Psychology, 34*, 224-227.

The Trauma Related Irrational Belief Scale

As you answer the following questions please think about the traumatic event you described in the previous section of this questionnaire.

For each statement below please indicate whether you Strongly Disagree (A), Somewhat Disagree (B), are Neutral (C), Somewhat Agree (D), or Strongly Agree (E).

A	B	C	D	E
STRONGLY DISAGREE	**SOMEWHAT DISAGREE**	**NEUTRAL**	**SOMEWHAT AGREE**	**STRONGLY AGREE**

1.	I absolutely should have acted differently during the traumatic event that I experienced.	**A B C D E**
2.	The traumatic event that I experienced absolutely should not have happened.	**A B C D E**
3.	The traumatic event that I experienced was completely awful and catastrophic; the worst thing that could have happened.	**A B C D E**
4.	The traumatic event that I experience was extremely bad and unpleasant but it wasn't the worst thing that could have happened.	**A B C D E**
5.	I can't stand the fact that I had to experience this traumatic event and I find it hard to experience any kind of happiness as a result.	**A B C D E**
6.	Although I don't like the fact that I experienced this traumatic event, I can stand the fact that it happened, and I find that I can experience happiness despite it.	**A B C D E**
7.	I think that I am less worthwhile as a person because of what happened during the traumatic event.	**A B C D E**
8.	I think that life is less worthwhile because of what happened during the traumatic event.	**A B C D E**

Mental Health Review Journal

Emerald Article: Resolving a difference between cognitive therapy and rational emotive behaviour therapy: towards the development of an integrated CBT model of psychopathology

Philip Hyland, Daniel Boduszek

Resolving a difference between cognitive therapy and rational emotive behaviour therapy: towards the development of an integrated CBT model of psychopathology

Philip Hyland and Daniel Boduszek

Philip Hyland and Daniel Boduszek are based in the School of Psychology, University of Ulster, Londonderry, UK.

Abstract

Purpose – *The field of cognitive-behavioural therapy contains many different theoretical models of psychopathology, with each discipline ascribing greater emphasis to a particular cognitive process or organisation of beliefs. This paper seeks to propose a method of integrating the two most widely practiced and researched schools of CBT; Beck's cognitive therapy (CT) and Ellis's rational emotive behaviour therapy (REBT).*

Design/methodology/approach – *Although there exist a large degree of similarity between the two therapeutic approaches, the two models do differ in relation to their respective hypothesises regarding the core psychological variable in psychopathology. Cognitive theory hypothesises that negative representational beliefs are of central importance whereas rational emotive behaviour theory hypothesises that negative evaluative demands lie at the core of psychological disturbance. This paper evaluates these competing predictions on the basis of the available empirical literature.*

Results – *The empirical literature provides greater support for the organisation and interrelations of the irrational beliefs proposed by REBT theory over CT theory, however the research data clearly indicate the importance of the cognitive variables stressed by CT theory in the pathogenesis of psychological distress. Based on the available evidence an integrated CBT model which incorporates elements of both CT and REBT theory is presented. It is proposed that this integrated model can serve as the stepping-stone toward a larger, single, coherent CBT model of psychopathology.*

Research limitations/implications – *Few empirical studies have directly compared the competing predictions of CT and REBT theory. If future research supports the findings presented in this paper, the proposed model can serve as a template for the development of a unified, general-CBT theory of psychopathology.*

Practical implications – *The integrated model presented in this paper can serve as a guiding theoretical model for therapeutic practice which takes into account therapeutic methods from both CT and REBT.*

Originality/value – *This paper proposes the first theoretical model which incorporates the competing theoretical conceptualizations of psychological distress from the two main schools of CBT.*

Keywords *Cognitive therapy, Irrational beliefs, Cognitive-behavioural therapy, Rational emotive behaviour therapy, Individual psychology, Mental illness, Beliefs*

Paper type *Conceptual paper*

The basics of cognitive-behavioural therapy

Cognitive-behavioural theoretical conceptualizations of various psychological disorders have proven themselves to be the most thoroughly and rigorously investigated (Barlow, 2008; Chambless and Hollon, 1998) and empirically supported (Butler *et al.*, 2006; Chambless and Ollendick, 2001; Engels *et al.*, 1993; Epp and Dobson, 2010; Lyons and Woods, 1991) psychological models currently proposed. Cognitive-behavioural therapy (CBT)-based therapies are predicated upon the theory that psychological disorders are

the result of dysfunctional cognitive processing (Ellis, 1962, 1994; Beck, 1976). David and Szentagotai (2006) explain that from the CBT perspective, complex human processes such as cognition, affect, and behaviour are considered to be ''cognitively penetrable''. This implies that such processes are the direct result of some form of conscious or unconscious cognitive processing, and that if changes are affected in a person's cognitive processes, either through direct or indirect means, changes can be brought about in an individual's cognitive, emotional, and behavioural responses.

Within the CBT tradition there are numerous approaches including cognitive-behavioural modification (Meichenbaum, 1977), multimodal therapy (Lazarus, 1976), dialectical behaviour therapy (Linehan and Dimeff, 2001), acceptance and commitment therapy (Hayes *et al.*, 2003), and reality therapy (Glasser, 1965; see Kuehlwein and Rosen, 1993, for a more detailed review). Two of the most influential and widely used approaches within the CBT tradition are rational emotive behaviour therapy (REBT: Ellis, 1958, 1962, 1994) and cognitive therapy (CT: Beck, 1963, 1976, 2011).

Each approach within the CBT tradition is similar by virtue of the fact that there is a theoretical agreement that cognitive variables mediate the impact of stressful events on the development of cognitive, emotional, and behavioural distress (a diathesis-stress model). However, each approach within the CBT field has a unique and distinct diathesis-stress model related to the specific kinds of (dysfunctional) cognitions that are hypothesised to be the key etiopathogenetic mechanisms in the development of psychopathology (David and Szentagotai, 2006). This differential focus on various types of cognitive variables means that each approach within the CBT field has a distinct model of psychopathology, and consequentially, a distinct clinical approach to the treatment of psychopathology.

The theory of CT

The CT model of psychopathology as outlined by Beck (1976, 2011) and Leahy (2003), among many others, is a schema-based, information-processing model of psychopathology. According to Beck *et al.* (1990, p. 4), ''Schemas are the cognitive structures that organize experience and behavior; beliefs and rules represent the content of the schemas and consequently determine the content of thinking, affect and behaviour''. In other words, schemas are particular kinds of cognitive structures which are comprised of an organised set of beliefs which, when activated, can influence a person's cognitive processes including memory and attention (Segal, 1998; Williams *et al.*, 1988), ultimately leading to distortions in conscious thought which in turn impacts upon affective and behavioural responses. Maladaptive schemas are hypothesised to develop during childhood and adolescence, but can develop later in life too, and thus represent very stable cognitive patterns that once activated by internal (e.g. endocrine factors or ingestion of drugs) or external triggers (e.g. experiencing a traumatic event) lead to biased information processing that causes a person to make systematic negative interpretations of life events that are congruent with the content of the maladaptive schema (Beck, 1972, 1987). Schemas which are of a dysfunctional and negative nature represent cognitive vulnerability factors for the development of psychopathology. Vulnerability has been defined as an ''endogenous, stable characteristic that remains latent until activated by a precipitating event'' (Clark and Beck, 2010, p. 102).

According to Beck (2011), the specific content of these schemas are comprised of a person's ''core'' and ''intermediate'' beliefs. Core beliefs are fixed, global, overgeneralized, unconditional, and absolutistic beliefs that a person holds about oneself, others, and/or the world in general. These beliefs are hypothesised to represent the core cognitive variables in the development and maintenance of psychopathology. According to the cognitive model people generally form both positive and negative core beliefs early in life and these core beliefs become highly influential in determining how a person interacts with the world. During emotional distress, negative core beliefs become activated and information is then processed in a biased fashion which serves to reinforce the activated negative core belief (Neenan and Dryden, 2011). Beck (2011) has posited that negative core beliefs about the self-relate to three main areas; helplessness, unlovability, and worthlessness.

CT theory posits that as a result of a person's core beliefs, a number of ''intermediate beliefs'' are formed (Beck, 2011). Leahy (2003) and Neenan and Dryden (2011) explain that intermediate beliefs are the various rules, assumptions, or attitudes that a person holds and directs towards themselves, others, and/or the world in general. Like core beliefs, intermediate beliefs also tend to be rigid, absolutistic, overgeneralized,and overinclusive. Maladaptive assumptions or dysfunctional attitudes often take the form of conditional ''if . . . then . . . '' or ''unless . . . then . . . '' statements while a person's ''rules for living'' tend to be expressed within rigid ''must'', ''have to'', ''ought to'' and ''should'' statements. Beck *et al.* (1985) have suggested that intermediate beliefs relate to three broad categories; acceptance, competence, and control. These rules and assumptions are intimately linked with the underlying core beliefs and if the terms of these rigid rules or assumptions are violated, the underlying core belief becomes activated.

Once activated, core and intermediate beliefs lead to specific and identifiable cognitive distortions which Beck (1976) termed ''negative automatic thoughts''. These are thoughts which enter into consciousness automatically, reflecting certain negative biases or distortions in thought, which are accepted as valid and true by the individual, and contribute to disturbed emotions and maladaptive behaviours (Beck and Dozois, 2011; Leahy, 2003). Automatic thoughts tend to be situational specific, unlike intermediate and core beliefs, which are more general in nature.

The CT theory of psychopathology therefore is a multilevel model of psychopathology. At the most conscious, surface level of analysis, are negative automatic thoughts such as ''If I go to the party nobody will talk to me''. The emotional and potentially maladaptive behavioural consequences of negative automatic thoughts are related to the person's deeper level cognitions such as their intermediate beliefs ''I must be liked and approved of by everyone I meet'', and their core beliefs, ''I'm unlovable''. In other words, negative automatic thoughts are evaluated with respect to intermediate beliefs which develop from, and are linked to, core beliefs. dysfunctional schemas, comprised as they are of core and intermediate beliefs, once activated, give rise to the distortions and biases in conscious thought by influencing memory retrieval and the focus of attention on information congruent with the content of the dysfunctional schema (Leahy, 2003; Beck, 2011). A crucial aspect of Beck's cognitive model of psychopathology is that the presence of a dysfunctional schema is a necessary condition for the development of psychopathology but it is not a sufficient condition. Some kind of relevant activating stimuli is necessary to trigger the activation of the dysfunctional schema which then leads to distorted thinking, disturbed emotional reactions, and maladaptive behavioural responses (Beck and Dozois, 2011; Kovacs and Beck, 1978).

The theory of REBT

REBT's cognitive model of psychopathology is organised around Ellis's (1958, 1962, 1994) ''ABC'' model of emotional disturbance. This model outlines the key tenet of REBT, and the wider field of CBT, that cognitions are the main mediators and determinants of a range of complex human responses including cognitive, emotional, and behavioural responses. According to the ABC model, ''A'' represents the myriad of activating events or adversities which a person will face throughout their life in which some aspect of their personal domain (Beck, 1976) comes under threat. Subsequent to the experience of this activating event (which can be an internal or external stimulus) a person is likely to experience a range of cognitive, emotional, and behavioural consequences representing ''C'' in the ABC model. These consequences may be functional, adaptive, and healthy or they may be dysfunctional, maladaptive, and unhealthy. According to Ellis's model, the determining factor in whether a person will experience functional/healthy/adaptive consequences or dysfunctional/unhealthy/maladaptive consequence subsequent to the experience of a negative activating event depends upon the kinds of beliefs (''B'') a person holds about that activating event.

The particular cognitive variables that the theory of REBT is organised around are rational and irrational beliefs and these beliefs represent specific kinds of evaluative or appraisal beliefs (David *et al.*, 2002). Rational beliefs are beliefs which are empirically sound, logically coherent, and/or pragmatic. The characteristic nature of rational beliefs moreover

is that they are flexible and non-extreme. Irrational beliefs, contrastingly, are beliefs which are not grounded in empirical reality, are logically incoherent, and/or are non-pragmatic. The characteristic nature of irrational beliefs is that they are rigid and extreme (Ellis *et al.*, 2010; Dryden and Neenan, 2004).

According to REBT theory then, if a person responds to a negative activating event with a set of rational beliefs they are likely to experience functional cognitive, healthy negative emotional, and adaptive behavioural consequences, respectively. On the other hand, when a person holds a set of irrational beliefs about the same negative activating event that person will experience dysfunctional cognitive, unhealthy negative emotional, and maladaptive behavioural responses, respectively. REBT works at relieving psychopathology by identifying these irrational beliefs and disputing (''D'') such beliefs so as to bring about a change in a person's belief system whereby they adopt a new set of rational and efficient (''E'') beliefs which will serve to eradicate their cognitive-emotional-behavioural disturbances (David and Szentagotai, 2006).

REBT's theory of psychopathology is simple and parsimonious and avoids elaborate explanations for the development of psychological disturbance. In essence, REBT theory is solidly evolutionary based and biologically focused (Dryden and Neenan, 2004). It diverges from many other counselling approaches by stressing more vigorously the role of biology rather than the role of the environment in influencing human cognition, emotion, and behaviour. It must be noted, however, that REBT theory does not ignore the role of the environment and fully recognises that the environment interacts with our innate biological tendencies to disturb ourselves. The central precept of REBT's theory of psychological disturbance is that humans have an innate tendency to exaggerate our flexible preferences (rational beliefs) into rigid demands (irrational beliefs) (Ellis, 1994; Wallen *et al.*, 1992). REBT theory recognises that all humans are born as goal-seeking animals who strive to fulfil their general and idiosyncratic goals. As such, humans have an innate disposition to prefer and desire the achievement of one's ambitions. However, as Ellis discovered, humans also have an innate tendency to transmute these flexible preferences and desires for the fulfilment of one's goals into rigid, absolutistic, and dogmatic demands. This process of raising one's preferences into demands is hypothesised to lie at the core of psychological disturbance (David *et al.*, 2010).

This process which Ellis termed demandingness is the primary irrational appraisal mechanism in the development of psychopathology, according to REBT theory. These rigid demandingness beliefs give rise to a set of secondary irrational appraisal beliefs which are extreme in nature. Catastrophizing beliefs reflect a person's evaluation that getting what they believe they must not get, or not getting what they believe they must get, is as bad a situation as anything could be; completely catastrophic. Low frustration tolerance beliefs reflect an individual's belief that one is incapable of tolerating not having what they believe they must have, or of being utterly incapable of experiencing any kind of happiness so long as their demands are not met. Depreciation beliefs reflect the global, overgeneralized, and negative evaluations a person makes of oneself, others, and/or the world in general when oneself, others, or the world fails to live up to the person's self-created or self-imposed demands. The interaction between these primary and secondary appraisal beliefs about a given activating event produces the specific kinds of cognitive distortions, unhealthy negative emotions, and maladaptive behavioural consequences that are characteristic of various forms of psychopathology (David, 2003).

In REBT's ABC theory there are two distinct type of A's (Dryden and Neenan, 2004, pp. 7-8). The first is the situational A which reflects a neutral and objective description of the specific activating event. The second is the critical A, which is the individual's own subjective description, representation, interpretation, or inference about the meaning of the actual situation. REBT theory states, in contrast to CT theory, that distorted cognitive representations of reality are not the proximate cause of disturbed cognitive, emotional, or behavioural responses; rather it is the evaluative irrational beliefs that represent the proximate causes of such dysfunctional consequences. Essentially, how a person evaluates or appraises their own subjective representation of an event, by means of rational or irrational beliefs, ultimately determines their cognitive, emotional, and behavioural responses.

Ellis *et al.* (2010) and David and Szentagotai (2006) have described this crucial distinction between REBT's and CT's respective theories of psychopathology in terms of Abelson and Rosenberg's (1958) distinction of ''hot'' and ''cold'' cognitions (David and Szentagotai, 2006). Abelson and Rosenberg (1958) define cold cognitions as those that are reflective of the processes of representation, description, or knowing, whereas hot cognitions are defined as those that are reflective of the process of appraisal or evaluation. In other words, CT theory postulates that cold cognitions are the proximate causes of psychopathological responses while REBT theory views cold cognitions as distal causes of psychopathological responses and hot cognitions as the proximate causes of such responses. REBT's theory of psychopathology is therefore congruent with Lazarus' (1991) appraisal theory of emotions which states that although representational cognitions contribute to appraisal, it is only the process of appraisal itself which gives rise to emotions. REBT theory is as such consistent with what is currently the most accepted model of emotions in cognitive psychology (Smith *et al.*, 1993; David, 2003).

Similarities and differences between CT and REBT

It is clear that CT theory and REBT theory share much in common; both theories are organised around Ellis's ABC model of psychopathology, and both models view the same irrational beliefs as integral to the development and maintenance of psychopathology. Where the two theories diverge in their most important and crucial respect is in regards to the organisation and interrelationship between these irrational beliefs. CT theory hypothesises that negative depreciation beliefs lie at the core of psychological distress and that these beliefs effect conscious thought, emotions, and behaviour through a series of dysfunctional intermediate beliefs represented by demandingness beliefs, catastrophizing beliefs, and/or low frustration tolerance beliefs (Figure 1).

Contrastingly, REBT theory hypothesises that the process of demandingness is the core psychological construct in the emergence and development of psychological distress and that its effect on conscious thought, emotions, and behaviour is mediated by a series of dysfunctional intermediate beliefs represented by depreciation beliefs, catastrophizing beliefs, and/or low frustration tolerance beliefs (Figure 2).

This theoretical distinction goes beyond mere academic interest as it directly influences the theoretical conceptualizations of specific psychological disorders, and consequently the therapeutic formulations. In CT-based theoretical formulations and treatment manuals for specific forms of psychopathology (Beck *et al.*, 1979; Clark and Beck, 2010; Ehlers and Clark, 2000). Demandingness beliefs are rarely included in these models, are not specifically targeted for cognitive restructuring unless the patient specifically demonstrates

Figure 1 CT model of the interrelations of irrational beliefs

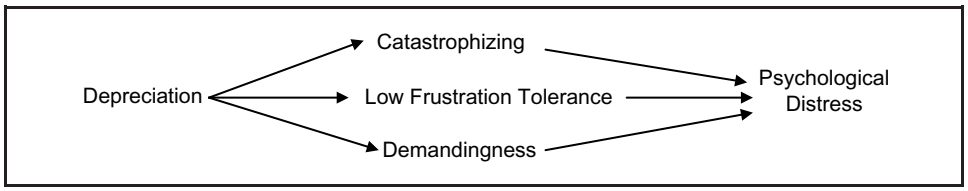
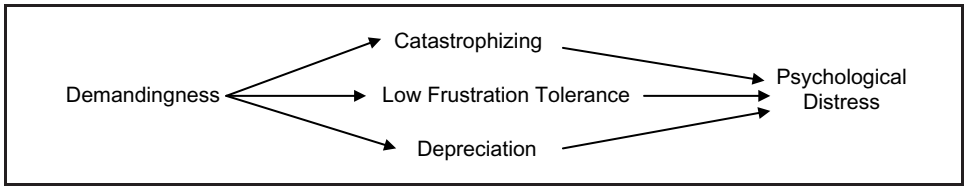


Figure 2 REBT model of the interrelations of irrational beliefs



or reports these types of cognitive distortions in their conscious thinking. Alternatively, REBT-based theoretical formulations and treatment manuals for specific forms of psychopathology (David *et al.*, 2004; Ellis, 2001) specify that demandingness beliefs are the most important and central cognitive variables in the emergence of psychopathological responses and therefore special emphasis is placed on identifying and restructuring these cognitions. The major implication of this distinction is that if the REBT hypothesis is correct, then current CT (and, by extension, CBT) treatment approaches are largely ignoring, or at the very least, greatly underestimating the most important dysfunctional cognitive process of all. In order to gain a clearer picture of which model is more accurate, a review of the relevant empirical literature is necessary.

Empirical review of the competing predictions of CT and REBT theory

Szentagotai and Freeman (2007) investigated the REBT hypothesis that evaluative cognitions represent the proximate causes of emotional disturbance while representational cognitions reflect the more distal causes. Their study involved clinical patients suffering from major depressive disorder and assessed the impact of distorted automatic thoughts on the development of depressed mood. Results from the study showed that distorted automatic thoughts only affected an individual's mood when such thoughts were experienced in the presence of an irrational belief. Consistent with REBT theory, cold cognitions (distorted automatic thoughts) were shown to be distal causes in changes to the participant's mood whereas hot cognitions (irrational beliefs) were shown to be the proximate causes of changes in mood.

Solomon *et al.* (1998) attempted to test the core hypothesis of REBT theory through the application of a research design which compared levels of irrational beliefs between a remitted-depression group and a never-depressed group. This design allowed the researchers to identify whether the presence of irrational beliefs posed a risk factor for the development of depression, or if irrational beliefs were merely a correlate of depression. Soloman *et al.* (1998) used two measures of irrational beliefs and a priming method to attempt to activate latent irrational beliefs. Results of the study indicated that no differences existed in the endorsement of irrational beliefs between the two groups suggesting that these beliefs fluctuate with depression level contradicting the predictions of REBT theory. However, Soloman *et al.* (2003) replicated the study, this time also using a measure of irrational beliefs that would identify the specific and idiosyncratic kinds of demandingness beliefs held by depressed clients, which REBT theory hypothesises are at the core of psychopathological disorders such as depression. In line with their predictions, Soloman and colleagues found that although there were no differences in the rates of endorsement of general irrational beliefs between the remitted-depression group and the never-depressed group, there were very large and statistically significant differences between the groups on the specific measure of demandingness beliefs. The remitted-depression group were nine times more likely than the never-depressed group to hold at least one strong self-demand, and 70 per cent of the remitted-depression group possessed at least one strong self-demand compared to just 20 per cent of the never-depressed group. These results support REBT's hypothesis that demandingness beliefs are a central psychological construct in the maintenance of depression (Ellis, 1987) and that irrational beliefs represent cognitive vulnerability factors that lead to the development of psychopathology (Ellis, 1994).

Szentagotai *et al.* (2008) produced evidence to support the findings of Soloman *et al.* (2003) when they analysed the mechanisms of change that occurred during a randomized clinical trial comparing the efficacy of REBT, CT, and pharmacotherapy for the treatment of major depressive disorder (see David *et al.*, 2008, for details of the trial). All three treatment approaches were equally efficacious at post-test, however, at a six-month follow-up REBT, but not CT, was found to be significantly better than medication at reducing levels of relapse (on one of two measures of depression). Their analyses showed that REBT proved more efficacious at reducing levels of implicitly held irrational beliefs (demandingness beliefs) than both CT and pharmacotherapy. The authors proposed that this factor accounted for REBT's significantly better results at the six-month follow up compared to pharmacotherapy.

Although REBT proved significantly better at restructuring implicitly held irrational beliefs than CT, the rates of relapse in the REBT treatment group, while lower, were not statistically significantly lower than the CT treatment group. Szentagotai and colleagues suggested that the psychosocial skills acquired through CT served to protect patients from redeveloping clinical symptoms despite the presence of certain implicitly held irrational beliefs.

In an attempt to determine the algorithmic-representational nature of irrational beliefs as described by REBT theory, Szentagotai *et al.* (2005) performed a series of implicit and explicit memory recall quasi-experiments. It was hypothesised based on substantial prior research findings (Schwartzberg, 1997; Williams *et al.*, 1988) that if any of the irrational belief processes (demandingness, catastrophizing, low frustration tolerance, and depreciation beliefs) were represented as schemas in the cognitive structure they would have a direct effect on the explicit memory tests. Specifically, schema-congruent information would be better recalled then schema-incongruent information. Results from the quasi-experiments showed that demandingness and depreciation beliefs are represented in the cognitive system as evaluative schemas as they were found to bias memory retrieval of both schema-congruent and schema-incongruent information (DiGiuseppe, 1996) while results showed that catastrophizing and low frustration tolerance beliefs had no impact on memory recall therefore these beliefs are more likely represented in the cognitive system as propositional networks (Dryden, 1984). There are two major implications from the results of this study which provide strong support for REBT's theory regarding the interrelationship of irrational beliefs.

First, it was found that even when participant's self-report levels of demandingness beliefs were low, once these beliefs were in the presence of high catastrophizing, and/or high low frustration tolerance, and/or high depreciation beliefs, demandingness beliefs still biased memory recall. This finding suggests that even when individuals are not consciously aware that they are holding demandingness beliefs, these beliefs still impact upon one's cognitive processes. This finding supports Ellis' (1994) hypothesis that demandingness beliefs always accompany the other irrational beliefs and that demandingness beliefs are often stored within the implicit, rather than the explicit, memory system.

The second major implication that can be derived from the findings of Szentagotai *et al.* (2005) is in relation to the depreciation belief process. Negative depreciation beliefs about oneself are well established to be an important core belief in certain forms of psychopathology including depression (Beck, 1976; Beck *et al.*, 1979; Ellis, 1994), and depression is also known to bias memory retrieval (Williams *et al.*, 1988). Szentagotai *et al.*'s (2005) research findings demonstrated that every time self-depreciation beliefs had an effect on memory recall there was also found to be a demandingness-belief effect. The two processes are intimately linked in other words. Ellis (1987) has consistently argued that Beck's CT model of depression (Beck *et al.*, 1979) is incomplete as it does not take into account the primary role played by demandingness beliefs. Ellis (1987, 1994) argued that negative self-depreciation beliefs always exist along with a primary self-directed demandingness belief. This hypothesis brought about considerable criticism from those within the CT community. Marzillier (1987) and later Brown and Beck (1989) argued that although demandingness beliefs were sometimes involved in depression, demandingness beliefs were neither specific to, nor necessary for, the development and maintenance of depression. According to the CT model of depression (and psychopathology more generally), demandingness beliefs are viewed as part of the intermediate belief system. This finding from Szentagotai *et al.* (2008) and Solomon *et al.* (2003) provide substantial empirical support for Ellis' (1987) and REBT's hypothesis that demandingness beliefs are at the core of depression and are always present along with negative self-depreciation beliefs.

Factor analytic research has supported the interrelations between the irrational beliefs as proposed by REBT theory, which findings indicating that catastrophizing, low frustration tolerance, and depreciation beliefs are all associated with each other, and all three processes are related directly to demandingness beliefs (Fulop, 2007; Bernard, 1998; DiGiuseppe *et al.*, 1988).

David *et al.* (2002, 2005a, b) examined the interrelations of the irrational beliefs within the paradigm of Lazarus's (1991) appraisal theory of emotions and found that demandingness

beliefs were highly correlated with primary appraisals, and more strongly associated with primary appraisals than with catastrophizing, low frustration tolerance, and depreciation beliefs. Furthermore, catastrophizing, low frustration tolerance, and depreciation beliefs were highly related to secondary appraisals. The results of these two studies support the primary appraisal role of demandingness beliefs and demonstrated that the effect of demandingness beliefs on the development of emotions is mediated by the secondary appraisal mechanisms of catastrophizing, low frustration tolerance, and depreciation beliefs, as predicted by REBT theory.

The competing CT and REBT predictions regarding the meditational relationship between these irrational beliefs was then specifically tested by DiLorenzo *et al.* (2007) through the use of meditational analysis. The researchers examined the interrelations of the irrational beliefs on the development of exam-related distress at two time points (at the beginning of a college semester and immediately prior to the sitting of an important exam). Their results showed that at both time points each irrational belief process was significantly correlated with exam-related distress. At time 1, the effect of demandingness on the development of distress was completely mediated by catastrophizing, low frustration tolerance, and depreciation beliefs. At time 2, the effect of demandingness was completely mediated by catastrophizing and depreciation beliefs but not by low frustration tolerance beliefs. These results provide strong empirical support that not only do irrational beliefs about specific events give rise to psychopathological responses but that the interrelations between the irrational beliefs are as hypothesised by REBT theory.

Conclusion and future directions

The current paper is by no means unique in its discussion regarding the distinctive features of CT and REBT. Nearly a decade ago an effort was made by the pioneers of both forms of therapy to address the similarities and differences between the two models. Padesky and Beck (2003) argued that although both models share a large degree of similarity, the fundamental difference lies in CT's commitment to scientific empiricism as its guiding principle for theory development and modification, along with therapeutic evaluation, whereas REBT, they argued, was philosophically rather than empirically derived and driven. Ellis's (2003) initial discussion regarding the similarities and differences in the two approaches was similar to Padesky and Beck's in that his discussion centred on the philosophical, historical, and therapeutic similarities and differences between the two models. Ellis did, however, strongly emphasise that REBT theory fundamentally differs from CT in regards to the hypothesised central role played by evaluative demandingness beliefs in the development and maintenance of psychological distress. Ellis's (2005) second paper on the topic served to correct Padesky and Beck's (2003) assertion that the fundamental difference between the two therapeutic models related to CT being an empirically based therapy in contrast to REBT being a philosophically based therapeutic approach. Ellis (2005) convincingly argues that REBT and CT are both empirically and philosophically orientated therapies and their respective philosophies and commitment to scientific empiricism are evidence of a high degree of similarity. However, Ellis also stressed that REBT tends to be much more explicit in stressing and advocating the philosophical underpinnings of its theory than CT and crucially REBT incorporates these philosophical principals as central features of its therapeutic approach.

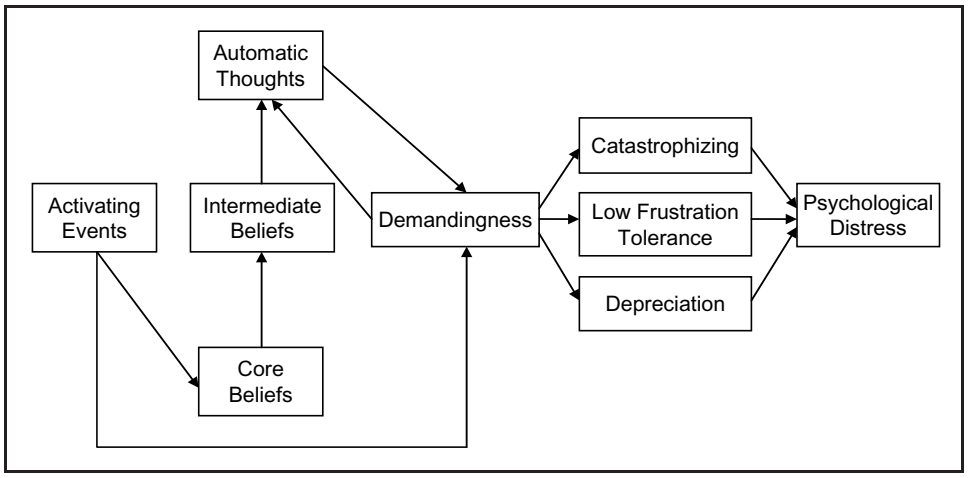
These discussions on the similarities and differences between CT an REBT are highly informative but unfortunately did not serve to resolve the differences both parties identified, or even to suggest an empirical method by which these differences could be resolved. The present article proposes that rather than focusing on a discussion of the philosophical or therapeutic similarities and differences, a more fruitful approach is to clearly elucidate a key theoretical distinction that is fundamental in distinguishing CT theory and REBT theory, and axiomatically their therapeutic approaches, and evaluating the evidence relevant to this topic. By approaching this difficulty empirically rather than theoretically or philosophically it is possible to determine which of the model's competing theoretical predictions is most strongly supported by the empirical data, and then to subsequently derive a theoretical model which incorporates key elements of both approaches in a coherent and empirically supported manner.

As previously outlined the data that is currently available provides considerable empirical support for the predictions of REBT theory over CT theory regarding the organisation and interrelations of the irrational beliefs, and specifically that demandingness beliefs appear to be the core cognitive variable in psychopathological responses. Beck's CT is unquestionably the most efficacious form of psychotherapy available today with an overwhelming body of supportive evidence for a wide variety of psychiatric, psychological, and medical disorders (Butler *et al*., 2006; Epp and Dobson, 2011). The preeminence of the field of ''CBT'' with respect to all other schools of psychotherapy is almost entirely due to the efforts of the CT community, both in relation to the validation of its therapy and its theoretical models. However, despite how successful CT interventions have been demonstrated to be, many individuals who receive CT remain unresponsive, with estimates as high as 30-40 per cent depending on the disorder (David and Szentagotai, 2006). We fully agree with the views of David and Szentagotai (2006) that it may be possible to improve these response rates, along with increasing the scientific integrity of the wider CBT field, by deriving an integrated CBT model of psychopathology (Figure 3).

It is our belief that the theoretical model described successfully encapsulates the various components of both REBT theory (irrational evaluative beliefs) and CT theory (dysfunctional representational beliefs) in a parsimonious and empirically consistent manner. It is fully consistent with Ellis's (1958, 1962) original ''ABC'' model of psychological disturbance. Activating events, which can be either external or internal cues, trigger the activation of schematic structures (core beliefs, demandingness beliefs). Once these schematic structures become activated they give rise to systematic biases in information processing leading to identifiable cognitive distortions (automatic thoughts) in conscious thought. These automatic thoughts are subsequently evaluated by means of rational or irrational beliefs; the primary irrational appraisal mechanism being demandingness beliefs and the secondary irrational appraisal mechanisms represented by catastrophizing beliefs, low frustration tolerance beliefs, and/or depreciation beliefs. The process of irrationally appraising one's distorted representational automatic thoughts, which themselves arise as a consequence of the activation of underlying dysfunctional representational (core beliefs) and appraisal (demandingness beliefs) schematic structures, gives rise to the development of cognitive-emotional-behavioural dysfunctioning. As such, core beliefs, intermediate beliefs, and automatic thoughts constitute the distal cognitive causes of psychological distress while irrational beliefs represent the most proximate cognitive cause of psychological distress.

It is necessary to note that often many of the belief types represented in the current model can be identified and recognised in conscious thought. Negative core beliefs, demandingness beliefs, and catastrophizing beliefs are all frequently identifiable in conscious thought and have frequently being described in the CT literature as specific categories of negative automatic thoughts (Beck, 1976, 2011; Leahy, 2003). We argue that

Figure 3 Integrated CBT model of psychological distress



although often identifiable in conscious thought, these thoughts are more accurately conceptualized as the conscious awareness of underlying belief processes that more frequently operate at an automatic and unconscious level and thus should not be classified as part of the automatic thought system but recognised as discrete belief processes.

This model is suggested not as a conclusion, but rather as a desired commencement to unify the field of CBT. As detailed at the beginning of this article, there currently exist a large number of distinct schools that come under the umbrella term of ''CBT''. This approach of an ever growing number of unique schools of CBT has had certain advantages in that each discipline has highlighted or introduced important cognitive processes not otherwise considered as significant in the development of emotional disturbance by many of the other approaches. It has also allowed for the development of unique and effective cognitive and behavioural interventions in order to bring about symptom relief.

Despite the benefits that have accrued, it is our contention that the current trajectory of the field of CBT is ultimately a deleterious one as the evolution of an increasing number of distinct approaches undermines the scientific integrity of the field of CBT, which prides itself on its adherence to scientific scrutiny. We believe the field of CBT would be well served by researchers focusing their efforts on how to bring together the disparate theoretical models into a single integrated, coherent, and empirically derived model. This could not only function as a means of creating greater scientific coherency with respect to the theory, but could well lead to the development of treatment interventions that have the potential to increase the success rates from what is currently enjoyed. David *et al.* (2003) have discussed the current trend among ''CBT'' therapists to practice a ''cocktail-school of cognitive-behaviour therapy'', in which therapist's avail of a variety of intervention strategies drawn for the various CBT schools, but without any guiding theoretical formulation of the development of psychopathology or any consideration of the hypothesised theory of change. This approach is deeply unscientific, however, the development of an integrated CBT model of psychopathology which is informed by the discoveries of the respective schools could easily solve this problem, as therapists could draw on a variety of therapeutic techniques, as needed, in the services of creating cognitive restructuring that is at all times driven by, and in reference to, a sound theoretical understanding of the development and maintenance of psychological distress.

Our effort in this paper has been to highlight one crucial distinction that exists between the theories of CT and REBT and to present a model that resolves and integrates these differences. It is our hope that future researchers will continue this effort by advancing our model in a way that further incorporates many other important cognitive variables in a logical and empirically driven manner.

References

Abelson, R.P. and Rosenberg, M.J. (1958), ''Symbolic psycho-logic: a model of attitudinal cognition'', *Behavioral Science*, Vol. 3, pp. 1-13.

Barlow, D.H. (2008), *Clinical Handbook of Psychological Disorders: A Step-by-step Treatment Manual*, 4th ed., Guilford Press, London.

Beck, A.T. (1963), ''Thinking and depression: idiosyncratic content and cognitive distortions'', *Archives of General Psychiatry*, Vol. 9, pp. 324-33.

Beck, A.T. (1972), *Depression: Causes and Treatments*, University of Pennsylvania Press, Philadelphia, PA.

Beck, A.T. (1976), *Cognitive Therapy for Emotional Disorders*, International University Press, New York, NY.

Beck, A.T. (1987), ''Cognitive models of depression'', *Journal of Cognitive Psychotherapy*, Vol. 1, pp. 5-37.

Beck, A.T. and Dozois, D.J.A. (2011), ''Cognitive therapy: current status and future directions'', *Annual Review of Medicine*, Vol. 62, pp. 2.1-2.13.

Beck, A.T., Emery, G. and Greenberg, R.L. (1985), *Anxiety Disorders and Phobias: A Cognitive Perspective*, Basic Books, New York, NY.

Beck, A.T., Freeman, A. and Associates (1990), *Cognitive Therapy of Personality Disorders*, The Guilford Press, London.

Beck, A.T., Rush, A.J., Shaw, B.F. and Emery, G. (1979), *Cognitive Therapy for Depression*, The Guilford Press, London.

Beck, J.S. (2011), *Cognitive Therapy: Basics and Beyond*, 2nd ed., The Guilford Press, London.

Bernard, M.E. (1998), ''Validation of the general attitudes and belief scale'', *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, Vol. 16, pp. 183-96.

Brown, G.B. and Beck, A.T. (1989), ''The role of imperatives in psychopathology: a reply to Ellis'', *Cognitive Therapy and Research*, Vol. 13, pp. 315-21.

Butler, A.C., Chapman, J.E., Forman, E.M. and Beck, A.T. (2006), ''The empirical status of cognitive-behavioural therapy: a review of the meta-analyses'', *Clinical Psychology Review*, Vol. 26, pp. 17-31.

Chambless, D.L. and Hollon, S.D. (1998), ''Defining empirically supported treatments'', *Journal of Consulting and Clinical Psychology*, Vol. 66, pp. 7-19.

Chambless, D.L. and Ollendick, T.H. (2001), ''Empirically supported psychological interventions: controversies and evidence'', *Annual Review of Psychology*, Vol. 52, pp. 685-716.

Clark, D.A. and Beck, A.T. (2010), *Cognitive Therapy of Anxiety Disorders*, The Guilford Press, London.

David, D. (2003), Rational emotive behaviour therapy (REBT): the view of a cognitive psychologist, in Dryden, W. (Ed.), *Theroretical Developments in REBT*, Routledge, London.

David, D. and Szentagotai, A. (2006), ''Cognition in cognitive-behavioral psychotherapies (CBT): toward an integrative model'', *Clinical Psychology Review*, Vol. 3, pp. 284-98.

David, D., Lynn, S.J. and Ellis, A. (2010), *Rational and Irrational Beliefs: Research, Theory, and Clinical Practice*, Oxford University Press, Oxford.

David, D., Miclea, M. and Opre, A. (2003), ''The information processing approach to the human mind: basic and beyond'', *Journal of Clinical Psychology*, Vol. 4, pp. 353-69.

David, D., Schnur, J. and Belloiu, A. (2002), ''Another search for the 'hot' cognitions: appraisal, irrational beliefs, attributions, and their relation to emotion'', *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, Vol. 15, pp. 93-131.

David, D., Ghinea, C., Macavei, B. and Kallay, E. (2005a), ''A search for 'hot' cognitions in a clinical and non-clinical context: appraisal, attributions, core relational themes, irrational beliefs, and their relations to emotion'', *Journal of Cognitive and Behavioral Psychotherapies*, Vol. 5, pp. 1-42.

David, D., Kangas, M., Schnur, J.B. and Montgomery, G.H. (2004), *REBT Depression Manual; Managing Depression Using Rational Emotive Behavior Therapy*, Babes-Bolyai University (BBU), Cluj-Napoca.

David, D., Szentagotai, A., Kallay, E. and Macavei, B. (2005b), ''A synopsis of rational-emotive behavior therapy (REBT): fundamental and applied research'', *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, Vol. 23, pp. 175-221.

David, D., Szentagotai, A., Lupu, V. and Cosman, D. (2008), ''Rational-emotive behaviour therapy versus cognitive therapy versus medication in the treatment of major depressive disorder: a randomized clinical trial'', *Journal of Clinical Psychology*, Vol. 6, pp. 728-46.

DiGiuseppe, R. (1996), ''The nature of irrational and rational beliefs: progress in rational emotive behavior theory'', *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, Vol. 4, pp. 5-28.

DiGiuseppe, R., Leaf, R., Exner, T. and Robin, M.W (1988), ''The development of a measure of irrational/rational thinking paper presented at the World Congress of Behavior Therapy'', Edinburgh, Scotland.

DiLorenzo, T.A., David, D. and Montgomery, G.H. (2007), ''The interrelations between irrational cognitive processes and distress in stressful academic settings'', *Personality and Individual Differences*, Vol. 42, pp. 765-77.

Dryden, W. (1984), *Rational-Emotive Therapy: Fundamentals and Innovations*, Croom Helm, Kent.

Dryden, W. and Neenan, M. (2004), *Rational Emotive Behavioural Counselling in Action*, 3rd ed., Sage, London.

Ehlers, A. and Clark, D.M. (2000), ''A cognitive model of persistent posttraumatic stress disorder'', *Behaviour Research and Therapy*, Vol. 38, pp. 319-45.

Ellis, A. (1958), ''Rational psychotherapy'', *Journal of General Psychology*, Vol. 59, pp. 35-49.

Ellis, A. (1962), *Reason and Emotion in Psychotherapy*, Lyle Stuart, New York, NY.

Ellis, A. (1987), ''A sadly neglected cognitive element in depression'', *Cognitive Therapy and Research*, Vol. 11, pp. 121-45.

Ellis, A. (1994), *Reason and Emotion in Psychotherapy*, revised ed., Birch Lane, Secaucus, NJ.

Ellis, A. (2001), *Overcoming Destructive Beliefs, Feelings, and Behaviours: New Directions for Rational Emotive Behaviour Therapy*, Prometheus Books, New York, NY.

Ellis, A. (2003), ''Similarities and differences between rational emotive behavior therapy and cognitive therapy'', *Journal of Cognitive Psychotherapy: An International Quarterly*, Vol. 17 No. 3, pp. 225-40.

Ellis, A. (2005), ''Discussion of Christine A. Padesky and Aaron T. Beck, 'Science and philosophy: comparison of cognitive therapy and rational emotive behavior therapy'', *Journal of Cognitive Psychotherapy: An International Quarterly*, Vol. 19 No. 2, pp. 181-9.

Ellis, A., David, D. and Lynn, S.J. (2010), ''A historical and conceptual perspective'', in David, D., Lynn, S.J. and Ellis, A. (Eds), *Rational and Irrational Beliefs: Research, Theory, and Clinical Practice*, Oxford University Press, Oxford, pp. 3-22.

Engels, G.I., Garnefsky, N. and Diekstra, R.F.W. (1993), ''Efficacy of rational-emotive therapy: a quantitative analysis'', *Journal of Consulting and Clinical Psychology*, Vol. 61, pp. 1083-91.

Epp, A. and Dobson, K.S. (2010), ''The evidence base for cognitive-behavioral therapy'', in Dobson, K.S. ed., *Handbook of Cognitive-Behavioral Therapies*, Guilford, London, pp. 39-73.

Fulop, I.E. (2007), ''A confirmatory factor analysis of the attitude and belief scale 2'', *Journal of Cognitive and Behavioral Psychotherapies*, Vol. 7, pp. 159-70.

Glasser, W. (1965), *Reality Therapy: A New Approach to Psychiatry*, Harper and Row, New York, NY.

Hayes, S.C., Strosahl, K.C. and Wilson, K.G. (2003), *Acceptance and Commitment Therapy: An Experiential Approach to Behavior Change*, The Guilford Press, London.

Kovacs, M. and Beck, A.T. (1978), ''Maladaptive cognitive structures in depression'', *American Journal of Psychiatry*, Vol. 135, pp. 525-33.

Kuehlwein, K.T. and Rosen, H. (1993), *Cognitive Therapies in Action: Evolving Innovative Practice*, Jossey-Bass, San Francisco, CA.

Lazarus, A. (1976), *Multimodal Behaviour Therapy*, Springer, New York, NY.

Lazarus, R. (1991), *Emotion and Adaptation*, Oxford University Press, Oxford.

Leahy, R.L. (2003), *Cognitive Therapy Techniques: A Practitioner's Guide*, The Guilford Press, London.

Linehan, M.M. and Dimeff, L. (2001), ''Dialectical behaviour therapy in a nutshell'', *The California Psychologist*, Vol. 34, pp. 10-13.

Lyons, L.C. and Woods, P.J. (1991), ''The efficacy of rational-emotive therapy: a quantitative review of the outcome research'', *Clinical Psychology Review*, Vol. 11, pp. 357-69.

Marzillier, J. (1987), ''A sadly neglected cognitive element in depression: a reply to Ellis'', *Cognitive Therapy and Research*, Vol. 11, pp. 147-51.

Meichenbaum, D. (1977), *Cognitive-Behavior Modification: An Integrative Approach*, Plenum Press, New York, NY.

Neenan, M. and Dryden, W. (2011), *Cognitive Therapy in a Nutshell*, Sage, London.

Padesky, C.A. and Beck, A.T. (2003), ''Science and philosophy: comparison of cognitive therapy and rational emotive behavior therapy'', *Journal of Cognitive Psychotherapy: An International Quarterly*, Vol. 17 No. 3, pp. 211-24.

Schwartzberg, S. (1997), ''Cognitive functioning in depressed elderly patients'', *Dissertations Abstracts International*, Vol. 57, p. 5353.

Segal, Z.V. (1998), ''Appraisal of the self-schema construct in cognitive models of depression'', *Psychological Bulletin*, Vol. 103, pp. 147-62.

Smith, C.A., Haynes, K.N., Lazarus, R.S. and Pope, L.K. (1993), ''In search of the 'hot' cognitions: attributions, appraisals and their relation to emotion'', *Journal of Personality and Social Psychology*, Vol. 65, pp. 916-29.

Solomon, A., Arnow, B.A., Gotlib, I.H. and Wind, B. (2003), ''Individualized measurement of irrational beliefs in remitted depressives'', *Journal of Clinical Psychology*, Vol. 59, pp. 439-55.

Solomon, A., Haaga, D.A.F., Brody, C.F., Kirk, L. and Friedman, D.G. (1998), ''Priming irrational beliefs in recovered-depressed people'', *Journal of Abnormal Psychology*, Vol. 107, pp. 440-9.

Szentagotai, A. and Freeman, A. (2007), ''An analysis of the relationship between irrational beliefs and automatic thoughts in predicting distress'', *Journal of Cognitive and Behavioural Psychotherapies*, Vol. 7, pp. 1-9.

Szentagotai, A., David, D., Lupu, V. and Cosman, D. (2008), ''Rational-emotive behaviour therapy versus cognitive therapy versus medication in the treatment of major depressive disorder: mechanisms of change analysis'', *Psychotherapy Theory, Research, Practice*, Vol. 4, pp. 523-38.

Szentagotai, A., Schnur, J., DiGiuseppe, R., Macavei, B., Kallay, E. and David, D. (2005), ''The organization and the nature of irrational beliefs: schemas or appraisal?'', *Journal of Cognitive and Behavioral Psychotherapies*, Vol. 2, pp. 139-58.

Wallen, S., DiGiuseppe, R. and Dryden, W. (1992), *A Practitioner's Guide to Rational-Emotive Therapy*, Oxford Press, New York, NY.

Williams, J.M.G., Watts, F.N., MacLeod, C. and Mathews, A. (1988), *Cognitive Psychology and Emotional Disorders*, Wiley, Chichester.

Further reading

Bard, J. (1980), *Rational-Emotive Therapy in Practice*, Research Press, Champaign, IL.

Campbell, I. (1988), ''The psychology of homosexuality'', in Ellis, A. and Bernard, M.E. (Eds), *Clinical Applications of Rational-Emotive Therapy*, Plenum, New York, NY, pp. 153-80.

Dryden, W. (2003), *Rational Emotive Behaviour Therapy: Theoretical Developments*, Brunner/Routledge, London.

Ellis, A. and Dryden, W. (2007), *The Practice of Rational Emotive Behaviour Therapy*, 2nd ed., Springer, New York, NY.

McDermutt, J.F., Haaga, D.A.F. and Bilek, L.A. (1997), ''Cognitive bias and irrational beliefs in major depression and dysphoria'', *Cognitive Therapy and Research*, Vol. 21, pp. 459-76.

Macavei, B. (2005), ''The role of irrational beliefs in the rational emotive behavior theory of depression'', *Journal of Cognitive and Behavioral Psychotherapies*, Vol. 5, pp. 73-83.

Montgomery, G.H., David, D., DiLorenzo, T.A. and Schur, J.B. (2007), ''Response expectancies and irrational beliefs predict exam-related distress'', *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, Vol. 25, pp. 17-34.

Riskind, J.H. (2004), ''Cognitive theory and research on generalized anxiety disorder'', in Leahy, R.L. (Ed.), *Contemporary Cognitive Therapy: Theory, Research, and Practice*, The Guilford Press, London.

Wessler, R.A. and Wessler, R.L. (1980), *The Principles and Practice of Rational-Emotive Therapy*, Jossey-Bass, San Francisco, CA.

About the authors

Philip Hyland is a PhD candidate at the University of Ulster at Magee. His main research interest is in the area of cognitive behavioural therapy and posttraumatic stress disorder. He is also the co-founder and Associate Editor of the *Journal of Criminal Psychology*. Philip Hyland is the corresponding author and can be contacted at: philipehyland@gmail.com

Daniel Boduszek is a PhD candidate at the University of Ulster at Magee. His main research interest is in the area of criminal psychology, with a specific interest in criminal thinking styles and criminal identity. He is the founder and Editor-in-chief of the *Journal of Criminal Psychology*.

Journal of Humanistics and Social Sciences ®
Journal of Humanistics & Social Sciences
ISSN 2009 – 4612
2012, Volume 1 (1), 49-61

DOI: http://jhss.eu

REVIEW ARTICLE

Article Info
Received 28 May 2012
Accepted 13 June 2012
Available online 14 May 2012

A Unitary or Binary Model of Emotions: A Discussion on a Fundamental Difference between Cognitive Therapy and Rational Emotive Behaviour Therapy

Philip Hyland & Daniel Boduszek
University of Ulster, UK

Abstract: The primary purpose of this paper is to consider the differential cognitive conceptualization of emotions postulated by the two main schools of cognitive behavioural therapy (CBT), namely Rational Emotive Behaviour Therapy (REBT) and Cognitive Therapy (CT).While CT theory favours a unitary model of emotional distress, REBT theory posits a binary model of emotional distress. This paper will address how the two approaches differ in their conceptualizations of emotional disturbance and the implications such differences have on clinical, theoretical, and research practice in both psychotherapy and psychology. A review of the relevant empirical literature will be presented with a recommendation for how future research can better investigate the differing predictions made by REBT and CT theory, respectively.

Key words: Cognitive Therapy, Rational Emotive Behaviour Therapy, Emotions

Introduction

As a mode of psychotherapy Cognitive-Behavioural Therapy (CBT) has emerged from all others as the most empirically investigated and validated method of treating psychiatric and psychological disorders (Barlow, 2008; Butler, Forman, Chapman, & A. T. Beck, 2006; Chambless & Hollon, 1998; Chambless & Ollindick, 2001; Engels, Garnefsky, & Diekstra, 1993; Epp & Dobson, 2010; Lyons & Woods, 1991). The central theoretical precept of CBT, and from which it's clinical practice emerges, is that all psychological disturbances occurs as a consequence of at least some form of dysfunctional cognitive information processing (A. T. Beck, 1976; Ellis, 1962, 1994). Complex emotional reactions are hypothesised to occur as a result of conscious or unconscious cognitive processing (David & Szentagotai, 2006). Dysfunctional, irrational, or unrealistic processing of internal stimuli (e.g., a pain in the chest) or external stimuli (e.g., receiving a low grade on an exam) are hypothesised to produce unhealthy or maladaptive emotional reactions, while functional, rational, or realistic processing of such information will produce healthy and adaptive emotional reactions (J. S. Beck, 2011; David & Szentagotai, 2006). This relationship between cognitions and emotions is among the most central of topics within not just psychotherapy but also cognitive psychology and psychological science as a whole. Cognitive Therapy (CT) and Rational Emotive

Behaviour Therapy (REBT) are the primary "CBT" approaches and given their respective conceptualizations of the importance of cognition in the development of emotions, they are both to be considered very much a part of the cognitive approach to emotions (see David & Cramer, 2010). The distinctions between CT's and REBT's models of emotion can be best understood with reference to well established cognitive models of emotions.

One of the earliest and most influential cognitive theories of emotions is the "Two-factor theory of emotions" (Schachter & Singer, 1962). The two-factor theory posits that emotional experience involves an interaction between physiological arousal and cognitive representation. Specifically, information received by the sense organs which is sent to sub-cortical regions of the brain triggers an autonomic response which is cognitively interpreted in relation to the situational context in order to label the arousal as fear, love, anger, joy, or some other emotion (Schachter, 1966). The two-factor theory (Schachter & Singer, 1962) posits that the important determining factor in the development of an emotional response is the way in which the individual represents a given situation in their cognitive system.

The two-factor theory of emotions (Schachter & Singer, 1962) explores the effects of representational cognitions on emotional experience. These representational cognitions include schemas, attributions, inferences, and automatic thoughts. These cognitions are congruent with what Abelson and Rosenberg (1958) refer to as "cold cognitions". More recent cognitive theories of emotions have improved upon the two-factor theory by focusing on the role of "hot cognitions" (appraisal cognitions) as the primary causal cognitive mechanisms in the development of emotion.

The most prominent cognitive theory of emotion is the 'Appraisal theory of emotions' (Folkman & Lazarus, 1988; Lazarus, 1991; Smith & Lazarus, 1993). Appraisal theory acknowledges the important role of cold cognitions in the development of emotions, as cold cognitions are viewed as the information that an individual subsequently evaluates in terms of the significance to one's own personal interests. Appraisal theory states therefore that cold cognitions are a necessary, but not a sufficient condition for the emergence of emotions. As long as cold cognitions go unevaluated they are insufficient to produce emotional reactions (Lazarus, 1991; Smith & Lazarus, 1993).

According to Appraisal theory (Folkman & Lazarus, 1988; Lazarus, 1991; Smith & Lazarus, 1993), emotion formation initially involves information processing to assess whether or not the present environmental situation is harmful, beneficial, threatening, or challenging, and an appraisal of one's abilities to face or deal with this environment. This process of appraisal takes into account both the individual's goals and their representation of the situation. So while the cognitive representation of a particular event has an influence on emotion formation, only the process of appraisal itself directly results in the development of emotional experience. In other words, the way in which a person appraises their representation of reality will determine their emotional response.

The appraisal process and the emotions which subsequently result then influence the way in which the individual copes with a particular environmental stimulus, thus a change in the person-environment context occurs. This altered person-environment context is then reappraised and this process of secondary appraisal leads to alterations in the nature and intensity of the emotional reaction.

Investigations into emotional development from a cognitive perspective have highlighted the importance not only of cognitive processes in general, but the

differential effect various types of cognitive processes have on emotions; the distal causes of attributions, inferences, and schemas (Schachter & Singer, 1962) and the proximate causes of evaluations and appraisals (Folkman & Lazarus, 1988; Lazarus, 1991; Smith & Lazarus, 1993; Smith, et al, 1993).

The CT and REBT Theories of Emotions

CT's theory of psychopathology focuses on cognitive distortions expressed in automatic thoughts, inferences, attributions, rules, assumptions, and schemas (J. S. Beck, 2011; Leahy, 2003). These cognitive processes are consistent with Ableson and Rosenberg's (1958) description of cold cognitions. These cognitive processes are ways of representing and/or interpreting the world in one's cognitive system. CT theory posits that erroneous, negative, and/or maladaptive schemas give rise to distorted interpretations and representations of reality which in turn result in the development of emotional distress (A. T. Beck & Dozois, 2011; J. S. Beck, 2011; Leahy, 2003). Given its focus on dysfunctional cold cognitions in the development of emotional reactions, the theory and clinical practice of CT can therefore be said to be in line with the two-factor theory of emotions (Schachter & Singer, 1962).

Alternatively, REBT's theory of psychopathology focuses on the role of irrational beliefs (Ellis, 1994). Irrational beliefs, as described by REBT theory, are evaluative or appraisal cognitive mechanisms, and hence are consistent with Ableson and Rosenberg's (1958) description of hot cognitions. Rational and irrational beliefs are ways of appraising or evaluating particular representations of reality in terms of their personal significance to a particular individual. The theory of REBT posits that rigid, extreme, unrealistic, and illogical appraisals of our automatic interpretations give rise to emotional disturbances (Walen, DiGiuseppe, & Dryden, 1992; Ellis, 1994; Ellis & Dryden, 2007). Given REBT's focus on hot cognitions as the primary causal cognitive mechanisms in the development of emotional reactions, the theory and clinical practice of REBT can therefore be said to be strongly congruent with the appraisal theory of emotions (Folkman & Lazarus, 1988; Lazarus, 1991; Smith & Lazarus, 1993). Such a distinction is extremely important because it indicates that the theory of emotions as described by REBT theory, as opposed to CT theory, is consistent with the most contemporary and empirically validated model of emotions in cognitive psychology (David, 2003).

A Unitary Versus a Binary View of Emotions

Psychological science has predominately conceptualized emotions as a unitary entity (Russell & Carroll, 1999; Watson & Tellegen, 1999). However, the theory of REBT challenges this view and posits that emotional distress can be more accurately understood as a binary construct. The unitary model of emotional distress assumes that distress is experienced along a continuum which ranges from low levels of emotional distress to high levels of emotional distress, irrespective of the kind of emotion that is being measured, or whether one aggregates specific scores from various measures of discrete (negative) emotions into a score of general (negative) emotional distress (e.g. McNair, Lorr, & Droppleman, 1971). Currently within the psychological and CBT literature, the severity of emotional disturbance is considered to be a direct reflection of the intensity of the subjective level of negative emotional affect. If an individual experiences high levels of negative emotional affect such as high levels of sadness, anxiety, rage, irritation, shame, or regret, for example, that person is considered to

be emotionally disturbed, while a person who experiences low levels of such emotions is considered to be emotionally healthy. Psychological measures of mood, and of specific disorders, such as the Beck Depression Inventory II (A. T. Beck, Steer, & Brown, 1996) and the shortened version of the Profile of Mood States (Shacham, 1983) have been developed based on this view. Within this framework no distinction is made between various negative emotions which may be conceptualized as functional or dysfunctional; rather the functionality or dysfunctionality of the emotional experience is determined by the intensity with which any particular emotion is experienced.

David, Montgomery, Macavei, and Bovbjerg (2005a) point out that within a unitary framework of emotions different terms which are used to describe similar but apparently distinct emotional experiences, for example, concern as opposed to panic, or sadness as opposed to depression, could be considered from a number of perspectives. Firstly, labels such as concern or anxiety could be considered simply as synonyms: different labels describing an identical emotional experience. Secondly, such labels could describe differences in the intensity with which a person experiences the same underlying condition: concern represents low levels of anxiety whereas panic represents high levels of anxiety. Or thirdly, such labels could represent qualitatively different emotional responses: concern and panic are similar but distinct emotions, and their functionality depends upon the intensity with which each is experienced. According to this view, high levels of concern and/or high levels of panic would be considered unhealthy and dysfunctional while low levels of concern and/or low levels of panic would be considered functional and healthy.

Contrastingly, the binary model of emotional distress makes a qualitative rather than a quantitative distinction between functional and dysfunctional emotions. According to this view, an emotion such as panic is not merely "too much" concern, rather panic and concern are viewed as distinct emotions resulting from a radically different underlying cognitive architecture. In an important paper on the topic, Ellis and DiGiuseppe (1993) outlined in detail the REBT binary model of emotions, explaining that distinctions between functional and dysfunctional emotions (be they of a positive or a negative variety) cannot be made based upon arousal levels given that both functional and dysfunctional emotions can be experienced with low, medium, or high levels of intensity; that healthy and unhealthy emotions can be experienced simultaneously; that although emotions like rage or panic will usually produce maladaptive behavioural responses and are therefore usually considered "unhealthy", under certain circumstances such emotions may in fact lead to adaptive behavioural responses and thus in unique circumstances emotions such as depression or anxiety can be considered "healthy" (a view which is congruent with an evolutionary perspective of human emotions - Pelusi, 2003); and that functional and dysfunctional emotions are largely the product of rational and irrational beliefs, respectively. Furthermore, the binary model of emotions does not preclude the possibility that a person can experience both healthy and unhealthy emotions simultaneously. In other words, a person can experience both low, medium, or high levels of concern and low, medium, or high levels of anxiety about the same event.

An implication of the binary model within the clinical setting is that not all forms of negative affect would be targeted for intervention. A clinical intervention would target only unhealthy negative emotional experiences (feelings of worthlessness or panic) while recognising the beneficial nature of healthy negative

emotional experiences (feelings of concern or regret). The unitary model of emotions cannot make such a theoretical distinction between healthy and unhealthy emotions and thus any clinical intervention based upon the unitary framework would necessarily attempt to reduce all negative affect irrespective of its functionality; an approach which could well result in disadvantageous clinical outcomes.

Quantitative or Qualitative Differences in Emotion: A Review of the Empirical Literature

Cramer (1985) first attempted to test the REBT binary model of emotions with a series of correlational studies. These studies, which examined the relationship between irrational beliefs and functional and dysfunctional negative emotions, involved placing participants in either an imagined stressful situation or a non-stressful situation. The results of Cramer's (1985) study demonstrated a positive correlation between irrational beliefs and both functional and dysfunctional emotional reactions.

Cramer and Fong (1991) employed an experimental design in order to examine the relationship between irrational beliefs and functional and dysfunctional emotions. In this study, participants repeated either irrational or rational statements about a potentially unpleasant situation. Their hypothesis was that if functional and dysfunctional emotions differ quantitatively then those participants who repeated irrational statements should rate their functional and dysfunctional emotions as being more intense than those participants who repeated rational statements. If however functional and dysfunctional emotions differed qualitatively then it was hypothesised that participants repeating irrational statements should rate only their dysfunctional emotions as more intense than those participants repeating rational statements because irrational beliefs were hypothesised to influence only the dysfunctional emotions. The results of this study were congruent with Cramer's (1985) earlier finding, revealing that rehearsal of irrational beliefs was associated with an increase in both functional and dysfunctional emotions leading Cramer and Fong (1991) to the conclusion that, "*there was no support for the view that irrational beliefs evoke feelings which are qualitatively different from those produced by rational beliefs*" (p. 327). Furthermore, they concluded that their results "*indicate that 'inappropriate'* (dysfunctional) *feelings are more suitably viewed as simply differing in intensity from 'appropriate'* (functional) *ones*" (p. 327).

Cramer and Fong (1991) claimed that their research findings invalidated REBT's binary model of emotions and their findings provided empirical support for the unitary model of emotions. Further studies by Cramer and Kupshik (1993), Cramer and Buckland (1996), and Cramer (2004, 2005) replicated these findings and provided additional weight to Cramer's (1993) view that REBT's original unitary model of emotional distress (Ellis & Harper, 1961; Ellis, 1962), which was wholly consistent with the current CT unitary model of emotions, is the more accurate model based upon the empirical evidence attained.

The findings of Cramer's research group were not the only critique of REBT's binary model of emotions. A philosophical critique from within the REBT community was articulated by Wessler (1996) who argued that the binary model of emotions is logically inconsistent. Wessler's view rested on the arguments that it is impossible to feel both sad and depressed simultaneously; that mild feelings of depression or anxiety, for example, are considered dysfunctional by REBT theory;

that such conclusions are impossible to comprehend in clinical terms; and that no major theory of emotions endorses a binary view and therefore that the concept is pseudoscientific and REBT theory would do well to abandon it. Wessler also pointed to findings from Kassinove, Eckhardt, and Endes (1993) which showed that although people are easily able to identify quantitative differences in emotional experience, they find it extremely difficult to identify qualitative differences, suggesting to Wessler a major flaw in the binary model of emotions.

The evidence gathered by Cramer's research group however is not an invalidation of REBT's binary theory of emotions; in fact the evidence gathered by Cramer and his colleagues actually provides support for the predictions made by the binary model of emotions. The major flaw in the research program of Cramer and his colleagues is a fundamental misunderstanding of what the REBT theory of emotions actually predicts. This programme of research was based upon the hypothesis that if participants who rehearsed irrational statements showed increases in the intensity with which they rated both functional and dysfunctional emotions then the binary model would be invalidated and the unitary model would be supported. However, as detailed by Ellis and DiGiuseppe (1993) this is not at all what the REBT binary model of emotions proposes. Contrary to Cramer and Fong's (1991) hypothesis, the REBT binary theory in fact predicts that individuals who hold irrational beliefs will show increased levels of both functional and dysfunctional emotions. Ellis and DiGiuseppe (1993) state:

"...people who feel regretful and who also feel depressed and worthless start off with a preferential (or rational) Belief - such as "I don't *like* my acting foolishly" – and then add a rigid, absolutist demand: "Therefore I *have to* do what I prefer, and if I don't act sensibly, as I *must,* I cannot accept my *self* and must view myself as a really *rotten person*." (Ellis & DiGiuseppe, 1993, p. 473).

REBT theory states that at the core of neurotic disturbance is a process of escalating one's rational, flexible preferences into irrational, rigid demands. Humans construct their unhealthy irrational beliefs from their healthy rational beliefs, in other words. Therefore, according to REBT theory it is to be expected that when a person possesses an irrational belief they will exhibit both functional and dysfunctional emotional responses since irrational beliefs tend to develop from rational ones, and consequently functional emotions are a component of dysfunctional emotions.

With respect to the criticisms of Wessler (1996), David, Schnur, and Belloiu (2002) point out that according to the appraisal theory of emotions (Lazarus, 1991) the simultaneous coexistence between various types of negative emotions, whether they are functional or dysfunctional, as well as the simultaneous coexistence between positive and negative emotions, makes perfect sense. This can also be understood within the context of REBT theory. A person can have multiple goals when they encounter a specific activating event, about which they can have different beliefs and therefore experience multiple different emotional consequences. The variety of goals and the variety of beliefs an individual holds about the same event means the experience of different emotional reactions simultaneously is perfectly understandable.

Although Cramer's research findings can be interpreted as support for REBT's theory, when these findings are viewed in terms of what the binary model actually predicts, these findings should be interpreted cautiously given the

methodology employed. Firstly, rehearsals of rational and irrational beliefs were used in these studies so there is no way of knowing whether or not participants actually internalised and believed these statements. Secondly, the vast majority of these studies employed imagined stressful situations, rather than remembered or real-life stressful events. Ellis (1994) has argued vigorously that a true test of the REBT theory should involve real-life stressful situations because rational and irrational beliefs are very often held implicitly until activated by a particular event, and would therefore only become accessible in the context of a real-life stressful activating event. Indeed there is now considerable evidence that this is in fact the case (Solomon, Arnow, Gotlib, & Wind, 2003; Szentagotai, David, Lupu, & Cosman, 2008).

In order to more fully and accurately test the REBT binary model of emotions as outlined by Ellis and Harper (1975, 1997), Ellis and DiGiuseppe (1993), and Ellis (1994); David et al. (2002) tested the model within the framework of appraisal theory (Lazarus, 1991; Smith & Lazarus, 1993). This involved relating various concepts within the REBT model to the concepts of appraisal theory. Specifically, it was hypothesised that Demandingness/Preferences, which are the primary irrational and rational appraisal mechanisms in REBT theory, would be associated with the primary appraisal function in appraisal theory, while Awfulizing/Non-Awfulizing, Low Frustration Tolerance/High Frustration Tolerance, and Global Evaluations/Acceptance, which are the secondary irrational and rational appraisal mechanisms in REBT theory, would be significantly associated with the secondary appraisal mechanisms of appraisal theory. David et al.'s (2002) analysis did indeed support this hypothesis, validating a central component of Ellis' (1994) REBT theory.

David et al.'s (2002) study also sought to investigate the relative contribution of appraisals and irrational beliefs relative to attributions in the development of emotions, specifically with respect to four emotion groups (concern/anxiety, sadness/depression, remorse/guilt, and annoyance/anger) which represented the distinction between the functional and dysfunctional emotions. In line with the predictions of appraisal theory (Lazarus, 1991; Smith and Lazarus, 1993) and Ellis' (1994) theory, results of this study showed that emotions were more significantly and directly related to appraisals and irrational beliefs then they were to attributions.

The results from this study also supported the REBT binary theory of emotions. While appraisals were directly related to emotions of both a functional and dysfunctional nature, irrational beliefs were related to dysfunctional emotions while functional emotions were associated with rational beliefs (measured as low levels of irrational beliefs). Functional emotions (concern, sadness, regret, and annoyance) were found to involve primary appraisals associated with Preferences while dysfunctional emotions (anxiety, depression, guilt, and anger) were found to involve primary appraisals associated with Demandingness. David et al. (2002) using regression analyses were able to increase the percentage of variance explained by appraisal theory (Smith et al. 1993) for each of the emotions studied by adding irrational beliefs to the analysis. Empirical evidence was therefore found which demonstrated that through the introduction of REBT's theory of functional and dysfunctional emotions, the explanatory power of appraisal theory was significantly increased.

The binary model was further supported by the finding that levels of arousal did not differentiate between functional and dysfunctional emotions. This supports Ellis' (1994) hypothesis that the differentiating factor between functional and dysfunctional emotions is not a result of the intensity with which the emotion is experienced.

Due to criticisms that the results of the David et al. (2002) study were unreliable due to the use of a sample that consisted of psychology undergraduates who could have been aware of the theory under investigation, a replication of the study was conducted by David, David, Ghinea, Macavei, and Kallay (2005b) involving a sample of 120 physics undergraduate students and a sample of 60 patients undergoing psychotherapy. Findings from this study replicated the original study from David et al. (2002), although some correlations while remaining significant did decrease. However, these findings from David et al. (2002) and David et al. (2005b) support the REBT theory that Demandingness is the primary irrational appraisal mechanism involved in various forms of psychopathology; that irrational beliefs being appraisal in nature are the proximate cognitive antecedents of emotions, and that irrational beliefs give rise to qualitatively different emotions than rational beliefs. It can be argued based on the fact that David et al.'s (2002) initial findings in support of the REBT binary model of emotions were replicated in a clinical and non-clinical sample that these findings are both reliable and generalizable.

In order to further evaluate the robustness and generalizability of the binary theory of emotions, David, Schnur, and Birk (2004) tested Ellis' (1994) cognitive theory of emotions within the framework of Schachter and Singer's (1962) two-factor theory of emotions. As outlined previously in this chapter Schachter and Singer's (1962) theory posits that emotion formation involves an interaction between cognitive and physiological factors. Specifically the theory states that during levels of high arousal individuals will give meaning to that arousal through cognitive interpretations of the environmental situation. However, the theory also states that when an obvious explanation for the physiological arousal is presented, no further explanatory search is conducted by the individual.

David et al. (2004) employed a quasi-experimental method in which undergraduate participants were primed with either rational or irrational beliefs. Participants were then randomly assigned to an exercise or no-exercise group. Participants then exercised or sat still and then either after a delay (the experimental group) or immediately following the exercise regime (the control group) the participants completed a rating of their emotional state.

The results supported both Schachter and Singer's (1962) two-factor theory of emotions and Ellis' (1994) cognitive theory of emotions. The participants in the experimental condition who did not have an obvious explanation for their continued arousal levels interpreted their arousal in line with their primed beliefs. Furthermore, those participants who were primed with rational beliefs interpreted their arousal with functional positive emotions (indicating the activating event was considered a positive one) while those who were primed with irrational beliefs interpreted their arousal with both functional and dysfunctional negative emotions; the functional negative emotions were combined with the dysfunctional ones (participants reported feeling sad and depressed, for example). Given that the unitary model of emotions states that arousal levels will differentiate functional from dysfunctional emotions, the findings of this study stand in contradiction with the predictions of the unitary model and support the binary model of emotions.

David et al.'s (2004) findings further demonstrated that arousal levels were not the differentiating variable between functional and dysfunctional emotions, rather rational and irrational beliefs were the differentiating causal variable between functional and dysfunctional emotions, supporting the binary model of emotions as predicted by REBT theory (Ellis & DiGiuseppe, 1993; Ellis, 1994).

The binary model of emotions was tested by David and colleagues (2005a) with respect to a third paradigm; the factorial paradigm. This followed the recommendation of Ellis and DiGiuseppe (1993) that the most appropriate test of the REBT cognitive theory of emotions would involve a principal component analysis (PCA). Specifically, Ellis and DiGiuseppe's (1993) hypothesis was that if the REBT theory is correct then a PCA of the data should reveal two principal components. The first principal component should reveal that high levels of irrationality are positively correlated with both functional and dysfunctional negative emotions, while the second principal component should reveal that high levels of rationality are positively correlated with functional negative emotions and negatively correlated with dysfunctional negative emotions.

In order to maximise the ecological validity of the study David et al. (2005a) carried out two prospective studies involving 55 breast-cancer patients from the United States, and 45 breast-cancer patients from Romania, who were all about to undergo surgery related to their cancer. The results of both studies confirmed Ellis and DiGiuseppe's (1993) hypothesis. Two principal components were extracted from the data which showed that during a real-life stressful event, high levels of irrational beliefs were associated with high levels of functional and dysfunctional negative emotions, while low levels of irrational beliefs (conceptualized as high levels of rational beliefs) were associated with high levels of functional negative emotions and low levels of dysfunctional negative emotions. Support for the REBT binary model was therefore found in two culturally distinct clinical samples.

Evidence supporting REBT's cognitive theory of emotions (Ellis & DiGiuseppe, 1993; Ellis, 1994) has been established from other researchers too. Zisook, Shuchter, Irwin, Darko, Sledge, and Resovsky (1994) carried out a study investigating the immune functioning of recently widowed women compared to married women. Although no significant difference was found in immune functioning between the widowed sample and the non-widowed sample, within the widowed group itself significant differences were found between those women who met the diagnostic criteria for depression compared to those who did not. Widows who were experiencing depression, compared to widows who were experiencing grief (sadness), showed lower levels of NK cell activity and lower mitogen stimulation, revealing that depression, but not sadness, resulted in lower levels of immune functioning.

Harris, Davies, and Dryden (2006) experimentally tested a central hypothesis of REBT that irrational beliefs are at the core of psychological disturbance within the binary paradigm of emotions. The study involved a sample of 90 participants attending a General Practitioner's office who had no history of mental illness. The participants were divided into three groups; a rational belief group, an irrational belief group, and an indifference belief group that served as a control group. Participants were then connected to a machine to monitor their blood pressure levels and told to sit as still as possible in front of a camera for 1 minute and 10 "behavioural experts" would scrutinize their video, looking for tiny facial movements, and would then give each person a score out of 100 for stillness.

The results of the experiment showed that participants in the irrational belief group experienced increased levels of anxiety (with corresponding increases in systolic blood pressure), while those in the rational belief group experienced increases in their levels of concern, but not anxiety (and a corresponding decrease in systolic blood pressure). Harris et al.'s (2006) study provides experimental support for REBT's binary model of emotion.

Conclusion and Future Directions

This review of the empirical literature which has tested the predictions of the unitary and binary models of emotions has provided considerably strong and robust support in favour of a binary rather than a unitary view of emotional distress. The binary model advanced by REBT theory has been supported within the framework of three separate cognitive paradigms, in multiple clinical and non-clinical samples from distinct cultural backgrounds, and within the context of a true experimental design. However, there is a significant limitation with the majority of these studies which needs consideration. In most of these studies high levels of rational beliefs were measured as low scores on a measure of irrational beliefs. The assumption that low levels of irrational beliefs signify the presence of high levels of rational beliefs may well be an erroneous one. Research has suggested that rational and irrational beliefs are by no means polar opposites of each other (Bernard, 1998; DiGiuseppe, Robin, Leaf, & Gorman, 1989) therefore this research, strong and supportive as it is, should be interpreted with this limitation in mind.

Despite the evidence obtained in support of the binary model of emotions, it would be premature and inaccurate to argue that the binary model should be considered superior to the much more widely accepted unitary model. Far more empirical data is required before any conclusion regarding which model should be favoured can be drawn. Finding an answer to this question is however extremely important as the implications of such an answer would have far reaching consequences in both the theoretical and clinical domains. We propose that a significant contribution will be made by overcoming some of the methodological limitations of previous research endeavours. We suggest that researchers should employ an alternative and more stringent statistical-methodological approach to investigate Ellis and DiGiuseppe's (1993) recommendation for how to best test the competing predictions of the unitary and binary models. Rather than utilizing principal component analysis, the use of confirmatory factor analysis would provide a much more robust method of investigating the differential theoretical predictions. Additionally, rather than conceptualizing high levels of rational beliefs from a low score on a measure of irrational beliefs, a practice that previous studies have employed which appears to founded on a false assumption (see Bernard, 1998), future investigators should use a measure of both rational and irrational beliefs in order to more accurately determine whether the predictions of REBT regarding a binary view of emotions is valid. Given the serious clinical implications that would arise from support for the binary model, it is essential that such research be carried out.

References

Abelson, R. P., & Rosenberg, M. J. (1958). Symbolic psycho-logic: A model of attitudinal cognition. *Behavioral Science, 3*, 1-13.

Anderson, K.J. (1994). Impulsivity, caffeine, and task difficulty: A within-subjects test of the Yerkes-Dodson law. *Personality and Individual Differences, 6*, 813–829.

Barlow, D. H. (2008). *Clinical handbook of psychological disorders. A step-by-step treatment manual*. (4th ed.). London: The Guilford Press.

Beck, J. S. (2011). *Cognitive behaviour therapy: Basics and beyond* (2nd ed.). London: The Guilford Press.

Beck, A. T., & Dozois, D. J. A., (2011). Cognitive therapy: Current status and future directions. *Annual Review of Medicine, 62*, 2.1-2.13.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for Beck Depression Inventory II (BDI-II)*. San Antonio, TX: Psychology Corporation.

Bernard, M.E. (1998). Validations of general attitude and beliefs scale. *Journal of Rational Emotive and Cognitive-Behavior Therapy, 16*, 183–196.

Butler, A. C., Chapman, J. E., Forman, E., M., & Beck, A. T. (2006). The empirical status of cognitive-behavioural therapy: A review of the meta-analyses. *Clinical Psychology Review, 26,* 17-31.

Chambless, D. L., & Ollendick, T. H. (2001). Empirically supported psychological interventions: Controversies and evidence. *Annual Review of Psychology, 52*, 685–716.

Chambless, D. L., & Hollon, S. D. (1998). Defining empirically supported treatments. *Journal of Consulting and Clinical Psychology, 66*, 7–19.

Cotton, J. L. (1981). A review of Schachter's theory of emotion and the misattribution of arousal. *European Journal of Social Psychology, 11*, 365-397.

Cramer, D. (1985). Irrational beliefs and strength versus inappropriateness of feelings. *British Journal of Cognitive Psychotherapy, 3*, 81–92.

Cramer, D. (1993). Are inappropriate or dysfunctional feelings in rational-emotive therapy qualitative or quantitative? A response to Ellis and DiGiuseppe. *Cognitive Therapy and Research, 5,* 479-481.

Cramer, D. (2004). Effect of destructive disagreement belief on relationship satisfaction with a romantic partner or closest friend. *Psychology and Psychotherapy, 77*, 121-133.

Cramer, D. (2005). Effect of four aspects of rational statements on expected satisfaction with a close relationship. *British Journal of Guidance & Counselling, 33*, 227-238.

Cramer, D., & Buckland, N. (1996). Effect of rational and irrational statements and demand characteristics on task anxiety. *The Journal of Psychology, 129*, 269-275.

Cramer, D., & Fong, J. (1991). Effect of rational and irrational beliefs on intensity and "inappropriateness" of feelings: A test of rational-emotive theory. *Cognitive Therapy and Research, 4*, 319–329.

Cramer, D., & Kupshik, G. (1993). Effect of rational and irrational statements on intensity and "inappropriateness" of emotional distress and irrational beliefs in psychotherapy patients. *British Journal of Clinical Psychology, 32*, 319–325.

David, D. (2003). Rational Emotive Behaviour Therapy (REBT): The view of a cognitive psychologist. In Dryden W. (Ed.), *Theoretical developments in REBT*. London: Brunner/Routledge.

David, D. & Cramer, D. (2010). Rational and irrational beliefs in human feelings and psychopathology. In Ellis, A., David, D., & Lynn, S. J. *Rational and irrational beliefs: Research, theory, and clinical practice* (p. 99-112). Oxford: Oxford University Press.

David, D., David, A, Ghinea, C., Macavei, B., & Kallay, E. (2005b). A search for "hot" cognitions in a clinical and non-clinical context: Appraisal, attributions, core relational themes, irrational beliefs, and their relations to emotion. *Journal of Cognitive and Behavioral Psychotherapies, 5*, 1-42.

David, D., & Szentagotai, A. (2006). Cognition in cognitive-behavioral psychotherapies (CBT): Toward an integrative model. *Clinical Psychology Review, 3*, 284–298.

David, D., Montgomery, G. H., Macavei, B., & Bovbjerg, D. H. (2005a). An empirical investigation of Albert Ellis's binary model of distress. *Journal of Clinical Psychology, 61,* 499-516.

David, D., Schnur, J., & Belloiu, A. (2002). Another search for the "hot" cognitions: Appraisal, irrational beliefs, attributions, and their relation to emotion. *Journal of Rational-Emotive and Cognitive-Behavior Therapy, 15*, 93–131.

David, D., Schnur, J., & Birk, J. (2004). Functional and dysfunctional feelings in Ellis' cognitive theory of emotion: An empirical analysis. *Cognition and Emotion, 18*, 869–880.

DiGiuseppe, R., Robin, M. W., Exner, T., & Gormon, B. (1988). A discriminative validation and factor analysis of a measure of rational/irrational beliefs. *Paper presented at the World Congress of Cognitive Therapy, Oxford, UK.*

DiLorenzo, T. A., David, D., & Montgomery, G. H. (2007). The interrelations between irrational cognitive processes and distress in stressful academic settings. *Personality and Individual Differences, 42*, 765-777.

Dutton, D. G., & Aron, A. P. (1974). Some evidence for heightens sexual attraction under conditions of high anxiety. *Journal of Personality and Social Psychology, 30,* 510-517.

Ellis, A. (1994). *Reason and emotion in psychotherapy* (rev. ed.). Secaucus, NJ: Birch Lane.

Ellis, A., & DiGiuseppe, R. (1993). Are inappropriate or dysfunctional feelings in rational-emotive therapy qualitative or quantitative? *Cognitive Therapy and Research, 5*, 471– 477.

Ellis, A., & Dryden, W. (2007). *The practice of rational emotive behaviour therapy* (2nd ed.). New York: Springer Publishing Company.

Ellis, A., & Harper, R. A. (1961). *A guide to rational living*. Englewood Cliffs, NJ: Prentice Hall.

Ellis, A., & Harper, R. A. (1975). *A new guide to rational living*. North Hollywood, CA: Wilshire Books.

Ellis, A., & Harper, R. A. (1997). *A guide to rational living* (3rd ed.). Chatsworth, CA: Wilshire Books.

Engels, G. I., Garnefsky, N., & Diekstra, R. F. W. (1993). Efficacy of rational-emotive therapy: A quantitative analysis. *Journal of Consulting and Clinical Psychology, 61*, 1083–1091.

Epp, A., & Dobson, K. S. (2010). The evidence base for cognitive-behavioral therapy. In Dobson, K. S. *Handbook of Cognitive-Behavioral Therapies* (pp. 39–73). London: Guilford

Erdmann, G., & Janke, W. (1978). Interaction between physiological and cognitive determinants of emotions: Experimental studies on Schachter's theory of emotions. *Biological Psychology, 6*, 61-74.

Folkman, S., & Lazarus, R. (1988). Coping as a mediator of emotion. *Journal of Personality and Social Psychology, 54,* 466-475.

Harris, S., Davies, M. F., & Dryden, W. (2006). An experimental test of a core REBT hypothesis: Evidence that irrational beliefs lead to physiological as well as psychological arousal. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 24*, 101-111.

Kassinove, H., Eckhardt, C. I., & Endes, R. (1993). Assessing the intensity of "appropriate" and "inappropriate" emotions in rational-emotive therapy. *Journal of Cognitive Psychotherapy: An International Quarterly, 7*, 227-238.

Lazarus, R. S. (1991*). Emotion and adaptation.* New York: Oxford University Press.

Leahy, R. L. (2003). *Cognitive therapy techniques: A practitioner's guide*. London: The Guilford Press.

Lyons, L. C., & Woods, P. J. (1991). The efficacy of rational-emotive therapy: A quantitative review of the outcome research. *Clinical Psychology Review, 11*, 357–369.

Marshall, G. D., & Zimbardo, P. G. (1979). Affective consequences of inadequately explained physiological arousal. *Journal of Personality and Social Psychology, 37*, 970-988.

Maslach, C. (1979). Negative emotional biasing of unexplained arousal. *Journal of Personality and Social Psychology, 37,* 953-969.

McNair, D. M., Lorr, M., & Droppleman, L. F. (1971). *EITS Manual for the Profile of Mood States.* San Diego, CA: Educational and Industry Testing Service.

Pelusi, N. M. (2003). Evolutionary psychology and rational emotive behaviour therapy. In Dryden W. (Ed.), *Theoretical developments in REBT*. London: Brunner/Routledge.

Russell, J.A., & Carroll, J.M. (1999). On the bipolarity of positive and negative affect. *Psychological Bulletin, 1*, 30–30.

Shacham, N. (1983). A shortened version of the profile of mood states. *Journal of Personality Assessment, 47,* 305–306.

Schachter, S. (1966). The interaction of cognitive and physiological determinants of emotional state. In C. D. Spielberg (Ed.), *Anxiety and Behavior*. New York: Academic Press.

Schachter, S., & Singer, J.E. (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review, 69*, 379–399.

Smith, C. A., & Lazarus, R. (1993). Appraisal components, core relational theme, and the emotions. *Cognition and Emotion, 7*, 233-269.

Smith, C. A., Haynes, K. N., Lazarus, R. S., & Pope, L. K. (1993). In search of the "hot" cognitions: Attributions, appraisals and their relation to emotion. *Journal of Personality and Social Psychology, 65,* 916-929.

Solomon, A., Arnow, B.A., Gotlib, I.H., & Wind, B. (2003). Individualized measurement of irrational beliefs in remitted depressives. *Journal of Clinical Psychology, 59*, 439–455.

Spielberger, C. D. (1983). *State-trait anxiety inventory (Form Y)*. Palo Alto: Consulting Psychologists Press.

Spielberger, C. D., Gorusch, R. L., & Lushene, R. E. (1970). *Manual for the state-trait anxiety inventory*. Palo Alto, CA: Consulting Psychologists Press.

Szentagotai, A., & Freeman, A. (2007). An analysis of the relationship between irrational beliefs and automatic thoughts in predicting distress. *Journal of Cognitive and Behavioural Psychotherapies, 7*, 1-9.

Szentagotai, A., David, D., Lupu, V., & Cosman, D. (2008). Rational-emotive behaviour therapy versus cognitive therapy versus medication in the treatment of major depressive disorder: Mechanisms of change analysis. *Psychotherapy Theory, Research, Practice, 4*, 523–538.

Wallen, S., DiGiuseppe, R., & Dryden, W. (1992). *A practitioner's guide to rational-emotive therapy*. New York: Oxford Press.

Watson, D., & Tellegen, A. (1999). Issues in the dimensional structure of affect—Effects of descriptors, measurement error, and response formats: Comment on Russell and Carrol (1999). *Psychological Bulletin, 5*, 601– 610.

Wessler, R. L. (1996). Idiosyncratic definitions and unsupported hypotheses: Rational-emotive behavior therapy as pseudoscience. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 14*, 41-61.

Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habit formation. *Journal of Comparative Neurology and Psychology, 18*, 459– 482.

Zisook, S., Shuchter, S. R., Irwin, M., Drako, D. F., Sledge, P., & Resovsky, K. (1994). Bereavement, depression, and immune function. *Psychiatry Research, 52*, 1-10.

Cognitive Behaviour Therapy
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/sbeh20

Modeling the Structure of the Attitudes and Belief Scale 2 using CFA and Bifactor Approaches: Toward the Development of an Abbreviated Version

Philip Hyland [a], Mark Shevlin [a], Gary Adamson [a] & Daniel Boduszek [b]

[a] School of Psychology, University of Ulster, Londonderry, UK

[b] Department of Behavioral and Social Sciences, University of Huddersfield, Huddersfield, UK

Published online: 04 Jun 2013.

To cite this article: Philip Hyland, Mark Shevlin, Gary Adamson & Daniel Boduszek (2013): Modeling the Structure of the Attitudes and Belief Scale 2 using CFA and Bifactor Approaches: Toward the Development of an Abbreviated Version, Cognitive Behaviour Therapy, DOI:10.1080/16506073.2013.777467

To link to this article: http://dx.doi.org/10.1080/16506073.2013.777467

Cognitive Behaviour Therapy, 2013
http://dx.doi.org/10.1080/16506073.2013.777467

Routledge
Taylor & Francis Group

Modeling the Structure of the Attitudes and Belief Scale 2 using CFA and Bifactor Approaches: Toward the Development of an Abbreviated Version

Philip Hyland[1]*, Mark Shevlin[1], Gary Adamson[1] and Daniel Boduszek[2]

[1]*School of Psychology, University of Ulster, Londonderry, UK;* [2]*Department of Behavioral and Social Sciences, University of Huddersfield, Huddersfield, UK*

Abstract. The Attitudes and Belief Scale-2 (ABS-2: DiGiuseppe, Leaf, Exner, & Robin, 1988. *The development of a measure of rational/irrational thinking*. Paper presented at the World Congress of Behavior Therapy, Edinburg, Scotland.) is a 72-item self-report measure of evaluative rational and irrational beliefs widely used in Rational Emotive Behavior Therapy research contexts. However, little psychometric evidence exists regarding the measure's underlying factor structure. Furthermore, given the length of the ABS-2 there is a need for an abbreviated version that can be administered when there are time demands on the researcher, such as in clinical settings. This study sought to examine a series of theoretical models hypothesized to represent the latent structure of the ABS-2 within an alternative models framework using traditional confirmatory factor analysis as well as utilizing a bifactor modeling approach. Furthermore, this study also sought to develop a psychometrically sound abbreviated version of the ABS-2. Three hundred and thirteen ($N = 313$) active emergency service personnel completed the ABS-2. Results indicated that for each model, the application of bifactor modeling procedures improved model fit statistics, and a novel eight-factor intercorrelated solution was identified as the best fitting model of the ABS-2. However, the observed fit indices failed to satisfy commonly accepted standards. A 24-item abbreviated version was thus constructed and an intercorrelated eight-factor solution yielded satisfactory model fit statistics. Current results support the use of a bifactor modeling approach to determining the factor structure of the ABS-2. Furthermore, results provide empirical support for the psychometric properties of the newly developed abbreviated version. *Key words: attitudes and belief scale-2 (ABS-2); bifactor modeling; rational emotive behavior therapy; irrational beliefs; confirmatory factor analysis*

Received 6 December, 2012; Accepted 14 February, 2013

**Correspondence address: Philip Hyland, University of Ulster, Magee campus, Northland Road, Londonderry BT48 7JL, Northern Ireland, UK. Tel: +00353857414696. E-mail: philipehyland@gmail.com*

Introduction

Rational Emotive Behavior Therapy (REBT) is the original form of what is today generally referred to as Cognitive Behavior Therapy (CBT). REBT theory is therefore congruent with the wider field of CBT in that it hypothesises that cognition mediates the impact of internal or external activating events on the development of cognitive, affective, behavioral, and physiological responses (Ellis 1958, 1962, 1994). What differentiates REBT from other schools within the field of CBT (such as Cognitive Therapy or Dialectical Behavior Therapy, for example) is the nature of the cognitive variables which are theorized to represent the proximate antecedents of psychological distress or disturbance, namely evaluative or appraisal cognitions (Ellis 1994; Hyland & Boduszek, 2012; Walen, DiGiuseppe, & Dryden, 1992). According to REBT theory, these appraisal/evaluative beliefs can be held in either a rational (flexible and non-extreme) or an irrational (rigid and extreme) manner. Rational beliefs about negative activating events will produce functional and adaptive cognitive, affective, behavioral, and physiological responses, while irrational beliefs about negative activating events will give rise to dysfunctional and maladaptive

cognitive, affective, behavioral, and physiological responses (David & Szentagotai 2006). The practice of REBT is predicated upon the principle that individuals who experience psychological disturbances can access and modify their irrational beliefs and formulate new, alternative rational beliefs, which will serve to modulate their cognitive, affective, behavioral, and physiological experiences toward more functional and adaptive responses.

In Ellis's (1962) original conceptualization of REBT theory, he proposed 11 key irrational beliefs which were deemed to be central in the development of various forms of neurotic disturbance. The theory later underwent significant revision (Walen et al., 1992; Ellis 1994; David 2003; David, Szentagotai, Kallay, & Macavei, 2005) and REBT theory now describes four main irrational evaluative belief *processes* including (i) demandingness beliefs, (ii) catastrophizing beliefs, (iii) low frustration tolerance beliefs, and (iv) depreciation beliefs. These irrational belief processes exist alongside their rational counterparts: (i) preference beliefs, (ii) non-catastrophizing beliefs, (iii) high frustration tolerance beliefs, and (iv) acceptance beliefs.

The Attitudes and Belief Scale 2 (ABS-2; DiGiuseppe, Leaf, Exner, Robin, & 1988) was constructed to be consistent with the current theory of REBT and includes 72 items that attempt to measure the four rational and four irrational belief processes (David et al., 2005; Dryden & David 2008). The ABS-2 is useful for both researchers and clinicians, given that total scores may be computed for global irrationality and rationality, respectively, along with total scores for each of the four irrational (demandingness, catastrophizing, low frustration tolerance, and depreciation) and rational (preferences, non-catastrophizing, high frustration tolerance, and acceptance) belief processes.

Despite being developed upon a clear theoretical foundation and being widely employed in REBT research, there is a paucity of psychometric research investigating the underlying factor structure of the measure. DiGiuseppe, Robin, Leaf, and Gormon (1989) first attempted to identify the factor structure of the ABS-2 through the use of exploratory factor analysis (EFA) among a total sample of 1135 participants which included participants drawn from clinical and non-clinical populations. The EFA results indicated that a 24-factor solution accounted for 66.5% of variance. Further analysis indicated that the 24 factors could be explained in terms of four higher-order factors termed "General rationality/irrationality," "Rationality," "Comfort," and "Irrationality." However, Fulop (2007) argued that the items comprising the general rationality/irrationality factor reflected the depreciation beliefs and as such this factor could be better understood if termed 'Depreciation'.

Bernard (1998) extended the ABS-2 (DiGiuseppe et al., 1988) by introducing an additional 24 items in order to measure the context of fairness. Like DiGiuseppe et al. (1989), Bernard (1998) sought to investigate the underlying factor structure of the items through the use of EFA. Bernard (1998) used an item-factor loading criteria of 0.40 for item retention and as such retained 55 items for analysis. The EFA that followed revealed seven factors, which Bernard (1998) termed "rationality," "self-downing" (equivalent to "self-depreciation" beliefs), "need for achievement," "need for approval," "need for comfort," "demands for fairness," and "other-downing" (equivalent to "other-depreciation" beliefs).

The results of these studies are inconsistent in terms of identifying the correct number of latent variables that are needed to explain ABS-2 (DiGiuseppe et al., 1988) scores. This poses significant problems in terms of formulating an appropriate scoring scheme for the questionnaire. The inconsistency of the factor analytic findings may be largely attributable to the use of EFA procedures. EFA is a method that allows for the reduction of a large body of data; however, it does not allow for the testing or falsification of a particular model. There are no objective statistical criteria to determine the solution with the optimal number of factors. Confirmatory factor analysis (CFA) is a more powerful statistical method that allows the researcher to specify, a priori, a number of theoretically plausible models deemed to describe the underlying structure of a particular measure (see Bollen 1989 for discussion on the relative strengths and benefits of EFA and CFA). To date, only one CFA has been conducted on data from the ABS-2.

Fulop (2007) carried out this analysis on the Romanian translation of the ABS2-R (Macavei 2002) using a sample of 300 Romanian undergraduate students. The analysis compared five alternative models derived from theory and previous research findings. These models included a one-factor model in which all 72 items loaded on a single latent variable of global irrationality; a two-factor model representing global rationality and irrationality; a three-factor model reflecting the domains of context in which each belief statement is presented (comfort, achievement, and affiliation); a correlated four-factor solution representing the four major irrational beliefs (demandingness, low frustration tolerance, depreciation, and catastrophizing); and finally a model consistent with the findings of DiGiuseppe et al. (1989) EFA results. In this model, the 72 items load onto 24 first-order factors, which are then specified to load onto four second-order latent variables (general factor, rationality, comfort, and irrationality).

The results indicated that both the two-factor model of rationality and irrationality and the higher-order model proposed by DiGiuseppe et al. (1989) generated adequate model fit. Fulop (2007) concluded on the basis of these results that the DiGiuseppe et al. model was the better fitting model of the two. This conclusion could be questioned on the basis of a number of statistical and methodological issues. First, although both models yielded adequate fit statistics, Fulop did not report any fit statistics that allowed models to be compared, such as information criterion indices which can be used in order to compare alternative models. Normally, the Akaike Information Criterion (AIC; Akaike 1974) values and/or χ^2 difference tests are reported which provide an objective method for determining which of a series of alternative models best fits the data. Second, the DiGiuseppe et al. (1989) model was the least parsimonious, and such complex models tend to fit sample data better than simpler ones. Statistical assessment of fit should consider and correct for differences in the relative complexity of alternative models. Finally, in addition to the methodological problems associated with the model of DiGiuseppe and colleagues, the solution itself fails to make sense on purely theoretical grounds, as it is not congruent with the current theoretical formulation of REBT (David, Lynn, & Ellis, 2010).

In addition to the inadequate psychometric research currently available with regards to the ABS-2 (DiGiuseppe et al., 1989), two further methodological and practical limitations associated with this measure need to be addressed. Methodologically, the indicators of each of the eight belief processes included in the ABS-2 are contaminated by contextual factor. The ABS-2 does not distinguish between the process of belief (demands, low frustration tolerance, etc.) and the contexts in which these beliefs are presented. The various rational and irrational belief processes are presented in three contextual areas; those that are related to issues of (i) comfort, (ii) achievement, and (iii) affiliation. While rational and irrational beliefs can certainly be experienced in these areas, REBT theory makes no predictions that rational and irrational beliefs are confined to these contexts or that there is anything unique with respect to the way rational and irrational beliefs operate in theses contexts. The goal of REBT research is to examine the belief processes, rather than the context in which they occur, therefore it may well be necessary to consider, and to control for, this methodological weakness of the ABS-2. In addition, the ABS-2 can be criticized on practical grounds. Comprised of 72 items, the ABS-2 is an extremely long measure that requires a substantial period of time to fully complete, therefore making its use problematic in many research contexts.

In order to address the substantial limitations of the ABS-2, this study was carried out with two main objectives. First, we seek to provide a methodologically rigorous investigation of the construct validity of the ABS-2 (DiGiuseppe et al., 1989) by investigating a series of theoretically plausible models of the underlying structure of the ABS-2, including a novel eight-factor model consistent with current REBT theory which has hitherto not been proposed or empirically investigated. The dimensionality of the ABS-2 will be investigated through the use of conventional CFA techniques, along with the utilization of a bifactor (or hierarchical) modeling approach (Reise, Morizot, & Hays, 2007; Yung, Thissen, & McLeod, 1999). Bifactor modeling provides an empirically and conceptually distinct alternative to traditional higher-order sol-

utions. In traditional higher-order models, observable covariation between latent factors is assumed to be explained in terms of a superordinate latent construct. However, within a bifactor modeling approach, covariation among observable indicators is assumed to be explained by both "general factors" and "nuisance factors" which exist at the same conceptual level. In the present case, the general factors refer to the psychological belief factors assumed to explain the item covariation, while the nuisance factors refer to the three context factors (Comfort, Achievement, and Approval) which also are assumed to contribute to additional item covariation. Both categories of latent factors provide sources of item covariation, therefore inclusion of the nuisance factors within a hierarchical solution should allow for a more accurate determination of the optimal number of psychological factors necessary to explain the dimensionality of the ABS-2 (Reise et al., 2007). Furthermore, while traditional CFA models and bifactor models can produce identical model fit, bifactor models are advantageous in that they provide a useful method of investigating a measures dimensionality in situations such as the ABS-2 where indicators of psychological processes are contaminated by unwanted factors such as contextual presentation.

The second aim of the current study emerges from the practical limitations of the ABS-2, and as such seeks to develop and validate a psychometrically sound abbreviated version of the ABS-2 that will be available for use in future research endeavours.

Methods

Participants and procedures

The sample for the current study consisted of 313 ($N = 313$) emergency service personnel recruited from active duty while in serving in the Republic of Ireland and the Republic of Kosovo over a 12-month period (June 2011–June 2012). The sample consisted of 212 males (67.7%) and 101 females (32.3%). The participants' age ranged from 23 to 65 years with a mean age of the total sample of 38.18 years (SD = 8.70). Participants were informed of the nature of the study being under taken either by a member of the research team or an assigned liaison for a particular organization, and each participant's involvement in the research project was voluntary. No obligations were placed upon potential respondents nor were any inducements employed to recruit the sample.

Materials

The Attitudes and Belief Scale 2 (ABS-2; DiGiuseppe et al., 1988*)*. The ABS-2 is a 72-item self-report measure of rational and irrational beliefs, as defined by current REBT theory (Ellis 1994). The ABS-2 includes three core components. The first is a measure of cognitive processes that accounts for each of the four irrational belief processes which include *demandingness* (e.g. "I must do well at important things, and I will not accept it if I do not do well."); *catastrophizing* (e.g. "It's awful to have hassles in one's life and it is a catastrophe to be hassled."); *low frustration tolerance* (e.g. "I can't stand being disliked by certain people, and I can't bear the possibility of their disliking me."); and *depreciations* ("If important people dislike me, it is because I am an unlikable bad person."). The ABS-2 also measures the four rational belief processes including *preferences* ("I very much want to be liked by certain people, but I realize I don't have to be liked by them."); *non-catastrophizing* ("It is disappointing if I'm not doing well at tasks that are important to me, but I realize it is not awful or the worst thing in the world if I do not perform well."); *high frustration tolerance* ("If someone important to me disapproves of me or rejects me, I realize I can tolerate and bear his/her disliking me."); and *acceptance* ("When I fail at an important task, I can accept myself with my faults and limitations, and not condemn myself for failing."). The second component of the ABS-2 is a measure of three content/context areas that include rational or irrational beliefs related to areas of comfort, achievement, and affiliations. The third component of the ABS-2 relates to the lexical construction of the individual items; either rationally worded or irrationally worded.

Participants are requested to rate their level of agreement or disagreement with each statement along a five-point Likert scale: *strongly disagree (1), somewhat disagree (2), neutral (3), somewhat agree (4),* and *strongly agree (5)*. Scores can be summated to produce a single global score for irrationality; separate scores of rationality or irrationality; or individual scores on each of the four irrational belief processes (demandingness, depreciation, catastrophizing,

and low frustration tolerance) or rational belief processes (preferences, non-catastrophizing, low frustration tolerance, acceptance). High scores in each case indicate higher levels of each variable. Previous research efforts demonstrate that the ABS-2 possesses excellent internal reliability (e.g. David, Schnur, & Belloiu, 2002; DiLorenzo, David, & Montgomery, 2007; DiGiuseppe et al., 1989).

Analysis

Eight alternative confirmatory factor models were developed to explain the latent factor structure of the ABS-2 (DiGiuseppe et al., 1989). The models were specified and estimated using Mplus version 6.0 (Muthen & Muthen, 1998 – 2010) with robust maximum likelihood estimation. The traditional CFA models allowed items to load only onto a single factor, while the bifactor models allowed each item to load onto two factors (the relevant belief factor and the relevant nuisance context factor). In all cases, items measurement error terms were uncorrelated as suggested in previous research (Boduszek, Shevlin, Mallett, Hyland, & O'Kane, 2012).

Model 1 is a one-factor solution in which each of 72 items of the ABS-2 load on a single latent variable of global irrationality. Model 2 is a correlated two-factor model in which the two latent variables are represented by rationality and irrationality and 36 items load on each factor, respectively. Model 3 is an intercorrelated four-factor model in which the four factors reflect the four irrational belief groups; demandingness, catastrophizing, low frustration tolerance, and depreciation. Eighteen items load on the individual factors, respectively. Model 4 is an eight-factor model in which the eight factors are represented by the four irrational belief groups (demandingness, catastrophizing, low frustration tolerance, depreciation) and the four rational belief groups (preferences, non-catastrophizing, high frustration tolerance, acceptance), respectively. Nine items load onto each of the eight factors.

Each of these models was also specified within a bifactor model conceptualization. For these bifactor models, three nuisance factors were specified reflecting the three domains of context: comfort, achievement, and approval. Twenty-four items loaded on each of the three nuisance factors, respectively, and these three nuisance factors were included within each of the four specified models above when estimating the relevant bifactor solutions.

The overall fit of each model and the relative fit between models were assessed using a range of goodness-of-fit statistics and assessment of the appropriateness of the model parameters. The χ^2 statistic assessed the sample and implied covariance matrix, and a good fitting model is indicated by a non-significant result. However, χ^2 statistic is strongly associated with sample size, and as such good models tend to be over-rejected. Therefore, Tanaka (1987) suggested that a model should not be rejected simply on the basis of a significant χ^2 result. Accordingly, it is recommended that researchers examine the ratio of the χ^2 value to the degrees of freedom (df), and according to Kline (1994), any model with a χ^2-to-df ratio of less than 3:1 indicates a good fitting model. The Comparative Fit Index (CFI; Bentler 1990) and the Tucker Lewis Index (TLI; Tucker & Lewis 1973) are measures of how much better the model fits the data compared to a baseline model where all variables are uncorrelated. For these indices, values above .90 indicate reasonable fit while values above .95 indicated good model fit (Bentler 1990; Hu & Bentler 1999). In addition, two more absolute indices are presented; the standardized root mean-square residual (SRMR: Joreskog & Sorborn, 1981) and the root mean-square error of approximation (RMSEA: Steiger 1990). Ideally these indices should be less than .05; however, values less than .08 also suggest adequate fit (Bentler 1990; Hu & Bentler 1999; Joreskog & Sorborn, 1993). Furthermore, AIC (Akaike 1974) was used to evaluate the alternative models, with the smaller value indicating the best fitting model. The CFI, RMSEA, and the AIC all have explicit penalties for model complexity.

Results

In order to attempt to identify the dimensionality of the ABS-2 (DiGisueppe et al., 1988), we first investigated the four specified alternative models using standard CFA techniques. Table 1 reports the fit indices and comparative fit indices of the four alternative models of the ABS-2 (DiGisueppe et al., 1988). As can be observed, all fit indices showed improvement for the intercorrelated eight-factor solution. All four models produced statistically significant χ^2

Table 1. *Standard CFA and bifactor model fit indices for four alternative models of the ABS-2*

Model	χ^2	*df*	CFI	TLI	RMSEA	SRMR	AIC
CFA models							
One-factor model	7556.795*	2485	0.70	0.70	0.08	0.11	62359.201
Two-factor model	7224.048*	2484	0.72	0.71	0.08	0.10	61958.420
Four-factor model	6621.378*	2478	0.76	0.75	0.07	0.07	61470.374
Eight-factor model	5846.597*	2456	0.80	0.79	0.07	0.07	60600.013
Bifactor models							
One-factor model	6310.949*	2410	0.71	0.76	0.07	0.06	61125.463
Two-factor model	5571.727*	2409	0.81	0.80	0.07	0.09	60343.983
Four-factor model	5659.979*	2404	0.81	0.80	0.07	0.06	60404.801
Eight-factor model	5091.306*	2382	0.84	0.83	0.06	0.06	59778.160

Note. N = *310;* χ^2*, chi square goodness of fit statistic; df, degrees of freedom; RMSEA, root-mean-square error of approximation; CI, confidence interval; AIC, Akaike Information Criterion; CFI, comparative fit index; TLI, Tucker Lewis Index; SRMR, standardized square root mean-square residual. *Indicates* χ^2 *are statistically significant* ($p < .001$).

results, however, rejection of the models on the basis of this fit index is unwarranted given that the sample size utilized in the current study would have increased the power of the test (Tanaka, 1987). Additionally, the eight-factor intercorrelated model produced the lowest χ^2 result, and its χ^2-to-df ratio was less than 3:1, suggesting an acceptable model according to Kline's (1994) indications. The RMSEA and SRMR results also suggest an adequate fit; however, the CFI and TLI values are below the recommended levels for adequate model fit. All models failed to produce satisfactory model fit across all indices but, however, on the basis of the χ^2-to-df ratio, RMSEA, and SRMR results, the intercorrelated eight-factor model could be said to represent an adequate representation of the underlying structure of the ABS-2.

A possible explanation for the less than satisfactory model fit statistics was thought to relate to the presence of three nuisance contextual factors. We therefore included these nuisance latent factors within each of the four theoretical model solutions in order to create four alternative bifactor models which could serve to provide a more satisfactory solution to the underlying structure of the ABS-2. Table 1 also presents the incremental and absolute fit indices for the four alternative bifactor models of the ABS-2. All four models showed marked improvements within the bifactor solutions as compared to the standard CFA solutions supporting the use of bifactor modeling approach for the ABS-2.

The eight-factor solution again provided the best fit of the data across all indices, as well as producing the lowest overall AIC value. A χ^2 difference test revealed that this bifactor model conceptualization was a significantly better model compared with the eight-factor model without the inclusion of the three nuisance factors (χ^2 difference = 755.291, df = 74, $p < .01$). Even with these improved model fit statistics, the eight-factor intercorrelated solution failed to produce satisfactory model fit statistics across all indices with the CFI and TLI values below the required cutoff criteria for acceptable model fit. Overall then, these results fail to support the construct validity of the ABS-2. As such, these results greatly enhanced the importance of the second aim of the current study which sought to develop a psychometrically sound abbreviated version of the ABS-2.

In order to develop an abbreviated version, we followed the guidelines of Bernard (1998) and retained three items with statistically significant factor loadings above .40 from each of the eight belief factors identified from the relevant bifactor model solution. We selected indicators of each belief factor from the bifactor solution, as item factor loadings in the bifactor model provided a clearer indication of which items most accurately measured each belief process, given that item covariation due to the nuisance contextual factors had been removed. Twenty-four items were thus retained for the abbreviated version and five models were compared within a standard alternative models framework using CFA techniques.

These five models included a one-factor solution in which all 24 items loaded on a single latent construct; an intercorrelated two-factor solution of rationality and irrationality; an intercorrelated four-factor solution representing the four irrational belief processes (demandingness, catastrophizing, low frustration tolerance, and depreciation); an intercorrelated eight-factor solution representing the four irrational belief processes and the four rational belief processes (preferences, non-catastrophizing, high frustration tolerance, and acceptance); and finally a higher-order model in which the four rational belief factors are subsumed under a Rationality factor and the four irrational belief factors are subsumed under an irrationality factor.

As detailed in Table 2, the eight-factor solution of the 24-item abbreviated version of the ABS-2 was the only model to exhibit satisfactory model fit. The χ^2-to-df ratio was approximately 2:1 and the SRMR value was .05 indicating good model fit. The CFI, TLI, and RMSEA values, respectively, indicated an adequate fit of the data. The adequacy of this model can also be observed in relation to the parameter estimates. Table 3 reports the standardized and unstandardized factor loadings (along with standard errors) for each observed variable on its respective latent variable. All factor loadings were positive and statistically significant, and all items possessed factor loadings greater than .40 with the majority of indicators exhibiting factor loadings above .60, thus generally satisfying the strict recommendations of Hair, Anderson, Tatham, and Black (1998) for factor loading requirements.

The factor correlations for the abbreviated version were predominately within expected and acceptable levels with the majority of variables moderate-to-moderately strongly correlated (see Table 4). However, there was one notable exception in the case of the factor correlation between Acceptance and Depreciation beliefs ($r = -.948$). These observed factor correlations suggested the possible presence of two higher order latent constructs. We therefore tested a two-factor higher-order model in which the four rational belief factors loaded on a Rationality factor, and the four irrational belief factors loaded on an irrationality factor. However, as detailed in Table 2, this solution was rejected as a poor fitting model.

Discussion

The current study set out to assess the dimensionality of the ABS-2 (DiGiuseppe et al., 1988), a frequently used measure of rational and irrational beliefs in REBT research contexts, which has not been subjected to rigorous psychometric investigation. In order to ascertain the appropriate factor structure of the ABS-2, a series of alternative factor solutions were devised including a novel and original eight-factor solution that is congruent with contemporary REBT theory (David et al., 2010). Furthermore, given a methodological limitation associated with the ABS-2, namely that the individual items fail to discriminate between the process of belief and the context of belief, we concurrently applied a bifactor modeling approach that served to control for the presence of these nuisance contextual factors which could lead to mis-

Table 2. *Fit Indices for the alternative factor models of the abbreviated version of the ABS-2*

Model	χ^2	*df*	CFI	TLI	RMSEA	SRMR	AIC
CFA models							
One-factor model	1334.263*	252	0.74	0.71	0.12	0.10	21905.520
Two-factor model	1263.337*	251	0.76	0.73	0.11	0.10	21805.427
Four-factor model	844.996*	246	0.86	0.84	0.08	0.09	21337.153
Eight-factor model	488.908*	224	0.94	0.92	0.06	0.05	20955.071
Second-order model	733.998*	243	0.88	0.87	0.08	0.08	21201.614

Note. N = *310;* χ^2*, chi square goodness of fit statistic; df, degrees of freedom; RMSEA, root-mean-square error of approximation; CI, confidence interval; AIC, Akaike Information Criterion; CFI, comparative fit index; TLI, Tucker Lewis Index; SRMR, standardized square root mean-square residual. *Indicates* χ^2 *are statistically significant* ($p < .001$).

Table 3. *Standardized and unstandardized factor loadings (and standard errors) for the four-factor model of the abbreviated version of the ABS-2*

Item	β	B	SE
Factor 1 (demandingness)			
I must do well at important things, and I will not accept it if I do not do well.	0.775	1.000	–
It's essential to do well at important jobs; so I must do well at these things.	0.777	0.971	0.070
I must be successful at things that I believe are important, and I will not accept anything less than success.	0.759	1.031	0.074
Factor 2 (catastrophizing)			
It's awful to be disliked by people who are important to me, and it is a catastrophe if they don't like me.	0.783	1.000	–
Sometimes I think the hassles and frustrations of everyday life are awful and the worst part of my life.	0.763	0.984	0.062
If loved ones or friends reject me, it is not only bad, but the worst possible thing that could happen to me.	0.742	0.911	0.062
Factor 3 (low frustration tolerance)			
It's unbearable being uncomfortable, tense or nervous and I can't stand it when I am.	0.761	1.000	–
It's unbearable to fail at important things, and I can't stand not succeeding at them.	0.621	0.855	0.089
I can't stand being tense or nervous and I think tension is unbearable.	0.830	1.104	0.069
Factor 4 (depreciation)			
If important people dislike me, it is because I am an unlikable bad person.	0.920	1.000	–
If I do not perform well at tasks that are very important to me, it is because I am a worthless bad person.	0.908	1.035	0.034
When people I like reject me or dislike me, it is because I am a bad or worthless person.	0.961	1.110	0.034
Factor 5 (preferences)			
I do not want to fail at important tasks but I realize that I do not have to perform well just because I want to.	0.682	1.000	–
I want to perform well at some things, but I do not have to do well just because I want to.	0.680	0.930	0.092
I want to do well at important tasks, but I realize that I don't have to do well at these important tasks just because I want to.	0.694	1.044	0.127
Factor 6 (non-catastrophizing)			
It is unfortunate when I am frustrated by hassles in my life, but I realize it's only disappointing and not awful to experience hassles.	0.604	1.000	–
When life is hard and I feel uncomfortable, I realize it is not awful to feel uncomfortable or tense, only unfortunate and I can keep going.	0.560	0.989	0.205
It's bad to be disliked by certain people, but I realize it is only unfortunate to be disliked by them.	0.594	1.053	0.168
Factor 7 (high frustration tolerance)			
I do not like to be uncomfortable, tense or nervous, but I can tolerate being tense.	0.571	1.000	–
I get distressed if I'm not doing well at important tasks, but I can stand the distress of failing at important tasks.	0.454	0.743	0.148
It's only frustrating not doing well at some tasks, but I know I can stand the frustration of performing less than well.	0.787	1.221	0.138
Factor 8 (acceptance)			
When people whom I want to like me disapprove of me, I know I am still a worthwhile person.	0.915	1.000	–
Even when my life is tough and difficult, I realize that I am a person who is just as good as anyone else even though I have hassles.	0.977	1.117	0.031
When my life becomes uncomfortable, I realize that I am still a good person even though I am uncomfortable.	0.909	0.993	0.032

Notes. *All Factor loadings are statistically significant ($p < .001$). B stands for Beta (unstanbdardized factor loading).*

Table 4. *Correlations for the eight-factor model of the abbreviated version of the ABS-2*

Item	DEM	CAT	LFT	DEP	PREF	NCAT	HFT	ACC
Demandingness (DEM)	–							
Catastrophizing (CAT)	0.788	–						
Low frustration tolerance (LFT)	0.798	0.780	–					
Depreciation (DEP)	0.569	0.748	0.730	–				
Preferences (PREF)	−0.634	−0.480	−0.670	−0.477	–			
Non-catastrophizing (NCAT)	−0.444	−0.349	−0.465	−0.486	0.401	–		
High frustration tolerance (HFT)	−0.612	−0.538	−0.681	−0.624	0.859	0.670	–	
Acceptance (ACC)	−0.597	−0.713	−0.754	−0.948	0.565	0.579	0.698	–

Note. *All Factor correlations are statistically significant ($p < .001$).*

identification of the appropriate factor structure. Bifactor modeling has predominately been applied within intelligence testing paradigms (e.g. Carroll 1993; Gustafsson & Balke 1993) or in situations where researchers are interested in identifying a unidimensional structure for a given measure (Reise et al., 2007). However, bifactor modeling approaches offer many advantages that make their use desirable when assessing the dimensionality of measures of various psychological constructs, and such approaches are beginning to be adopted by researchers interested is psychological constructs other than intelligence (e.g. Patrick, Hicks, Nichol, & Kruger, 2007).

Our initial results based on standard CFA model specifications indicated that none of the four tested models of the factor structure of the ABS-2 satisfied the required model fit statistics. The results did suggest that our proposed eight-factor model was the best approximation of the population covariance matrix of the models tested. We therefore hypothesized that the presence of three contextual "nuisance" factors may have been contributing additional, and unwanted, item covariation which was contributing to the poor model fit results. A bifactor modeling approach was thus adopted and the same four solutions were specified, but in each case three nuisance factors were also included within a hierarchical model.

Inclusion of these nuisance factors improved the model fit of all four models across all fit indices indicating that consideration of these nuisance context factors is worthwhile when assessing the factor structure of the ABS-2 (DiGiuseppe et al., 1989). This intercorrelated eight-factor solution again provided the most impressive factor solution; however, despite the improvements in model fit obtained by utilizing a bifactor solution, the model fit statistics failed to satisfy acceptable fit criteria across all indices. Ultimately, although the addition of the nuisance contextual factors improved the model fit of the eight-factor conceptualization, these analyses failed to provide strong empirical support for the construct validity of the ABS-2.

The second objective of the current study was to develop a psychometrically sound abbreviated version of the ABS-2 for use in many research contexts where the application of a 72-item measure is impractical. Given that current findings failed to provide the desired

level of empirical support for the construct validity of the ABS-2 (DiGiuseppe et al., 1989), the development of an abbreviated version of the ABS-2 with sound psychometric properties was of the utmost importance. In order to select the relevant items for the abbreviated version of the ABS-2, we inspected the items factor loadings for each of the eight belief factors as revealed in the relevant bifactor model solution. Since this model allowed items to load on both the nuisance context factor and the appropriate psychological factor, we were able to retain items that were the best indicators of the relevant rational and irrational belief processes. All items selected possessed statistically significant factor loadings above a value of .40.

Given that indicators were selected after the effects of the nuisance factors were controlled, it was necessary to only compare the four alternative model solutions using standard CFA techniques. Of the five alternative specified models, the intercorrelated eight-factor solution for the abbreviated version of the ABS-2 was the only model to obtain satisfactory model fit. The χ^2-to-df ratio result indicated a good model, as did the SRMR result, while the RMSEA, CFI, and TLI values all indicated adequate model fit. It should also be noted that despite being less parsimonious that many of the other tested models, the AIC, CFI, and RMSEA indices, all include explicit penalties for model complexity and this eight-factor solution still exhibited the most impressive values across all three indices, therefore strongly suggesting that it is the most accurate conceptualization of the underlying factor structure of the measure. Furthermore, this factor solution derived additional support on the basis of the observed standardized factor loadings. The majority of the indicators exceeded Hair et al.'s (1998) strict cutoff criteria of 0.60, and those few indicators that did not still exhibited statistically significant factor loadings above 0.40.

As would be expected based on theoretical understandings, the eight latent factors all showed statistically significant associations, and these associations were predominately moderate to strong. The correlation between acceptance and depreciation beliefs ($r = .95$) was very high. Given that these beliefs are the rational and irrational counterparts of each other, it suggests that they are either bipolar constructs, or the indicators of each factor are failing to appropriately measure the distinctive constructs. Future research endeavours with the abbreviated version of the ABS-2 will be necessary to ascertain which of these possible explanations is correct. All four irrational latent factors and all four rational latent factors were positively and statistically significantly related to one another. These correlations suggested the possible presence of two second-order latent factors, rationality and irrationality, which could serve to explain the observed factor correlation, however, this second-order model was a poor representation of the data.

As is the case with any research project, there are limitations that need to be indicated. The current analysis was conducted within a sample of 313 participants drawn from a unique and specialized strata of the population (emergency service personnel), and therefore these results are not widely generalizable. Future studies should preferably retest the factor structure of both the 72-item ABS-2 (DiGiuseppe et al., 1988) and the 24-item abbreviated version presented herein among more diverse population groups in order to develop a more robust picture of the factor structure of these measures. Future analyses should ideally utilize a bifactor modeling approach to control for the effects of context factors, as present results indicate that such bifactor models improve model fit. In addition, construct validation studies are preferably conducted on larger sample sizes which can additionally facilitate investigation of the factorial invariance of the measure between the sexes. However, given the extremely specialized nature of the current sample, this limitation was impossible to overcome.

In conclusion, this study has provided the most comprehensive and methodologically rigorous investigation of the psychometric properties of a widely used measure of rational and irrational beliefs within the REBT field to date. In doing so, this paper has provided empirical support for the value of utilizing a bifactor modeling approach when assessing the dimensionality of this psychological measure. Our results failed to provide acceptable evidence of the dimensionality of the ABS-2 (DiGiuseppe et al., 1988) within this particular population, in spite of attempts to overcome a number of methodological limitations associ-

ated with the measure. In order to surmount the identified methodological and practical difficulties associated with the full version of the ABS-2, a 24-item abbreviated version was developed and psychometrically validated. An original and previously un-suggested eight-factor intercorrelated solution, fully consistent with contemporary REBT theory, was demonstrated to provide satisfactory fit of the obtained data. The abbreviated version of the ABS-2 therefore provides a practical, theoretically consistent, and psychometrically validated measure of rational and irrational beliefs.

References

Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control*, *19*, 716–723.

Bentler, P. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*, 238–246.

Bernard, M.E. (1998). Validations of general attitude and beliefs scale. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *16*, 183–196.

Boduszek, D., Shevlin, M., Mallett, J., Hyland, P., & O'Kane, D. (2012). Dimensionality and construct validity of the rosenberg self-esteem scale within a sample of recidivistic prisoners. *Journal of Criminal Psychology*, *2*(1), 19–25, doi: 10.1108/20093821211210468.

Bollen, K.A. (1989). *Structural equations with latent variables*. New York, NY: Wiley.

Carroll, J.B. (1993). *Human cognitive abilities: A survey of factor-analytic studies*. Cambridge, MA: Cambridge University Press.

David, D. (2003). Rational emotive behavior therapy; the view of a cognitive psychologist. In W. Dryden (Ed.), *Theoretical developments in REBT*. London: Brunner/Routledge.

David, D., Lynn, S.J., & Ellis, A. (2010). *Rational and irrational beliefs: Research, theory, and clinical practice*. Oxford: Oxford University Press.

David, D., Schnur, J., & Belloiu, A. (2002). Another search for the "hot" cognitions: Appraisal, irrational beliefs, attributions, and their relation to emotion. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *15*, 93–131.

David, D., & Szentagotai, A. (2006). Cognition in cognitive-behavioral psychotherapies (CBT): Toward an integrative model. *Clinical Psychology Review*, *3*, 284–298.

David, D., Szentagotai, A., Kallay, E., & Macavei, B. (2005). A synopsis of rational-emotive behavior therapy (REBT): Fundamental and applied research. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *23*, 175–221.

DiGiuseppe, R., Leaf, R., Exner, T., & Robin, M.V. (1988). *The development of a measure of rational/irrational thinking*, Paper presented at the World Congress of Behavior Therapy, Edinburg, Scotland.

DiGiuseppe, R., Robin, M.W., Leaf, R., & Gormon, B. (1989). *A discriminative validation and factor analysis of a measure of rational/irrational beliefs*. Paper presented at the World Congress of Cognitive Therapy, Oxford, UK.

DiLorenzo, T.A., David, D., & Montgomery, G.H. (2007). The interrelations between irrational cognitive processes and distress in stressful academic settings. *Personality and Individual Differences*, *42*, 765–777.

Dryden, W., & David, D. (2008). Rational emotive behavior therapy: Current status. *Journal of Cognitive Psychotherapy: An International Quarterly*, *22*, 195–209.

Ellis, A. (1958). Rational psychotherapy. *Journal of General Psychology*, *59*, 35–49.

Ellis, A. (1962). *Reason and emotion in psychotherapy*. New York, NY: Lyle Stuart.

Ellis, A. (1994). *Reason and emotion in psychotherapy* (rev. ed.). Secaucus, NJ: Birch Lane.

Fulop, I.E. (2007). A confirmatory factor analysis of the Attitude and Belief Scale 2. *Journal of Cognitive and Behavioral Psychotherapies*, *7*, 159–170.

Gustafsson, J.E., & Balke, G. (1993). General and specific abilities as predictors of school achievement. *Multivariate Behavioral Research*, *28*, 407–434.

Hair, J.F. Jr, Anderson, R.R., Tatham, R.L., & Black, W.C. (1998). *Multivariate Data Analysis with Readings* (5th ed.). Englewood Cliffs, NJ: Prentice Hall.

Hu, L., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1–55.

Hyland, P., & Boduszek, D. (2012). Resolving a Difference between Cognitive Therapy and Rational Emotive Behaviour Therapy: Towards the Development of an Integrated CBT Model of Psychopathology. *Mental Health Review Journal*, *17*, 104–116.

Joreskog, K., & Sorbom, D. (1981). *LISREL V: Analysis of linear structural relationships by the method of maximum likelihood*. Chicago, IL: National Educational Resources.

Joreskog, K., & Sorbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Chicago, IL: Scientific Software International Inc.

Kline, P. (1994). *An easy guide to factor analysis*. London: Routledge.

Macavei, B. (2002). Scala de Atitudini si Convingeri II (ABS II): date preliminare pentru populatia de limba româna. *Romanian Journal of Cognitive and Behavioral Psychotherapies*, *2*, 105–122.

Muthen, L.K., & Muthen, B.O. (1998–2010). *Mplus – Statistical Analysis with Latent Variables. User's Guide* (6th ed.). Los Angeles, CA: Muthen and Muthen.

Patrick, C.J., Hicks, B.M., Nichol, P.E., & Kruger, R.F. (2007). A bifactor approach to modelling the structure of the Psychopathy Checklist. *Journal of Personality Disorders*, *21*, 118–141.

Reise, S.P., Morizot, J., & Hays, R.D. (2007). The role of the bifactor model in resolvingdimensionality issues in health outcomes measures. *Quality of Life Research*, *16*, 19–31

Steiger, J.H. (1990). Structural model evaluation and modification: an interval estimation approach. *Multivariate Behavioral Research*, *25*, 173–180.

Tanaka, J. S. (1987). "How big is big enough?" Sample size and goodness of fit in structural equation models with latent variables. *Child Development*, *58*, 134–146.

Tucker, L.R., & Lewis, C. (1973). The reliability coefficient for maximum likelihood factor analysis. *Psychometrika*, *38*, 1–10.

Yung, Y., Thissen, D., & McLeod, L. D. (1999). On the relationship between the higher-order factor model and the hierarchical factor model. *Psychometrika*, *64*, 113–128.

Walen, S., DiGiuseppe, R., & Dryden, W. (1992). *A practitioner's guide to rational-emotive therapy*. New York, NY: Oxford Press.

The Cognitive Behaviour Therapist (2013), vol. 6, e15, page 1 of 12
doi:10.1017/S1754470X13000214

ORIGINAL RESEARCH

The factor structure and composite reliability of the Profile of Emotional Distress

Philip Hyland[1]*, Mark Shevlin[1], Gary Adamson[1] and Daniel Boduszek[2]

[1]*School of Psychology, University of Ulster, Londonderry, UK*
[2]*Department of Behavioural and Social Sciences, University of Huddersfield, Huddersfield, UK*

Received 30 March 2013; Accepted 27 October 2013

Abstract. This study provides the first assessment of the latent structure of the Profile of Emotional Distress (PED). The PED is a self-report measure of emotional distress (ED) associated strongly with its links to Rational Emotive Behaviour Therapy (REBT). To date, the PED has been weakly conceptualized using both unitary and binary models of ED. In this study, the dimensionality of the PED was examined within an alternative models' framework using confirmatory factor analysis and bifactor modelling techniques. A total of 313 law enforcement, military, and related emergency-service personnel completed the PED. Results indicated that a bifactor model conceptualization was the best fit of the data. The bifactor model included a single general factor (ED) and four grouping factors (Concern, Anxiety, Sadness, Depression). Model parameter estimates indicated that the ED factor accounts for the majority of covariance among the observable indicators. Low factor loadings were observed on each of the grouping factors, thus subscale construction is not recommended. Composite reliability results demonstrated that the ED factor possesses excellent internal reliability. The PED was found to be a reliable and valid measure of emotional distress.

Key words: Emotion, evidence-based practice, measurement, objective assessment, Profile of Emotional Distress (PED), REBT.

Introduction

Rational Emotive Behaviour Therapy (REBT; Ellis, 2001) is based on the theoretical premise that dysfunctional cognitive, emotional, behavioural, and physiological responses, or 'consequences' (C), are not the direct product of the adverse activating events experienced (A), but are rather the result of evaluative or appraisal beliefs (B) about these activating events. Evaluative beliefs are thus hypothesized to be the key aetiopathogenetic variables in the development of cognitive-emotional-behavioural-physiological reactions.

REBT theory outlines two main classes of evaluative beliefs; rational beliefs and irrational beliefs. Rational beliefs reflect flexible and non-extreme evaluations of life

*Author for correspondence: Mr P. Hyland, School of Psychology, University of Ulster, Magee Campus, Northland Road, Lodonderry BT48 7JL, UK (email: philipehyland@gmail.com)

events whereas irrational beliefs reflect rigid, absolutistic, and extreme evaluations of life events (Dryden & Neenan, 2004). The primary irrational belief process is termed 'Demandingness' beliefs, (absolutistic imperatives directed towards oneself, others, and life conditions).

Demandingness beliefs are hypothesized to give rise to a set of secondary irrational beliefs which include: 'Catastrophizing' beliefs (an event is evaluated in extremely negative terms); 'Low frustration tolerance' beliefs (a person hugely underestimates their own ability to tolerate the discomfort of not having their demand met); and 'Depreciation' beliefs (global negative evaluations of the self, others, and/or the world). The rational counterparts to these beliefs include: 'Preference' beliefs (desires or wishes rather than demands); 'Non-catastrophizing' beliefs (balanced and realistic evaluations of the badness of an adverse life event); 'High frustration tolerance' beliefs (recognition of one's capacity to cope with, and withstand, unpleasant life events); and 'Acceptance' beliefs (acceptance of one's own, or others, fallibility as human beings).

Activation of a set of irrational beliefs in response to a life adversity is expected to lead to dysfunctional negative emotional consequences (along with associated maladaptive behaviours or behavioural tendencies, distorted negative automatic thoughts, and disturbing physiological arousal). Alternatively, responding to the same unpleasant event with a set of rational beliefs is predicted to give rise to functional negative emotional consequences (along with associated adaptive behaviours or behavioural tendencies, non-distorted automatic thoughts, and non-disturbing physiological arousal) (see David *et al.* 2005*a*).

A distinguishing theoretical feature of REBT theory (Ellis, 1994) relates to its prediction of a binary model of emotional distress (ED). REBT theory is therefore unique in the field of psychotherapy as all other theoretical models assume a unitary model of ED. The unitary model of ED assumes that distress is experienced along a continuum which ranges from low to high levels of ED, regardless of the particular emotion being considered. As such, from the perspective of the unitary model of emotions, functional and dysfunctional emotions are considered to differ quantitatively.

By contrast, the binary model of ED assumes a qualitative rather than a quantitative distinction between functional and dysfunctional emotions. In other words, functional and dysfunctional emotions are not predicted to be distinguished on the basis of the intensity with which the emotion is experienced but rather by the underlying cognitive architecture of the emotional response, along with the subjective phenomenological experience of the emotion, and the associated behavioural consequences of the emotion (Ellis & DiGiuseppe, 1993). A number of recent research findings have offered support for the cognitive, emotional and behavioural response styles that can be predicated using the binary model of emotions (e.g. David *et al.* 2002, 2004, 2005*b*; DiLorenzo *et al.* 2011). Despite the recent empirical support for the binary model of emotions, there is still no scientific consensus on the superiority of either the unitary or binary models and therefore many within the REBT community continue to favour the unitary approach to conceptualizing ED (Wessler, 1996).

To provide a method of investigating the predictions of the binary model of emotions, researchers developed the Profile of Emotional Distress (PED; Opris & Macavei, 2007). The PED is first self-report measure of ED constructed upon a binary model of ED. The scale was designed to measures four emotional categories (sadness, concern, anxiety, depression) which are expected to reflect the distinctions between functional and dysfunctional affective responses.

Opris & Macavei (2007) initially investigated the validity and reliability of the PED within a large sample ($n = 701$) of the Romanian general population. Results suggested that the PED possessed satisfactory internal reliability (Cronbach's $\alpha = 0.94$ for the full scale and each of the four subscales demonstrated internal reliability values >0.75). Subsequent analysis indicted good concurrent and discriminant reliability. In an effort to establish the construct validity of the scale, the authors performed a principal component analysis (PCA) among both a clinical ($n = 32$) and a non-clinical ($n = 122$) sample with results revealing two factors. The first was termed 'General distress' and included all items of both functional and dysfunctional distress, while the second factor was termed 'Functional distress' and included only the functional negative distress items. A number of methodological issues undermine the results of this study. For example, PCA is method that simply allows for the reduction of a large body of data, it does not allow for the testing or falsification of a particular model. Within a PCA framework there are no objective statistical criteria to determine the solution with the optimal number of factors (see Bollen, 1989). The small sample sizes employed for such analysis further undermines the reliability of such results.

Consequently, the latent structure of the PED has yet to be established and formulating an appropriate scoring system scheme for this questionnaire remains problematic. Moreover, given that the PED was developed to capture the qualitative distinctions between functional and dysfunctional emotions, and its intended use in research programmes using this paradigm, it is necessary that a comprehensive evaluation of the underlying factor structure of PED be performed. Establishing the latent structure of the PED (Opris & Macavei, 2007) is therefore a prerequisite not only for identifying accurate assessments of validity and reliability, but also for establishing its use within a variety of research contexts. Research has demonstrated that treating a multidimensional measure as unidimensional can result in unstable estimates of reliability (Shevlin *et al.* 2000).

Therefore, the primary aim of the current study is to test a series of theoretically plausible factorial solutions within an alternative models' framework using CFA techniques as well confirmatory bifactor modelling producers (see Yung *et al.* 1999; Reise *et al.* 2007, 2010). Confirmatory bifactor modelling is a conceptually distinct alternative to traditional CFA models in which the covariance among PED items is explained in terms of a single general ED factor reflecting the overlap across all items, and independent (uncorrelated) method factors reflecting the unique covariance that occurs among a particular groups of items (concern, sadness, anxiety, depression). Reise *et al.* (2010) argue that bifactor models should always be used as a baseline comparison model rather than the traditional one-factor model given that a bifactor model is capable of retaining a unidimensional conceptualization while also acknowledging the unintended and meaningless covariance that can occur between particular items in a scale due to wording effects and can thus present spurious evidence of multidimensionality. Additionally, the current study also seeks to better establish the reliability of the PED through the use of composite reliability analysis.

Methods

Participants and procedures

The sample for the current study consisted of 313 (males: $n = 212$; females: $n = 101$) emergency-service personnel (police, military, and related emergency-service officers)

recruited from active duty while serving in either the Republic of Ireland or the Republic of Kosovo. All participants chosen for inclusion in the current study had English as a primary language. Participants ranged in age from 23 to 65 years (mean = 38.18, S.D. = 8.70). Participation in the current study was voluntary and no inducements or obligations were used. Each participant was assured about confidentiality and those who chose to take part in the research project had the option of completing either an anonymous self-administered paper-and-pencil version of the questionnaire or an electronic version which was delivered and returned via email. The majority of respondents chose the paper-and-pencil option (63.26%, $n = 198$).

Instruments

The PED (Opris & Macavei, 2007) is a 26-item self-report measure of ED which is theoretically associated with Ellis' (1994) binary cognitive model of ED. The PED measures functional and dysfunctional emotions within two major categories: concern/anxiety and sadness/depression. Six adjective items are used to measure *concern*, *anxiety*, and *sadness* respectively, while eight items are employed to measure *depression*. Participants were asked to rate how often they experienced each emotion over the past 2 weeks by selecting either (1) 'not at all', (2) 'a little', (3) 'moderately', (4) 'quite a bit', and (5) 'extremely'. Possible scores range from 26 to 130, with higher scores indicating higher ED.

Analysis

The dimensionality of the PED was investigated through the use of conventional CFA techniques, along with the utilization of a confirmatory bifactor modelling approach (see Yung *et al*. 1999; Chen *et al.* 2006; Reise *et al*. 2007, 2010).

Model 1 is a one-factor model in which all 26 items load on a single latent ED variable. Model 2 is an intercorrelated four-factor solution measuring Concern (six items), Anxiety (six items), Sadness (six items), and Depression (eight items). This model represents the intended structure of the scale and is congruent with the binary model.

Model 3 is a two-factor model represented by a functional negative emotional distress (F-NED) factor and a dysfunctional negative emotional distress (D-NED) factor. This model is also in line with theoretical predictions of the binary model and within this model 12 items load onto the F-NED factor (items measuring sadness and concern) and 14 items load onto the D-NED factor (items measuring anxiety and depression). Model 4 is consistent with a unitary model of emotions and reflects an alternative two-factor solution. This model includes an Anxiety factor (12 items measuring concern and anxiety) and a Depression factor (14 items measuring sadness and depression) (see Fig. 1). Model 5 is a bifactor conceptualization in which all 26 items load onto a single ED factor. This model also includes four grouping factors [Concern (six items), Anxiety (six items), Sadness (six items), Depression (eight items)] which exist at the same conceptual level as the general ED factor.

The overall fit of each model and the relative fit between models were assessed using a range of goodness-of-fit statistics and assessment of the appropriateness of the model parameters. The χ^2 statistic assessed the sample and implied covariance matrix and a good fitting model is indicated by a non-significant result. However, the χ^2 statistic is strongly associated with

Table 1. *Confirmatory factor analysis (CFA) and bifactor model fit indices for the alternative models of the Profile of Emotional Distress (PED)*

Model	χ^2	d.f.	CFI	TLI	RMSEA (90% CI)	SRMR	AIC
CFA models							
Unidimensional	1488.625*	299	0.83	0.82	0.11 (0.11–0.12)	0.06	17058.003
F-NED/D-NED	1475.646*	298	0.83	0.82	0.11 (0.11–0.12)	0.06	17039.976
Binary	1033.504*	293	0.90	0.89	0.09 (0.08–0.10)	0.04	16440.743
Unitary	1061.136*	298	0.89	0.88	0.09 (0.09–0.10)	0.04	16471.362
Bifactor	840.476*	274	0.92	0.91	0.08 (0.08–0.09)	0.05	16189.658

$N = 313$.
χ^2, Chi square goodness-of-fit statistic; d.f., degrees of freedom; CFI, Comparative Fit Index; TLI, Tucker–Lewis Index; RMSEA, root-mean-square error of approximation; CI, confidence interval; SRMR, standardized square root mean residual; AIC, Akaike's Information Criterion; F-NED; Functional negative emotional distress; D-NED, Dysfunctional negative emotional distress.
* Indicates χ^2 are statistically significant ($p < 0.001$).

sample size, and as such good models tend to be over-rejected. Therefore Tanaka (1987) suggested that a model should not be rejected simply on the basis of a significant χ^2 result. Accordingly, it is recommended that researchers examine the ratio of the χ^2 value to the degrees of freedom (d.f.), and according to Kline (1994), any model with a χ^2:d.f. ratio of less than 3:1 indicates a good fitting model. The Comparative Fit Index (CFI; Bentler, 1990) and the Tucker–Lewis Index (TLI; Tucker & Lewis, 1973) are measures of how much better the model fits the data compared to a baseline model where all variables are uncorrelated. For these indices values >0.90 indicate a reasonable fit while values >0.95 indicate a good model fit (Bentler, 1990; Hu & Bentler, 1999). In addition, two more absolute indices are presented; the standardized root mean square residual (SRMR; Jöreskog & Sörbom, 1981) and the root mean-square error of approximation (RMSEA; Steiger, 1990). Ideally these indices should be <0.05; however, values <0.08 also suggest adequate fit (Bentler, 1990; Jöreskog & Sörbom, 1993; Hu & Bentler, 1999). Furthermore, Akaike's Information Criterion (AIC; Akaike, 1974) was used to evaluate the alternative models, with the smaller value indicating the best fitting model. The CFI, RMSEA and AIC all have explicit penalties for model complexity. These models were specified and estimated using Mplus version 6.0 (Muthen & Muthen, 1998–2010) with robust maximum-likelihood estimation.

Results

The mean PED score for the entire sample was 53.53 (S.D. = 24.96). Scores ranged from 26 to 129.

Model results

Table 1 reports the fit indices for the five alternative models. On the basis of the χ^2:d.f. ratio, CFI, TLI, RMSEA, and SRMR results, Model 5 (the bifactor model) was found to be the most accurate representation of the underlying latent structure of the PED. The χ^2:d.f. ratio of 3:1 and SRMR value of 0.05 indicate good model fit while a RMSEA value of 0.08 and CFI and

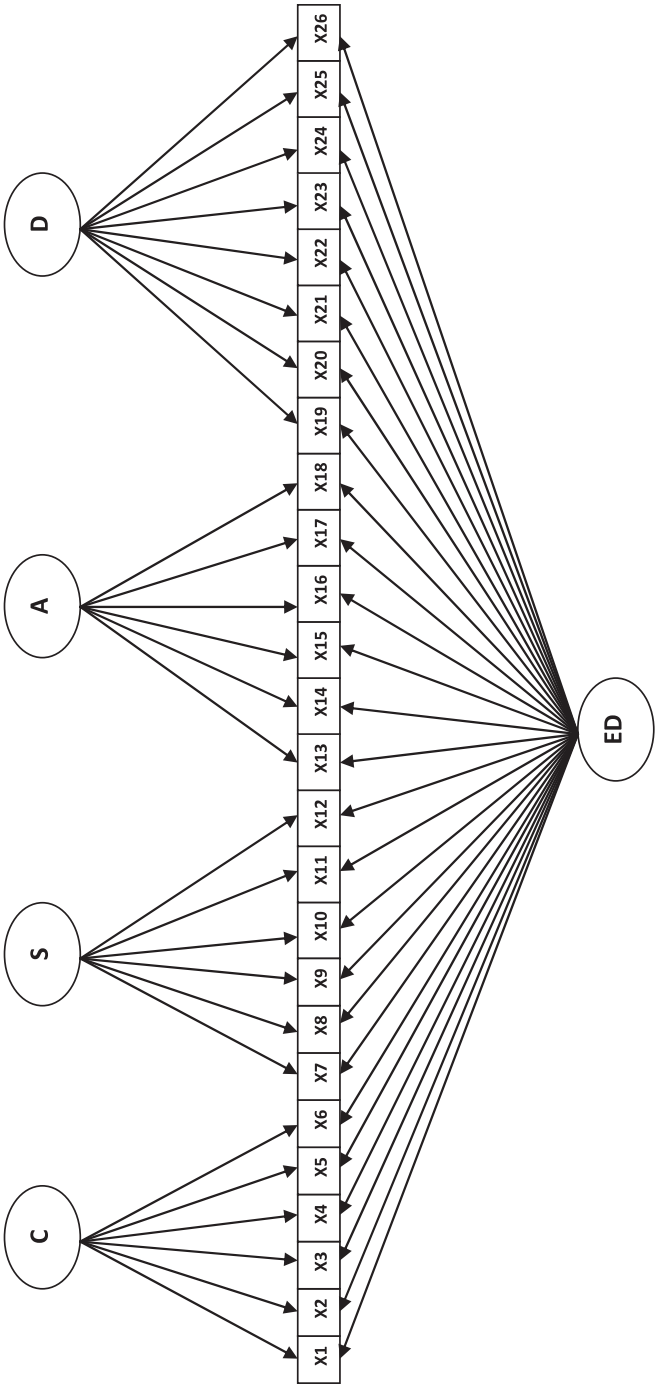


Fig. 1. Bifactor model of the Profile of Emotional Distress Scale. C, Concern; S, Sadness; A, Anxiety; D, Depression; ED, Emotional distress.

Table 2. *Standardized and unstandardized factor loadings (and standard errors) for each Profile of Emotional Distress item on the Emotional distress factor*

Item	β	B	S.E.
Emotional distress			
Tense	0.67	0.79	0.05
Sad	0.78	0.86	0.05
Blue	0.88	10.09	0.05
Hopeless	0.92	1.26	0.05
Useless	0.90	1.07	0.06
Worried	0.72	0.73	0.04
Miserable	0.92	1.19	0.05
Anxious	0.79	0.98	0.05
Depressive	0.94	1.07	0.05
Concerned	0.60	0.59	0.05
Frightened	0.79	0.83	0.06
Depressed	0.95	1.13	0.05
Sorrowful	0.88	1.06	0.06
Strained	0.76	0.98	0.06
Gloomy	0.86	1.01	0.05
Terrified	0.82	0.82	0.06
Nervous	0.69	0.76	0.05
Hurt	0.65	0.64	0.05
Alarmed	0.66	0.61	0.05
Panicky	0.77	0.88	0.06
Upset	0.78	0.93	0.05
Shattered	0.85	1.16	0.06
Desperate	0.91	1.24	0.06
Restless	0.49	0.49	0.05
Scared	0.76	0.75	0.06
Helpless	0.92	1.19	0.05

All factor loadings are statistically significant ($p < 0.001$).

TLI values >0.90 suggest an adequate model fit. This model also displayed the lowest AIC value further indicating its statistical superiority.

The adequacy of this model can also be determined in relation to its parameter estimates. All the factor loadings for the general factor of ED were high, positive, and statistically significant (p <0.001) (see Table 2). Further inspection of the factor loadings for each of the grouping factors (Concern, Anxiety, Sadness, Depression) provides critical information regarding the appropriateness of including these factors in the scoring scheme of the PED. Reise *et al.* (2010) advise that when items load strongly onto a general factor, and comparatively weaker on each of the grouping factors, this provides overwhelming support for consideration of a unidimensional scoring scheme. Alternatively when items load as strongly, or more strongly, onto each of the respective grouping factors as they do on the general factor, creation of subscales is then appropriate.

As outlined in Table 3, factor loadings for each grouping factor were markedly lower compared to the general ED factor with a number of items displaying non-significant loadings

Table 3. *Standardized and unstandardized factor loadings (and standard errors) for the four grouping factors of the Profile of Emotional Distress*

Item	β	B	S.E.
Concern			
Tense	0.37**	0.42	0.06
Worried	0.34**	0.35	0.07
Concerned	0.47**	0.46	0.06
Strained	0.15*	0.19	0.08
Alarmed	0.38**	0.35	0.05
Restless	0.49**	0.49	0.07
Sadness			
Sadness	0.63**	0.69	0.03
Blue	0.13**	0.16	0.05
Miserable	0.02	0.02	0.03
Sorrowful	0.08*	0.10	0.03
Gloomy	0.06	0.07	0.04
Sad	0.31**	0.37	0.05
Anxiety			
Anxious	0.30**	0.37	0.05
Frightened	0.43**	0.45	0.05
Terrified	0.43**	0.43	0.05
Nervous	0.40**	0.45	0.04
Panicky	0.41**	0.46	0.05
Scared	0.43**	0.43	0.05
Depression			
Hopeless	0.19**	0.26	0.06
Useless	0.07	0.08	0.05
Depressive	−0.27**	−0.31	0.05
Depressed	−0.24**	−0.28	0.06
Hurt	−0.04	−0.04	0.06
Shattered	0.22**	0.30	0.06
Desperate	0.16**	0.22	0.06
Helpless	0.16**	0.21	0.06

Factor loadings are statistically significant: * $p < 0.01$, ** $p < 0.001$.

on their respective grouping factors. These results demonstrate that there is little value in considering the distinct grouping factors as substantively meaningful and creation of subscales based on these four factors should be avoided. The PED is best conceptualized as a unidimensional measure of ED, once the effects of item heterogeneity have been controlled for.

Composite reliability

The use of traditional measures of internal reliability such as Cronbach's α have been criticized within a latent variable modelling context given the propensity to over- or under-estimate scale reliability (see Raykov, 1998). In order to provide a more rigorous assessment

of the internal reliability of the PED the current study investigated the composite reliability of the measurement properties of the scale. Composite reliability was calculated using the formula

$$p_c = \frac{\left(\sum_{i=1}^{m} \lambda i\right)^2}{\left(\sum_{i=1}^{m} \lambda i\right)^2 + \left(\sum_{i=1}^{m} (\theta i)\right)},$$

where ρ_c is the reliability of the factor score, λ_i is the standardized factor loading, and θ_i is the standardized error variance. Values >0.60 are generally considered acceptable (Bagozzi & Yi, 1988; Diamantopoulos & Winklhofer, 2001). The results show that the ED factor exhibited excellent composite reliability ($\rho_c = 0.98$). In contrast, the composite reliability for the four grouping factors were lower, and in the case of the Sadness and Depression factors, the reliabilities were unacceptably low (Concern, $\rho_c = 0.66$; Anxiety, $\rho_c = 0.80$; Sadness, $\rho_c = 0.25$; Depression, $\rho_c = 0.55$). These results provide further indications that the distinct grouping factors are of little relevance, and that the PED is best conceptualized as a unidimensional measure of ED.

Discussion

This study provided the first comprehensive assessment of the factor structure of the PED by testing five alternative models using CFA and confirmatory bifactor modelling procedures. The PED was developed to capture the qualitative distinctions between functional (concern and sadness, respectively) and dysfunctional (anxiety and depression, respectively) negative emotional responses. The absence of any reliable psychometric data meant it was unclear whether the PED was effectively capturing the hypothesized qualitative distinctions among these negative emotions, or whether an alternative factorial solution would offer a more accurate and parsimonious account of the latent structure of the scale. Given that the PED was the first scale developed in line with the binary model of emotions, and intended for use in research contexts evaluating the competing predictions of the unitary and binary models of emotions, a thorough investigation of the latent structure was indeed warranted.

Many researchers (e.g. Chen *et al*. 2006; Reise *et al*. 2010) have argued that a significant limitation of factor analytical research is the use of a traditional one-factor model when attempting to assess unidimensionality. This type of model structure is rarely expected or discovered to adequately explain the covariation among the observable indicators of a scale given the necessity of using heterogeneous item sets in order to capture the diverse aspects of a single psychological variable. Using a one-factor solution as the foundational model in any comparative work is believed to be misguided. Thus, Chen *et al*. and Reise *et al*. have recommended that a bifactor model be considered a baseline model of unidimensionality given the ability of a bifactor conceptualization to model unidimensionality while also accounting for appearances of multidimensionality. The basis for this is homogeneous item sets developed to capture the diverse elements of the latent variable of interest. Bifactor modelling therefore has the capacity to determine whether these grouping factors have any statistical relevance or whether they are better conceptualized as rather unimportant method effects.

In line with these recommendations, a bifactor model conceptualization was investigated as a possible explanation of the latent structure of the PED. This model included a general factor

of ED in which all 26 items load onto this factor, and four grouping factors (Concern, Anxiety, Sadness, Depression) reflecting the distinct item sets. Each item therefore was allowed to load onto the ED factor and its respective grouping factor. This bifactor model emerged as the only viable factorial solution exhibiting acceptable model fit values across all fit indices.

Inspection of the model parameters provided considerable evidence for a unidimensional conceptualization of the PED. All 26 items loaded strongly onto the ED factor, with the majority of items displaying factor loadings in excess of 0.60 thus generally satisfying the strict criteria outlined by Hair *et al.* (1998). By contrast, factor loadings for each of the four grouping factors were consistently low, with a number of items not reaching the level of statistical significance. These results provide unequivocal evidence that a large proportion of the variation within each observable indicator is attributable to a single ED latent variable, rather than as a result of any of the four grouping factors. It is therefore strongly recommended that on the basis of current results the PED be considered a unidimensional measure of ED, and that researchers avoid the construction of subscales in the scoring of the PED in subsequent research efforts.

In order to provide a thorough evaluation of the reliability of the PED, composite reliability analysis was conducted. The ED factor was found to possess extremely good internal reliability while the four grouping factors displayed noticeably lower reliability values, and in the case of both the Sadness and Depression factors, reliability was poor. These results provide further indication that within the current sample, the development of subscales is unwarranted.

The current analysis was conducted within a specialized sample and therefore current results may not be widely generalizable. Future studies will need to retest the factor structure of the PED among more diverse population groups in order to develop a more robust picture of the true underlying latent structure of this measure. It should be noted, however, that models 2 and 4 were found to be an almost adequate fit and therefore should still be considered alongside the bifactorial model as potential model solutions in future studies.

In conclusion, the current study provides initial evidence of the underlying factor structure of the PED and suggests that the PED is best conceptualized as a unidimensional measure of ED which includes four grouping/method factors that exist due to item heterogeneity. These findings indicate that the PED is not a valid method of capturing the qualitative distinctions between functional and dysfunctional negative emotions as described in REBT theory and its use is therefore questioned when investigating predictions of the binary model of emotions. However, the PED does appear to be a valid measure of ED, possessing excellent internal reliability, and of good practical value given its short length and ease of completion.

Declaration of Interest

None.

References

Akaike H (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control* **19**, 716–723.

Bagozzi RP, Yi Y (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science* **16**, 74–94.

Bentler P (1990). Comparative fit indexes in structural models. *Psychological Bulletin* **107**, 238–246.

Bollen KA (1989). *Structural Equations with Latent Variables.* New York: Wiley.

Chen FF, West SG, Sousa KH (2006). A comparison of bifactor and second-order models of quality-of-life. *Multivariate Behavioral Research* **41**, 189–225.

David D, Montgomery GH, Macavei B, Bovbjerg DH (2005*b*). An empirical investigation of Albert Ellis's binary model of distress. *Journal of Clinical Psychology* **61**, 499–516.

David D, Schnur J, Belloiu A (2002). Another search for the 'hot' cognitions: appraisal, irrational beliefs, attributions, and their relation to emotion. *Journal of Rational-Emotive and Cognitive-Behavior Therapy* **15**, 93–131.

David D, Schnur J, Birk J (2004). Functional and dysfunctional feelings in Ellis' cognitive theory of emotion: an empirical analysis. *Cognition and Emotion* **18**, 869–880.

David D, Szentagotai A, Kallay E, Macavei B (2005*a*). A synopsis of rational-emotive behavior therapy (REBT): fundamental and applied research. *Journal of Rational-Emotive and Cognitive-Behavior Therapy* **23**, 175–221.

Diamantopoulos A, Winklhofer HM (2001). Index construction with formative indicators: an alternative to scale development. *Journal of Marketing Research* **38**, 269–277.

DiLorenzo TA, David D, Montgomery GH (2011). The impact of general and specific rational and irrational beliefs on exam distress; a further investigation of the binary model of emotional distress as an emotional regulation model. *Journal of Cognitive and Behavioural Psychotherapies* **11**, 121–142.

Dryden W, Neenan M (2004). *Rational Emotive Behavioural Counselling in Action*, 3rd edn. London: Sage.

Ellis A (1994). *Reason and Emotion in Psychotherapy* (revised edn). Secaucus, NJ: Birch Lane.

Ellis A (2001). *Overcoming Destructive Beliefs, Feelings, and Behaviours: New Directions for Rational Emotive Behaviour Therapy*. Amherst, New York: Prometheus Books.

Ellis A, DiGiuseppe R (1993). Are inappropriate or dysfunctional feelings in rational-emotive therapy qualitative or quantitative? *Cognitive Therapy and Research* **5**, 471–477.

Hair Jr. JF, Anderson RE, Tatham RL, Black WC (1998). *Multivariate Data Analysis with Readings*, 5th edn. Englewood Cliffs, NJ: Prentice Hall.

Hu L, Bentler PM (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling* **6**, 1–55.

Jöreskog K, Sörbom D (1981). *LISREL V: Analysis of Linear Structural Relationships by the Method of Maximum Likelihood*. Chicago: National Educational Resources.

Jöreskog K, Sörbom D (1993). *LISREL 8: Structural Equation Modeling with the SIMPLIS Command Language*. Chicago, IL: Scientific Software International Inc.

Kline P (1994). *An Easy Guide to Factor Analysis*. London: Routledge.

Muthen LK, Muthen BO (1998–2010). *Mplus – Statistical Analysis with Latent Variables. User's Guide*, 6th edn. Los Angeles: Muthen and Muthen.

Opris D, Macavei B (2007). The profile of emotional distress: norms for the Romanian population. *Journal of Cognitive and Behavioral Psychotherapies* **7**, 139–158.

Raykov T (1998). Coefficient alpha and composite reliability with interrelated nonhomogeneous items. *Applied Psychological Measurement* **22**, 375–385.

Reise SP, Moore TM, Haviland MG (2010). Bifactor models and rotations: exploring the extent to which multidimensional data yield univocal scale scores. *Journal of Personality Assessment* **92**, 544–559.

Reise SP, Morizot J, Hays RD (2007). The role of the bifactor model in resolving dimensionality issues in health outcomes measures. *Quality of Life Research* **16**, 19–31.

Shevlin ME, Miles JNV, Davies MNO, Walker S (2000). Coefficient alpha: a useful indicator of reliability? *Personality and Individual Differences* **28**, 229–238.

Steiger JH (1990). Structural model evaluation and modification: an interval estimation approach. *Multivariate Behavioral Research* **25**, 173–180.

Tanaka JS (1987). 'How big is big enough?' Sample size and goodness of fit in structural equation models with latent variables. *Child Development* **58**, 134–146.

Tucker LR, Lewis C (1973). The reliability coefficient for maximum likelihood factor analysis. *Psychometrika* **38**, 1–10.

Wessler RL (1996). Idiosyncratic definitions and unsupported hypotheses: rational-emotive behavior therapy as pseudoscience. *Journal of Rational-Emotive & Cognitive-Behavior Therapy* **14**, 41–61.

Yung Y, Thissen D, McLeod LD (1999). On the relationship between the higher order factor model and the hierarchical factor model. *Psychometrika* **64**, 113–128.

Learning objectives

(1) To understand the impact of the binary model of emotions in the interpretation of the Profile of Emotional Distress (PED).
(2) To determine the factor structure of the PED, a novel measure of emotional distress associated strongly with Rational Emotive Behaviour Therapy (REBT). Identification of factors may help support the argument for a binary model of emotion regarding interpretation of the PED.
(3) To investigate the internal consistency of the PED through the use of composite reliability, a more statistically sophisticated approach than traditional measures such as Cronbach's α.

The Organization of Irrational Beliefs in Posttraumatic Stress Symptomology: Testing the Predictions of REBT Theory Using Structural Equation Modelling

Philip Hyland,[1] Mark Shevlin,[1] Gary Adamson,[1] and Daniel Boduszek[2]

[1] *University of Ulster*
[2] *University of Huddersfield*

Objective: This study directly tests a central prediction of rational emotive behaviour therapy (REBT) that has received little empirical attention regarding the core and intermediate beliefs in the development of posttraumatic stress symptoms. **Method:** A theoretically consistent REBT model of posttraumatic stress disorder (PTSD) was examined using structural equation modelling techniques among a sample of 313 trauma-exposed military and law enforcement personnel. **Results:** The REBT model of PTSD provided a good fit of the data, $\chi^2 = 599.173$, df = 356, $p < .001$; standardized root mean square residual = .05 (confidence interval = .04–.05); standardized root mean square residual = .04; comparative fit index = .95; Tucker Lewis index = .95. Results demonstrated that demandingness beliefs indirectly affected the various symptom groups of PTSD through a set of secondary irrational beliefs that include catastrophizing, low frustration tolerance, and depreciation beliefs. **Conclusions:** Results were consistent with the predictions of REBT theory and provides strong empirical support that the cognitive variables described by REBT theory are critical cognitive constructs in the prediction of PTSD symptomology. © 2013 Wiley Periodicals, Inc. J. Clin. Psychol. 00:1–12, 2013.

Keywords: rational emotive behaviour therapy (REBT); irrational beliefs; posttraumatic stress disorder (PTSD); structural equation modelling (SEM)

Rational emotive behaviour therapy (REBT; Ellis, 1994) is the original cognitive-behavioural model of psychopathology. REBT theory built upon Ellis' "ABC" model of emotional distress that states that cognitive-emotional-behavioural-physiological responses or consequences (C) are not the direct product of the adverse activating events experienced in our internal or external environments (A), but are rather the result of our evaluative or appraisal beliefs (B) about these activating events. According to REBT theory there are two main classes of evaluative beliefs; rational beliefs and irrational beliefs.

Rational beliefs reflect flexible and nonextreme evaluations of the events we experience in our day-to-day lives, whereas irrational beliefs reflect rigid, absolutistic, and extreme evaluations of various kinds of activating events (Dryden & Neenan, 2004). REBT theory predicts that if a person responds to a negative activating event with a set of rational beliefs, a series of functional and adaptive cognitive-emotional-behavioural-psychological consequences will arise. Alternatively, if a person holds a set of irrational beliefs about a given negative activating event, then a series of dysfunctional and maladaptive cognitive-emotional-behavioural-physiological responses will develop.

Contemporary REBT theory (see David, Ellis, & Lynn, 2010) describes four basic irrational belief processes that are hypothesised to interact with each other in a specific manner to bring about a psychopathological response. According to the model, the core psychological process in the emergence of psychopathology is the transformation of flexible "preferences" for goal fulfilment (rational beliefs) into rigid "demands" (irrational beliefs; Ellis, 1994; Wallen, DiGiuseppe,

Please address correspondence to: Philip Hyland, University of Ulster Magee, Northland Road Londonderry BT48 7JL, Northern Ireland. E-mail: philipehyland@gmail.com

Published online in Wiley Online Library (wileyonlinelibrary.com/journal/jclp). DOI: 10.1002/jclp.22009

& Dryden, 1992). This process of escalating flexible preference beliefs (e.g., "*I want to succeed at this task*") into rigid demandingness beliefs (e.g., "*I must succeed at this task*") is hypothesised to represent the core psychological process in the development of psychopathology (David et al., 2010; Soloman, Arnow, Gotlib, & Wind, 2003).

Demandingness beliefs as such are viewed as the primary irrational belief process and are predicted to give rise to a set of secondary irrational appraisal beliefs which are *extreme* in nature. These include catastrophizing beliefs, which describe the process of evaluating an event in the most extremely negative manner possible, low frustration tolerance beliefs, which involve a person terrifically underestimating his or her own ability to tolerate or cope with the distress of not having their demand met, and depreciation beliefs, which involve a person making overgeneralized, global negative evaluations of the self, others, and/or the world. REBT theory is explicit in stating that demandingness beliefs should affect various states of psychopathology indirectly through catastrophizing, low frustration tolerance, and/or depreciation beliefs (David et al. 2010; Ellis, 1994).

There is a great deal of evidence supporting the role of these irrational belief processes in a variety of psychopathological states (see Browne, Dowd, & Freeman, 2010 for a full review); however, substantially less empirical evidence exists with regards to the organization and interrelationships among irrational belief processes, despite the centrality of this issue in contemporary REBT theory.

David, Schnur, and Belloiu (2002) attempted to examine the interrelations of the irrational beliefs within the paradigm of Lazarus's (1991) Appraisal Theory of emotions and found that demandingness beliefs were highly correlated with primary appraisals, and more strongly associated with primary appraisals than with catastrophizing, low frustration tolerance, and depreciation beliefs. Furthermore, catastrophizing, low frustration tolerance, and depreciation beliefs were highly related to secondary appraisals. Their results suggested that demandingness beliefs are better represented as a primary appraisal mechanism, and catastrophizing, low frustration tolerance, and depreciation beliefs are better represented as secondary appraisal mechanisms. This study was then replicated within both clinical and nonclinical samples and similar patterns of results were observed (David, Ghinea, Macavei, & Kallay, 2005). Such results offered tentative support that the impact of demandingness beliefs on psychological distress may be mediated by catastrophizing, low frustration tolerance, and/or depreciation beliefs.

DiLorenzo, David, and Montgomery (2007) then specifically investigated the proposed mediational relationships between the irrational beliefs using meditational analytic methods suggested by Baron and Kenny (1986). DiLorenzo et al. (2007) conducted their analysis within a longitudinal research design that included 99 students experiencing exam-related anxiety measured at two time periods. Their analysis found that the effect of demandingness beliefs on psychological distress were fully mediated by catastrophizing beliefs and depreciation beliefs at both time periods, while low frustration tolerance beliefs fully mediated the relationship between demandingness beliefs and exam-related anxiety at time 1 but not at time 2.

Past research findings therefore offer support for the predictions of REBT theory regarding the organization of the irrational belief processes; however, given the central nature of this prediction to both REBT theory and therapy, far greater research is warranted. The purpose of the current study is to directly test this key prediction of REBT theory within a sample of trauma-exposed participants who are experiencing symptoms of posttraumatic stress disorder (PTSD), utilizing latent variable modelling techniques. No empirical work could be found that has directly assessed the role of irrational beliefs, as outlined in REBT theory, in the development or maintenance of PTSD symptomology. Given that these cognitive variables are unique and distinct from the types of cognitive variables described in the field of cognitive therapy (CT; see Hyland & Boduszek, 2012), which have informed current cognitive models of PTSD (e.g., Ehlers & Clark, 2000; Clark & Beck, 2011), the current study will add valuable and unique data to the scientific literature regarding the importance of irrational beliefs in PTSD. Additionally, the current study will be the first to utilize latent variable modelling procedures to assess the organization of the irrational beliefs and their direct and indirect effects on psychopathological outcomes.

Table 1
Descriptive Statistics, Cronbach Alpha, and Correlations Between Demandingness, Catastrophizing, Low Frustration Tolerance, Depreciation, Intrusions, Avoidance, Dysphoria, and Hyperarousal

	M	*SD*	1	2	3	4	5	6	7	8
1. Demandingness	7.06	3.71	(.88)							
2. Catastrophizing	7.30	3.75	.81	(.86)						
3. Low Frustration Tolerance	7.84	3.72	.84	.80	(.84)					
4. Depreciation	6.17	4.18	.81	.81	.73	(.95)				
5. Intrusions	3.52	3.28	.73	.71	.69	.69	(.86)			
6. Avoidance	1.34	1.62	.51	.56	.53	.52	.63	(.77)		
7. Dysphoria	5.12	5.41	.69	.69	.68	.67	.79	.60	(.90)	
8. Hyperarousal	1.44	1.78	.63	.63	.59	.60	.76	.54	.71	(.88)

Note. M = means; SD = standard deviation. All correlations are statistically significant ($p < .001$). Scale reliabilities are reported on the diagonal.

Method

Participants and Procedures

The sample included 212 males (67.7%) and 101 females (32.3%) and these individuals ranged in age from 23 to 65 years, with a mean age of 38.18 (standard deviation [*SD*] = 8.70). Participants were informed of the nature of the study being undertaken either by a member of the research team or an assigned liaison for a particular organization, and each participant's involvement in the research project was voluntary. Obligations were not placed upon potential respondents nor were any inducements employed to recruit the sample. Each participant was assured about confidentiality and those who chose to take part in the research project had the option of completing either an anonymous self-administered paper-and-pencil version of the questionnaire or an electronic version that was completed and returned via e-mail. The majority of respondents chose the paper-and-pencil option (63.26%, n = 198).

Materials

The Posttraumatic Stress Diagnostic Scale (PDS; Foa, Cashman, Jaycox, & Perry, 1997) is a 49-item self-report measure of the severity of posttraumatic stress symptomology related to a particular traumatic event. The PDS assess all aspects of a PTSD diagnosis from Criteria A to F as outlined in the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV; American Psychiatric Association, 1994). The PDS measures the nature of the traumatic experience, the duration of the experienced symptoms, the effect of the experienced symptoms on daily functioning, and the severity of the symptoms. Seventeen items measure each of the identified symptoms of PTSD along a 4-point Likert scale. Respondents rate the severity of each symptom from a score of 0 (*not at all or only one time*) to 3 (*5 or more times a week/almost always*). This produces a total range of scores from 0 to 51 with higher scores indicating higher levels of posttraumatic stress symptomology. The PDS possesses strong psychometric properties with Griffin, Uhlmansiek, Resick, and Mechanic (2004), demonstrating that it shares a strong correlation with the Clinician-Administered PTSD scale (Blake et al., 1995). Cronbach alpha levels for each subscale of the PDS are reported in Table 1.

The Abbreviated Version of the Attitudes and Belief Scale 2 (AV-ABS2; Hyland, Shevlin, Adamson, & Boduszek, 2013) is a 24-item self-report measure of rational and irrational beliefs, as defined by current REBT theory (David et al., 2010). The AV-ABS2 measures all four irrational belief processes (demandingness, catastrophizing, low frustration tolerance, and depreciation) and their corresponding four rational belief processes (preferences, noncatastrophizing, high frustration tolerance, and acceptance). Each subscale is measured via three items. Items of the AV-ABS2 include: "I must do well at important things, and I will not accept it if I do not do well" (demandingness); "It's awful to be disliked by people who are important to me, and it

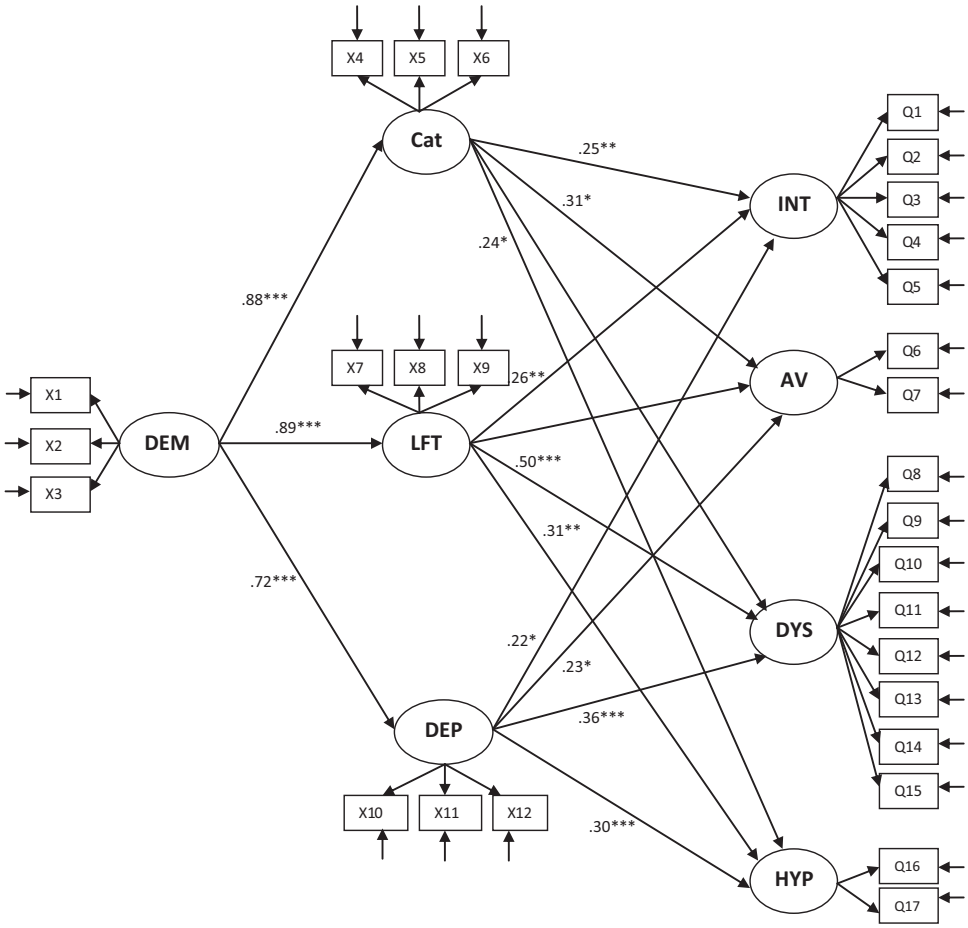


Figure 1. REBT model of posttraumatic stress symptomology.
Note. DEM = demandingness; CAT = catastrophizing; LFT = low frustration tolerance; DEP = depreciation; INT = intrusions; AV = avoidance; DYS = dysphoria; HYP = hyperarousal. X1- X12 = items included in the Abbreviated Version of the Attitudes and Belief Scale 2, Q1- Q17 = items included in Posttraumatic Diagnostic Scale. Statistical significance: *p < .05 **p < .01 ***p < .001.

is a catastrophe if they don't like me" (catastrophizing); "Its unbearable being uncomfortable, tense or nervous and I can't stand it when I am" (low frustration tolerance); and "If I do not perform well at tasks that are very important to me, it is because I am a worthless bad person" (depreciation).

The AV-ABS2 produces a total composite score for both rational and irrational as well as producing total scores on each of the individual rational and irrational belief processes. Item are scored along a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher scores in each case indicating higher levels of the respective variable. Possible scores for each subscale range from 3–15 with higher scores indicative of higher levels of each belief process. The AV-ABS2 exhibited satisfactory internal consistency with all subscales recording a Cronbach's Alpha level above .80 (see Table 1).

Analysis

As can be seen in Figure 1, the model under investigation in the current study represents the predictions of REBT theory in which demandingness beliefs are modelled as the primary

irrational belief process, and exert an indirect effect on posttraumatic stress symptoms (PTS) via catastrophizing, low frustration tolerance, and depreciation beliefs. Structural equation modelling (SEM) techniques were utilized to test this model. SEM is a combination of two analytical procedures: confirmatory factor analysis (CFA), which assesses the measurement component of a theoretical model, and path analysis, which assesses the relationship between latent variables. Within an SEM framework, the structural and measurement elements of analysis are estimated simultaneously (McCallum & Austin, 2000). A number of other features make the use of SEM procedures appropriate for the current analysis. These include controlling for systematic and random measurement error and the ability to simultaneous test for both direct and indirect effects within a model (Bollen, 1989; Kline, 2005). The SEM analysis was conducted in Mplus version 6.0 (Muthen & Muthen, 1998–2010) with robust maximum likelihood (MLR) estimation.

The overall fit of each model and the relative fit between models were assessed using a range of goodness-of-fit statistics and assessment of the appropriateness of the model parameters. The chi-square (χ^2) statistic assessed the sample and implied covariance matrix and a good fitting model is indicated by a nonsignificant result. However the chi-square statistic is strongly associated with sample size, and, as such, good models tend to be overrejected. Therefore, Tanaka (1987) suggested that a model should not be rejected simply on the basis of a significant chi-square result. Accordingly, it is recommended that researchers examine the ratio of the chi-square value to the degrees of freedom (df), and according to Klein (1994), any model with a $\chi 2$-to-df ratio of less than 3:1 indicates a good fitting model.

The comparative fit index (CFI; Bentler, 1990) and the Tucker Lewis index (TLI; Tucker & Lewis, 1973) are measures of how much better the model fits the data compared with a baseline model in which all variables are uncorrelated. For these indices values above .90 indicate reasonable fit, while values above .95 indicate good model fit (Bentler, 1990; Hu & Bentler, 1999). In addition, two more absolute indices are presented: the standardized root mean square residual (SRMR; Joreskog & Sorborn, 1981) and the root mean square error of approximation (RMSEA; Steiger, 1990). Ideally, these indices should be less than .05; however, values less than .08 also suggest adequate fit (Bentler, 1990; Hu & Bentler, 1999; Joreskog & Sorborn, 1993). Furthermore, Akaike information criterion (AIC; Akaike, 1974) was used to evaluate the alternative models, with the smaller value indicating the best fitting model. The CFI, RMSEA and the AIC all have explicit penalties for model complexity.

Results

Descriptive Statistics and Correlations

Descriptive statistics including means, standard deviations, and range for the all variables are presented in Table 1, together with Cronbach's alpha reliability results (Cronbach, 1951). Correlations between all variables are also presented. Results suggest that the current sample experienced relatively low-to-moderate levels of posttraumatic stress symptoms overall. Furthermore, moderate levels of each of the irrational belief process were observed among the current sample. Correlations between all measured variables were positive, statistically significant, and ranged from moderate to strong.

Measurement Models

Anderson and Gerbing (1988) state that it is necessary to determine the appropriate factor structure of any measure used in a study prior to investigating the structural model. Based on extensive findings regarding the factor structure of posttraumatic stress indicators (Yufik & Simms, 2010), three alternative model conceptualizations of the PDS (Foa et al., 1997) were specified and tested using CFA techniques. Model 1 is a four-factor solution (intrusions, avoidance, emotional numbing, and hyperarousal) first suggested by King, Leskin, King, and Weathers (1998). Model 2 is an alternative four-factor solution (intrusions, avoidance, dysphoria, hyperarousal) first suggested by Simms, Watson, and Doebbeling (2002). Model 3 is the DSM-

Table 2
Fit Indices for Factor Models of the PDS and AV-ABS2

Measure	χ^2	*df*	CFI	TLI	RMSEA	SRMR	AIC
PDS							
King et al.	208.115*	113	.96	.95	.05	.04	10357.414
Simms et al.	152.937*	113	.98	.98	.03	.03	10257.512
DSM-IV	269.955*	116	.93	.92	.07	.05	10439.115
AV-ABS2							
4 factor model	844.996*	246	.86	.84	.08	.09	21337.153
8 factor model	488.908*	224	.94	.92	.06	.05	20955.071
2nd order model	733.998*	243	.88	.87	.08	.08	21201.614

Note. PDS = Posttraumatic Stress Diagnostic Scale; AV-ABS2 = Abbreviated Version of the Attitudes and Belief Scale 2; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders; df = degree of freedom; χ^2 = chi square goodness of fit statistic; RMSEA = root-mean-square error of approximation; CI = confidence interval; AIC = Akaike information criterion; CFI = comparative fit index; TLI = Tucker Lewis index; SRMR = standardized square root mean residual.
*Indicates χ^2 are statistically significant ($p < .001$).

IV's three-factor solution (intrusions, avoidance and emotional numbing, and hyperarousal). As outlined in Table 2, the Simms et al. (2002) dysphoria model was found to be most accurate model solution demonstrating the most impressive fit statistics and the lowest AIC value.

Three distinct factorial models of the AV-ABS2 were compared. Model 1 is an eight-factor model represented by the four irrational belief processes (demandingness, catastrophizing, low frustration tolerance, and depreciation) and the four rational belief processes (preferences, non-catastrophizing, high frustration tolerance, and acceptance) with each factor measured via three items. Model 2 is a four-factor phenomenon comprised of the four irrational belief types with six items loading onto each factor. In this model the three items measuring the rational beliefs are expected to load onto their opposing irrational belief process. Model 3 is a second-order variation of Model 1 in which the four irrational belief factors load onto a single irrationality factor, and the four rational belief factors load onto a single rationality factor. CFA results suggested the intercorrelated eight-factor solution represented acceptable model fit across all indices and was superior to the other factorial solutions (see Table 2).

Additional support for both the PDS (Foa et al., 1997) and the AV-ABS2 was obtained through inspection of the model parameters. Standardized factor loadings were all statistically significant ($p < .001$), positive, and above .40 with the majority exceeding a value .60, thus generally satisfying the strict recommendations of Hair, Anderson, Tatham, and Black (1998) for factor loading requirements.[1]

Structural Model

The REBT model of PTS (Figure 1) was developed based upon the results obtained from the previous CFA analyses and included eight latent variables: demandingness, catastrophizing, low frustration tolerance, depreciation, intrusions, avoidance, dysphoria, and hyperarousal. The REBT-based model of PTS produced satisfactory model fit statistics–$\chi^2 = 599.173$, $df = 356$, $p < .001$; RMSEA = .05 (confidence interval [CI] = .04–.05); SRMR = .04; CFI = .95; TLI = .95–and explained 67% of the variance in intrusions, 50% of variance in avoidance, 67% of variance in dysphoria, and 56% of variance in hyperarousal.

Table 3 displays the standardized and unstandardized (direct and indirect) regression weights for the specified REBT SEM of PTS. As can be noted, demandingness beliefs had a strong,

[1]Standardized and unstandardized factor loadings (and standard errors) for the PDS and AV-ABS2 are not included for the sake of brevity but can be obtained by contacting the corresponding author.

Table 3
Standardized and Unstandardized Regression Weights (With Standard Errors) for the REBT-Based Structural Equation Model of Posttraumatic Stress Symptoms

Variables	β	B	*SE*
Direct influence			
Demandingness ⇒ catastrophizing	.89***	.91	.05
Demandingness ⇒ low frustration tolerance (LFT)	.89***	.94	.04
Demandingness ⇒ depreciation	.72***	1.01	.05
Catastrophizing ⇒ intrusions	.25**	.27	.18
LFT ⇒ intrusions	.26**	.16	.15
Depreciation ⇒ ntrusions	.22*	.08	.06
Catastrophizing ⇒ avoidance	.31*	.26	.15
LFT ⇒ avoidance	.26	.09	.16
Depreciation ⇒ avoidance	.23*	.06	.08
Catastrophizing ⇒ dysphoria	.05	.02	.08
LFT ⇒ dysphoria	.50***	.15	.06
Depreciation ⇒ dysphoria	.36***	.05	.03
Catastrophizing ⇒ hyperarousal	.24*	.34	.23
LFT ⇒ hyperarousal	.31**	.08	.18
Depreciation ⇒ hyperarousal	.30***	.09	.09
Indirect influence			
Demandingness ⇒ intrusions via catastrophizing	.22**	.14	.05
Demandingness ⇒ intrusions via LFT	.23**	.15	.06
Demandingness ⇒ intrusions via depreciation	.30***	.20	.04
Demandingness ⇒ avoidance via catastrophizing	.28*	.18	.09
Demandingness ⇒ avoidance via LFT	.23	.15	.08
Demandingness ⇒ avoidance via depreciation	.16*	.11	.05
Demandingness ⇒ dysphoria via catastrophizing	.04	.01	.02
Demandingness ⇒ dysphoria via LFT	.44***	.13	.03
Demandingness ⇒ dysphoria via depreciation	.26***	.08	.02
Demandingness ⇒ hyperarousal via catastrophizing	.21*	.16	.07
Demandingness ⇒ hyperarousal via LFT	.27**	.21	.08
Demandingness ⇒ hyperarousal via depreciation	.21***	.16	.05
R^2			
Intrusions $R^2 = .67$, SE = .04, $p < .001$; avoidance $R^2 = .50$, SE = .06, $p < .001$; dysphoria $R^2 = .67$, $p < .001$; hyperarousal $R^2 = .56$, SE = .06, $p < .001$;			
Fit indices			
$\chi^2 = 599.173$, df = 356, $p < .001$; RMSEA = .05 (CI = .04–.05); SRMR = .04; CFI = .95; TLI = .95)			

Note. SE = standard error; RMSEA = root-mean-square error of approximation; CI = confidence interval; df = degree of freedom; CFI = comparative fit index; TLI = Tucker Lewis index; SRMR = standardized square root mean residual.
*p < .05. **p < .01. ***p < .001.

direct effect on catastrophizing beliefs (β = .89, p < .001), low frustration tolerance beliefs (β = .89, p < .001), and depreciation beliefs (β = .72, p < .001). In terms of the direct effect of the secondary belief processes on intrusions, catastrophizing beliefs (β = .25, p < .01), low frustration tolerance beliefs (β = .26, p < .01), and depreciation beliefs (β = .22, p < .05) were all found to make positive, statistically significant contributions. With respect to avoidance symptoms, both catastrophizing beliefs (β = .31, p < .05) and depreciation beliefs (β = .23, p < .05) exerted a weak-to-moderate direct effect. In terms of symptoms of dysphoria, low frustration tolerance beliefs (β = .50, p < .001) and depreciation beliefs (β = .36, p < .001) were identified as strong and moderate direct predictors, respectively. Finally, catastrophizing beliefs (β = .24, p < .05), low frustration tolerance beliefs (β = .31, p < .01), and depreciation beliefs (β = .30, p < .001) all directly affected hyperarousal symptoms to a weak-to-moderate degree.

A number of positive, statistically significant, and indirect effects were also observed. An indirect relationship existed between demandingness beliefs and intrusions via catastrophizing beliefs ($\beta = .22$, $p < .01$), low frustration tolerance beliefs ($\beta = .23$, $p < .01$), and depreciation beliefs ($\beta = .30$, $p < .001$). Statistically significant indirect effects were also observed between demandingness beliefs and avoidance via catastrophizing beliefs ($\beta = .28$, $p < .05$) and depreciation beliefs ($\beta = .16$, $p < .05$). Additionally, statistically significant indirect effects were observed between demandingness beliefs and dysphoria via low frustration tolerance beliefs ($\beta = .44$, $p < .001$) and depreciation beliefs ($\beta = .26$, $p < .001$). And finally, statistically significant indirect effects were identified between demandingness beliefs and hyperarousal via catastrophizing beliefs ($\beta = .21$, $p < .05$), low frustration tolerance beliefs ($\beta = .27$, $p < .01$), and depreciation beliefs ($\beta = .21$, $p < .001$).

Discussion

The primary objective of the current study was to investigate the theoretical predictions of REBT with regards to the organization of the irrational beliefs hypothesised to be crucial in the pathogenesis of psychopathological symptoms. Moreover, the current study was performed to assess for the first time the importance of the cognitive variables outlined in REBT in the experience of PTSD symptomology.

To test REBT's theoretical model it was necessary to first establish the dimensionality and construct validity of both the PDS (Foa et al., 1997) and the AV-ABS2 using CFA techniques. This analysis was conducted to accommodate the required variables within an appropriate latent variable framework. Results of the CFA indicated that the PDS was best represented by the Simms et al. (2002) four-factor model, a finding consistent with the overall literature regarding the symptom structure of PTSD (Yufik & Simms, 2010). The AV-ABS2 was found to be most accurately explained by an eight-factor solution comprisingthe four irrational belief processes (demandingness, catastrophizing, low frustration tolerance, depreciation) and the four rational belief processes (preferences, noncatastrophizing, high frustration tolerance, acceptance). For the purposes of the current study, however, we considered only the four irrational beliefs within the respective structural model as we are concerned with establishing the organization of these variables in the emergence of psychological distress.

SEM results demonstrated that the REBT model of PTSD was a good fit of the data. The $\chi 2$-to-df ratio was less than 2:1, and the CFI, TLI, RMSEA, and SRMR results were all within ranges indicative of good model fit. This REBT model explained an impressive amount of variance in each of the four PTSD symptom groups. The irrational beliefs were found to explain 67% of variance in Intrusive symptoms, 50% of variance in avoidance symptoms, 67% of variance in dysphoria symptoms, and 56% of variance in hyperarousal symptoms. These findings strongly suggest that the cognitive factors described by REBT are critical cognitive constructs in the development and maintenance of PTSD symptomology.

In addition to identifying the importance of irrational beliefs in the prediction of posttraumatic stress symptomology, this study was primarily interested in identifying the organization of the irrational beliefs by investigating the indirect pathways between demandingness beliefs and the various symptom clusters of PTSD. Multiple indirect effects were observed from demandingness beliefs to intrusions, avoidance, dysphoria, and hyperarousal.

In the case of the relationships between demandingness beliefs and the intrusions and hyperarousal symptom clusters, respectively, indirect effects were observed for all three secondary irrational belief processes. Whereas in the relationship between demandingness beliefs and avoidance symptoms, indirect effects were observed for catastrophizing and depreciation beliefs, and in the relationship between demandingness beliefs and dysphoria symptoms, indirect effects were observed for low frustration tolerance and depreciation beliefs. These results are consistent with the predictions of REBT theory (David et al., 2010; Ellis, 1994; Wallen et al., 1992) and are generally in line with previous research findings.

Current results lend support to the view that demandingness beliefs appear to be the primary irrational belief process and affect the various symptom groups of PTSD in an indirect manner via a variety of the secondary belief process. DiLorenzo et al. (2007) previously found the

catastrophizing and depreciation beliefs served to mediate the relationship between demandingness beliefs and exam-related anxiety. Past and current results thus indicate that the relationship between demandingness beliefs and various psychopathological states will likely not always be mediated via all three secondary irrational belief processes, but rather unique and distinct patterns of relationships between the primary and secondary are likely to exist depending upon the nature of the psychological distress under investigation.

David et al. (2002) have previously presented theoretical predictions of the nature of the relationship between the irrational beliefs in the development of anxiety and depressive disorders and current results offer novel evidence that each of the four irrational belief types are critical cognitive variables in posttraumatic stress symptomology. Identification of the critical irrational beliefs in the prediction of psychopathology has important clinical implications as clinical strategies can be focused only on the most relevant irrational belief processes. Based on current results, intrusion and hyperarousal symptoms may be best treated through the targeted modification of demandingness beliefs along with all secondary irrational belief processes. Alleviation of avoidance symptoms could be best achieved through the reduction of demandingness, castastrophizing, and depreciation beliefs; while symptoms of dysphoria may well best respond to the reduction in levels of demandingness, low frustration tolerance and depreciation beliefs.

Ellis (1987, 1994) consistently argued that demandingness beliefs lie at the core of all forms of psychological disturbances and should affect various states of psychopathology through catastrophizing, low frustration tolerance, and depreciation beliefs. This hypothesis courted considerable criticism from many within the cognitive-behavioural therapy (CBT) community (e.g., Brown & Beck, 1989; Padesky & Beck, 2003), who asserted that while demandingness beliefs can sometimes play a role in the emergence of some forms of psychopathology, demandingness beliefs by no means represent a core psychological construct in all types of psychopathology. Little evidence currently exists to either support or refute this rather grand claim; however, Soloman et al. (2003) previously produced evidence to support the primacy of demandingness beliefs in the major depressive disorder, and current results provide tentative evidence for the importance of conceptualizing demandingness beliefs as a critical core psychological construct in PTSD.

Currently, cognitive models of PTSD (e.g., Clark & Beck, 2010; Ehlers & Clark, 2000; Resick & Schnicke, 1993) and measures of specific cognitions relevant to PTSD (e.g., Foa, Ehlers, Clark, Tolin, & Orsillo, 1999; Najavits, Gotthardt, Weiss, & Epstein, 2004; Vogt, Shipherd, & Resick, 2012) make no explicit accommodation of demandingness beliefs. Because empirically validated CBT treatment protocols derive directly from these theoretical models, current results suggest the possibility of improving theoretical understandings and potentially developing more efficacious treatment approaches if consideration of demandingness cognitions were included within relevant theoretical and therapeutic models of PTSD; however, substantially greater research would be required to better establish the validity of this possibility.

The current study contains a number of limitations that ought to be considered. The nature of the sample is limited to a very specific strata of the population (law enforcement, military, and emergency service personnel), thus generalizations of current findings to the wider population is problematic. In particular, the professions from which the sample were drawn may have influenced the level of demandingness beliefs observed; therefore, future research efforts should seek to replicate the current study among more diverse population groups to develop more robust and reliable conclusions.

Additionally, a self-report measure of PTSD symptomology was used and although self-report measures of PTSD such as the PDS (Foa et al., 1997) used in the current study have been shown to highly correspond with clinician-administered measures (Griffin et al., 2004), clinician-based measures would have been preferable as they are considered the gold standard method of assessing PTSD symptomology. Given the cross-sectional design of the current study, it was possible to investigate only indirect effects rather than testing mediational pathways, which REBT theory specifically states. Although current findings provide good support for the REBT model, longitudinal research designs will be necessary to more fully establish the mediational effects of catastrophizing, low frustration tolerance, and depreciation beliefs in the relationship between demandingness beliefs and PTSD symptomology.

In conclusion, this study substantially contributes to the scientific literature in a number of important ways. The current study is the first of its kind to apply latent variable modelling techniques to determine the organization and interrelations of the irrational beliefs described in REBT theory, and as such offer additional and methodologically rigorous support for the core predictions of REBT theory. These findings are also the first to provide empirical support for REBT theory regarding the importance of the irrational beliefs in posttraumatic stress responses. Findings from the present study also offer the possibility that theoretical and clinical improvements to current CBT models of PTSD might be obtained by considering the important role played by demandingness beliefs in the development and maintenance of posttraumatic stress symptoms.

References

Akaike, H. (1974). A new look at the statistical model identification. IEEE Transactions on Automatic Control, 19(6), 716–723.

American Psychiatric Association (1994). Diagnostic and statistical manual of mental disorders. (4th ed.). Washington, DC: Author.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. Psychological Bulletin, 103, 411–423.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology, 51, 1173–1182.

Beck, A. T. (1987). Cognitive models of depression. Journal of Cognitive Psychotherapy, 1, 5–37.

Bentler, P. M. (1990). Comparative fit indices in structural models. Psychological Bulletin, 107, 238–246.

Blake, D. D., Weathers, F. W., Nagy, L. M., Kaloupek, G. D., Charney, D. S., & Keane, T. M. (1998). The Clinican-Administered PTSD Scale for DSM-IV. Boston, MA: National Centre for PTSD, Behavioural Science Division.

Bollen, K. A. (1989). Structural equations with latent variables. New York, NY: Wiley.

Browne, C. M., Dowd, E. T., & Freeman, A. (2010). Rational and irrational beliefs and psychopathology. In David, D., Lynn, S. J., & Ellis, A. Rational and irrational beliefs: Research, theory, and clinical practice (pp. 3–22). New York, NY: Oxford University Press.

Browne, M. W., & Cudeck, R. (1989). Single sample cross-validation indices for covariance structures. Multivariate Behavioral Research, 24, 445–455.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), Testing structural equation models (pp. 136–162). Newsbury Park, CA: Sage.

Brown, G. B., & Beck, A. T. (1989). The role of imperatives in psychopathology: A reply to Ellis. Cognitive Therapy and Research, 13, 315–321.

Clark, D. A., & Beck, A. T. (2010). Cognitive therapy of anxiety disorders. London, UK: The Guilford Press.

Cohen, J., & Cohen, P. (1983). Applied multiple regression/correlation analysis for the behavioral sciences (2nd Ed.). Hillsdale, NJ: Erlbaum.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16, 297–334.

David, D., Ghinea, C., Macavei, B., & Kallay, E. (2005). A search for "hot" cognitions in a clinical and non-clinical context: Appraisal, attributions, core relational themes, irrational beliefs, and their relations to emotion. Journal of Cognitive and Behavioral Psychotherapies, 5, 1–42.

David, D., Lynn, S. J., & Ellis, A. (2010) Rational and irrational beliefs: Research, theory, and clinical practice. New York, NY: Oxford University Press.

David, D., Schnur, J., & Belloiu, A. (2002). Another search for the "hot" cognitions: Appraisal, irrational beliefs, attributions, and their relation to emotion. Journal of Rational-Emotive and Cognitive-Behavior Therapy, 15, 93–131.

David, D., & Szentagotai, A. (2006). Cognition in cognitive-behavioral psychotherapies (CBT): Toward an integrative model. Clinical Psychology Review, 3, 284–298.

DiLorenzo, T. A., David, D., & Montgomery, G. H. (2007). The interrelations between irrational cognitive processes and distress in stressful academic settings. Personality and Individual Differences, 42, 765–777.

Dryden, W., & Neenan, M. (2004). Rational emotive behavioural counselling in action (3rd ed.). London, UK: Sage.

Ehlers, A., & Clark, D. M. (2000). A cognitive model of persistent posttraumatic stress disorder. Behaviour Research and Therapy, 38, 319–345.

Ellis, A. (1987). A sadly neglected cognitive element in depression. Cognitive Therapy and Research, 11, 121–145.

Ellis, A. (1994). Reason and emotion in psychotherapy (rev. ed.). Secaucus, NJ: Birch Lane.

Foa, E., Cashman, L., Jaycox, L., & Perry, K. (1997). The validation of a self-report measure of PTSD: The Posttraumatic Diagnostic Scale. Psychological Assessment, 9, 445–451.

Foa, E. B., Ehlers, A., Clark, D. M., Tolin, D. F., & Orsillo, S. M. (1999). The Posttraumatic Cognitions Inventory (PTCI): Development and validation. Psychological Assessment, 11, 303–314.

Griffin, M. G., Uhlmansiek, M. H., Resick, P. A., & Mechanic, M. B. (2004). Comparison of the Posttraumatic Diagnostic Scale versus the Clinician-Administered Posttraumatic Stress Disorder Scale in domestic violence survivors. Journal of Traumatic Stress, 17, 497–503.

Hair, J. F., Jr., R. E. Anderson, R. L. Tatham, & W. C. Black (1998). Multivariate Data Analysis with Readings, 5th Edition. Englewood Cliffs, NJ: Prentice Hall.

Hu, L., & Bentler, P. (1998). Fit indices in covariance structural modeling: Sensitivity to underparameterized model misspecification. Psychological Methods, 3, 424– 453.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling, 6, 1–55.

Hyland, P., & Boduszek, D. (2012). Resolving a difference between Cognitive Therapy and Rational Emotive Behaviour Therapy: Towards the development of an integrated CBT model of psychopathology. Mental Health Review Journal, 17, 104–117.

Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2013, in press). Modelling the factor structure of the Attitudes and Belief Scale 2: Toward the development of an abbreviated version. Cognitive Behaviour Therapy.

Joreskog, K., & Sorbom, D. (1981). LISREL V: Analysis of linear structural relationships by the method of maximum likelihood. Chicago, IL: National Educational Resources.

King, D., Leskin, G., King, L., & Weathers, F. (1998). Confirmatory factor analysis of the clinician administered PTSD Scale: Evidence for the dimensionality of posttraumatic stress disorder. Psychological Assessment, 10, 90–96.

Kline, P. (1994). An easy guide to factor analysis. London / New York: Routledge.

Kline, R. B. (2005). Principles and practice of structural equation modeling (2nd Ed.). London, UK: The Guilford Press.

Lazarus, R. (1991). Emotion and adaptation. New York, NY: Oxford University Press.

MacCallum, R. C., & Austin, J. T. (2000). Applications of structural equation modeling in psychological research. Annual Review of Psychology, 51, 201–226.

Muthen, L. K., & Muthen, B. O. (1998–2010). Mplus – Statistical Analysis with Latent Variables. User's Guide (6th Ed). Los Angeles, CA: Muthen and Muthen.

Najavits, L. M, Gotthardt, S., Weiss, R. D., & Epstein, M. (2004).Cognitive distortions in the dual diagnosis of PTSD and substance use disorder. Cognitive Therapy and Research, 28, 159–172.

Padesky, C. A., & Beck, A. T. (2003). Science and philosophy: Comparison of cognitive therapy and rational emotive behaviour therapy. Journal of Cognitive Psychotherapy, 17, 211–224.

Resick, P. A., & Schnicke, M. K. (1993). Cognitive processing therapy for rape victims: A treatment manual. Newbury Park, CA: Sage.

Simms, L. J., Watson, D., & Doebbeling, B. N. (2002). Confirmatory factor analyses of posttraumatic stress symptoms in deployed and nondeployed veterans of the Gulf war. Journal of Abnormal Psychology, 111, 637–647.

Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. Multivariate Behavioural Research, 25, 173–180.

Tanaka, J. S. (1987). "How big is big enough?" Sample size and goodness of fit in structural equation models with latent variables. Child Development, 58, 134–146.

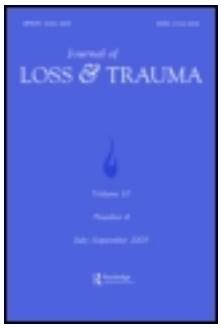
Tucker, L. R., & Lewis, C. (1973). The reliability coefficient for maximum likelihood factor analysis. Psychometrika, 38, 1–10.

Vandenberg, R. J. (2002). Toward a further understanding of an improvement in measurement invariance methods and procedures. Organizational Research Methods, 5, 139–158.

Vogt, D. S., Shipherd, J. C., & Resick, P. A. (2012). Posttraumatic maladaptive beliefs scale: Evolution of the personal beliefs and reactions scale. Assessment, 9, 308–317.

Wallen, S., DiGiuseppe, R., & Dryden, W. (1992). A practitioner's guide to rational-emotive therapy. New York, NY: Oxford Press.

Yufik, T., & Simms, L. J. (2010). A meta-analytic investigation of the structure of posttraumatic stress disorder symptoms. Journal of Abnormal Psychology, 119, 764–776.



Journal of Loss and Trauma: International Perspectives on Stress & Coping
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/upil20

Irrational Beliefs in Posttraumatic Stress Responses: A Rational Emotive Behavior Therapy Approach

Philip Hyland [a] , Mark Shevlin [a] , Gary Adamson [a] & Daniel Boduszek [b]
[a] School of Psychology , University of Ulster , Londonderry , United Kingdom
[b] Department of Behavioural and Social Sciences , University of Huddersfield , Huddersfield , United Kingdom
Accepted author version posted online: 07 Dec 2013.Published online: 07 Dec 2013.

To cite this article: Philip Hyland , Mark Shevlin , Gary Adamson & Daniel Boduszek (2013): Irrational Beliefs in Posttraumatic Stress Responses: A Rational Emotive Behavior Therapy Approach, Journal of Loss and Trauma: International Perspectives on Stress & Coping, DOI: 10.1080/15325024.2013.839772

To link to this article: http://dx.doi.org/10.1080/15325024.2013.839772

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Philip Hyland[1], Mark Shevlin[1], Gary Adamson[1], Daniel Boduszek[2]

[1]School of Psychology, University of Ulster, Londonderry, United Kingdom,

[2]Department of Behavioural and Social Sciences, University of Huddersfield, Huddersfield, United Kingdom

Philip Hyland is a researcher at the University of Ulster with a special interest in investigating the validity cognitive-behavioural models of anxiety and stress disorders. He is also the co-founder and Associate Editor of the Journal of Criminal Psychology. **Mark Shevlin** is a professor of psychology at the Psychology Research Institute in the University of Ulster. His research interests involve applying advanced statistical analytic techniques in the areas of traumatic stress responses and psychotic experiences. **Gary Adamson** is a professor of psychology at the Psychology Research Institute in the University of Ulster. His research interests involve applying advanced statistical analytic techniques in the areas psychological epidemiology and mental health. **Daniel Boduszek** is lecturer in criminal psychology at the University of Huddersfield. His research interests lie in the area of criminal psychology and mental health. He is the co-founder and Editor-In-Chief of the Journal of Criminal Psychology.

Received 7-16-13, accepted 8-27-13

Correspondence to: Philip Hyland, University of Ulster Magee campus. Northland Road, Londonderry BT48 7JL, Northern Ireland, philipehyland@gmail.com

KEYWORDS: Rational Emotive Behaviour Therapy (REBT), irrational beliefs, dysfunctional cognitions, posttraumatic stress disorder (PTSD), structural equation modelling (SEM)

Abstract

The current study aimed to test a key theoretical prediction of Rational Emotive Behaviour Therapy theory by assessing the role of general and trauma-specific irrational beliefs in the prediction of posttraumatic stress responses. A sample (N = 313) of trauma-exposed emergency service workers participated in the study. Structural equation modelling results demonstrated that an REBT-based model provided satisfactory model fit and explained 89% of variance in posttraumatic stress symptomology. Theoretical predictions were supported with results demonstrating that general-level irrationality indirectly impacted posttraumatic stress responses via a set of trauma-specific irrational beliefs. Results indicate the importance of irrational beliefs in predicting posttraumatic stress responses.

INTRODUCTION

Substantial empirical evidence has been obtained to support both the efficacy and effectiveness of trauma-focused cognitive-behavioural therapy (TF-CBT) for posttraumatic stress disorder (PTSD; Bisson, Ehlers, Matthews, Pilling, Richards & Turner, 2007; Hofmann, Asnaani, Vonk, Sawyer & Fang, 2012). Therapeutic strategies

for treating PTSD derive directly from theoretical cognitive models. In Ehlers and Clark's (2000) highly influential model of PTSD two cognitive processes are deemed critical in the development and maintenance of the disorder. First, there is an overly negative interpretation of the traumatic event and its sequelea, and second, there is a poor elaboration of the memory of the traumatic incident and insufficient integration of the trauma memory within one's autobiographical memory.

Clark and Beck (2010) have presented an updated cognitive model of PTSD in which traumatic experiences are hypothesised to interact with pre-existing schematic vulnerability factors. This gives rise to a range of maladaptive beliefs about the self, others, the world, the future, and the traumatic event itself. The presence of these belief systems has a negative impact on a number of cognitive processes leading to faulty trauma memories and attentional cognitive biases towards threatening stimuli. Such processes are hypothesised to produce the characteristic intrusive and hyperarousal symptoms which are consequently appraised in a negative manner leading to maladaptive behavioural control strategies which involve avoidance and emotion control/suppression efforts.

A range of psychometrically validated measures of specific cognitions relevant to PTSD derived from these theoretical models have been developed (e.g., Foa, Ehlers, Clark, Tolin & Orsillo, 1999; Vogt, Shipherd & Resick, 2012). In a recent study based upon the Ehlers and Clark (2000) model of PTSD, Kleim et al. (2013), utilizing sophisticated latent growth modelling procedures, demonstrated for the first time that changes in

dysfunctional cognitions (as measured by a shortened version of the Posttraumatic Cognition Inventory) significantly predicted subsequent reductions in PTSD symptomology. These findings strongly support the role of dysfunctional cognitions as key mechanisms of change in PTSD symptomology.

These cognitive models of PTSD are all based upon the general theoretical foundation of Beck's Cognitive Therapy model of psychopathology (e.g., Beck, 2011). An alternative CBT model of psychopathology which has received comparatively little empirical attention in the context of PTSD is Ellis' Rational Emotive Behaviour Therapy (REBT; Ellis, 2001). Although the theoretical models of Cognitive Therapy and REBT share much in common, important differences do exist, particularly with respect to the key etiopathogenetic cognitive variables in the development and maintenance of psychopathology (Hyland & Boduszek, 2012). Investigation of the role of the cognitive variables outlined in REBT theory offers the possibility of identifying additional critical dysfunctional cognitions associated with PTSD symptomology.

From the perspective of REBT theory the current cognitive models and psychometric measures of PTSD are incomplete. Contemporary REBT theory (David, Lynn & Ellis, 2010) describes four main irrational belief processes: (i) Demandingness beliefs are rigid imperatives directed toward the self, others, or the external environment for how things "must be", "have to be", "ought to be", or "absolutely should be": (ii) Catastrophizing beliefs are extreme negative evaluations of unpleasant life events: (iii) Low Frustration Tolerance beliefs involve appraisals of a negative event as unbearable and intolerable:

and (iv) Depreciation beliefs reflect global negative evaluations of the self, others, and of life events. REBT theory proposes that Demandingness beliefs represent the core cognitive construct in the emergence and maintenance of psychopathological responses and their impact on such outcomes will be mediated through the secondary irrational belief processes of Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs (David, Schnur & Belloiu, 2002; DiLorenzo, David & Montgomery, 2007). Recent empirical findings have provided further support for this hypothesised organisation of the irrational beliefs specifically in the context of PTSD. Through the application of structural equation modelling techniques Hyland, Shevlin, Adamson, and Boduszek (2013a) demonstrated that Demandingness beliefs indirectly impacted on each symptom group of PTSD via each of the secondary irrational belief processes.

The majority of evidence that exists in support of the predictions of REBT theory has been obtained through empirical investigation of the role of general-level irrational beliefs. REBT theory however predicts that disorder-specific variants of the irrational beliefs should mediate the impact of more generalised forms of irrational beliefs on emotional distress (Dryden, 2009), and that disorder-specific irrational beliefs should act as superior predictors of psychopathology as compared to the more generalised forms utilized in most research programs. Unfortunately very little research has been undertaken within the REBT domain to explore this central hypothesis.

DiLorenzo, David and Montgomery (2011) investigated the differential contributions of general-level and disorder-specific irrational beliefs in the emergence of exam related

distress among 86 female students at two time periods (T1: start of term, and T2: immediately prior to the sitting of an exam at the end of term). They found that disorder-specific irrational beliefs were a better predictor of exam related distress than were general-level irrational beliefs when distress was measured immediately prior to the taking of an exam. When exam-related distress was measured at time 1 (start of term) neither general-level nor disorder-specific irrational beliefs had an independent effect on distress. These results suggest that disorder-specific irrational beliefs make a contribution to the explanation of distress beyond the contribution of general-level irrational beliefs.

Moldovan (2009) examined the mediating role of specific illness related irrational beliefs in the relationship between general-level irrational beliefs and emotional distress. This study included a small sample of 56 cancer and type-II diabetes patients. Moldovan's results found that illness-specific irrational beliefs fully mediated the relationship between general-level irrational beliefs and depression, anxiety, and stress levels, respectively. Although these findings are consistent with the predictions of REBT theory, the low sample size and use of a cross-sectional research design in the establishment of mediation means that substantially more research is required in order to corroborate these findings.

REBT theory has been criticised (Padesky & Beck, 2003) as an overly monolithic therapy that is not well suited to adequately conceptualising the unique cognitive features of specific disorders such as PTSD due its focus on just a few core irrational belief processes. David, Szentagotai, Kallay and Macavei (2005) responded to this criticism by

pointing out that while REBT theory fully incorporates the "cognitive content specificity hypothesis" of Cognitive Therapy theory (Riskind, 2004), the advantage of a reductionist approach favoured by REBT is an ability to explain the development of a range of psychological disorders in terms of the interactions between just a few irrational belief processes. David et al. (2005) point out that the REBT approach is similar to the approach to understanding psychopathology employed within the field of neuroscience where various forms of psychopathology are explained in terms of a small group of neurotransmitters, and the interactions that take place between them. David, Schnur and Belloiu (2002) have put forth a proposed model for the development of specific disorders based upon the interplay between the primary (Demandingness) and secondary (Catastrophizing, Low Frustration Tolerance, and Depreciation) general-level irrational belief processes. Depression, for example, is hypothesised to involve Demandingness and self-Depreciation beliefs, while anxiety disorders are hypothesised to involve relationships between Demandingness beliefs and Catastrophizing and/or Low Frustration Tolerance beliefs. Research testing these individualised REBT models of psychopathology is still in its infancy and little empirical research exists to either confirm or reject the predictions of David and his colleagues (2002). Another plausible route towards the development of disorder-specific REBT models of psychopathology is the inclusion of disorder-specific variants of the irrational beliefs within a respective theoretical model.

The REBT research community has unquestionably failed to keep pace with the Cognitive Therapy community in terms of developing disorder-specific cognitive models

of psychopathology. However, given the degree of empirical support for REBT theory and the importance of identifying additional dysfunctional cognitive processes associated with posttraumatic stress symptomology, investigation of the cognitive variables outlined in REBT theory appears highly warranted. Interestingly, in recent years a good deal of empirical work has indicated the importance of 'distress intolerance' beliefs in posttraumatic stress responses (Marshall-Berenz, Vujanovic, Bonn-Miller, Bernstein & Zvolensky, 2010; Vujanovic, Bonn-Miller, Potter, Marshall-Berenz & Zvolensky, 2011), a cognitive variable that shares a substantial degree of conceptual overlap with Low Frustration Tolerance beliefs.

The current study includes two primary objectives. The first is to test a central theoretical prediction of REBT theory regarding the indirect relationship between general-level irrational beliefs and posttraumatic stress responses via a set of trauma-specific irrational beliefs. The second objective is to provide evidence to the wider CBT community regarding the important role of irrational beliefs, as described by REBT theory, in posttraumatic stress responses. The hypothesised indirect relationship between general-level irrational beliefs and posttraumatic stress symptoms via trauma-specific irrational beliefs will be investigated using structural equation modelling (SEM) techniques. Two alternative models will be tested; the first is a fully indirect model while the second assumes both a direct effect of general-level irrational beliefs on posttraumatic stress symptomology along with an indirect effect through trauma-specific irrational beliefs.

METHODS

Participants And Procedures

The sample for the current study consisted of three hundred and thirteen (N = 313) trauma-exposed emergency service personnel (police, military, and related emergency service workers) recruited from active duty while serving in the Republic of Ireland and the Republic of Kosovo over a twelve month period (June 2011 – June 2012). All participants in the current study had experienced a 'Criterion A' trauma as outlined in the *Diagnostic and Statistical Manual of Mental Disorders IV-Text Revised* (DSM-IV-TR: American Psychiatric Association, 2000). The most commonly reported traumatic event was being involved in a serious accident (60.4%, n = 189), followed by a non-sexual assault by a stranger (56.9%, n = 178), and military combat (42.5%, n = 133). The sample included 212 males (67.7%) and 101 females (32.3%) and these individuals ranged in age from 23 to 65, with a mean age of 38.18 years (SD = 8.70). Participants were informed of the nature of the study either by a member of the research team or an assigned liaison for a particular organisation, and each participant's involvement in the research project was voluntary. No obligations were placed upon potential respondents nor were any inducements employed to recruit the sample. *Materials*

The Posttraumatic Stress Diagnostic Scale (PDS: Foa, Cashman, Jaycox & Perry, 1997) is a 49-item self-report measure of the severity of posttraumatic stress symptomology related to a particular traumatic event. The PDS assess all aspects of a PTSD diagnosis from Criteria A to F as outlined in the DSM-IV-TR (American Psychiatric Association, 2000). The PDS measures the nature of the traumatic experience, the duration of the

experienced symptoms, the impact of the experienced symptoms on daily functioning, and the severity of the symptoms. Seventeen items measure each of the identified symptoms of PTSD along a four-point Likert scale. Respondents rate the severity of each symptom from a score of 0 ("not at all or only one time") to 3 ("5 or more times a week / almost always"). This produces a total range of scores from 0 to 51 with higher scores indicating higher levels of posttraumatic stress symptomology. The PDS possess strong psychometric properties with Griffin, Uhlmansiek, Resick, and Mechanic (2004) demonstrating that it shares a strong correlation (r = .71) with the Clinician-Administered PTSD scale (Blake et al., 1995).

The Abbreviated Version of the Attitudes and Belief Scale 2 (AV-ABS2: Hyland, Shevlin, Adamson & Boduszek, 2013b) is a 24-item self-report measure of general rational and irrational beliefs, as defined by current REBT theory (David et al., 2010). The AV-ABS2 measures all four Irrational Belief processes (Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciation) and all four Rational Belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance). Each subscale is measured via three items. The construct validity of the AV-ABS2 has been demonstrated in a previous confirmatory factor analytic study (Hyland et al., 2013b), and its psychometric properties were demonstrated to be superior to the full length Attitudes and Beliefs Scale-2 (DiGiuseppe, Leaf, Exner, & Robin, 1988). Items of the AV-ABS2 include, "*I must do well at important things, and I will not accept it if I do not do well*" (Demandingness): "*It's awful to be disliked by people who are important to me, and it is a catastrophe if they don't like me*" (Catastrophizing): "*Its unbearable being*

uncomfortable, tense or nervous and I can't stand it when I am" (Low Frustration Tolerance): and "*If I do not perform well at tasks that are very important to me, it is because I am a worthless bad person*" (Depreciation). Items are scored along a five-point Likert scale from 1 ("Strongly Disagree") to 5 ("Strongly Agree"), with higher scores in each case indicating higher levels of the respective variable. Possible scores of each subscale range from 3-15. The AV-ABS2 exhibited satisfactory internal consistency with all subscales recording a Cronbach's Alpha level above .80.

In order to measure trauma-specific variants of each of the four irrational belief processes a new scale called the *Trauma-Related Irrational Belief Scale* (TRIBS) was constructed for the current study (see Appendix A for the full scale). The TRIBS is an 8-item self-report measure of irrational beliefs specifically related to the experience of a traumatic life event. The scale was constructed in accordance with guidelines set forth by Montgomery, et al. (2007) in the development of their 'Exam-Related Belief Scale' which was used to capture rational and irrational beliefs specifically related to the context of exam-related distress. The TRIBS includes sub-scales for each of the four irrational belief processes and each belief process is measured via two items. Items of the TRIBS are scored along a five-point Likert scale from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). Items 4 and 6 included in the scale were scored in a reverse direction. Scores on each subscale range from 2-10 with higher scores reflecting higher levels of irrationality. Internal consistency for the full scale was satisfactory ($\alpha = .95$), and each of the subscales also yielded acceptable results with all alpha levels exceeding .80.

Analysis

Descriptive statistics and preliminary analysis were conducted within Statistical Package for the Social Sciences (SPSS) 20. The theoretical models illustrated in figures 1 and 2, respectively, were analysed using structural equation modelling (SEM) techniques. SEM is a combination of two analytical procedures; confirmatory factor analysis (CFA) which assesses the measurement component of a theoretical model, and path analysis which assesses the relationship between latent variables. Within an SEM framework, the structural and measurement elements of analysis are estimated simultaneously (McCallum & Austin, 2000). A number of other features make the use of SEM procedures appropriate for the current analysis. These include controlling for systematic and random measurement error and the ability to simultaneous test for both direct and indirect effects within a model (Bollen, 1989). The SEM analysis was conducted in Mplus version 6.0 (Muthen & Muthen, 1998 – 2010) with Robust Maximum Likelihood (MLR) estimation.

The overall fit of each model and the relative fit between models were assessed using a range of goodness-of-fit statistics and assessment of the appropriateness of the model parameters. The chi-square ($\chi 2$) statistic assessed the sample and implied covariance matrix and a good fitting model is indicated by a non-significant result. However the chi-square statistic is strongly associated with sample size, and as such good models tend to be over-rejected. Therefore Tanaka (1987) suggested that a model should not be rejected simply on the basis of a significant chi-square result. Accordingly, it is recommended that researchers examine the ratio of the chi-square value to the degrees of freedom (df), and

according to Klein (1994), any model with a $\chi 2$-to-df ratio of less than 3:1 indicates a good fitting model. The Comparative Fit Index (CFI; Bentler, 1990) and the Tucker Lewis Index (TLI; Tucker & Lewis, 1973) are measures of how much better the model fits the data compared to a baseline model where all variables are uncorrelated. For these indices values above .90 indicate reasonable fit while values above .95 indicate good model fit (Bentler, 1990; Hu & Bentler, 1999). In addition, two more absolute indices are presented; the standardized root mean-square residual (SRMR: Joreskog & Sorborn, 1981) and the root mean-square error of approximation (RMSEA: Steiger, 1990). Ideally these indices should be less than .05 however values less than .08 also suggest adequate fit (Bentler, 1990; Hu & Bentler, 1999; Joreskog & Sorborn, 1993). Furthermore, Akaike Information Criterion (AIC; Akaike, 1974) was used to evaluate the alternative models, with the smaller value indicating the best fitting model. The CFI, RMSEA and the AIC all have explicit penalties for model complexity.

RESULTS

Descriptive Statistics And Factor Correlations

The mean level of posttraumatic stress symptomology (PTS) for the entire sample was 11.40 (SD = 10.77; scores ranged from 0-41). The mean scores for general irrationality was 28.32 (SD = 14.16; scores ranged from 12-60) and the mean scores for trauma-specific irrationality was 18.39 (SD = 10.44; score ranged from 8-40). All correlations between the latent variables were positive and statistically significant. General irrationality ($r = .86$, $p < .001$) and trauma-specific irrationality ($r = .94$, $p < .001$), were

both strongly associated with levels of PTS. General irrationality and trauma-specific irrationality were also highly correlated ($r = .91$, $p < .001$).

Measurement Models

Based on extensive findings regarding the factor structure of posttraumatic stress indicators (e.g., Yufik & Simms, 2010), three alternative models of the PDS (Foa et al., 1997) were investigated. Model 1 is a four-factor solution (Intrusions, Avoidance, Emotional Numbing, and Hyperarousal) first suggested by King, Leskin, King and Weathers (1998); Model 2 is an alternative four-factor solution (Intrusions, Avoidance, Dysphoria, Hyperarousal) first suggested by Simms, Watson and Doebbeling (2002); and Model 3 is the DSM-IV-TR's three-factorial solution. The Simms et al. 'Dysphoria' model was found to be the best fitting model yielding the most impressive fit statistics ($\chi 2 = 152.94$, df = 113, $p < .001$; CFI = .98; TLI = .98, RMSEA = .03; SRMR = .03) along with the lowest AIC value. These four subscales were consequently used as measured variables within the full structural model in order to construct a posttraumatic stress (PTS) latent variable.

Structural Model

The REBT fully indirect model of PTS (Figure 1) was thus developed and included three latent variables: (i) General Irrationality measured via the four general-level irrational belief subscales of the AV-ABS-2; (ii) Trauma-Specific Irrationality measured via the four trauma-specific irrational belief subscales of the TRIBS; and (iii) PTS measured via Intrusions, Avoidance, Dysphoria, and Hyperarousal. Factor loadings for each measured

variable on their respective latent variable were all statistically significant, positive, and greater than 0.60 (see Table 1 for full details).

The fully indirect REBT model of PTS produced satisfactory model fit statistics ($\chi 2$ = 84.80, df = 52, p = .003; RMSEA = .05 (CI 90% = .03/.06); SRMR = .02; CFI = .99; TLI = .98; AIC = 20145.69) and explained 89% of the variance in posttraumatic stress symptoms. As can be seen in Figure 1, General Irrationality had a statistically significant, positive, and strong direct impact on Trauma-Specific Irrationality ($\beta = .91$, $p < .001$), while Trauma-Specific Irrationality also displayed a statistically significant, positive, and strong direct effect on PTS ($\beta = .94$, $p < .001$). Additionally, a statistically significant, positive, and strong indirect effect was observed between General Irrationality and PTS via Trauma-Specific Irrationality ($\beta = .86$, $p < .001$).

The direct and indirect model REBT model PTS produced similar fit statistics to the fully indirect model ($\chi 2$ = 84.926, df = 51, p = .003; RMSEA = .05 (CI 90% = .03-.06); SRMR = .02; CFI = .98; TLI = .98; AIC = 20149.20) accounted for 88% of the variance in levels of PTS. As can be seen in Figure 2, General Irrationality had a statistically significant, positive, direct, and strong impact on Trauma-Specific Irrationality ($\beta = .91$, $p < .001$), while Trauma-Specific Irrationality again was found to have a statistically significant, positive, strong, direct impact on PTS ($\beta = .86$, $p < .001$). Importantly however, no statistically significant direct effect was observed between General Irrationality and PTS. The indirect effect remained statistically significant between General Irrationality and

PTS via Trauma-Specific Irrationality, however this relationship was slightly lower than within the fully indirect model ($\beta = .81$, $p < .001$).

DISCUSSION

The current study was performed in order to substantially develop PTSD-based research within the REBT community specifically, and to contribute evidence to the wider scientific community regarding the role of irrational beliefs as potentially important dysfunctional cognitions in posttraumatic stress responses. REBT theory is explicit in predicting that context-specific variants of each irrational belief process should not only directly influence various psychopathological outcomes (Ellis, 2001), but that they should also serve as a mediator between more generalised forms of irrational beliefs and psychopathological responses (Dryden, 2009).

In order to empirically test this hypothesis, two theoretically derived REBT models of posttraumatic stress symptomology were developed. The first model was in-line with REBT theory (Dryden, 2009) and predicted that general-level irrationality would impact upon posttraumatic stress symptoms indirectly via a set of trauma-specific irrationality. The second model reflected a slightly modified version of REBT theory and assumed a direct relationship between general irrationality and posttraumatic stress symptomology, along with the expected indirect relationship via trauma-specific irrationality.

The results of the SEM analysis indicated that both the models of posttraumatic stress responses were a good fit of the data. It was difficult to identify a superior model based

upon the incremental and absolute model fit statistics. The fully indirect model was found to be superior only on the basis of the TLI results. AIC values which are used to compare alternative models also suggested both that models were practically indistinguishable however the fully indirect model did record a marginally lower value suggesting it to be statistically superior. On the basis of these results in addition to the fact that the fully indirect model possesses fewer model parameters and is consistent with the general REBT model of psychopathology, the fully indirect model was preferred on the grounds of parsimony and theoretical consistency.

Dryden (2009) has theorised that the activation of general-level irrational beliefs during an activating event biases information processing leading to the development of dysfunctional automatic thoughts, which are then evaluated by means of context-specific irrational beliefs. These context-specific irrational beliefs are expected to derive from more general-level irrational beliefs that are already a component of one's cognitive architecture. In others words, general-level irrational beliefs are viewed as critical factors in the development and maintenance of psychopathological responses however these beliefs are hypothesised to indirectly impact psychopathological responses by leading to the creation of context-specific irrational beliefs. This general REBT theoretical formulation shares much in common with Clark and Beck's (2010) updated cognitive model of PTSD.

Results of the current study are in line with Dryden's (2009) predictions as general-level irrationality was found to exert a strong direct effect on trauma-specific irrationality, but

no direct effect was observed between general-level irrationality and posttraumatic stress symptomology. The direct effect between trauma-specific irrationality and posttraumatic stress symptomology was found to be very strong, supporting Ellis' (2001) argument that context-specific versions of the various irrational belief processes offer a potent predictor of psychologically distressing outcomes.

The current findings suggest that the presence of general-level irrational beliefs (Demandingness beliefs, Catastrophizing beliefs, Low Frustration Tolerance beliefs, and Depreciation beliefs) within an individual's cognitive architecture represent important cognitive vulnerability factors for the development of posttraumatic stress reactions, while the more context-specific variants of these cognitive processes (associated with the individual's traumatic experience) appear to be a more proximate predictor of such psychopathological responses.

The fully indirect REBT model was found to explain 89% of variance in posttraumatic stress symptoms, thus providing strong evidence that the irrational beliefs, as outlined in REBT theory, play a crucially important role in posttraumatic stress responses. REBT theory states that Demandingness beliefs represent the core psychological construct in the emergence of psychological distress, and that their impact on psychopathological responses is mediated through the secondary irrational belief processes of Catastrophizing, Low Frustration Tolerance, and/or Depreciation beliefs. This contention has drawn criticism from many within the Cognitive Therapy community (e.g., Padesky & Beck, 2003) however recently empirical work has provided support for this core REBT

hypothesis (David et al., 2002; David et al., 2005; Hyland et al., 2013; Soloman et al., 2003; and Szentagotai et al., 2008). Results from the current analysis add additional support to previous findings demonstrating the accuracy of the theoretical predictions of REBT in general, and also add original evidence to the scientific literature regarding the importance of irrational beliefs in explaining posttraumatic stress responses, specifically.

Current findings lend considerable empirical support for our suggestion that REBT theory can convincingly overcome the reasonable criticisms of Padesky and Beck (2003) that REBT is an overly monolithic approach that is incapable of formulating individualized and disorder-specific models of psychopathology. While REBT theory has generally always favoured a more transdiagnostic approach to conceptualising psychopathology, the current study suggests that it is possible for the REBT community to substantially develop its theoretical base through the development of more disorder-specific models of psychopathology by placing an emphasis on conceptualizing, measuring, and evaluating the role of disorder-specific irrational beliefs in the development and maintenance of various forms of psychopathology. In doing so, not only can the field of REBT flourish but the wider scientific community can be enriched by such theoretical advancements and discoveries.

Although there is considerable evidence attesting to the importance of each irrational belief process described by REBT theory in a range of psychopathologies (Browne, Dowd & Freeman, 2010; Dryden & David, 2008), these cognitive constructs have generally not yet been integrated within mainstream cognitive-behavioural models of

PTSD. Current and past results (Hyland et al., 2013a) suggest that these irrational belief processes have an important role to play in the development and maintenance of posttraumatic stress reactions, and that their rational belief counterparts are critical factors in protecting against the development of posttraumatic stress responses (Hyland, Shevlin, Adamson, & Boduszek, 2013c), therefore greater consideration of both general-level and trauma-specific irrational beliefs could potentially yield greater theoretical understandings of the cognitive architecture upon which posttraumatic stress responses rest, and lead to more efficacious treatment interventions. Substantially more evidence is certainly required before any firm conclusions can be drawn regarding the importance of the irrational beliefs in predicting the development of PTSD. These studies are limited considerably due to the cross-sectional nature of the study designs and future work should ideally seek to replicate the design of Kleim and colleagues (2013) in evaluating the role of irrational belief in PTSD symptomology.

As with any research endeavour, the current study contains a number of limitations which need to be considered. The most salient limitation of the current study relates to the attempt to test predictions of mediation with the use of cross-sectional data. Given that the current study was cross-sectional in nature it was impossible to ascertain whether trauma-specific irrationality mediated the relationship between general-level irrationality and posttraumatic stress symptomology due to the temporal assumptions inherent in determining causality which mediation implies. Although results of the current study are in-line with the predictions of REBT theory the possibility remains that the development of trauma-specific irrationality in the immediate aftermath of a trauma could generalise

and lead to the emergence of more general-level irrationality. Although this is contrary to theoretical prediction such an occurrence is plausible and cannot be ruled out within cross-sectional designs therefore future research efforts should ideally seek to utilize longitudinal data in order to test this possibility. Furthermore, a self-report measure of posttraumatic stress symptoms was employed and although self-report measures of PTSD, such as the PDS (Foa et al., 1997) used in the current study, have been shown to highly correspond with clinician-administered measures (Griffin et al., 2004), clinician-based measures would have been preferable as they are considered the gold standard method of assessing PTSD symptomology.

In conclusion, this study originally contributes to both the trauma and REBT literature in a number of important ways. The current study is the first of its kind to apply latent variable modelling techniques to determine the direct and indirect effects of trauma-specific irrational beliefs among a sample of participants experiencing posttraumatic stress symptoms. Given the strength of the direct effects observed between trauma-specific irrationality and posttraumatic stress symptomology, as well as the level of variance explained in such symptoms due to both general and trauma-specific irrational beliefs, this study has highlighted the importance of a set of cognitive variables that are currently ignored within current cognitive-behavioural models of PTSD.

APPENDIX

THE TRAUMA RELATED IRRATIONAL BELIEF SCALE

As you answer the following questions please think about the traumatic event you described in the previous section of this questionnaire.

For each statement below please indicate whether you Strongly Disagree (A), Somewhat Disagree (B), are Neutral (C), Somewhat Agree (D), or Strongly Agree (E).

		A STRONGLY DISAGREE	B SOMEWHAT DISAGREE	C NEUTRAL	D SOMEWHAT AGREE	E STRONGLY AGREE
1.	I absolutely should have acted differently during the traumatic event that I experienced.	**A**	**B**	**C**	**D**	**E**
2.	The traumatic event that I experienced absolutely should not have happened.	**A**	**B**	**C**	**D**	**E**
3.	The traumatic event that I experienced was	**A**	**B**	**C**	**D**	**E**

	completely awful and catastrophic; the worst thing that could have happened.					
4.	The traumatic event that I experience was extremely bad and unpleasant but it wasn't the worst thing that could have happened.	**A**	**B**	**C**	**D**	**E**
5.	I can't stand the fact that I had to experience this traumatic event and I find it hard to experience any kind of happiness as a result.	**A**	**B**	**C**	**D**	**E**
6.	Although I don't like the fact that I experienced this traumatic event, I can stand the fact that it happened, and I find that I can experience happiness despite it.	**A**	**B**	**C**	**D**	**E**
7.	I think that I am less worthwhile as a person because of what happened during the traumatic event.	**A**	**B**	**C**	**D**	**E**
8.	I think that life is less worthwhile because of what happened during the traumatic event.	**A**	**B**	**C**	**D**	**E**

REFERENCES

Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control, 19*, 716–723.

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders*. (4th ed., rev.). Washington, DC: Author.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*, 411–423.

Beck, J. S. (2011). *Cognitive behaviour therapy: Basics and beyond* (2nd ed.).London: The Guilford Press.

Bentler, P. M. (1990). Comparative fit indices in structural models. *Psychological Bulletin, 107,* 238–246.

Bisson, J. I., Ehlers, A., Matthews, R., Pilling, S., Richards, D., & Turner, S. (2007). Psychological treatments for chronic post-traumatic stress disorder. *The British Journal of Psychiatry, 190,* 97–104.

Blake, D. D., Weathers, F. W., Nagy, L. M., Kaloupek, G. D., Charney, D. S., & Keane, T. M. (1998). *The Clinican-Administered PTSDD Scale for DSM-IV*. Boston: National Centre for PTSD, Behavioural Science Division.

Bollen, K. A. (1989). *Structural equations with latent variables.* New York: Wiley.

Browne, M. W., & Cudeck, R. (1989). Single sample cross-validation indices for covariance structures. *Multivariate Behavioral Research, 24*, 445-455.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136-162). Newsbury Park, CA: Sage.

Browne, C. M., Dowd, E. T., & Freeman, A. (2010). Rational and irrational beliefs and psychopathology. In David, D., Lynn, S. J., & Ellis, A. *Rational and irrational beliefs: Research, theory, and clinical practice* (p. 3-22). Oxford: Oxford University Press.

Clark, D. A., & Beck, A. T. (2010). *Cognitive therapy of anxiety disorders*. London: The Guilford Press.

Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioral sciences* (2nd Ed.). Hillsdale, NJ: Erlbaum.

David, D., Lynn, S. J., & Ellis, A. (2010) *Rational and irrational beliefs: Research, theory, and clinical practice*. Oxford: Oxford University Press.

David, D., Szentagotai, A., Lupu, V., & Cosman, D. (2008). Rational-emotive behaviour therapy versus cognitive therapy versus medication in the treatment of major depressive disorder: A randomized clinical trial. *Journal of Clinical Psychology, 6,* 728–746.

David, D., Szentagotai, A., Kallay, E., & Macavei, B. (2005). A synopsis of rational-emotive behavior therapy (REBT): Fundamental and applied research. *Journal of Rational-Emotive and Cognitive-Behavior Therapy, 23,* 175–221.

David, D., Schnur, J., & Belloiu, A. (2002). Another search for the "hot" cognitions: Appraisal, irrational beliefs, attributions, and their relation to emotion. *Journal of Rational-Emotive and Cognitive-Behavior Therapy, 15*, 93–131.

DiGiuseppe, R., Leaf, R., Exner, T., & Robin, M.V. (1988). The development of a measure of rational / irrational thinking. *Paper presented at the World Congress of Behavior Therapy, Edinburg, Scotland.*

DiLorenzo, T. A., David, D., & Montgomery, G. H. (2007). The interrelations between irrational cognitive processes and distress in stressful academic settings. *Personality and Individual Differences, 42*, 765-777.

DiLorenzo, T. A., David, D., & Montgomery, G. H. (2011). The impact of general and specific rational and irrational beliefs on exam distress; A further investigation of the binary model of emotional distress as an emotional regulation model. *Journal of Cognitive and Behavioural Psychotherapies, 11*, 121-142.

Dryden, W. (2009). *Understanding emotional problems: The REBT perspective*. London: Routledge.

Dryden, W., & David, D. (2008). Rational Emotive Behaviour Therapy: Current Status. *Journal of Cognitive Psychotherapy: An International Quarterly, 22*, 195-209.

Ehlers, A., & Clark, D. M. (2000). A cognitive model of persistent posttraumatic stress disorder. *Behaviour Research and Therapy, 38*, 319-345.

Ellis, A. (2001). *Overcoming destructive beliefs, feelings, and behaviours: New directions for rational emotive behaviour therapy*. Amherst, New York: Prometheus Books.

Foa, E., Cashman, L., Jaycox, L., & Perry, K. (1997). The validation of a self-report measure of PTSD: The Posttraumatic Diagnostic Scale. *Psychological Assessment, 9*, 445-451.

Foa, E. B., Ehlers, A., Clark, D. M., Tolin, D. F., & Orsillo, S. M. (1999). The Posttraumatic Cognitions Inventory (PTCI): Development and validation. *Psychological Assessment, 11*, 303–314.

Griffin, M. G., Uhlmansiek, M. H., Resick, P. A., & Mechanic, M. B. (2004). Comparison of the Posttraumatic Diagnostic Scale versus the Clinician-Administered Posttraumatic Stress Disorder Scale in domestic violence survivors. *Journal of Traumatic Stress, 17*, 497-503.

Hofman, S. G., Asnaani, A., Vonk, I. J. J., Sawyer, A. T., & Fang, A. (2012). The efficacy of cognitive behavioral therapy: A review of meta-analyses. *Cognitive Therapy and Research, 36*, 427-440.

Hu, L., & Bentler, P. (1998). Fit indices in covariance structural modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods, 3*, 424- 453.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6,* 1–55.

Hyland, P., & Boduszek, D. (2012). Resolving a difference between cognitive therapy and rational emotive behaviour therapy: Towards the development of an integrated CBT model of psychopathology. *Mental Health Review Journal*, *17,* 104-116.

Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2013a). The organisation of irrational beliefs in posttraumatic stress symptomology: Testing the predictions of REBT theory using structural equation modelling. *Journal of Clinical Psychology*, DOI: 10.1002/jclp.22009

Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2013b). Modelling the structure of the attitudes and belief scale 2 using CFA and bifactor approaches: Toward the development of an abbreviated version. *Cognitive Behaviour Therapy*, DOI:10.1080/16506073.2013.777467

Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2013c). The moderating role of rational beliefs in the relationship between irrational beliefs and posttraumatic stress symptomology. *Behavioural and Cognitive Psychotherapy,* DOI: 10.1017/S1352465813000064

Joreskog, K., & Sorbom, D. (1981). *LISREL V: Analysis of linear structural relationships by the method of maximum likelihood.* Chicago: National Educational Resources.

Jöreskog, K., & Sörbom, D. (2004). *Interactive Lisrel (8,72)*. Scientific Software

International. Inc.

King, D., Leskin, G., King, L., & Weathers, F. (1998). Confirmatory factor analysis of the clinician administered PTSD Scale: Evidence for the dimensionality of posttraumatic stress disorder. *Psychological Assessment, 10*, 90–96.

Kline, P. (1994). *An easy guide to factor analysis*. London: Routledge.

Kleim, B., Grey, N., Wild, J., Nussbeck, F. W., Scott, R., Hackmann, A....Ehlers, A. (2013). Cognitive change predicts symptom reduction with cognitive therapy for posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology, 81*, 383-393.

MacCallum, R. C., & Austin, J. T. (2000). Applications of structural equation modeling in psychological research. *Annual Review of Psychology, 51*, 201–226.

Marshall-Berenz, E. C., Vujanovic, A. A., Bonn-Miller, M. O., Bernstein, A., & Zvolensky, M. J. (2010). Multi-method study of distress tolerance and PTSD symptom severity in a trauma-exposed community sample. *Journal of Traumatic Stress, 23*, 623–630.

Moldovan, R. (2009). An analysis of the impact of irrational beliefs and illness representations in predicting distress in cancer and type II diabetes patients. *Cognition, Brain, Behaviour: An Interdisciplinary Journal, 13*, 179-193.

Montgomery, G. H., David, D., DiLorenzo, T. A., & Schur, J. B. (2007). Response expectancies and irrational beliefs predict exam-related distress. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 25*, 17-34.

Muthen, L. K., & Muthen, B. O. (1998 - 2010). *Mplus – Statistical analysis with latent variables. User's guide* (6th ed). Muthen and Muthen: Los Angeles.

Padesky, C. A., & Beck, A. T. (2003). Science and philosophy: comparison of cognitive therapy and rational emotive behaviour therapy. *Journal of Cognitive Psychotherapy, 17*, 211–224.

Riskind, J. H. (2004). Cognitive theory and research on generalized anxiety disorder. In Leahy R. L. (Ed.), *Contemporary cognitive therapy: Theory, research, and practice*. London: The Guilford Press.

Simms, L. J., Watson, D., & Doebbeling, B. N. (2002). Confirmatory factor analyses of posttraumatic stress symptoms in deployed and nondeployed veterans of the Gulf war. *Journal of Abnormal Psychology, 111*, 637–647.

Solomon, A., Arnow, B. A., Gotlib, I. H., & Wind, B. (2003). Individualized measurement of irrational beliefs in remitted depressives. *Journal of Clinical Psychology, 59*, 439–455.

Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioural Research, 25*, 173-180.

Tanaka, J. S. (1987). "How big is big enough?" Sample size and goodness of fit in structural equation models with latent variables. *Child Development, 58,* 134–146.

Tucker, L. R., & Lewis, C. (1973). The reliability coefficient for maximum likelihood factor analysis. *Psychometrika, 38*, 1-10.

Vandenberg, R. J. (2002). Toward a further understanding of an improvement in measurement invariance methods and procedures. *Organizational Research Methods, 5*(2), 139-158.

Vogt, D. S., Shipherd, J. C., & Resick, P. A. (2012). Posttraumatic maladaptive beliefs scale: Evolution of the personal beliefs and reactions scale. *Assessment, 9*, 308-317.

Vujanovic, A. A., Bonn-Miller, M. O., Potter, C. M., Marshall-Berenz, E. C., & Zvolensky M. J. (2011). An evaluation of the association between distress tolerance and posttraumatic stress within a trauma-exposed sample. *Journal of Psychopathology and Behavioral Assessment, 33*, 129–135.

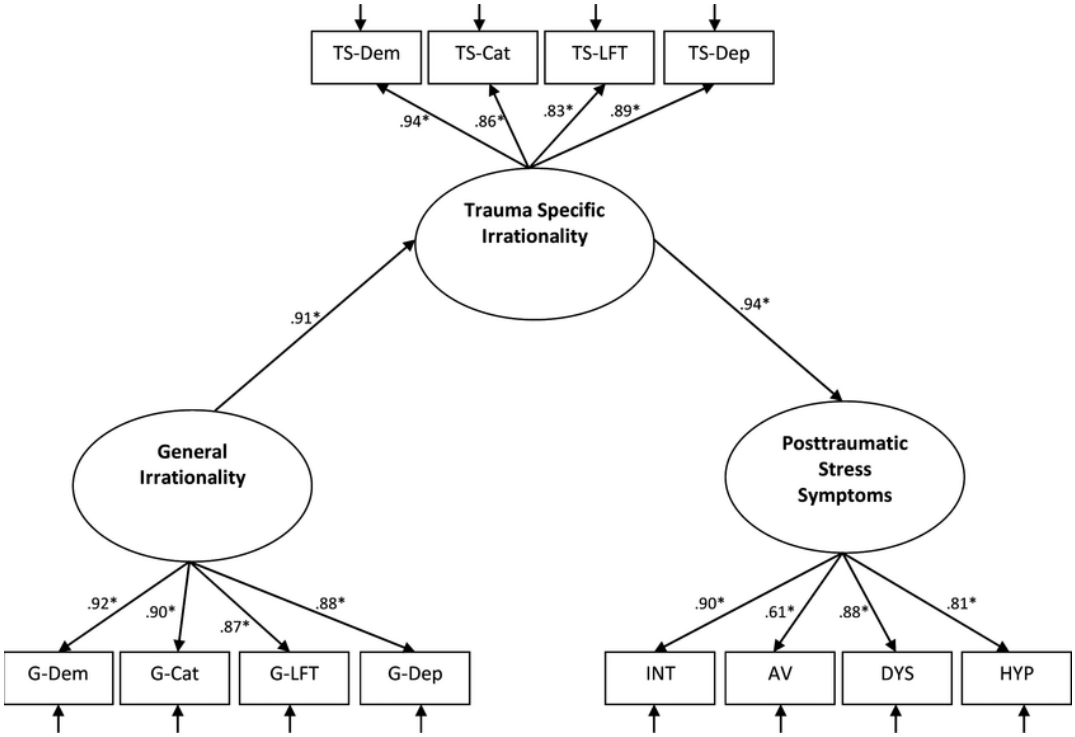
Yufik, T., & Simms, L. J. (2010). A meta-analytic investigation of the structure of posttraumatic stress disorder symptoms. *Journal of Abnormal Psychology, 119,* 764-776.

Table 1 *Standardized and Unstandardized Factor Loadings (and Standard Errors) for each latent variable*

Item	*β*	B	SE
PTS			
Intrusions	.90	1.00	---
Avoidance	.61	.39	.03
Dysphoria	.88	1.61	.08
Hyperarousal	.81	.48	.03
Trauma-Specific Irrationality			
Demandingness	.94	1.00	---
Catastrophizing	.86	.98	.03
Low Frustration Tolerance	.83	.80	.04
Depreciation	.90	.96	.03
General Irrationality			
Demandingness	.92	1.00	---
Catastrophizing	.90	.99	.03
Low Frustration Tolerance	.87	.95	.03
Depreciation	.88	1.07	.04

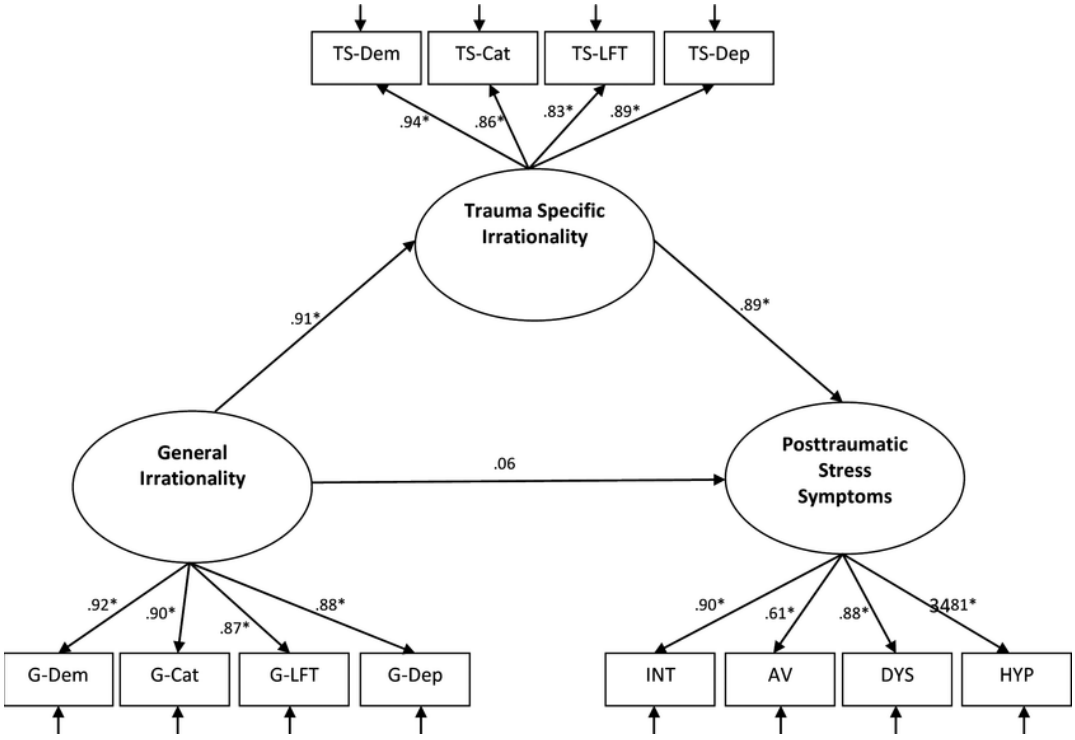
Note. All Factor loadings are statistically significant ($p < .001$).

Figure 1 REBT Fully Indirect model of Posttraumatic Stress Symptoms



Note: G-DEM = General Demandingness, G-CAT = General Catastrophizing, G-LFT = General Low Frustration Tolerance, G-DEP = General Depreciation, TS-DEM = Trauma-Specific Demandingness, TS-CAT = Trauma-Specific Catastrophizing, TS-LFT = Trauma-Specific Low Frustration Tolerance, TS-DEP = Trauma-Specific Depreciation, INT = Intrusions, AV = Avoidance, DYS = Dysphoria, HYP = Hyperarousal. Statistical significance: $p < .001$

Figure 2 REBT Direct and Indirect model of Posttraumatic Stress Symptoms



Note: G-DEM = General Demandingness, G-CAT = General Catastrophizing, G-LFT = General Low Frustration Tolerance, G-DEP = General Depreciation, TS-DEM = Trauma-Specific Demandingness, TS-CAT = Trauma-Specific Catastrophizing, TS-LFT = Trauma-Specific Low Frustration Tolerance, TS-DEP = Trauma-Specific Depreciation, INT = Intrusions, AV = Avoidance, DYS = Dysphoria, HYP = Hyperarousal. Statistical significance: $p < .001$

The Role of Trauma-Specific Irrational Beliefs and Sociodemographic Risk Factors in Posttraumatic Stress Responses

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Journal of Rational-Emotive & Cognitive-Behavior Therapy

ISSN 0894-9085

J Rat-Emo Cognitive-Behav Ther
DOI 10.1007/s10942-013-0167-y

Springer

J Rat-Emo Cognitive-Behav Ther
DOI 10.1007/s10942-013-0167-y

ORIGINAL ARTICLE

The Role of Trauma-Specific Irrational Beliefs and Sociodemographic Risk Factors in Posttraumatic Stress Responses

Philip Hyland · Mark Shevlin · Gary Adamson · Daniel Boduszek

Abstract Posttraumatic stress responses have been linked to a range of social-cognitive and sociodemographic factors. Rational emotive behaviour therapy suggests that responding to a traumatic life event with a set of irrational beliefs should play a crucial role in predicting the development of posttraumatic stress disorder (PTSD: Ellis in Overcoming destructive beliefs, feelings, and behaviours: new directions for rational emotive behaviour therapy, Prometheus Books, Amherst, 2001). The current study assessed the role of trauma-specific irrational beliefs in the prediction of clinically relevant posttraumatic stress responses, while controlling for a range of important sociodemographic factors. A sample of 313 trauma-exposed military and law enforcement personnel took part in the current study and were divided into two groups according to the intensity of reported PTSD symptomology. Results of the binary logistic regression indicated that trauma-specific Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs, respectively, significantly predicted belonging to the group reporting strong symptoms of PTSD compared to those reporting mild symptoms of PTSD. These results provide important evidence of the role of irrational beliefs in posttraumatic stress responses and highlight the importance of considering context-specific variants of each irrational belief process.

Keywords Irrational beliefs · Posttraumatic stress disorder (PTSD) · Logistic regression · Trauma · Risk factors

P. Hyland (✉) · M. Shevlin · G. Adamson
School of Psychology, University of Ulster, Magee Campus, Northland Road, Londonderry BT48 7JL, Northern Ireland, UK
e-mail: philipehyland@gmail.com

D. Boduszek
Department of Behavioural and Social Sciences, University of Huddersfield, Huddersfield, UK

Published online: 25 September 2013

Introduction

Large-scale national epidemiological surveys reveal that the anywhere between 60 and 90 % of western populations will experience at least one traumatic event in their lifetime (Breslau et al. 1998; Creamer et al. 2001; Kessler et al. 1995). Exposure to traumatic experiences does not appear to be evenly distributed throughout the population. Inner city dwellers seem to experience greater community-related violence (Norris and Slone 2007) while employees in front-line emergency service occupations such as military personnel, law enforcement officers, paramedics and fire-fighters are exposed to traumatic incidents much more commonly (Corneil et al. 1999). Comparable rates of trauma exposure have been found in other western countries with Creamer et al. (2001) reporting that within a nationally representative sample of Australian adults, 50 % of females and 65 % of males had experienced a minimum of one significant trauma during their lifetime. Among nations that experience high levels of civil unrest and war, exposures to serious traumatic events are even higher with as many as 90 % of the population found to have been exposed to a serious trauma in their lifetime (de Jong et al. 2001). In Algeria, 92 % of the population reported experiencing a serious traumatic event, and within this population prevalence of posttraumatic stress disorder (PTSD) was found to be 37.4 %.

Despite the frequency with which individuals within the population are exposed to traumatic life events, relatively few people actually go on to develop clinically significant symptoms of PTSD. Successive national comorbidity surveys conducted in the United States have suggested prevalence rates of 7.8 % (Kessler et al. 1995) and 6.8 % (Kessler et al. 2005a, b).

PTSD Diagnosis

PTSD is an anomalous psychiatric condition as, along with its precursor Acute Stress Disorder, it is the only disorder listed within the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5: American Psychiatric Association (APA) 2013) that requires the presence of a specific etiological variable for a diagnosis to be made; namely the direct experience of, or being witness to, an extremely stressful event. Despite a great deal of empirical literature on the subject, there is much controversy surrounding many of the theoretical and clinical features of PTSD (Rosen et al. 2008). Much of this controversy concerns two major issues. Firstly, an enormous body of factor analytic research has led to a reconceptualization of the symptom structure of PTSD in the new addition of the DSM so that the official diagnostic classification comes more in-line with the overwhelming majority of evidence supporting a four-factor solution (see Yufik and Simms 2010). Secondly, it is apparent that an "extreme stressor" is not necessary for the development of PTSD as many individuals can develop clinically relevant symptoms following routine life events such as loss of employment, divorce, social upheaval, and bereavement (Rosen and Lilienfeld 2008). Furthermore, evidence of a dose–response relationship is inconsistent with findings suggesting that increasingly severe traumatic

experiences are not always related to more intense traumatic reactions (e.g., McNally 2003; Rosen and Lilienfeld 2008).

Social-Cognitive Models of PTSD

Social-cognitive models of PTSD generally focus on the effect that experience of a traumatic stressful event has on an individual's existing belief system. Contemporary cognitive models are mainly derived from the theoretical perspective of Cognitive Therapy (CT). A number of influential cognitive models of PTSD have been developed (e.g. Ehlers and Clark 2000; Resick and Schnicke 1993). In Ehlers and Clark's (2000) model of PTSD, two cognitive processes are deemed critical in the development and maintenance of the disorder. First, there is an overly negative interpretation of the traumatic event and its sequelea, and second, there is a poor elaboration of the memory of the traumatic incident and insufficient integration of the trauma memory within one's autobiographical memory. Clark and Beck (2010) have presented an updated cognitive model of PTSD in which traumatic experiences are hypothesized to interact with pre-existing schematic vulnerability factors. This gives rise to a range of maladaptive beliefs about the self, others, the world, the future, and the traumatic event itself. The presence of these belief systems has a negative impact on a number of cognitive processes leading to faulty trauma memories and attentional cognitive biases towards threatening stimuli. This process is hypothesized to produce the characteristic intrusive and hyperarousal symptoms which are consequently appraised in a negative manner leading to maladaptive behavioural control strategies which involve avoidance and emotion control/suppression efforts. A range of psychometrically validated measures of PTSD cognitions derived from these theoretical models have been developed (e.g. Foa et al. 1999; Najavits et al. 2004; Vogt et al. 2012). One of the most frequently utilized measures of dysfunctional trauma-cognitions is the Posttraumatic Cognitions Inventory (PTCI: Foa et al. 1999). This scale captures three dysfunctional cognitive processes: Negative Cognitions about the Self, Negative Cognitions about the World, and Self-Blame beliefs (Daie-Gabai et al. 2011). Various studies utilizing the PTCI have indicated that the Negative Cognitions about the Self are most strongly associated with symptoms of PTSD, and depression (Daie-Gabai et al. 2011; Foa and Rauch 2004). Given that the PTCI and other existent measures of dysfunctional trauma-related cognitions are derived from the theoretical perspective of CT theory these scales focus exclusively on capturing representational cognitions rather than the evaluative or appraisal based cognitions stressed by REBT theory (see Hyland and Boduszek 2012; David and Szentagotai 2006 for a fuller discussion on this distinction).

From the perspective of REBT theory therefore these cognitive models and psychometric measures are somewhat incomplete. Contemporary REBT theory (David et al. 2010; Ellis 2001; Hyland and Boduszek 2012) describes four main irrational belief processes: (1) Demandingness beliefs which are rigid imperatives for how things "must be", "have to be", "ought to be", or "absolutely should be"; (2) Catastrophizing beliefs which are extreme negative evaluations of unpleasant life events; (3) Low Frustration Tolerance beliefs which involve

appraisals of a negative event as unbearable and intolerable; and (4) Depreciation beliefs which reflect global negative evaluations of the self, others, and of life events. REBT theory states that Demandingness beliefs represent the core cognitive construct in the emergence and maintenance of psychopathological responses and their impact on such outcomes will be mediated through the secondary irrational belief processes of Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs (David et al. 2002; DiLorenzo et al. 2007). Recent empirical findings have provided further support for this hypothesized organization of the irrational beliefs specifically in the context of PTSD, and highlighted the importance of these cognitive processes in the prediction of posttraumatic stress responses (see Hyland et al. 2013).

Despite the empirical support such findings offer REBT theory in general, the field of REBT has been criticized from many within the wider cognitive-behavioural therapy community for lacking the ability to develop disorder-specific models of psychopathology (Padesky and Beck 2003). A more elaborated version of REBT theory (see Dryden 2009) states that the presence of generalized irrational beliefs represent cognitive vulnerability factors for the development of psychopathology given that activation of these belief systems during specific activating events biases information processing in a manner congruent with the activated belief systems. An individual is then prone to making a number of inaccurate misinterpretations of daily events. These distorted thoughts and inferences are the types of cognitions currently emphasized within cognitive models of PTSD derived from the theory of CT. REBT theory predicts however that these distorted representations, while *necessary* cognitions for the development of psychopathological responses, are by themselves *insufficient* to produce a psychopathological response. In order that a psychopathological response emerges, such distorted inferential cognitions must be evaluated by means of a context-specific set of irrational beliefs. Unfortunately, empirical evidence regarding the role of context-specific variations of the irrational beliefs is generally sparse in the REBT literature and is non-existent in the context of PTSD. REBT theory has predominately favoured a more trans-diagnostic approach to theoretical considerations of psychopathology; however, given that recent theoretical formulations (Dryden 2009) stress the importance of context-specific manifestations of the irrational belief processes as the most proximate antecedent of psychopathological outcomes, there is a pressing need to investigate the role of context-specific irrational beliefs in a variety of psychiatric disorders.

Sociodemographic Predictors of PTSD

Beyond the cognitive factors found to be important predictors of posttraumatic stress responses, researchers have investigated a multitude of sociodemographic factors crucial in the development and maintenance of PTSD. Population-based research designs and conditional risk studies indicate that although males are exposed to a greater number of traumatic events, females are more likely than males to experience posttraumatic stress responses (Breslau et al. 1998; Galea et al. 2007; Kessler et al. 1995). It has been suggested that females exhibit greater levels of posttraumatic stress

symptomology due to the higher incidence of exposure to particularly toxic traumas such as sexual abuse (Creamer et al. 2001; Kessler et al. 1995), as well as an increased history of other anxiety and depressive disorders that increase their vulnerability. PTSD is especially prevalent during adolescence to mid-adulthood. In the United States national comorbidity survey, the median age of onset of PTSD was 23 (Kessler et al. 2005a). Interestingly, it is quite rare to identify new cases of PTSD in persons above the age of 50. Prevalence of PTSD symptomology appears to decease with age even when trauma exposure continues (Kessler et al. 1995; Kessler et al. 2005a). Lack of social support subsequent to experiencing a trauma has also been found repeatedly to be related to a diagnosis of PTSD (e.g. Ozer et al. 2003; Ullman et al. 2007). In a large scale meta-analysis Brewin et al. (2000) found a moderate relationship ($r = .40$) between lack of social support and PTSD, while Ozer et al. (2003) identified weaker but still robust relationship of $r = .28$ between the two variables.

The current study is carried out in order to substantially contribute to the empirical literature by investigating the direct effect of trauma-specific irrational beliefs, along with a range of important sociodemographic factors including number or reported traumatic experiences, age, gender, occupation type, and current marital status, on the prediction of PTSD symptomology. This study will therefore mark the first effort to investigate the role of context-specific variants of the irrational beliefs outlined in REBT theory in the prediction of PTSD symptomology.

Methods

Participants and Procedures

As detailed in Table 1 the sample for the current study consisted of three hundred and thirteen participants ($N = 313$). The sample consisted of an international group

Table 1 Frequencies for the current sample of military and police and emergency service officers on each demographic variable ($N = 313$)

Variable	Frequency	Valid percentage
Gender		
Male	212	67.7
Female	101	32.3
Job		
Police/emergency services	232	74.1
Military	81	25.9
Marital status		
Married	282	90.1
Divorced	31	9.9
Groups		
Mildly symptomatic	181	59
Strongly symptomatic	126	41

of soldiers (n = 81, 25.9 %), and police and associated emergency service personnel (n = 232, 74.1 %) recruited from active duty while serving in the Republic of Ireland and the Republic of Kosovo over a 12 months period (June 2011–June 2012). The sample consisted of 212 males (67.7 %) and 101 females (32.3 %) with participants ranging in age from 23 to 65 (M = 38.18, SD = 8.70). All participants included in the current study had reported experiencing at least one Criterion A trauma. The most commonly reported traumatic event was being involved in a serious accident (60.4 %, n = 189), followed by a non-sexual assault by a stranger (56.9 %, n = 178), and military combat (42.5 %, n = 133). Participants were informed of the nature of the study being under taken either by a member of the research team or an assigned liaison for a particular organization, and each participant's involvement in the research project was voluntary. Those choosing to take part in the research project had the option of completing either an anonymous self-administered paper-and-pencil version of the questionnaires or an electronic version which was delivered and returned via email. The majority of respondents chose the paper-and-pencil option (63.26 %, n = 198).

Materials

The Posttraumatic Stress Diagnostic Scale (PDS: Foa et al. 1997) is a 49-item self-report measure of the severity of posttraumatic stress symptomology related to a particular traumatic event. The PDS assess all aspects of a PTSD diagnosis from Criteria A to F as outlined in the DSM-IV (APA 1994). The PDS measures the nature of the traumatic experience, the duration of the experienced symptoms, the impact of the experienced symptoms on daily functioning, and the severity of the symptoms. Seventeen items measure each of the identified symptoms of PTSD along a four-point Likert scale. Respondents rate the severity of each symptom from a score of 0 ("not at all or only one time") to 3 ("5 or more times a week/almost always"). This produces a total range of scores from 0 to 51 with higher scores indicating higher levels of posttraumatic stress symptomology. Scores from 0 to 10 reflect mild symptoms of PTSD; scores from 11 to 20 reflect moderate symptoms of PTSD; scores from 21 to 35 reflect moderate-to-severe symptoms of PTSD; while scores from 36 to 51 reflect severe symptoms of PTSD. Within the current sample 59 % (n = 181) of respondents reported mild symptoms, 15.3 % (n = 47) reported moderate symptoms, 24.4 % (n = 75) reported moderate-severe symptoms, and 1.3 % (n = 4) reported severe symptoms. On the basis of the relatively unequal distribution of participants in each classification, for the purposes on the current study participants were classified into one of two groups: The "mildly symptomatic" group who reported scores on the PDS from 0 to 10 (n = 181, 59 %) and the "strongly symptomatic" group who reported scores on the PDS from 11 or above (n = 126, 41 %). The PDS possess strong psychometric properties with Griffin et al. (2004) demonstrating that it shares a strong correlation (r = .71) with the Clinician-Administered PTSD scale (Blake et al. 1995). The PDS demonstrated satisfactory internal reliability among the current sample with the full scale recording a Cronbach's Alpha value of .95.

In order to measure context-specific variants of each of the four irrational belief processes a new scale called the *Trauma-Related Irrational Belief Scale* (TRIBS) was constructed (see Appendix for the full scale). The TRIBS is an 8-item self-report measure of irrational beliefs specifically related to the experience of a traumatic life event. The scale was constructed in accordance with guidelines set forth by Montgomery et al. (2007) in the development of their 'Exam-Related Belief Scale' which was used to capture rational and irrational beliefs specifically related to the context of exam-related distress. The TRIBS includes sub-scales for each of the four irrational belief processes and each belief process is measured via two items. Examples from each belief process include; "*I absolutely should have acted differently than I did during the traumatic event that I experienced*" (Demandingness); "*The traumatic event that I experienced was completely awful and catastrophic; the worst thing that could have happened*" (Catastrophizing); "*I can't stand the fact that I had to experience this traumatic event and I find it hard to experience any kind of happiness as a result*" (Low Frustration Tolerance); and "*I think that life is less worthwhile because of what happened during the traumatic event*" (Depreciation). Items of the TRIBS are scored along a five-point Likert scale from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). Items 4 and 6 included in the scale were scored in a reverse direction (i.e., *strongly disagree* = 5 and *strongly agree* = 1). Scores on each subscale range from 2 to 10, while a total composite score of irrationality can be obtained by summating all eight items. Total scores for the TRIBS can therefore range between 8 and 40. In every case higher scores reflect higher levels of irrationality. Internal consistency for the full scale was satisfactory ($\alpha = .95$), and each of the subscales also yielded acceptable results with all alpha levels exceeding .80.

Results

Group Differences

Table 2 presents group differences (between the mildly and strongly symptomatic groups) on trauma-specific Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs, respectively, along with number of reported traumatic experiences. Independent sample *t* test results suggest that those individuals reporting strong symptoms of PTSD ($M = 7.49$, $SD = 2.23$) and those reporting mild symptoms of PTSD ($M = 3.85$, $SD = 1.86$) significantly differed [$t_{(305)} = -15.07$, $p < .001$, $\eta^2 = .43$] with regards to the scores on trauma-specific Demandingness beliefs with higher scores reported by those experiencing strong symptoms of PTSD. Furthermore, those experiencing strong symptoms of PTSD ($M = 6.90$, $SD = 2.36$) scored significantly higher [$t_{(305)} = -15.92$, $p < .001$, $\eta^2 = .45$] than those experiencing mild symptoms of PTSD ($M = 3.19$, $SD = 1.36$) on levels of trauma-specific Catastrophizing beliefs. Similarly, data suggests that those individuals reporting strong symptoms of PTSD ($M = 6.77$, $SD = 2.76$) tend to report increased levels of trauma-specific Low Frustration Tolerance beliefs [$t_{(305)} = -17.01$, $p < .001$, $\eta^2 = .49$] comparing to those experiencing mild

Table 2 Group differences between individuals with symptoms of PTSD and No-PTSD for irrational beliefs and number of traumas

Group	N	M	SD	t	η^2
Demandingness					
Mildly symptomatic	181	3.85	1.86	−15.07*	.43
Strongly symptomatic	126	7.49	2.23		
Catastrophizing					
Mildly symptomatic	181	3.19	1.36	−15.92*	.45
Strongly symptomatic	126	6.90	2.36		
Low frustration tolerance					
Mildly symptomatic	181	2.41	0.97	−17.01*	.49
Strongly symptomatic	126	6.77	2.76		
Depreciation					
Mildly symptomatic	181	3.20	1.38	−15.29*	.44
Strongly symptomatic	126	6.81	2.39		
Number of traumas					
Mildly symptomatic	181	2.69	1.44	−1.25	.21
Strongly symptomatic	126	2.91	1.56		

Statistical significance: * $p < .001$

symptoms of PTSD ($M = 2.41$, $SD = .97$). Finally, strongly symptomatic respondents ($M = 6.81$, $SD = 2.39$) were found to possess higher levels of trauma-specific Depreciation beliefs [$t_{(304)} = -15.29$, $p < .001$, $\eta^2 = .44$] than the mildly-symptomatic group ($M = 3.20$, $SD = 1.38$). In terms of number of experienced traumas, results from the independent samples t-tests did not indicate any significant differences between the two groups. Partial eta squared values (η^2) indicated that the magnitude of difference between the two groups on each of the respective irrational belief processes were large.

Binary Logistic Regression

Direct binary logistic regression analysis was performed to assess the impact of trauma-specific Demandingness beliefs, Catastrophizing beliefs, Low Frustration Tolerance beliefs, and Depreciation beliefs, respectively, along with number of traumas experienced, age, gender, occupation type, and marital status on the likelihood of reporting strong symptoms of PTSD following exposure to at least one traumatic life experience. The correlations amongst all continuous predictor variables included in the study were examined (see Table 3). Each of the four irrational belief processes were positively related to one another, and to a moderately-strong degree with r values ranging between .59 ($p < .001$) to .80 ($p < .001$). Although some of these correlations were strong, investigation of the Tolerance and VIF statistics demonstrated that these associations did not exceed recommended levels indicating that multicollinearity was unlikely to be a problem (see Tabachnick and Fidell 2007).

Table 3 Descriptive statistics, correlations, and reliability between all continuous predictor variables

Variables	1	2	3	4	5	6
1. Demandingness	1					
2. Catastrophizing	.61*	1				
3. LFT	.66*	.76*	1			
4. Depreciation	.80*	.59*	.75*	1		
5. Age	−.04	−.06	−.06	−.03	1	
6. Number of traumas	.04	.00	.01	.04	.18*	1
Mean	5.33	4.72	4.18	4.67	38.18	2.75
Standard deviation	2.69	2.58	2.87	2.57	8.70	1.51
Range	2–10	2–10	2–10	2–10	23–65	011
Cronbach Alpha	.81	.81	.96	.81	n/a	n/a

Statistical significance: * $p < .001$

A test of the full model containing all predictor variables against a constant-only model was statistically significant, X^2 (9, 302) = 273.617, $p < .001$, indicating that the model was able to distinguish between individuals who reported experiencing strong symptoms of PTSD and those that reported experiencing just mild symptoms. The model as a whole explained between 60 % (Cox and Snell R square) and 80 % (Nagelkerke R square) of the variance in PTSD status, and displayed satisfactory positive predictive value correctly classifying 89.7 % of cases.

As shown in Table 4, only three of the variables in the model made a unique statistically significant contribution to the model (trauma-specific Catastrophizing

Table 4 Binary logistic regression analysis predicting likelihood of reporting strong symptoms of PTSD

Variable	B	S.E.	Exp(B) with 95 % CI
Demandingness	.23	.13	1.26 (.99/1.62)
Catastrophizing	.53	.14	1.71* (1.29/2.25)
Low Frustration Tolerance	.53	.16	1.70* (1.24/2.33)
Depreciation	.57	.16	1.77* (1.28/2.44)
Age	.03	.03	1.03 (.97/1.09)
Number of Trauma	.11	.15	1.12 (.83/1.49)
Gender			
Female			1
Male	.54	.51	1.71 (.63/4.68)
Group			
Police			1
Military	.11	.57	1.12 (.37/3.40)
Marital status			
Married			1
Divorced	.19	.72	1.21 (.29/4.96)

Statistical significance: * $p < .01$

beliefs, trauma-specific Low Frustration Tolerance beliefs, and trauma-specific Depreciation beliefs). The strongest predictor of belonging to the PTSD symptomology group was trauma-specific Depreciation beliefs (OR = 1.77, $p < .01$). This result indicates that for every unit increase in Depreciation beliefs related to a traumatic experience, an individual was 1.77 times more likely to belong to the strongly symptomatic PTSD group, controlling for all other factors in the model. Trauma-specific Catastrophizing beliefs (OR = 1.71, $p < .01$), and trauma-specific Low Frustration Tolerance beliefs (OR = 1.70, $p < .01$) exhibited similar results, suggesting that individuals scoring higher on both variable were approximately 1.7 times more likely to belong to the PTSD symptomology group than those individuals with lower levels of each belief process, controlling for all other factors in the model.

Discussion

The primary aim of the current study was to provide initial evidence of the role of trauma-specific irrational beliefs (as described by REBT theory) in the likelihood of reporting clinically significant symptoms of PTSD, while controlling for a range of important sociodemographic risk factors. This research was undertaken in order to contribute to the field of REBT by evaluating the importance of each irrational belief process in distinguishing between those trauma-exposed individuals who develop serious symptoms of PTSD and those who develop mild symptoms. Furthermore, the current study was performed in order to highlight to the wider cognitive-behavioural therapy community the importance of the specific types of dysfunctional cognitions described in REBT theory in the predictions of PTSD symptomology.

Initial investigations revealed very large differences between the strongly symptomatic and mildly-symptomatic groups on each of the irrational belief processes. In each case the strongly symptomatic groups exhibited substantially higher levels of each irrational belief process than the mildly-symptomatic group. These results although striking are generally unsurprising in that they indicate that those participants displaying strong symptoms of PTSD display far high levels of irrationality compared to those who reported mild levels of PTSD. An interesting finding was that trauma-specific Demandingness beliefs were the most strongly endorsed irrational belief process among the strongly symptomatic group. These beliefs are hypothesized to represent the core cognitive variables in the emergence of PTSD according to REBT theory (Ellis 2001) and current results indicate a high endorsement rate among the current sample.

Results from the binary logistic regression analysis produced strong support for the theoretical model, with nearly 90 % of participants correctly classified, a substantial improvement over the nearly 60 % of correctly classified cases in the constant only model. The results of this analysis identified three predictor variables that made a unique, statistically significant contribution to the prediction of reporting strong symptoms of PTSD. These three predictors were the secondary irrational belief processes: Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs. Notably, once the effects of the cognitive factors were

controlled for, none of the sociodemographic variables included in this study (age, number of trauma's experienced, gender, marital status, and occupation type) made a statistically significant contribution to the prediction of reporting strong symptoms of PTSD. Although previous studies have identified these factors as important in the prediction of PTSD itself, current findings suggest that these variables do little to differentiate those who display clinically significant levels of PTSD from those who display mild symptoms, and as such are far less important in understanding the development of more severe symptoms of PTSD compared to the role of irrational beliefs.

Each of the three irrational belief processes identified as statistically significant predictors of belonging to the PTSD symptomology group yielded similar odds ratio levels, however trauma-specific Depreciation beliefs did emerge as the strongest predictor. Individuals who reported ever increasing levels of negative self-evaluative beliefs related to their traumatic experience were increasingly likely to report strong symptoms of PTSD. This finding is generally consistent with previous work applying the PTCI (Foa et al. 1999) which found that the latent factor reflecting negative views of the self was most strongly associated with developing PTSD (Daie-Gabai et al. 2011; Foa and Rauch 2004). Current results therefore provide additional evidence that negative evaluations of the self are a critical cognitive vulnerability factor in the development and maintenance of posttraumatic stress responses.

Catastrophizing and Low Frustration Tolerance beliefs displayed near identical odds ratio values with results indicating that the more extreme a person's evaluations of the badness of the traumatic event, and the more one evaluates himself or herself as being unable to cope with, or withstand, the effects of the traumatic incident, the greater their likelihood of reporting strong symptoms of PTSD. Although approaching the level of statistical significance, Demandingness beliefs did not make a unique contribution to the prediction of reporting symptoms of PTSD despite being the most strongly endorsed irrational belief process among the symptomatic group. This result is generally consistent with the predictions of REBT theory which states that Demandingness beliefs will not exert a direct influence on psychopathological outcomes but should instead indirectly impact psychological distress via the secondary irrational belief processes, all of which were identified as statistically significant predictors.

These results have a number of important implications to the REBT literature and the wider scientific literature regarding the cognitive constructs integral to the development and maintenance of posttraumatic stress responses. According to REBT theory, various psychopathological outcomes result from differential interactions between the primary irrational belief process and the various secondary irrational belief processes (David et al. 2002). Anxiety disorders are predicted to arise as a consequence of an interaction between Demandingness beliefs and Catastrophizing and/or Low Frustration Tolerance beliefs. Results of the current study are partially supportive of this prediction in that both Catastrophizing and Low Frustration Tolerance were identified as important predictors of posttraumatic stress responses. Additionally, Depreciation beliefs, which are hypothesized to be more relevant to depressive disorders (David et al. 2002), were also found to be a

significant factor in the prediction of PTSD symptomology. PTSD and depression are well established to share a high degree of comorbidity (Kessler et al. 1995; Zlotnick et al. 2006) and based on current and previous findings (e.g. Daie-Gabai et al. 2011; Foa and Rauch 2004) it is possible that the comorbidity between these disorders is the result of the operation of the same basic cognitive process, namely negative evaluations of the self. Alternatively, given the cross-sectional nature of the studies from which these findings arise, it is possible that the consistent finding of a relationship between negative self-evaluative beliefs and posttraumatic stress responses is a consequence of failing to control for the presence of depressive symptomology. Future studies should seek to investigate the effect of trauma-specific irrational beliefs, specifically Depreciation belief, on PTSD while controlling for the effect of depression, in order to more fully investigate this possibility. It is also interesting to note that in the new DSM-5 PTSD is no longer listed as an anxiety disorder, and is now rather included as a stress- and trauma-related disorder. Current findings may therefore indicate a development of David et al. (2002) model and suggest that stress- and trauma-related disorders arise as consequence of interactions between Demandingness beliefs and all three secondary belief processes.

Furthermore results of the present study provide additional evidence supporting the role of irrational beliefs in posttraumatic stress responses. Previous findings (Hyland et al. 2013) indicated that generalized forms of each of the irrational belief processes played an important role in the prediction of each symptom group of PTSD (Re-experiencing, Avoidance, Dysphoria, and Hyperarousal). Current results indicate that trauma-specific variants of the irrational beliefs are effective in differentiating strong from mild symptoms of PTSD, while also considering a range of important sociodemographic factors.

As with any research endeavour the current study contains a number of limitations which ought to be considered. The nature of the sample is limited to a specific strata of the population (law enforcement and military personnel), thus generalizations of current findings to the wider population is problematic. Additionally, a self-report measure of PTSD symptomology was used and although self-report measures of PTSD such as the PDS (Foa et al. 1997) used in the current study have been shown to highly correspond with clinician-administered measures (Griffin et al. 2004), clinician based measures would have been preferable as they are considered the gold standard method of assessing PTSD symptomology. Additionally correlations among the various irrational belief processes were rather high which may well have accounted for the non-significant effect of Demandingness beliefs, however this is a perennial issue in REBT research given that the irrational beliefs are expected to share a high degree of association with each other and particularly in relationship to Demandingness beliefs. The continued development of ever more refined psychometic instruments with improved discriminant validity is clearly required.

In conclusion, this article has provided the first piece of empirical evidence demonstrating the direct effect of trauma-related irrational beliefs as outlined in REBT theory in the prediction of posttraumatic stress responses. Specifically, findings from the current study demonstrated that higher levels of trauma-related

Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs all predict a greater probability of reporting clinically significant symptoms of PTSD, while controlling for the effects of a range of key sociodemographic factors. These results thus provide a substantial contribution to the wider scientific literature regarding the types of cognitive variables involved in posttraumatic stress responses, and contribute additional empirical support for the predictions of REBT theory in the context of a psychiatric disorder that has not been widely investigated by the field.

Appendix: The Trauma Related Irrational Belief Scale

As you answer the following questions please think about the traumatic event you described in the previous section of this questionnaire.

For each statement below please indicate whether you Strongly Disagree (A), Somewhat Disagree (B), are Neutral (C), Somewhat Agree (D), or Strongly Agree (E).

1.	I absolutely should have acted differently during the traumatic event that I experienced	A	B	C	D	E
2.	The traumatic event that I experienced absolutely should not have happened	A	B	C	D	E
3.	The traumatic event that I experienced was completely awful and catastrophic; the worst thing that could have happened	A	B	C	D	E
4.	The traumatic event that I experience was extremely bad and unpleasant but it wasn't the worst thing that could have happened	A	B	C	D	E
5.	I can't stand the fact that I had to experience this traumatic event and I find it hard to experience any kind of happiness as a result	A	B	C	D	E
6.	Although I don't like the fact that I experienced this traumatic event, I can stand the fact that it happened, and I find that I can experience happiness despite it	A	B	C	D	E
7.	I think that I am less worthwhile as a person because of what happened during the traumatic event	A	B	C	D	E
8.	I think that life is less worthwhile because of what happened during the traumatic event	A	B	C	D	E

References

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Blake, D., Weathers, F., Nagy, L., Kaloupek, D., Klauminzer, G., Charney, D., et al. (1995). A clinician rating scale for assessing current and lifetime PTSD: The CAPS-1. *Behavior Therapist, 13*, 187–188.

Breslau, N., Kessler, R. C., Chilcoat, H. D., Schultz, L. R., Davis, G. C., & Andreski, P. (1998). Trauma and posttraumatic stress disorder in the community: The 1996 Detroit Area Survey of Trauma. *Archives of General Psychiatry, 55*, 626–632.

Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology, 68*, 748–766.

Clark, D. A., & Beck, A. T. (2010). *Cognitive therapy of anxiety disorders*. London: The Guilford Press.

Corneil, W., Beaton, R., Murphy, S., Johnson, C., & Pike, K. (1999). Exposure to traumatic incidents and prevalence of posttraumatic stress symptomology in urban firefighters in two countries. *Journal of Occupational Health Psychology, 4*, 131–141.

Creamer, M., Burgess, P. M., & McFarlane, A. C. (2001). Posttraumatic stress disorder: Findings from the Australian National Survey of Mental Health and Well-Being. *Psychological Medicine, 31*(7), 1237–1247.

Daie-Gabai, A., Aderka, I. M., Allon-Schindel, I., Foa, E. B., & Gilboa-Schechtman, E. (2011). Posttraumatic cognitions inventory (PTCI): Psychometric properties and gender differences in an Israeli sample. *Journal of Anxiety Disorders, 25*, 266–271.

David, D., Lynn, S. J., & Ellis, A. (2010). *Rational and irrational beliefs: Research, theory, and clinical practice*. Oxford: Oxford University Press.

David, D., Schnur, J., & Belloiu, A. (2002). Another search for the "hot" cognitions: Appraisal, irrational beliefs, attributions, and their relation to emotion. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 15*, 93–131.

David, D., & Szentagotai, A. (2006). Cognition in cognitive-behavioral psychotherapies (CBT): Toward an integrative model. *Clinical Psychology Review, 3*, 284–298.

de Jong, J. T., Komproe, I. H., Van Ommeren, M., El Masri, M., Araya, M., Khaled, N., et al. (2001). Lifetime events and posttraumatic stress disorder in 4 postconflict settings. *Journal of the American Medical Association, 286*(5), 555–562.

DiLorenzo, T. A., David, D., & Montgomery, G. H. (2007). The interrelations between irrational cognitive processes and distress in stressful academic settings. *Personality and Individual Differences, 42*, 765–777.

Dryden, W. (2009). *Understanding emotional problems: The REBT perspective*. London: Routledge.

Ehlers, A., & Clark, D. M. (2000). A cognitive model of persistent posttraumatic stress disorder. *Behaviour Research and Therapy, 38*, 319–345.

Ellis, A. (2001). *Overcoming destructive beliefs, feelings, and behaviours: New directions for rational emotive behaviour therapy*. Amherst, NY: Prometheus Books.

Foa, E., Cashman, L., Jaycox, L., & Perry, K. (1997). The validation of a self-report measure of PTSD: The Posttraumatic Diagnostic Scale. *Psychological Assessment, 9*, 445–451.

Foa, E. B., Ehlers, A., Clark, D. M., Tolin, D. F., & Orsillo, S. M. (1999). The posttraumatic cognitions inventory (PTCI): Development and validation. *Psychological Assessment, 11*, 303–314.

Foa, E. B., & Rauch, S. A. (2004). Cognitive changes during prolonged exposure versus prolonged exposure plus cognitive restructuring in female assault survivors with posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology, 72*, 978–984.

Galea, S., Brewin, C. R., Gruber, M., Jones, R. T., King, D. W., King, L. A., et al. (2007). Psychological sequelae of the September 11 terrorist attacks in New York City. *New England Journal of Medicine, 346*, 982–987.

Griffin, M. G., Uhlmansiek, M. H., Resick, P. A., & Mechanic, M. B. (2004). Comparison of the posttraumatic diagnostic scale versus the clinician administered posttraumatic stress disorder scale in domestic violence survivors. *Journal of Traumatic Stress, 17*, 497–503.

Hyland, P., & Boduszek, D. (2012). Resolving a difference between cognitive therapy and rational emotive behaviour therapy: Towards the development of an integrated CBT model of psychopathology. *Mental Health Review Journal, 17*, 104–117.

Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2013). The organisation of irrational beliefs in posttraumatic stress symptomology: Testing the predictions of REBT theory using structural equation modelling. *Journal of Clinical Psychology*. doi:10.1002/jclp.22009.

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005a). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*, 593–602.

Kessler, R. C., Chiu, W. T., Demler, O., Merikangas, K. R., & Walters, E. E. (2005b). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*, 617–627.

Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 52*, 1048–1060.

McNally, R. J. (2003). Progress and controversy in the study of posttraumatic stress disorder. *Annual Review of Psychology, 54*, 229–252.

Montgomery, G. H., David, D., DiLorenzo, T. A., & Schur, J. B. (2007). Response expectancies and irrational beliefs predict exam-related distress. *Journal of Rational- Emotive & Cognitive-Behavior Therapy, 25*, 17–34.

Najavits, L. M., Gotthardt, S., Weiss, R. D., & Epstein, M. (2004). Cognitive distortions in the dual diagnosis of PTSD and substance use disorder. *Cognitive Therapy and Research, 28*, 159–172.

Norris, F. H., & Slone, L. B. (2007). The epidemiology of trauma and PTSD. In M. J. Friedman, T. M. Keane, & P. A. Resick (Eds.), *Handbook of PTSD: Science and practice*. London: The Guildford Press.

Ozer, E., Best, S., Lipsey, T., & Weiss, D. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin, 129*, 52–73.

Padesky, C. A., & Beck, A. T. (2003). Science and philosophy: Comparison of cognitive therapy and rational emotive behaviour therapy. *Journal of Cognitive Psychotherapy, 17*, 211–224.

Resick, P. A., & Schnicke, M. K. (1993). *Cognitive processing therapy for rape victims: A treatment manual*. Newbury Park, CA: Sage.

Rosen, G. M., & Lilienfeld, S. O. (2008). Posttraumatic stress disorder: An empirical evaluation of core assumptions. *Clinical Psychology Review, 28*, 837–868.

Rosen, G. M., Spitzer, R. L., & McHugh, P. R. (2008). Problems with the posttraumatic stress disorder diagnosis and its future in DSM-V. *British Journal of Psychiatry, 192*, 3–4.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Allyn & Bacon.

Ullman, S. E., Filipas, H. H., Townsend, S. M., & Starzynski, L. L. (2007). Psychosocial correlates of PTSD symptom severity in sexual assault survivors. *Journal of Traumatic Stress, 20*, 821–831.

Vogt, D. S., Shipherd, J. C., & Resick, P. A. (2012). Posttraumatic maladaptive beliefs scale: Evolution of the personal beliefs and reactions scale. *Assessment, 9*, 308–317.

Yufik, T., & Simms, L. J. (2010). A meta-analytic investigation of the structure of posttraumatic stress disorder symptoms. *Journal of Abnormal Psychology, 119*, 764–776.

Zlotnick, C., Johnson, J., Kohn, R., Vicente, B., Rioseco, P., & Saldiva, S. (2006). Epidemiology of trauma, post-traumatic stress disorder (PTSD) and co-morbid disorders in Chile. *Psychological Medicine, 36*, 1523–1533.

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doi:10.1017/S1352465813000064

The Moderating Role of Rational Beliefs in the Relationship between Irrational Beliefs and Posttraumatic Stress Symptomology

Philip Hyland, Mark Shevlin and Gary Adamson

University of Ulster, Londonderry, UK

Daniel Boduszek

University of Huddersfield, UK

Background: Rational Emotive Behaviour Therapy (REBT) assumes that rational beliefs act as cognitive protective factors against the development of psychopathology; however little empirical evidence exists regarding the nature of the possible protective effects that they offer. **Aims:** The current study investigates whether rational beliefs moderate the impact of irrational beliefs on posttraumatic stress symptomology (PTS). **Method:** Three hundred and thirteen active law enforcement, military, and related emergency service personnel took part in the current study. Sequential moderated multiple regression analysis was employed to investigate: (i) the direct impact of irrational beliefs on PTS; (ii) the direct impact of rational beliefs on PTS; (iii) the moderating effects of rational beliefs in the relationship between irrational beliefs and PTS. **Results:** The irrational beliefs predicted by REBT theory emerged as critical predictors of PTS symptomology, in particular Depreciation beliefs. Rational beliefs (Preferences, and Acceptance beliefs) had a direct, negative impact on levels of PTS, and Acceptance beliefs moderated the impact of Catastrophizing beliefs on PTS. **Conclusions:** Irrational beliefs are important cognitive vulnerability factors in symptoms of PTS, while rational beliefs (Acceptance) appear to have a protective role in the emergence of PTS symptoms, both directly and by moderating the impact of Catastrophizing beliefs.

Keywords: Rational Emotive Behaviour Therapy (REBT), Posttraumatic Stress Symptomology (PTS), rational beliefs, irrational beliefs, moderation.

Introduction

Rational Emotive Behaviour Therapy (REBT) is the original form of cognitive behaviour therapy (CBT) (see Ellis, 1958, 1962). The general theory of REBT is built upon Ellis' (1962, 1994) "ABC" model, which presents the core theoretical principle of CBT that beliefs (B) mediate the relationship between activating events in our internal or external environments

Reprint requests to Philip Hyland, University of Ulster, Magee Campus, Northland Road, Londonderry BT48 7JL, Northern Ireland, UK. E-mail: philipehyland@gmail.com

(A) and a range of cognitive-emotional-behavioural-physiological consequences (C) that can be experienced. REBT theory is distinguished from other CBT models in that it hypothesizes that evaluative/appraisal beliefs represent the most proximate cognitive antecedents of cognitive-emotional-behavioural-physiological responses (Hyland and Boduszek, 2012).

Contemporary REBT theory discusses two general belief groups, namely irrational beliefs, and rational beliefs (David, Lynn and Ellis, 2010). Within both belief groups, REBT theory discusses four types of belief processes. The primary irrational belief process is stated to be Demandingness beliefs. These beliefs are rigid, absolutistic insistences for how things "must be", "ought to be", "should be", or "have to be" (e.g. "I must give a good presentation at work."). The secondary irrational belief processes include Catastrophizing beliefs, which refer to beliefs that an individual holds where unpleasant events are evaluated in the most extremely negative fashion possible (e.g. "If I don't give a good presentation, it will be a complete disaster."); Low Frustration Tolerance beliefs, which are beliefs that reflect a person's evaluation that they are completely incapable of withstanding, tolerating, or being capable of experiencing any kind of happiness should they not get what they demand they must get, or get what they demand they must not get (e.g. "I couldn't bear it if I were to give a poor presentation."); and Depreciation beliefs in which a person makes overgeneralized and all encompassing negative conclusions about themselves, others, or the world when they do not live up to their self-imposed demands (e.g. "If I give a bad presentation, I would be a complete failure."). REBT theory therefore predicts that Demandingness beliefs, as the primary irrational belief process, impacts upon various forms of emotional distress and psychopathology through the secondary irrational belief processes of Catastrophizing beliefs, Low Frustration Tolerance beliefs, and/or Depreciation beliefs. Various studies have been undertaken to investigate the organization and interrelations between the irrational beliefs and there is substantial evidence supporting the predictions of REBT theory (David, Schnur and Belloiu, 2002; David, Ghinea, Macavei and Kallay, 2005; DiLorenzo, David and Montgomery, 2007, 2011; Moldovan, 2009).

Each irrational belief processes is hypothesized to share an alternative rational belief. The rational alternative to Demandingness beliefs are Preference beliefs. Preference beliefs reflect flexible beliefs about how a person wants, desires, or prefers something to be (e.g. "I'd like to make a good presentation at work but obviously there is no reason why I have to give a good presentation just because I want to."). The secondary rational belief processes include: Non-catastrophizing beliefs whereby an individual evaluates negative events in realistic terms (e.g. "Giving a bad presentation would be bad, but it wouldn't be the end of the world."); High Frustration Tolerance beliefs whereby a person believes that they can tolerate and withstand difficulties or discomforts in life (e.g. "It would be very unpleasant to give a poor presentation but I could stand the unpleasantness."); and Acceptance beliefs whereby an individual does not make a global evaluation of one's own or another's worth on the basis of a single behaviour; rather the person legitimately rates one's behaviour but not their whole self (e.g. "I gave a very poor presentation on this occasion, but I can accept myself as a fallible human being that sometimes performs poorly at certain things.").

There is a large body of empirical evidence that demonstrates that irrational beliefs are critical cognitive variables in the emergence of various forms of psychopathology, including mood disorders (Macavei, 2005; Muran, Kassinove, Ross and Muran, 1989; Nelson, 1977; Prud'homme and Barron, 1992; McDermutt, Haaga and Bilek, 1997; Blatt, 1995),

major depressive disorder (Szentagotai, David, Lupu and Cosman, 2008), various anxiety disorders (Nieuwenhuijsen, Verbeek, Boer, Blonk and van Dijk, 2010; Lupu and Iftene, 2009; DiLorenzo et al., 2007; Montgomery, David, DiLorenzo and Schnur, 2007; Lorcher, 2003), anger disorders (Jones and Towers, 2004; Martin and Dahlen, 2004; Silverman and DiGiuseppe, 2001; Bernard, 1998), symptoms of various general psychiatric disorders (Alden, Safran and Weideman, 1978), lack of assertiveness (Alden and Safran, 1978), type A coronary prone behaviour pattern (Smith and Brehm, 1981), trait anger, trait depression, and trait anxiety (Bernard, 1998), and state anger, state guilt, and state anxiety (David et al., 2002).

While a great deal of research has examined the role of irrational beliefs as cognitive vulnerability factors in the emergence and maintenance of psychopathology, comparatively little is known about the role of rational beliefs. There is evidence that activation of rational beliefs during activating events gives rise to non-distorted automatic thoughts, functional and healthy emotional responses, and various adaptive behavioural and physiological responses (see David et al., 2010 for a full review). This seems to suggest that rational beliefs may serve as cognitive protective factors against the development of psychological distress. Additionally, rational beliefs are also theorized not to represent bipolar manifestations of their irrational counterparts but rather are believed to represent a unique and distinct cognitive construct. While there has been little effort to directly investigate the nature of the relationship between rational and irrational beliefs, what evidence that does exist provides tentative support for the hypothesis that rational and irrational beliefs are not bipolar cognitive constructs. Bernard (1998) found a moderate, negative statistically significant correlation of -0.44 between rational beliefs and irrational beliefs in a study of the latent structure of the General Attitudes and Belief Scale. In another study of the underlying factor structure of the Romanian version of the Attitudes and Belief Scale-2 (Macavei, 2002), rational beliefs and irrational beliefs were found to possess a weak, negative, statistically significant correlation of -0.32 (Fulop, 2007). Additionally, DiLorenzo et al. (2011) found similar levels of association between the various rational and irrational beliefs under investigation (correlations ranged from -0.29 to -0.34). These findings suggest that although a person may report high levels of irrational beliefs, this does not necessarily indicate low levels of rational beliefs.

The aim of the current study is to add to the existing REBT literature with regards to the possible protective role of rational beliefs in the emergence of psychopathology in a unique and novel way by investigating whether or not the presence of rational beliefs can serve to moderate the impact of the various irrational belief processes on levels of posttraumatic stress symptomology (PTS). This investigation will therefore serve to further elucidate the role played by both rational and irrational beliefs in psychopathology by investigating for the first time the direct impact of the various irrational beliefs on levels of PTS, as well as to assess whether the presence of rational beliefs can serve to moderate the impact of irrational beliefs on symptoms of PTS. The current study will therefore provide additional evidence regarding the nature of the relationship between rational and irrational beliefs.

Method

Participants and procedures

The sample for the current study consisted of 313 participants, including an international group of soldiers ($n = 81$, 25.9%), police officers ($n = 183$, 58.5%), and associated emergency

service personnel ($n = 49$, 15.7%) recruited from active duty while serving in the Republic of Ireland and the Republic of Kosovo over a 12-month period (June 2011–2012). All participants in the current study had been exposed to at least one major traumatic experience. The sample consisted of 212 males (67.7%) and 101 females (32.3%). The participants ranged in age from 23 to 65, with the mean age of the total sample being 38.18 years ($SD = 8.70$). Participants were informed of the nature of the study either by a member of the research team or an assigned liaison for a particular organization, and each participant's involvement in the research project was voluntary. No obligations were placed upon potential respondents nor were any inducements employed to recruit the sample. Each participant was assured about confidentiality and those who chose to take part in the research project had the option of completing either an anonymous self-administered paper-and-pencil version of the questionnaire or an electronic version that was delivered and returned via email. The majority of respondents chose the paper-and-pencil option (63.26%, $n = 198$).

Materials

The Posttraumatic Stress Diagnostic Scale (PDS; Foa, Cashman, Jaycox and Perry, 1997) is a 49-item self-report measure of the severity of posttraumatic stress symptomology related to a particular traumatic event. The PDS assesses all aspects of a PTSD diagnosis from Criteria A to F as outlined in the *Diagnostic and Statistical Manual of Mental Disorders IV* (American Psychiatric Association, 1994). The PDS measures the nature of the traumatic experience, the duration of the experienced symptoms, the impact of the experienced symptoms on daily functioning, and the severity of the symptoms. Seventeen items measure the 17 identified symptoms of PTS along a 4-point Likert scale. Respondents rate the severity of each symptom ranging from a score of 0 (not at all or only one time) to 3 (5 or more times a week/almost always). This produces a total range of scores from 0 to 51, with higher scores indicating higher levels of posttraumatic stress symptomology. The PDS possesses strong psychometric properties with Griffin, Uhlmansiek, Resick and Mechanic (2004), demonstrating that it shares a strong correlation with the Clinician-Administered PTS scale (Blake et al., 1995).

The Abbreviated Version of the Attitudes and Belief Scale 2 (AV-ABS2) is a 24-item self-report measure of rational and irrational beliefs, as defined by current REBT theory (David et al., 2010). The AV-ABS2 measures all four irrational belief processes (Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciation) and their corresponding four rational belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance). Each subscale is measured via three items. The AV-ABS2 produces a total composite score for both rational and irrational beliefs as well as producing total scores on each of the individual rational and irrational belief processes. Items are scored along a 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree), with higher scores in each case indicating higher levels of the respective variable. Possible scores for each subscale range from 3–15 with higher scores indicative of higher levels of each belief process. The AV-ABS2 exhibited satisfactory internal consistency, with all subscales recording a Cronbach's Alpha level above .70 (see Table 1).

Table 1. Descriptive statistics, Cronbach alpha, and correlations between all measured variables

Item	PTS	DEM	CAT	LFT	DEP	PRE	NCAT	HFT	ACC
PTS	–								
Demandingness (DEM)	.60**	–							
Catastrophizing (CAT)	.67**	.64**	–						
Low Frustration Tolerance (LFT)	.69**	.67**	.62**	–					
Depreciation (DEP)	.73**	.50**	.66**	.60**	–				
Preferences (PREF)	−.07	−.12*	.05	−.07	−.04	–			
Non-Catastrophizing (NCAT)	−.28**	−.31**	−.24**	−.29**	−.38**	.00	–		
High Frustration Tolerance (HFT)	−.53**	−.45**	−.35**	−.47**	−.45**	.25**	.47**	–	
Acceptance (Acc)	−.75**	−.54**	−.64**	−.65**	−.90**	−.00	.46**	.52**	–
Means	11.40	9.72	8.24	8.41	6.17	9.58	11.62	10.54	11.64
SD	10.77	3.48	3.75	3.54	4.18	1.92	2.59	2.87	4.09
Range	0–41	3–15	3–15	3–15	3–15	3–15	3–15	3–15	3–15
Possible Range	0–51	3–15	3–15	3–15	3–15	3–15	3–15	3–15	3–15
Cronbach Alpha	.95	.81	.81	.78	.95	.73	.61	.62	.95

Notes: ** is significant at the .01 level; * is significant at the .05 level

Results

Descriptive statistics and correlations

The descriptive statistics shown in Table 1 indicate that the current sample of 313 police officers, military personnel, and related emergency service workers demonstrated relatively low levels of PTS, on average. In terms of the irrational belief processes, moderate levels of Demandingness beliefs, Catastrophizing beliefs, and Low Frustration Tolerance beliefs were reported while low-to-moderate levels of Depreciation beliefs were reported. In terms of the rational belief processes, moderate levels of each of the four rational belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance) were indicated.

Table 1 also reports the correlations amongst the predictor variables (Demandingness, Catastrophizing, Low Frustration Tolerance, Depreciations Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance) included in the study. Those correlations between the predictor variables that were statistically significant generally ranged from weak to moderate, indicating multicollinearity was unlikely to be a problem (see Tabachnick and Fidell, 2007). However, one correlation was strong and reached a level that indicated a possible violation of multicollinearity. This correlation was between Depreciation and Acceptance beliefs ($r = .90$, $p < .001$); however, investigation of the Tolerance and VIF statistics demonstrated that, although high, these levels did not exceed an acceptable level. On the basis of these VIF and Tolerance values, and the fact that these beliefs are the rational and irrational counterparts of each other, it was decided to retain these two variables rather than collapse them into a single variable.

Furthermore all predictor variables, with the exception of Preference beliefs, were significantly correlated with PTS. These correlations with the dependent variable (PTS) ranged from weak to strong, ranging from $r = -.28$, $p < .001$ between Non-Catastrophizing and PTS to $r = -.75$, $p < .001$ between Acceptance beliefs and PTS. These results indicate that the data were suitably correlated with the dependent variable for examination through multiple linear regression to be reliably undertaken.

Sequential moderated multiple regressions

A sequential moderated multiple regression analysis, as the recommended method for testing interaction effects (Cohen and Cohen, 1983), was applied in order to investigate the predictive relationship between the irrational belief processes (Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciations) and PTS, while also examining for the moderating role of each of the four rational belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance). Four separate models were thus specified and empirically tested with all predictor and moderator variables being centred as suggested by Aiken and West (1991).

The first model considered the moderating role of Preference beliefs. In the first step of sequential moderated multiple regression, five predictors were entered: Demandingness beliefs, Catastrophizing beliefs, Low Frustration Tolerance beliefs, Depreciation beliefs, and Preference beliefs. This model was statistically significant F (5, 298) = 116.82; $p < .001$ and explained 66.2% of variance in levels of PTS (see Table 2). All variables, with the exception of Demandingness beliefs, were statistically significant predictors of levels of PTS; however the strongest predictor of PTS was Depreciation beliefs ($\beta = .40$ $p < .001$). The final step consisted of entering the interaction terms coding interactions between Preference beliefs and all four irrational belief processes. After the entry of the interaction effects the model as a whole explained 66.5% of variance in intentions F (9, 294) = 64.80; $p < .001$. The addition of the interaction effects at Step 2 only accounted for an additional 0.3% of variance in levels of PTS and this change was not statistically significant (R^2 Change = .003; F (4, 294) = .582; $p = .676$). The results at this step indicated that Demandingness beliefs ($\beta = .11$, $p = .043$), Catastrophizing beliefs ($\beta = .18$, $p = .001$), Low Frustration Tolerance beliefs ($\beta = .27$, $p < .001$), and Depreciation beliefs ($\beta = .41$, $p < .001$) were all significant predictors of levels of PTS. Additionally, no empirical evidence was found that Preference beliefs directly impact on levels of PTS or moderate the impact of any of the irrational beliefs on PTS.

The second model considered the moderating role of Non-Catastrophizing beliefs. In the first step of sequential moderated multiple regression, five predictors were entered: Demandingness beliefs, Catastrophizing beliefs, Low Frustration Tolerance beliefs, Depreciation beliefs, and Non-Catastrophizing beliefs. This model was statistically significant F (5, 298) = 114.61; $p < .001$ and explained 65.8% of variance in levels of PTS (see Table 3). All predictor variables at this step, with the exception of Non-Catastrophizing beliefs, were statistically significant predictors of levels of PTS, with Depreciation beliefs identified as the strongest predictor of PTS ($\beta = .40$, $p < .001$). The final step consisted of entering the interaction terms coding interactions between Non-Catastrophizing beliefs and all four irrational belief processes. After the entry of the interaction effects the model as a whole explained 65.9% of variance in intentions

Table 2. Regression model of PTS with Preference beliefs as a moderator

	R	R^2	*B*	*SE*	β	*t*
Step 1:	.814	.662**				
Demandingness			.28	.16	.09	1.84
Catastrophizing			.53	.15	.19**	3.58
Low Frustration Tolerance			.81	.16	.27**	5.25
Depreciation			1.03	.12	.40**	8.48
Preference			−.39	.19	−.07*	−2.02
Step 2:	.815	.665**				
Demandingness (Dem)			.32	.16	.11*	2.03
Catastrophizing (Cat)			.51	.15	.18**	3.35
Low Frustration Tolerance (LFT)			.81	.16	.27**	5.17
Depreciation (Dep)			1.05	.12	.41**	8.46
Preference (Pref)			−.37	.21	−.07	−1.81
Dem × Pref			−.03	.08	−.02	−.40
Cat × Pref			−.00	.08	−.00	−.02
LFT × Pref			.04	.07	.02	.49
Dep × Pref			−.07	.07	−.06	−1.01

Notes: ** is significant at the .01 level; * is significant at the .05 level

F (9, 294) = 63.21; $p < .001$. The addition of the interaction effects at Step 2 only accounted for an additional 0.1% of variance in levels of PTS and this change was unsurprisingly not statistically significant (R^2 Change = .001; F (4, 294) = .299; $p = .879$). These results indicated that Demandingness beliefs ($\beta = .11$, $p = .034$), Catastrophizing beliefs ($\beta = .18$, $p = .001$), Low Frustration Tolerance beliefs ($\beta = .27$, $p < .001$), and Depreciation beliefs ($\beta = .40$, $p < .001$) were all significant predictors of levels of PTS. Additionally, no empirical evidence was found that Non-Catastrophizing beliefs directly impact upon levels of PTS or moderate the impact of the various irrational belief groups on levels of PTS.

The third model considered the moderating role of High Frustration Tolerance beliefs. In the first step of sequential moderated multiple regression, five predictors were entered: Demandingness beliefs, Catastrophizing beliefs, Low Frustration Tolerance beliefs, Depreciation beliefs, and High Frustration Tolerance beliefs. This model was statistically significant F (5, 299) = 125.12; $p < .001$ and explained 67.7% of variance in levels of PTS (see Table 4). All predictor variables, with the exception of Demandingness beliefs, were statistically significant predictors of levels of PTS and the strongest predictor of PTS at this step was again Depreciation beliefs ($\beta = .35$, $p < .001$). The final step consisted of entering the interaction terms coding interactions between High Frustration Tolerance beliefs and all four irrational belief processes. After the entry of the interaction effects the model as a whole explained 69.3% of variance in intentions F (9, 295) = 65.84; $p < .001$. The addition of the interaction effects at Step 2 accounted for an additional 1.7% of variance in levels of PTS and this change in explained variance was statistically significant (R^2 Change = .017; F (4, 295) = 3.98; $p = .004$). These results indicated that Demandingness beliefs ($\beta = .13$, $p = .014$), Catastrophizing beliefs ($\beta = .18$, $p < .001$), Low Frustration Tolerance beliefs ($\beta = .24$, $p < .001$), Depreciation beliefs ($\beta = .30$, $p < .001$), and High Frustration Tolerance beliefs

Table 3. Regression model of PTS with Non-Catastrophizing beliefs as a moderator

	R	R^2	*B*	*SE*	β	*t*
Step 1:	.811	.658**				
Demandingness			.35	.16	.11	2.24
Catastrophizing			.49	.15	.17**	3.27
Low Frustration Tolerance			.83	.16	.27**	5.33
Depreciation			1.04	.13	.40**	8.19
Non-Catastrophizing			.09	.15	.02	.56
Step 2:	.812	.659**				
Demandingness (Dem)			.35	.16	.11*	2.13
Catastrophizing (Cat)			.51	.15	.18**	3.34
Low Frustration Tolerance (LFT)			.83	.16	.27**	5.22
Depreciation (Dep)			1.02	.13	.40**	7.73
Non-Catastrophizing (Ncat)			.08	.17	.02	.49
Dem × Ncat			−.01	.07	−.01	−.16
Cat × Ncat			−.05	.06	−.05	−.84
LFT × Ncat			.04	.06	.03	.56
Dep × Ncat			.00	.05	.01	.07

Notes: ** is significant at the .01 level; * is significant at the .05 level

Table 4. Regression model of PTS with High Frustration Tolerance beliefs as a moderator

	R	R^2	*B*	*SE*	β	*t*
Step 1:	.823	.677**				
Demandingness			.21	.15	.07	1.35
Catastrophizing			.55	.15	.19**	3.79
Low Frustration Tolerance			.73	.15	.24**	4.76
Depreciation			.90	.12	.35**	7.42
High Frustration Tolerance			−.62	.15	−.16	−4.20
Step 2:	.833	.693**				
Demandingness (Dem)			.39	.16	.13**	2.47
Catastrophizing (Cat)			.53	.15	.18**	3.57
Low Frustration Tolerance (LFT)			.73	.15	.24**	4.75
Depreciation (Dep)			.76	.13	.30**	6.04
High Frustration Tolerance (HFT)			−.48	.15	−.13*	−3.11
Dem × HFT			−.09	.06	−.09	−1.54
Cat × HFT			−.04	.06	−.04	−.72
LFT × HFT			−.05	.06	−.05	−.89
Dep × HFT			.02	.04	.02	.38

Notes: ** is significant at the .01 level; * is significant at the .05 level

($\beta = -.13$, $p = .002$) were all significant predictors of levels of PTS. Additionally, no empirical evidence was found that High Frustration Tolerance beliefs serve to moderate the impact of the various irrational belief groups on levels of PTS.

The fourth model considered the moderating role of Acceptance beliefs. In the first step of sequential moderated multiple regression, five predictors were entered: Demandingness

Table 5. Regression model of PTS with Acceptance beliefs as a moderator

	R	R^2	*B*	*SE*	β	*t*
Step 1:	.820	.672**				
Demandingness			.28	.15	.09	1.86
Catastrophizing			.50	.15	.18**	3.44
Low Frustration Tolerance			.72	.16	.24**	4.60
Depreciation			.42	.21	.16**	2.00
Acceptance			−.77	.22	−.29**	−3.57
Step 2:	.830	.689**				
Demandingness (Dem)			.40	.18	.13**	2.19
Catastrophizing (Cat)			.58	.15	.20**	3.87
Low Frustration Tolerance (LFT)			.76	.16	.25**	4.73
Depreciation (Dep)			.17	.25	.07	.68
Acceptance (Acc)			−.61	.22	−.23*	−2.79
Dem × Acc			−.03	.06	−.04	−.53
Cat × Acc			−.09	.04	−.13*	−2.17
LFT × Acc			−.07	.04	−.08	−1.53
Dep × Acc			.03	.04	.07	.78

Notes: ** is significant at the .01 level; * is significant at the .05 level

beliefs, Catastrophizing beliefs, Low Frustration Tolerance beliefs, Depreciation beliefs, and Acceptance beliefs. This model was statistically significant F (5, 298) = 121.89; $p < .001$ and explained 67.2% of variance in levels of PTS (see Table 5). All variables with the exception of Demandingness beliefs were statistically significant predictors of levels of PTS and the strongest predictor of PTS was Low Frustration Tolerance beliefs ($\beta = .24$, $p < .001$). The final step consisted of entering the interaction terms coding interactions between Acceptance beliefs and all four irrational belief processes. After the entry of the interaction effects the model as a whole explained 68.9% of variance in intentions F (9, 294) = 72.38; $p < .001$. The addition of the interaction effects at Step 2 accounted for an additional 1.7% of variance in levels of PTS and this additional variance was statistically significant (R^2 Change = .017; F (4, 294) = 4.12; $p = .003$). These results indicated that Demandingness beliefs ($\beta = .13$, $p = .029$), Catastrophizing beliefs ($\beta = .20$, $p < .001$), Low Frustration Tolerance beliefs ($\beta = .25$, $p < .001$), and Acceptance beliefs ($\beta = -.23$, $p = .006$) were all significant predictors of levels of PTS.

One statistically significant moderating effect was observed for the interaction between Catastrophizing beliefs and Acceptance beliefs ($\beta = -.13$, $p = .031$) indicating that the impact of Catastrophizing beliefs on levels of PTS depends upon the levels of Acceptance beliefs. Simple slopes for the relationship between Acceptance beliefs and PTS were investigated for low (-1 *SD* below the mean), medium (mean), and high (+1 *SD* above the mean) levels of Acceptance beliefs (see Cohen and Cohen, 1983; Jaccard, Turrisi and Wan, 1990). Each of the simple slope tests indicated a positive association between Catastrophizing beliefs and PTS; however Catastrophizing beliefs were most weakly associated with levels of PTS when levels of Acceptance beliefs were high (see Figure 1).

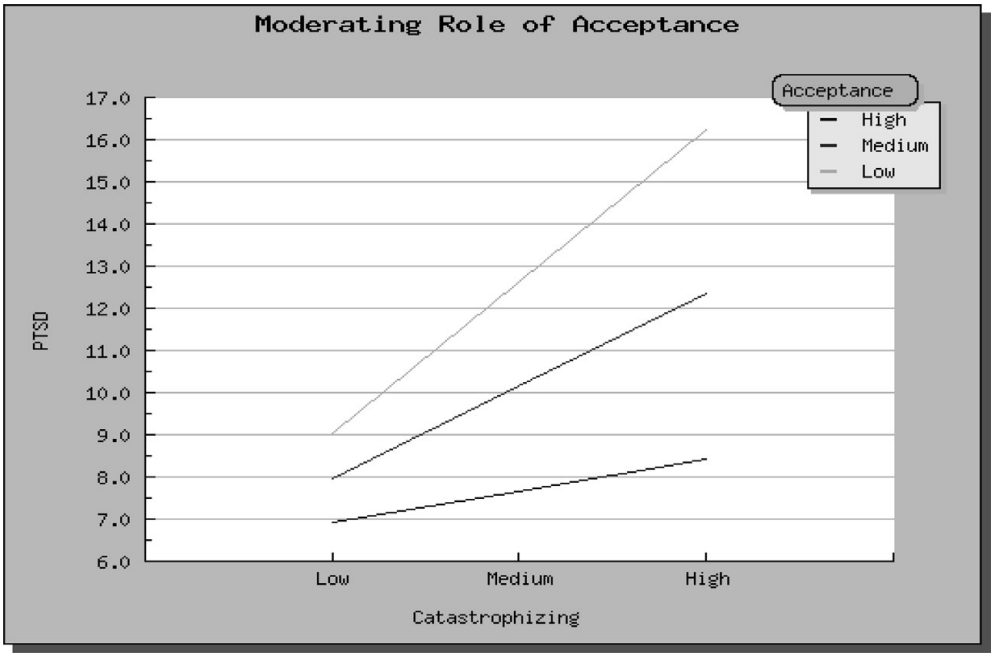

Figure 1. Relationship between Catastrophizing beliefs and PTS moderated by Acceptance beliefs

Discussion

The current study was carried out in order to provide additional empirical evidence to the REBT literature with regards to the hypothesized protective role of rational beliefs in the development of psychopathology by conducting the first empirical investigation of the moderating role of rational beliefs in the relationship between irrational beliefs and psychopathology. This study also sought to assess, for the first time, the direct impact of the various irrational and rational beliefs on levels of PTS, as well as to further investigate whether rational and irrational beliefs are best conceptualized as bipolar constructs or whether they represent qualitatively distinct cognitive constructs.

As can be seen in Table 1, findings of the current study provide equivocal indications regarding the relationship of irrational beliefs to rational beliefs. No statistically significant associations were observed between the primary rational and irrational belief processes (Preference and Demandingness beliefs), while a weak, negative association was identified between Non-Catastrophizing and Catastrophizing beliefs, and a weak-to-moderate negative association was discovered between High Frustration Tolerance and Low Frustration Tolerance beliefs. These results strongly suggest that these three rational and irrational belief processes are not bi-polar constructs. Contrastingly, there was a strong, negative association identified between Acceptance and Depreciation beliefs, indicating that these variables are bipolar constructs of each other. Given that none of the other rational and irrational belief process approached this level of association, it is possible that the strong (negative) relationship observed between Acceptance and Depreciation beliefs is a consequence of

an inability of the AV-ABS2 to properly discriminate between these constructs. Additional research utilizing generalized, and ideally, disorder-specific measures of rational and irrational beliefs will be required to gain better insight into whether or not these particular belief processes are bipolar constructs. Overall, current results support previous indications (Bernard, 1998) that rational and irrational beliefs represent separate cognitive constructs.

In order to investigate the unique direct effects of rational and irrational beliefs on PTS, and the interaction effects of the four rational belief processes (Preferences, Non-Catastrophizing, High Frustration Tolerance, and Acceptance beliefs), four distinct models were estimated and tested. In the first model we sought to assess the direct impact of each of the irrational belief processes (Demandingness, Catastrophizing, Low Frustration Tolerance, and Depreciations) along with Preference beliefs. The results indicated that Preferences had a very weak, negative direct impact on levels of PTS, suggesting that those who have higher levels of Preference beliefs tend to experience lower levels of PTS. Additionally, Catastrophizing, Low Frustration Tolerance, and Depreciation beliefs all positively influenced levels of PTS, with Depreciation beliefs being the strongest predictor of PTS. Catastrophizing and Low Frustration Tolerance beliefs have been predicted, in general, to be important variables in the emergence of anxiety disorders (see David, 2003) and the present results provide support for this prediction of REBT theory.

It is interesting to note that Depreciation beliefs, which are normally more commonly observed as key cognitive variables in the development of mood disorders, were the strongest predictor of PTS among the current sample. Posttraumatic stress disorder (PTSD) and depression have been well established to share a high degree of comorbidity (Kessler, Sonnega, Bromet, Hughes and Nelson, 1995; Zlotnick et al., 2006) and this may well account for the discovery that self-depreciatory beliefs were consistently identified as the strongest predictor of PTS. Also of interest is that Demandingness beliefs were not a statistically significant predictor of levels of PTS. REBT theory predicts that Demandingness beliefs should exert their influence on psychological distress through the secondary irrational belief processes, and thus the observation of no direct influence of Demandingness beliefs on PTS is understandable in light of theoretical predictions. Within this model, Preference beliefs did not serve to moderate the relationship of any of the four irrational beliefs with levels of PTS.

A very similar pattern of results emerged from the next two models, which assessed the direct and moderating effects of Non-Catastrophizing, and High Frustration Tolerance beliefs respectively. Again we observed that Depreciation beliefs were the strongest predictor of PTS, and in both cases neither rational belief process had a direct impact on levels of PTS, nor did either belief process exhibit a moderating effect for any of the irrational beliefs on PTS.

The final model considered the direct and moderating role of Acceptance beliefs. In this case, Acceptance beliefs demonstrated a weak but statistically significant direct effect on levels of PTS, suggesting that higher levels of Acceptance beliefs are associated with lower levels of PTS. Moreover, Acceptance beliefs were found to moderate the impact of Catastrophizing beliefs on levels of PTS. These results indicate that Acceptance beliefs serve as important cognitive protective factors in the emergence of PTS, not only directly as would be expected, but also by modulating in a positive direction the impact that Catastrophizing beliefs can have on levels of PTS.

These results, considered in their totality, provide strong empirical support for REBT theory within the context of a psychiatric disorder not yet examined by the REBT community. Our results demonstrated that the irrational beliefs hypothesized as crucial in the emergence and

maintenance of psychopathology by REBT theory are indeed very important predictors of PTS, and served to explain a substantial percentage of variance in levels of PTS. Furthermore, current results indicate that Preference and Acceptance beliefs directly impacted upon levels of PTS such that higher levels of each of these rational beliefs contributed to lower levels of PTS. Additionally, Acceptance beliefs were found to moderate the impact of Catastrophizing beliefs on levels of PTS. These results provide additional and unique support for the cognitive protective role played by rational beliefs.

Findings from the current study are not limited to REBT theory, but can be viewed as having significance to the wider CBT community. As a consequence of REBT being the original cognitive-behavioural model, many of the important functional and dysfunctional cognitive processes first described within REBT theory have been adopted and incorporated into distinct CBT models. For example, Catastrophizing beliefs are an integral component of contemporary cognitive therapy models of PTSD, as well as panic disorder and generalized anxiety disorder (see Clark and Beck, 2010). Low Frustration Tolerance beliefs are synonymous with "distress intolerance" beliefs, which are a key component of Dialectical Behavioural Therapy's theory of borderline personality disorder (Linehan, 1993). More recently distress intolerance beliefs have been demonstrated to be important predictors of PTSD (Marshall-Berenz, Vujanovic, Bonn-Miller, Bernstein and Zvolensky, 2010; Vujanovic, Bonn-Miller, Potter, Marshall-Berenz and Zvolensky, 2011). Additionally, Acceptance beliefs share a certain degree of similarity to the concept of acceptance described in Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, Bunting, Twohig and Wilson, 2004) and within other mindfulness-based disciplines (e.g., Mindfulness-Based Stress Reduction, and Mindfulness-Based Cognitive Therapy). Although REBT theory and these mindfulness-based models talk of acceptance, there are important distinctions. The mindfulness-based approaches encourage full attending to, and non-judgemental acceptance of, all contents of consciousness however pleasant or unpleasant, desirable or undesirable, they may be. Contrastingly, in REBT theory Acceptance beliefs involve an active process in which the contents of consciousness (thoughts, emotions, physical sensations), as well as the realities of the external world, are explicitly judged as being undesirable, unpleasant, or painful, but are accepted because that is the nature of reality in that moment. Moreover, in REBT theory Acceptance is the process of evaluating internal and external occurrences without making illogical overgeneralizations (e.g. not judging a person totally, based upon one moment of poor behaviour). Current findings consequently can be viewed as not only providing empirical support for a number of important predictions of REBT theory, but as widely supportive of the more general CBT model of psychopathology.

As with any research endeavour there are a number of limitations associated with the current study that ought to be considered. The nature of the sample is limited to a very specific strata of the population (law enforcement, military, and emergency service personnel) experiencing symptoms of PTS, and thus generalizations of current findings to the other contexts is not possible. Future research should seek to replicate this study within populations that experience various other psychological maladies in order to generate more robust and reliable conclusions. The current study also employed a measure of general rational and irrational beliefs; however it would have been preferable to examine the role of disorder-specific rational and irrational beliefs, as disorder-specific beliefs would likely provide a much clearer indication of the true role played by these cognitions in PTS. Additionally, a self-report measure of PTS was used and although self-report measures of PTS such as the PDS

used in the current study have been shown to highly correspond with clinician-administered measures (Griffin et al., 2004), clinician based measures would have been preferable as they are considered the gold standard method of assessing PTSD symptomology.

In conclusion, this study substantially contributes to the scientific literature in a number of important ways. It is the first of its kind to investigate the role of rational or irrational beliefs in the context of symptoms of PTS. As such this study has established the important cognitive vulnerability role of irrational beliefs, and the important cognitive protective role of rational beliefs, in PTS. This provides important additional evidence in support of REBT theory. Moreover, this study provides the first piece of empirical evidence that rational beliefs can serve to moderate the impact of irrational beliefs on psychological distress, although the protective role appears to be limited specifically to Acceptance beliefs. Current results provide a new perspective on the protective role played by rational beliefs and thus opens up a new area of research for those in the REBT community to further explore in the context of a variety of other forms of psychopathology.

References

Aiken, L. S. and West, S. G. (1991). *Multiple Regression: testing and interpreting interactions*. Newbury Park, CA: Sage.

Alden, L. and Safran, J. (1978). Irrational beliefs and nonassertive behavior. *Cognitive Therapy and Research*, *2*, 357–364.

Alden, L., Safran, J. and Weideman, R. (1978). A comparison of cognitive and skills training strategies in the treatment of unassertive clients. *Behavior Therapy*, *9*, 843–846.

American Psychiatric Association (1994). *Diagnostic and Statistical Manual of Mental Disorders (4th ed.)*. Washington, DC: Author.

Bernard, M. E. (1998). Validation of the general attitudes and belief scale. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *16*, 183–196.

Blake, D. D., Weathers, F. W., Nagy, L. M., Kaloupek, G. D., Charney, D. S. and Keane, T. M. (1995). *The Clinician-Administered PTS Scale for DSM-IV*. Boston: National Centre for PTS, Behavioural Science Division.

Blatt, S. J. (1995). The destructiveness of perfectionism. *American Psychologist*, *50*, 1003–1020.

Clark, D. A. and Beck, A. T. (2010). *Cognitive Therapy of Anxiety Disorders*. London: Guilford Press.

Cohen, J. and Cohen, P. (1983). *Applied Multiple Regression/Correlation Analysis for the Behavioural Sciences (2nd ed.)*. Hillsdale, NJ: Erlbaum.

David, D. (2003). Rational emotive behavior therapy: the view of a cognitive psychologist. In W. Dryden (Ed.), *Theoretical Developments in REBT*. London: Brunner/Routledge.

David, D., Ghinea, C., Macavei, B. and Kallay, E. (2005). A search for "hot" cognitions in a clinical and non-clinical context: appraisal, attributions, core relational themes, irrational beliefs, and their relations to emotion. *Journal of Cognitive and Behavioral Psychotherapies*, *5*, 1–42.

David, D., Lynn, S. J. and Ellis, A. (2010) *Rational and Irrational Beliefs: research, theory, and clinical practice*. Oxford: Oxford University Press.

David, D., Schnur, J. and Belloiu, A. (2002). Another search for the "hot" cognitions: appraisal, irrational beliefs, attributions, and their relation to emotion. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *15*, 93–131.

DiLorenzo, T. A., David, D. and Montgomery, G. H. (2007). The interrelations between irrational cognitive processes and distress in stressful academic settings. *Personality and Individual Differences*, *42*, 765–777.

DiLorenzo, T. A., David, D. and Montgomery, G. H. (2011). The impact of general and specific rational and irrational beliefs on exam distress: a further investigation of the binary model of emotional distress as an emotional regulation model. *Journal of Cognitive and Behavioural Psychotherapies*, *11*, 121–142.

Ellis, A. (1958). Rational psychotherapy. *Journal of General Psychology*, *59*, 35–49.

Ellis, A. (1962). *Reason and Emotion in Psychotherapy*. New York: Lyle Stuart.

Ellis, A. (1994). *Reason and Emotion in Psychotherapy (rev. ed.)*. Secaucus, NJ: Birch Lane.

Foa, E., Cashman, L., Jaycox, L. and Perry, K. (1997). The validation of a self-report measure of PTS: the Posttraumatic Diagnostic Scale. *Psychological Assessment*, *9*, 445–451.

Fulop, I. E. (2007). A confirmatory factor analysis of the attitude and belief scale 2. *Journal of Cognitive and Behavioral Psychotherapies*, *7*, 159–170.

Griffin, M. G., Uhlmansiek, M. H., Resick, P. A. and Mechanic, M. B. (2004). Comparison of the Posttraumatic Diagnostic Scale versus the Clinician-Administered Posttraumatic Stress Disorder Scale in domestic violence survivors. *Journal of Traumatic Stress*, *17*, 497–503.

Hayes, S. C., Strosahl, K. D., Bunting, K., Twohig, M. and Wilson, K. G. (2004). What is acceptance and commitment therapy? In S. C. Hayes and K. D. Strosahl (Eds.), *A Practical Guide to Acceptance and Commitment Therapy* (pp. 1–30). New York: Springer-Verlag.

Hyland, P. and Boduszek, D. (2012). Resolving a difference between Cognitive Therapy and Rational Emotive Behaviour Therapy: towards the development of an integrated CBT model of psychopathology. *Mental Health Review Journal*, *17*, 104–117.

Jaccard, J., Turrisi, R. and Wan, C. K. (1990). *Interaction Effects in Multiple Regression*. Newbury Park, CA: Sage.

Jones, J. and Towers, P. (2004). Irrational and evaluative beliefs in individuals with anger disorders. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *22*, 153–169.

Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M. and Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry*, *52*, 1048–1060.

Linehan, M. M. (1993). *Cognitive-Behavioral Treatment of Borderline Personality Disorder*. New York: Guilford.

Lorcher, P. S. (2003). Worry and irrational beliefs: a preliminary investigation. *Individual Differences Research*, *1*, 73–76.

Lupu, V. and Iftene, F. (2009). The impact of rational emotive behaviour education on anxiety in teenagers. *Journal of Cognitive and Behavioral Psychotherapies*, *1*, 95–105.

Macavei, B. (2002). Scala de Atitudini şi Convingeri II (ABS II): date preliminare pentru populaţia de limbă româna. *Romanian Journal of Cognitive and Behavioral Psychotherapies*, *2*, 105–122.

Macavei, B. (2005). The role of irrational beliefs in the rational emotive behavior theory of depression. *Journal of Cognitive and Behavioral Psychotherapies*, *5*, 73–83.

Marshall-Berenz, E. C., Vujanovic, A. A., Bonn-Miller, M. O., Bernstein, A. and Zvolensky, M. J. (2010). Multi-method study of distress tolerance and PTSD symptom severity in a trauma-exposed community sample. *Journal of Traumatic Stress*, *23*, 623–630.

Martin, R. C. and Dahlen, E. R. (2004). Irrational beliefs and the experience and expression of anger. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *22*, 3–20.

McDermutt, J. F., Haaga, D. A. F. and Bilek, L. A. (1997). Cognitive bias and irrational beliefs in major depression and dysporia. *Cognitive Therapy and Research*, *21*, 459–476.

Moldovan, R. (2009). An analysis of the impact of irrational beliefs and illness representations in predicting distress in cancer and type II diabetes patients. *Cognition, Brain, Behaviour: An Interdisciplinary Journal*, *13*, 179–193.

Montgomery, G. H., David, D., DiLorenzo, T. A. and Schur, J. B. (2007). Response expectancies and irrational beliefs predict exam-related distress. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *25*, 17–34.

Muran, J. C., Kassinove, H., Ross, S. and Muran, E. (1989). Irrational thinking and negative emotionality in college students and applications for mental health services. *Journal of Clinical Psychology*, *45*, 188–193.

Nelson, E. (1977). Irrational beliefs in depression. *Journal of Consulting and Clinical Psychology*, *45*, 1190–1191.

Nieuwenhuijsen, K., Verbeek, J. H. A. M., Boer, A. G. E. M., Blonk, R. W. B. and van Dijk, F. J. H. (2010). Irrational beliefs in employees with an adjustment, a depressive, or an anxiety disorder: a prospective cohort study. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *28*, 57–72.

Prud'homme, L. and Barron, P. (1992). The pattern of irrational beliefs associated with major depressive disorder. *Social Behavior and Personality*, *20*, 199–212.

Silverman, S. and DiGiuseppe, R. (2001). Cognitive-behavioral constructs and children's behavioural and emotional problems. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *19*, 119–134.

Smith, T. W. and Brehm, S. S. (1981). Cognitive correlates of the type A coronary-prone behaviour pattern. *Motivation and Emotion*, *5*, 215–223.

Szentagotai, A., David, D., Lupu, V. and Cosman, D. (2008). Rational-emotive behaviour therapy versus cognitive therapy versus medication in the treatment of major depressive disorder: mechanisms of change analysis. *Psychotherapy Theory, Research, Practice*, *4*, 523–538.

Tabachnick, B. G. and Fidell, L. S. (2007). *Using Multivariate Statistics (5th ed.)*. Boston: Allyn and Bacon.

Vujanovic, A. A., Bonn-Miller, M. O., Potter, C. M., Marshall-Berenz, E. C. and Zvolensky, M. J. (2011). An evaluation of the association between distress tolerance and posttraumatic stress within a trauma-exposed sample. *Journal of Psychopathology and Behavioral Assessment*, *33*, 129–135.

Zlotnick, C., Johnson, J., Kohn, R., Vicente, B., Rioseco, P. and Saldiva, S. (2006). Epidemiology of trauma, post-traumatic stress disorder (PTSD) and co-morbid disorders in Chile. *Psychological Medicine*, *36*, 1523–1533.