Does the Need for Cognition Moderate the Relationship between Rumination and

Levels of Anxiety and Depression

Gabriela Przybylska

X20398211

BA (Hons) Psychology

Submitted to the National College of Ireland, March 2023

Submission of Thesis and Dissertation

National College of Ireland
Research Students Declaration Form
(Thesis/Author Declaration Form)

Name: Gabriela Przybylska

Student Number: x20398211

Degree for which thesis is submitted: BA (Hons) in Psychology

Title of Thesis: Does the Need for Cognition Moderate the Relationship between Rumination and levels of Anxiety and Depression

Date: 13/03/2023

Material submitted for award:

A. I declare that this work submitted has been composed by myself. ☒

B. I declare that all verbatim extracts contained in the thesis have been distinguished by quotation marks and the sources of information specifically acknowledged. ☒

C. I agree to my thesis being deposited in the NCI Library online open access repository NORMA. ☒

D. I declare that no material contained in the thesis has been used in any other submission for an academic award. ☒

Acknowledgments

First and foremost, I would like to thank my mom Betty and my dad Robbie for their unconditional support throughout this thesis despite not understanding what I am talking about. Similarly, I'd like to thank my brother Daniel for trying his best to not disturb me each time he had something exciting to share with me. Without their support and belief in me throughout my life and study I would not be where I am today.

I'd like to sincerely thank Dr Caoimhe Hannigan for her time, feedback, and expertise throughout the completion of this thesis. It was reassuring and pleasant to be able to work with such a knowledgeable academic. Additionally, I'd like to thank Dr Michelle Kelly for her time, support, and lecture content. A big thank you to all of the lecturers at the National College of Ireland for providing me with the tools and knowledge that allowed me to proceed with this thesis in an informed manner.

Last, but not least, I would like to thank all of those who took the time to participate in this study and Dr John Krantz for publishing the study link on his website 'Psychological Research on the Net'.

Abstract

Those high in need for cognition (NFC) have been reported to monitor and regulate their mental activity while simultaneously seeking out and evaluating information. Recent research has revealed the potential role that NFC may play in moderating levels of anxiety and depression. This study followed up on those findings aiming to examine the ability that NFC has to moderate levels of anxiety and depression via the presence or absence of rumination. Additionally, this study aimed to investigate NFC as a potential means for treating and preventing the emergence of high levels of anxiety and/or depression. A moderated multiple regression was conducted where higher levels of rumination were associated with higher levels of depression and anxiety. Higher levels of NFC were not predictive of lower levels of depression and anxiety. Finally, NFC did not serve as a moderator upon the relationship between rumination and levels of anxiety and depression. Previous work appraising rumination as a contributor to levels of anxiety and depression has been supported. Findings pertaining to the function that NFC serves in relation to levels of anxiety and depression are not consistent with previous work. However, more research is crucial for clarifying NFC's role further.

Keywords: need for cognition, rumination, anxiety, depression, attentional control, effortful control

Table of Contents

Does the Need for Cognition Moderate the Relationship between Rumination and Levels of Anxiety and Depression

Individuals high in need for cognition (NFC) are conceptualized to monitor and regulate their mental activity while simultaneously seeking out and evaluating information (Perkins et al., 2000). NFC has been investigated in relation to both behavioural and personality correlates and presents itself as a potential target for intervention and prevention strategies for mental-ill health (Fleischaluer et al., 2010). The present study has investigated the moderating effect that NFC has on the relationship between ruminative thinking and levels of anxiety and depression. These findings have further assessed the construct validity of the claim implying that attentional control (a feature of NFC) may decrease the occurrence of ruminative thinking (DeJong et al., 2019). The emergence of findings that support NFC's decreasing effect on levels of rumination, anxiety, and depression may give rise to measures aimed at increasing NFC. The present study aimed to contribute towards this premature notion.

Anxiety and Rumination

Trait anxiety refers to an individual's general tendency to perceive circumstances as more threatening, ultimately, leading to disproportionate state anxiety reactions (Spielberger, 1966). State anxiety reactions are characterised by emotional factors such as arousal of the autonomic system accompanied by muscle tension, increased heart rate, blood pressure, respiration, and sweat gland activity (Saviola et al., 2020). As well as that, cognitive factors of state anxiety can affect thought processes and lead to rumination and/or a perceived lack of confidence (Liebert & Morris, 1967). In such states, one may find it difficult to initiate a behaviour that will remove or change the interpretation of the perceived threat (Eysenck et al., 2007). This may partly be due to the fact that anxiety impairs working memory

(Altenmuller et al., 2014; Baumeister, 1984) and efficient functioning of the ability to control voluntary attention (i.e. attentional control) (Eysenck et al., 2007). Consequently, these facets of state anxiety may make it harder to process the task at hand. As such, individuals with high state anxiety are more prone to engaging in a coping style that is passive and repetitive and one that involves thought patterns that are orientated around the causes and consequences of one's symptoms (Michi et al., 2013). Such thought patterns are characterized by being inconclusive and deprived of active coping or problem-solving strategies that may alleviate the anxious state and are referred to as rumination (Du Pont et al., 2019).

Consequently, experimentally induced rumination in distressed individuals has been shown to prolong both depressed and anxious states when compared to induced distraction (McLaughlin et al., 2007). Considering that experimental studies are at the top of the hierarchy of evidence and that these findings are congruent with Behar et al.s (2005) previous work, the findings appear to yield a promising link between these variables. These findings have highlighted that rumination prolongs negative emotional states rather than resolves them (McLaughlin et al., 2007; LeMoult et al., 2013). This notion's construct validity is strengthened by the findings that provide evidence for the association between rumination and levels of anxiety and depression where they have a reciprocal effect on one another (Kukyen et al., 2006; Olatunji et al., 2013; Hong, 2007). Despite these findings being mostly cross-sectional, their ecological validity has not been compromised within the context of a controlled laboratory environment. On the other hand, it limits the possibility of identifying a causal relationship between rumination and levels of anxiety and depression. Nevertheless, the considerable amount of empirical work mentioned above that has consistently replicated such findings provides relatively strong evidence. Moreover, such evidence suggests that anxiety and depression may induce rumination, and in turn, rumination may prolong anxious

and depressed moods proposing that rumination mediates the relationship between worry and symptoms of anxiety and depression (Roelof's et al., 2009; Sun et al., 2014).

Characteristics of Rumination

An individual's ability to choose what they pay attention to and what they ignore is what's referred to as attentional control. Recent findings by Allard and Yaroslavsky (2019) reveal that rumination is characterized by narrow and inflexible attentional control that has implications for emotional regulation and the development of psychopathologies. Although these findings emerged from a rather small and disproportionate sample, they were able to replicate this effect in a clinical sample. The mediating role that attentional control plays in terms of rumination is not an uncommon finding in psychological research (Hsu et al., 2015). Low levels of attentional control and its association with rumination and anxiety form the basis of Eysenck and Calvo's (1992) Attentional Control Theory. The Attentional Control Theory proposes that anxiety decreases attentional control and increases attention to threat-related stimuli, ultimately, compromising specific executive control processes (Eysenck et al., 2007). As well as being a mediator of rumination, poor attentional control has also been linked to poor effortful control that allows for self-regulation of positive and negative emotional reactivity (Derryberry & Reed, 2002). Effortful control is similar to attentional control, however, it pertains to the inhibition of behavioural responses as opposed to the allocation of attention (Morris et al., 2014). Teesdale et al. (1995) implied that those with high attentional control may me better able to manage depressing thoughts and negative reaction patterns. It has been suggested that attentional control and effortful control may be useful targets for interventions as current treatments do not address deficits in attentional control and effortful control (Wass et al., 2012) . On the other hand, contradicting findings revealing that lower attentional control levels increase treatment gains appears to challenge such claims (Allan et al., 2020).

Need for Cognition

The need for cognition (NFC) is a thinking style characterised by high attentional control and effortful control (Bauer & Stiner, 2020). Those high in NFC are conceptualized to actively seek, acquire, reflect on, and evaluate information in their environment without depending on cognitive heuristics, social comparisons, or experts in order to make judgments and reach conclusions (Wu et al., 2011). Additionally, they are more likely to monitor and regulate their mental activity in a metacognitive sense by evaluating their thoughts for empirical validity (Petty et al., 2009). Studying NFC is important because it reveals how an individual typically invests their cognitive capacities and the extent to which it serves as a coping strategy (Luong et al., 2017). The interindividual differences in NFC have been conceived to be subject to situational factors such as past experiences and behavioural histories as well as dispositional factors (Cacioppo et al., 1996). Consequently, NFC is conceptualized to be more reflective of disposition than it is of intellectual ability (Perkins et al., 2000; Stanovish & West, 1997). Essentially, an individual's ability to think critically and behave intellectually is dependent on their motivational disposition towards critical thinking (Stedman et al., 2009). This suggests that it might be a skill that can be developed rather than an inherent characteristic (Perkins et al., 2000), although, Colling et al. (2022) argue that it is more of a personality trait than anything else. Either way, individuals high in NFC are more likely to engage in emotionally stable, conscientious, and goal orientated behaviour independent of the context, ultimately allowing them to manage internal conflicts more readily (Fleischlauer et al., 2014).

Need for Cognition as it relates to Rumination, Anxiety, and Depression

The link between NFC and neuroticism has been studied more extensively than the link between NFC and anxiety (Johansson & Olund, 2017). Such research has demonstrated

that NFC is negatively associated with neuroticism (Bodling & Martin, 2011), where in turn, neuroticism is closely linked to anxiety (Widiger & Mullins-Sweatt, 2009). Accordingly, recent findings from Zainal and Newman's (2022) longitudinal study revealed that over a 10-year period, NFC had a moderate to large decreasing effect on symptoms of anxiety and depression. These findings are consistent with Sorjonen et al.s (2023) longitudinal research that found NFC to be negatively associated with levels of anxiety and depression. The implications of these findings are that measures to increase NFC may be useful in treating and preventing the emergence of high levels of anxiety and/or depression (Sorjonen et al., 2023). In spite of that, the aforementioned research did not consider the absence of rumination as a confounding variable, nor did it consider the role that NFC plays in moderating the cognitive symptoms of state anxiety. By establishing the process through which NFC may aid in alleviating or preventing symptoms of anxiety and depression, prevention and intervention strategies may be tailored more appropriately. According to Roelof's et al. (2009), rumination is a cognitive vulnerability factor for the development of depression and anxiety and thus, it may be more indicative of the coping strategies that may prevent the emergence of anxiety and depression.

In support of this, empirical evidence suggests that the attributes associated with a high NFC such as high attentional control and effortful control (DeJong et al., 2019) may be the very attributes that counteract rumination. According to Teesdale et al. (1995), attentional control may serve as a coping strategy by allowing individuals to avoid depressing thoughts and reaction patterns that are characteristic of rumination. A study by Derryberry & Reed (2002) aimed to examine the role that attentional control has in regulating attentional biases related to anxiety. The attentional bias in regard to anxiety refers to the tendency that anxious individuals have to favour threatening stimuli over non-threatening stimuli (Mobini & Grant, 2007). Attentional control was found to be the moderator of the relationship between anxiety

and attentional bias (Derryberry & Reed, 2002). This suggests that attentional control plays a key role in the disengagement process that may prevent catastrophic and ruminative thought processes which in turn lead to anxiety and depression (Roelof;s et al., 2009). This is further supported by Atalay et al.s (2022) and He et al.s (2019) findings that found rumination to be associated with lower levels of attentional control as well as cognitive flexibility. Cognitive flexibility allows for efficient switching between different functional modules in different brain modules (Ionescu, 2012). Moreover, Nishiguchi et al. (2016) found NFC to significantly predict an increase in effortful control over time. These findings indicate that NFC may be associated with effortful control efficiency and that NFC may improve control of cognitive functions such as attentional control (Pessoa, 2009). According to Eysenck et al. (1992) the adverse effects of anxiety on processing efficiency depend on the functioning of attentional control.

Overall, it may be the case that individuals more prone to thinking and evaluating may be more skilled at regulating their attentional focus which in turn may help to regulate negative emotionality via rumination counteraction (Atalay et al., 2022). The proposed function of NFC is further supported by the findings that revealed NFC to be positively associated with objectivism (Leary et al., 1986), emotionally stable and conscientious behaviour (Fleischlauer et al., 2010), self-esteem, and absorption (Obserg, 1987). Absorption refers to a state where all attention is entirely directed at modelling and experiencing the attentional object which may reflect high attentional control (Somer & Herscu, 2017). Cacioppo et al. (1996) indicated that these effects remain as such once cognitive ability is controlled for. This may mean that individuals high in NFC may have an increased ability to remain objective and focused on rational thought processes during internal conflict resolution irrespective of cognitive ability (Leary et al., 1986; Venkatraman & Price, 1990; Maio & Esses, 2001). Perhaps the most intriguing findings are those of Nishiguchi et al. s (2016) that

revealed that elevated depressive symptoms and decreased NFC occur simultaneously where NFC significantly predicted an increase in effortful control (EC) over time. This highlights the potential importance of targeting NFC in intervention and prevention strategies as NFC may have a moderating effect on the relationship between rumination and levels of anxiety and depression.

The Present Study

Since those high in NFC appear to possess desirable traits that my aid in coping with levels of anxiety and depression, the present study will aim to uncover potential functions of the intrinsic motivation to seek, acquire, and evaluate information. Levels of anxiety and depression as well as the tendency to ruminate and level of NFC will be measured in an Irish population for the first time. For the purpose of this study, anxiety has been operationalized as a state where an individual perceives the contextual demands in their environment as threatening and experiences an arousal in the autonomic system (Saviola et al., 2020). Rumination has been operationalized as the act of engaging in a repetitive thinking style that is inconclusive and orientated around one's symptoms and their causes and consequences (Michi et al., 2013). Finally, NFC has been operationalized as an intrinsically motivated thinking style that is associated with high cognitive engagement within contextual and meta-cognitive experiences (Fleischlauer et al., 2014). The present study will contribute to the construct validity of the claim that attentional control via NFC may decrease the occurrence of rumination, in turn decreasing overall levels of anxiety and depression (DeJong et al., 2019).

Apropos of previous research it is hypothesised that:

1) Higher levels of rumination will predict higher levels of anxiety and depression.

2) Higher levels of need for cognition will predict lower levels of anxiety and depression.

3) Need for cognition will moderate the relationship between rumination and levels of anxiety and depression.

Methods

Participants

The required sample size was calculated using Tabachnick and Fidell's (2013) sample size check for which the formula is: 50 +8(m) where m is the number of predictor variables. The minimum number of participants required equated to 74. However, a larger sample size was aimed for in order to minimize the effects of the imperfect measurement of subjective experiences such as levels of depression and anxiety as well as to decrease the likelihood of random errors and a selection bias. Participants were recruited using non-probability convenience sampling via personal contacts, social networking platforms, and advertisements in local stores and on Dr John. H. Krantz' 'Psychological Research on the Net' website. As such, whoever was accessible and met the inclusion criteria was recruited. The final sample consisted of 138 participants (22.5% male, 72.5% female, 3.6% non-binary, 0.7% transgender, 0.7% other; age: $M + SD = 29.28 + 11.57$ years, range = 18-64 years).

Design

The present study utilised a quantitative cross-sectional design. There was one criterion variable (levels of depression and anxiety), and three predictor variables (NFC, rumination, NFC x rumination) that remained consistent throughout the entire study. The predictor variable 'NFC x rumination' has been created to assess the level of moderation that such an interaction has on the relationship between rumination and levels of depression and anxiety above and beyond their independent effects.

Measures

All measures were administered using Google Forms. The measures are as follows:

Demographics

Participants were asked to indicate their gender (male, female, non-binary, transgender, or other) and to provide their age in years (Appendix A).

Need for Cognition

Varying levels of the NFC were assessed using Cacioppo et al.s (1982) 'Need for Cognition Scale' (Appendix B). The NFC Scale (Cacioppo et al., 1982) is an 18-item scale that is scored on a 4-point Likert scale from 1 (= *extremely uncharacteristic of me*) to 5 (= *extremely characteristic of me*) and summed. This scale aims to measure interindividual differences in cognitive motivation by examining one's propensity to seek, engage in, and enjoy cognitively demanding tasks. As such, higher scores reflect higher levels of NFC, and lower scores reflect lower levels of NFC. Questions 3, 4, 5, 7, 8, 9, 12, 16, and 17 were reverse scored to reflect such scoring. The NFC continues to demonstrate construct (discriminant) validity through emerging findings showing a negative association between NFC and measures presumed to be separate from NFC (e.g. anxiety, private and public self-consciousness)(Obserg, 1987; Olson et al., 1984). Perkins et al. (2000) demonstrated that the NFC is relatively stable over time and distinguishable from other indexes such as measures of IQ and grades. Overall, the NFC has proven to be a robust and reliable instrument with high internal consistencies (i.e. Cronbach alphas typically > .85; e.g. Cacioppo et al., 1996). In the current study, the Cronbach alpha coefficient was .87 demonstrating very good internal consistency reliability for the scale with the current sample.

Depression Anxiety Stress Scale

Levels of depression and anxiety were assessed using Lovibond and Lovibond's (1995) 'Depression Anxiety Stress Scale-21' (Appendix C). The Depression Anxiety Stress Scale-21 (DASS-21) is a 21-item self-report instrument that measures three negative

emotional states related to anxiety, tension/stress, and depression. It is a shortened version of

the DASS-42 that consists of 7 items from each of the three subscales. The 21-item version

appears to be advantageous over the 42-item version as it includes fewer items and has

smaller inter-factor correlations (Lovibond & Lovibond, 1995). The items are scored on a 3-

point Likert scale from 1 (= *did not apply to me at* all) to 3 (= *applied to me very much or*

most of the time) and summed. Higher scores on the DASS-21 reflect higher levels of

anxiety, depression and/or stress/tension. There were no items that needed to be reverse

scored. The DASS-21 demonstrates strong positive correlations with previously established

measures that measure the same construct (e.g. Beck's Depressive Inventory, the Beck

Anxiety Inventory) contributing to the overall concurrent validity of the scale (Lovibond &

Lovibond, 1995). According to Antony et al. (1998) the Dass-21 is a reliable and valid

measurement tool for assessing depression, anxiety, and stress/tension, with a Cronbach alpha

coefficient of .90. In the current study, the Cronbach's alpha coefficient was .95

demonstrating very good internal consistency reliability for the scale with the current sample.

Ruminative Responses Scale

The level of ruminative responses was assessed using Nolen-Hoeksema et al.s (1999)

'Ruminative Responses Scale'(Appendix D). The Ruminative Responses Scale (RRS) is a

22-item scale that measures an individual's tendency to focus on the causes and

consequences of their dysphoric mood. Responses are measured using a 4-point Likert scale

ranging from 1 (= *almost never*) to 4 (= *almost always*) where participants are provided with

the following instructions:

'People think and do so many different things when they feel sad, blue, or depressed.

Please read each of the items below and indicate whether you almost never,

sometimes, often, or almost always think or do each on when you feel down, sad, or depressed. Please indicate what you *generally* do, not what you think you should do'.

As such, higher scores reflect an increased tendency to ruminate. No items needed to be reverse scored. According to Roelofs et al. (2006) the RRS is a reliable and valid measure that is significantly moderately associated with trait anxiety, depression, and neuroticism and demonstrates moderate test-retest reliability. Internal consistency reliability has been reported to be very good (i.e. Cronbach's alpha > .80; e.g. Luminet, 2004). In the current study, the Cronbach's alpha coefficient was .95 demonstrating very good internal consistency reliability for the scale with the current sample.

Procedure

Ethical approval for the study was granted by the Psychology Filter Ethics Committee once the ethical approval form was reviewed. A Google Forms questionnaire was created that included 1) an information sheet (Appendix E), 2) consent form (Appendix F), 3) basic demographic variables (Appendix A), 3) the three measures (Appendix B, C, & D), and 4) the debriefing information (Appendix G). The debriefing sheet included avenues that could assist the participant with any distress should the questionnaire have evoked such a response. Aside from this, no other ethical implication was identified. The link for the study site was distributed via social media and local stores. Participants were required to read the information sheet, provide informed consent, provide basic demographic variables, and to record their responses on the three measures. Participation was estimated to take between 5 to 10 minutes. Once the data was recorded the participants were thanked for their cooperation and debriefed. Following the closure of response intake, the data was transferred to SPSS via Excel in order to be statistically analysed.

Data Analysis

IBM SPSS Statistics Software version 26.0 was used to conduct the statistical analysis (Appendix H). To test univariate normal distribution, the Kolmogorov-Smirnov tests ($p >$ .05), histograms, and Q-Q Plots were considered. A moderated multiple regression was conducted using PROCESS (version 4.2; Hayes, 2018). According to Hayes (2018), if one is interested in determining whether a certain variable has an influence on the effect that X has on Y, a moderation analysis is the statistical analysis to use. Identifying a moderator of an effect allows for the establishment of the boundaries and conditions of that effect or the circumstances for which the effect is large or small, negative or positive, absent or present. Diagram 1 below represents the process through which the effect that the variable rumination (X) has on levels of depression and anxiety (Y) is influenced by or dependent on NFC (W). PROCESS can estimate a moderation model such as this one, and it also provides a number of valuable output options for visualizing and probing an interaction should there be a significant one.

Diagram 1.

The conceptual diagram of the simple moderation model with a single moderator
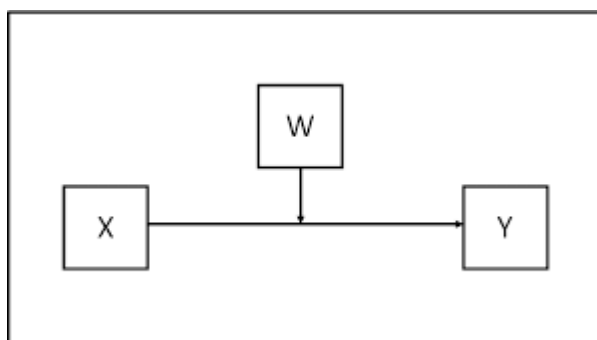
Results

Descriptive Statistics

The current data is taken from a sample of 138 participants (n = 138). The majority of the sample consisted of 71.9% females (n = 100) and 23.3% male (n = 31). The inferiority consisted of 5% that reported being either transgender (n = 1), non-binary (n = 1), or other (n = 1).

Table 1

Descriptive statistics and reliability for all continuous variables

	M[95% CI]	SD	Min	Max
Depression, anxiety, and stress	23.50[20.98, 26.02]	14.95	.00	63
Need for cognition	58.08 [55.89, 55.89]	13.00	22	85
Ruminative responses	54.42 [51.62, 57.22]	16.66	23	88
Age	29.28 [27.33, 31.22]	11.57	18	64

There are four continuous variable including levels of depression anxiety, and stress, need for cognition, tendency to ruminate, and age. Upon inspection of the histogram and Q-Q plot the distribution of all four continuous variables appears to approximate a normal distribution with scores bunching at the low end for age and levels of depression, anxiety, and stress. The Kolmogorov-Smirnov test for normality was insignificant for the need for cognition variable only (p = .200). The remaining continuous variables of age (p < .001), levels of depression, anxiety, and stress (p = .015), and ruminative responses (p = .002) were all statistically significant suggesting a non-normal distribution. However, inspection of

skewness and kurtosis suggests a relatively normal distribution. Mean, standard deviation, minimum and maximum scores are displayed in Table 1 above.

Inferential Statistics

A moderated multiple regression analysis was performed to determine how well levels of depression and anxiety could be explained by rumination, need for cognition, and by the interaction of rumination and need for cognition (Appendix H). Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. The correlation between the predictor variables included in the study was assessed. All correlations were moderate to strong, ranging between $r = -.05$, $p = .267$ to $r = .71$, $p < .001$. Tests for multicollinearity indicated that all tolerance and VIF values were in an acceptable range. However, in order to control for problematically high multicollinearity, the predictor variables were centred (i.e. rumination, need for cognition, interaction item; Aiken & West, 1991) . As such the data were suitable for examination through moderated multiple regression analysis.

The three predictors explained 50.4% of variance in levels of depression and anxiety to a statistically significant degree ($F(2, 135) = 68.57$, $p <.001$). The analysis shows that need for cognition did not predict levels of depression and anxiety to a statistically significant degree ($\beta = -.03$, $p = .535$). Rumination on the other hand did predict levels of anxiety and depression to a statistically significant degree ($\beta = .70$, $p <.001$). The interaction item between rumination and need for cognition scores did not significantly account for a proportion of the variance in DASS total scores ($\beta = .08$, $p = .814$). (see table 2 below for full details). Overall, rumination appeared to be the only predictor variable to uniquely predict levels of anxiety and depression to a statistically significant degree.

Table 2

Multiple Regression Model for predicting levels of Depression and Anxiety

Variable	R^2	B	SE	β	t	p
Model	.50***					
NFC		-.04	.07	-.04	0.62	.535
RRS		.64	.05	.71	11.68	.000
Interaction (NFC x RRS)		.00	.00	.08	.24	.814

Note: * <.05 , ** <.01 , *** <.001

Discussion

The current study aimed to investigate whether a tendency to ruminate is predictive of higher levels of anxiety and depression. It also aimed to examine whether higher levels of NFC are able to predict lower levels of anxiety and depression. Finally, this study aimed to identify whether NFC moderates the relationship between rumination and levels of anxiety and depression. It was hypothesized that higher levels of rumination will predict higher levels of anxiety and depression. The multiple regression yielded statistically significant results and thus, the hypothesis has been accepted. This would be consistent with previous findings that demonstrated rumination to increase stress sensitivity, ultimately maintaining higher levels of depression and anxiety in everyday life (Ruscio et al., 2016). Such findings support previous work emphasizing that rumination prolongs negative emotional states rather than resolves them (McLaughlin et al., 2007; LeMoult et al., 2013; Kukyen et al., 2006; Olatunji et al., 2013; Hong, 2007). Furthermore, these findings provide construct validity to previous work highlighting the role that rumination plays in heightened physiological responding, increased reactivity to upsetting events, and delayed recovery from stressors (Watkins, 2004; Zoccola et al., 2008). Although it must be noted that the present study relied on self-report measures only and physiological responses as well as stress recovery were not measured. As well as that, the cross-sectional design limits the possibility of inferring causality. However, it is clear that rumination does in fact significantly predict heightened levels of anxiety and depression. Finally, the implications of such findings provide additional support to brief interventions aimed at alleviating rumination (e.g. distraction, mindfulness). Such interventions have been successful in alleviating rumination compared to control groups with no intervention (Hill & Pollak, 2012). Similarly, rumination-focused cognitive behavioural therapy has also been successful in decreasing anxiety levels and increasing behavioural activation (i.e. a treatment for depression)(Feldhaus et al., 2020). Future research should

examine other potential moderators of the link between rumination and increased levels of anxiety and depression. Doing so would clarify potential specific intervention targets.

The second hypothesis was that higher levels of NFC predict lower levels of anxiety and depression. No significant effect was found in the current sample, thus, this hypothesis was rejected. These findings contradict previous work that found those with a high NFC to be more likely to regulate their mental activity in a metacognitive sense by evaluating their thoughts for empirical validity (Petty et al., 2009). As well as that, the results were not able to confirm that those high in NFC engage in emotionally stable and conscientious behaviour through the effective management of rumination and levels of anxiety and depression (Fleishchlauer et al., 2014). Seeming as no significant effect was found in the current sample, it is not possible to support the findings put forward by Fleishclauer et al. (2014) suggesting that those high in NFC are able to manage internal conflicts more readily. Finally, the current findings contradict those of Sorojen et al.s (2023) longitudinal study that revealed a negative association between NFC and levels of anxiety and depression. Perhaps employing a longitudinal design in the present study would have yielded a significant effect such as in Sorojen et al.s (2023) longitudinal study and Zainal and Newman's (2022) 10-year-long study. The fact that a clinical sample was not included in the present study may have contributed to the absence of a non-significant effect. The overall levels of anxiety and depression in the current sample were relatively low ($M = 23.50$). This may not have been sufficient enough to detect an effect. It may also be the case that levels of anxiety and depression compromise the executive functions necessary for cognitive functioning such as working memory. It is well known that emotional states have the potential to affect cognitive functioning (Lukasik et al., 2019). The direction of the relationship between NFC and levels of anxiety and depression is unclear in the sense that it is unknown whether lower levels of anxiety and depression increase NFC, or whether NFC decreases levels of anxiety and

depression. In response to this uncertainty, Nishiguchi et al. (2016) demonstrated that elevated levels of depression and decreased NFC occur simultaneously. Hence, it may be the case that NFC becomes compromised when levels of depression are elevated. On the other hand, the present study may contribute to the elimination of the concept of NFC as a potential intervention and/or treatment strategy. Nevertheless, future research should attempt to examine NFC's ability to predict lower levels of anxiety and depression using a longitudinal design in a clinical sample. In doing so, the ability of NFC to prevent the emergence of depression and anxiety in the long-term could be evaluated.

The final hypothesis was that NFC moderates the positive relationship between rumination and levels of anxiety and depression. It was expected that rumination would only predict lower levels of anxiety and depression should the NFC be low. However, no significant effect was found in the current sample and thus, this hypothesis was rejected. This poses questionability to previous work suggesting that NFC may be useful in treating and preventing the emergence of increased levels of anxiety and depression (Luong et al., 2017). It would appear that in the case of the current sample, NFC did not serve as a coping mechanism to a significant extent. The implications of such findings are that more research investigating NFC is needed in order to clarify its potential function. Finally, based on findings it would appear that in the current sample, those high in NFC were not able to regulate negative emotionality via rumination counteraction to a significant degree (Maoi & Esses, 2001). It may be the case that NFC plays less of a role in moderating levels of anxiety and depression than previously thought. It may also be the case that instead of targeting NFC as suggested by Zainal and Newman (2022), features associated with a high NFC (i.e. high attentional control and effortful control) should be targeted instead (Pessoa, 2009). Perhaps increasing attentional control and effortful control may increase NFC which may in turn decrease levels of anxiety and depression by moderating one's tendency to ruminate. This

would be in line with Englert and Bertram's (2015) work that highlights that strengthening attentional control may allow for the maintenance of performance despite high levels of anxiety. It remains unclear which self-regulatory processes are the ones that actually compensate for effects that anxiety has on attention regulation and performance. Additionally, Houle et al. (2022) identified that the extent to which an individual experiences depressive symptoms as a result of rumination is dependent on whether the individual co-ruminated with a friend as well as the appraisal provided by that friend. Co-rumination was not examined in the present study hence this variables implications are unknown. Moreover, self-esteem has previously been identified as a moderator of the association between rumination and depressive symptoms (Wang et al., 2018). Since NFC and self-esteem are positively related to one another, it may be the case that a high self-esteem was an extraneous variable that was not considered in this study that leads to lower levels of depression and anxiety and higher levels of NFC (Obserg, 1987). Finally, since Haug et al. (2010) identified that higher levels of NFC are required for high levels of self-efficacy when engaging in smoking cessation in their randomized control trial, it may be the case that high NFC enhances treatment adherence and benefits. Essentially, self-efficacy may account for the previous negative associations between NFC and levels of anxiety and depression (DeJong et al., 2019). Future research should clarify the role that NFC plays in preventing and treating mental-ill health, ideally in both clinical and non-clinical samples using a longitudinal design.

Limitations and Future Directions

While this study provided support for an already existing notion within the social sciences, it is not without limitations. Firstly, it was a cross-sectional study that relied on self-report measures which limits the ability to infer causality. Secondly, a G*Power analysis could have been used instead of Tabachnick and Fidell's (2013) sample size check that is normally carried out prior to a standard multiple regression. A power analysis allows for the

estimation of the required sample size needed to detect an effect at the desired significance level (Kang, 2021). Although the present study recruited an additional 64 participants over and above the amount suggested by Tabachnick and Fidell's (2013) sample size check, conducting a G*Power analysis may have providing findings with more extensive implications. Future research should employ the G*Power analysis to explore the potential moderation effect at hand further.

Additionally, future research should also control for self-esteem using a hierarchical multiple regression analysis as this was not controlled for in the current study. Higher levels of self-esteem could be a moderator of the relationship between rumination and levels of anxiety and depression as opposed to NFC. Finally, a longitudinal design with both a clinical and a non-clinical sample could have potentially yielded more significant results with broader implications. Essentially, NFC may serve a different purpose depending on whether the symptoms of anxiety and/or depression are clinically significant or not. A clinical sample was unavailable in the case of this study, thus, future research should examine these differences to clarify NFC's function within prevention and intervention strategies.

Moreover, future research should examine other potential moderators of the relationship between rumination and levels of anxiety and depression in order to clarify potential targets for future interventions. Despite these limitations, this study has provided further support for the ability of rumination to predict increased levels of anxiety and depression. As well as that, it has contributed to what is known about the construct validity of the notion that NFC may assist in alleviating increased levels of anxiety and depression. These findings may be useful in future studies that aim to explore this relationship further. Moreover, an additional 64 participants were recruited to minimise the potential effects of sampling bias and random errors. This strengthens the overall external validity of the present

study. Finally, NFC as a potential intervention/prevention strategy was investigated in an Irish population for the first time.

In conclusion, the current research has provided additional evidence to support the idea that rumination significantly predicts higher levels of anxiety and depression. Such evidence further encourages the use of interventions aimed at reducing the occurrence of rumination such as 'Rumination Focused Cognitive Behavioural Therapy'. Moreover, this study aimed to provide further evidence to support NFC's ability to act as moderator in the development and continuity of increased levels of anxiety and depression. Due to the lack of significant effects, it may be the case that NFC serves less of a role within mental-ill health prevention and treatment than previously thought. Although, considering that there is a discrepancy in studies examining the role of NFC in moderating symptoms of mental-ill health, more research is needed. Finally, NFC was investigated as a potential moderator of the effect that rumination has on levels of anxiety and depression in an Irish population for the first time. No significant effects were detected in the current sample indicating that NFC might not serve a function in moderating rumination's effects on levels of anxiety and depression. Considering that previous research has been able to link NFC to lower levels of anxiety and depression, more research with clinical and non-clinical samples using a longitudinal design is needed. The addition of self-esteem as a possible confounding variable using a hierarchical multiple regression and G*Power analysis may serve to clarify this notion further. Finally, future research should examine other moderators of the relationship between rumination and levels of anxiety and depression in order to clarify which potential intervention strategies are most optimal for those who struggle with rumination. Overall, rumination continues to be a strongly encouraged intervention target while the function of NFC remains unclear.

References

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

Publications, Inc.

Allan, N. P., Albanese, B. J., Judah, M. R., Gooch, C. V., & Schmidt, N. B. (2020). A multimethod

investigation of the impact of attentional control on a brief intervention for anxiety and

depression. *Journal of Consulting and Clinical Psychology*, *88*(3), 212-225.

https://doi.org/gp4c95

Allard, E. S., & Yaroslavsky, I. (2019). Attentional disengagement deficits predict brooding, but not

reflection, over a one-year period. *Frontiers in Psychology*, *10*, 2282. https://doi.org/jz66

Altenmuller, E., Ioannou, C. I., Raab, M., & Lobinger, B. (2014). Apollo's curse: Causes and cures of

motor failures in musicians: A proposal for a new classification. *Advances in Experimental

Medicine and Biology*, *826*, 161-178. https://doi.org/jrck

Antony, M. M., Beiling, P. J., Cox, B. J., & Enns, M. W. (1998). Psychometric properties of the 42-

item and 21-item versions of the depression anxiety stress scales in clinical groups and

community sample. *Psychological Assessment*, *10*(2), 176-181. https://doi.org/db4tz9

Atalay, A. A., Kiziloz,, B. K., Ilkmen, Y. S., & Kozol, E. (2022). Impact of abstract vs concrete

processing on state rumination: An exploration of the role of cognitive flexibility. *Journal of

Behaviour Therapy and Experimental Psychiatry*, *74*(3). https://doi.org/gmvxxh

Bauer, B., & Stiner, E. (2020). Need for cognition. In Zeigler-Hill, V., & Shackelford, T. K (Eds.),

Encyclopaedia of Personality and Individual Differences (pp. 3122-3125). Springer.

https://doi.org/jz7r

Baumeister, R. F. (1984). Choking under pressure: Self-consciousness and paradoxical effects of incentives on skilful performance. *Journal of Personality and Social Psychology*, *46*(3), 610-620. https://doi.org/fmw2rc

Behar, E., Zuelig, A., & Borkovec, T.D. (2005). Thought and imaginal activity during worry and trauma recall. *Behaviour Therapy*, *36*, 157-168.

Bodling, A. M., & Martin, T. (2011). *Encyclopaedia of clinical neuropsychology.* Springer Link.

Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology*, *42*, 116-131.

Olatunji, B. O., Naragon, K. G., & Wolitzky, T. K. B. (2013). Specificity of rumination in anxiety and depression: A multimodal meta-analysis. *Clinical Psychology: Science and Practice*, *20*(3), 225-257. https://doi.org/j2r6

Cacioppo, J. T., Petty, R. E., Feinstein, J. A., & Jarvis, W. B. G. (1996). Dispositional differences in cognitive motivation: The life and times of individuals varying in need for cognition. *Psychological Bulletin*, *119*(2), 197-253. https://doi.org/ghd

Colling, J., Wollschlager, R., Keller, U., Preckel, F., & Fischbach, A. (2022). Need for cognition and its relation to academic achievement in different learning environments. *Learning and Individual Differences*, *93*. https://doi.org/jz7t

DeJong, H., Fox, E., & Stein, A. (2019). Does rumination mediate the relationship between attentional control and symptoms of depression?. *Journal of Behaviour Therapy*, *63*, 28-35.

Derryberry, D., & Reed, M. A. (2002). Anxiety-related attentional biases and their regulation by attentional control. *Journal of Abnormal Psychology, 111*(2), 225-236. https://doi.org/dwzwwv

Du Pont, A., Rhee, S. H., Corley, R. P., Hewitt, J. K., & Friedman, N. P. (2019). Are rumination and neuroticism genetically or environmentally distinct risk factors for psychopathology? *Journal of Abnormal Psychology*, *128*(5), 385-396. https://doi.org/ghsc95

Englert, C., & Bertrams, A. (2015). Integrating attentional control theory and the strength model of self-control. *Frontiers in Psychology*, *6*, 824. https://doi.org/f7hr2k

Eysenck, M. W., & Calvo, M. G. (1992). Anxiety and performance: The processing efficiency theory. *Cognition and Emotion*, *6*, 409-434.

Eysenck, M. W., & Calvo, M. G. (1992). Anxiety and performance: The processing efficiency theory. *Cognition and Emotion*, *6*, 409-434.

Eysenck, M. W., Derakshan, N., Santos, R.,& Calvo, M. G. (2007). Anxiety and cognitive performance: Attentional control theory. *Emotion*, *7*(2), 336-353. https://doi.org/b5dfmh

Feldhaus, C. G., Jacobs, R. H., Watkins, E. R., Peters, A. T., Bessette, K., & Langenecker, S. A. (2020). Rumination-focused cognitive behavioural therapy decreases anxiety and increases behavioural activation among remitted adolescents. *Journal of Child and Family Studies*, *29*(7), 1982-1991. https://doi.org/ggtsgt

Fleischhauer, M., Enge, S., Brocke, B., Ullrich, J., Strobel, A., & Strobel, A. (2010). Same or different? Clarifying the relationship of need for cognition to personality and intelligence. *Personality and Social Psychology Bulletin*, *36*(1), 82-96. https://doi.org/c56dpx

Fleischlauer, M., Miller, R., Enge, S., & Albrecht, T. (2014). Need for cognition relates to low-level visual performance in a metacontrast masking paradigm. *Journal of Research in Personality*, *48*, 45-50. https://doi.org/f5sbt6

Haug, S., Meyer, C., Ullbricht, S., Gross, B., Rumpf, H. J., & John, U. (2010). Need for cognition as

a predictor and moderator of outcome in a tailored letters smoking cessation intervention.

Health Psychology, *29*(4), 367-373. https://doi.org/c8rcg5

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A

regression-based approach (methodology in the social sciences* (2nd ed.). The Guilford Press.

He, L., Zhuong, X., Li, Y., Sun, J., Meng, J., Zhu, W., Moo, Y., Chen, Q., Chen, X., & Qiu, J.

(2019). Brain flexibility associated with need for cognition contributes to creative

achievement. *Psycho-physiology, 56*(12), 1-15. https://doi.org/gmm87q

Hill, L. M., & Pollak, S. D. (2012). Getting out of rumination: Comparison of three brief

interventions in a sample of youth. *Journal of Abnormal Child Psychology, 40*(7), 1157-1165.

https://doi.org/gg47db

Hong, R. Y. (2007). Worry and rumination: Differential associations with anxious and depressive

symptoms and coping behaviour. *Behaviour Research and Therapy*, *45*(2), 277-290.

https://doi.org/fg5fbz

Houle, L., Barker, E, T., De France, K., Stack, D. M. (2022). Moderators of the association between

co-rumination and depressive symptoms in emerging adult friendships. *Emerging Adulthood*,

11(2). https://doi.org/j2np

Hsu, K. J., Beard, C., Rifkin, L., Dillon, D. G., Pizzagalli, D. A., & Bjorgvinsson, T. (2015).

Transdiagnostic mechanisms in depression and anxiety: The role of rumination and

attentional control. *Journal of Affective Disorders*, *188*, 22-27. https://doi.org/f7xjc9

Ionsecu, T. (2012). Exploring the nature of cognitive flexibility. *New Ideas in Psychology*, *30*(2),

190-200. https://doi.org/ddbfj7

Johansson, M., & Olund, A. (2017). *Thinking about thinking – A study of anxiety, neuroticism and need for cognition* (Doctoral dissertation). Umea University.

Kang, H. (2021). Sample size determination and power analysis using the G*Power software. *Journal of Education Evaluation for Health Professionals*, *18*, 17. https://doi.org/gnxngg

Kuyken, W., Watkins, E., Holden, E., & Cook, W. (2006). Rumination in adolescents at risk for depression. *Journal of Affective Disorders*, *96*(1-2), 39-47. https://doi.org/bp4trw

Leary, M. R., Sheppard, J. A., McNeil, M. S., Jenkins, T. B., & Barnes, B. D. (1986). Objectivism in information utilization: Theory and measurement. *Journal of Personality Assessment*, *50*, 32-43.

LeMoutl, J., Arditte, K. A., D'Avanzato, C. D., & Joormann, J. (2013). State rumination: Associations with emotional stress reactivity and attention biases. *Journal of Experimental Psychopathology*, *4*(5), 471-484. https://doi.org/gghndd

Libert, R. M., & Morris, L. W. (1967). Cognitive and emotional components of test anxiety: A distinction and some initial data. *Psychological Reports*, *20*(3), 975-978.

Lovibond, S. H., & Lovibond, P. F. (1995). The structure of negative emotional states: Comparison of the depression anxiety stress scales (dass) with the beck depression and anxiety inventories. *Behaviour Research and Therapy*, *33*(3), 335-343.

Lukasik, K., Waris, O., Soveri, A., Lehtonen, M., & Laine, M. (2019). The relationship of anxiety and stress with working memory performance in a large non-depressed sample. *Frontiers in Psychology*, *10*(4). https://doi.org/gghm97

Luminet, O. (2004). Measurement of depressive rumination and associated constructs. In Papageorgiou, C., & Wells, A., (Ed.). *Depressive rumination. Nature, theory and treatment* (pp. 187-215). Wiley.

Luong, C., Strobel, A., Wollschlager, R., & Greiff, S. (2017). Need for cognition in children and

adolescents: Behavioural correlates and relations to academic achievement and potential.

Learning and Individual Differences, 53, 103-113. https://doi.org/f9t32r

Maio, G. R., & Esses, V. M. (2001). The need for affect: Individual differences in motivation to

approach or avoid emotions. *Journal of Personality*, *69*, 583-615.

McLaughlin, K. A., Borkovec, T. O., & Sibrava, N. J. (2007). The effects of worry and rumination

on affect states and cognitive activity. *Behaviour Therapy*, *38*(1), 23-38.

Michi, L. C., McLaughlin, K. A., Shepherd, K., & Hoeksema, S. A. (2013). Rumination as a

mechanism linking stressful life events to symptoms of depression and anxiety: Longitudinal

evidence in early adolescents and adults. *Journal of Abnormal Psychology*, *122*(2), 339-352.

Mobini, S., & Grant, A. (2007). Clinical implications of attentional bias in anxiety disorders: An

integrative literature review. *Psychotherapy: Theory, Research, Practice, Training, 44*(4),

450-462. https://doi.org/ff9kmb

Morris, A. S., John, A., Haliburton, A. L., Morris, M. D. S., Robinson, L. R., Myers, S. S., Aucoin,

K. J., Keyes, A. W., & Terranova, A. (2014). Effortful control, behaviour problems and peer

relations: What predicts academic adjustment in kindergarteners from low-income families?.

Early Education and Development, *24*(6), 813-828. https://doi.org/ggknvp

Nishiguchi, Y., Takano, K., & Tanno, Y. (2016). The need for cognition mediates and moderates the

association between depressive symptoms and impaired effortful control. *Psychiatry

Research*, *241*, 8-13. https://doi.org/f8vztf

Nolen-Hoeksema, S., Larson, J., & Grayson, C. (1999). Explaining the gender difference in

depression symptoms. *Journal of Personality and Social Psychology, 77*(5), 1061-1072.

Obserg, T. M. (1987). The convergent and discriminant validity of the need for cognition scale. *Journal of Personality Assessment*, *51*(3), 441-450. https://doi.org/b68mz6

Olson, K., Camp, C., & Fuller, D. (1984). Curiosity and need for cognition. *Psychological Reports*, *54*, 71-74. .

Perkins, D., Tishman, S., Ritchhart, R., Donis, K., & Andrade, A. (2000). Intelligence in the wild: A dispositional view of intellectual traits. *Educational Psychology Review*, *23*, 269-293.

Pessoa, L. (2009). How do emotion and motivation direct executive control?. *Trends in Cognitive Science*, *13*(4), 160-166.

Petty, R. E., Brinol, P., Loersch, C., & McCaslin, M. J. (2009). The need for cognition. In M. R. Leary & R. H. Hoyle (Ed.). *Hand-book of individual differences in social behaviour* (p. 318-329). Guilford.

Roelofs, J., Muris, P., Huibers, M., Peeters, F., & Arntz, A. (2006). On the measurement of rumination: A psychometric evaluation of the ruminative response scale and the rumination on sadness scale in undergraduates. *Journal of Behaviour Therapy and Experimental Psychiatry*, *37*(4), 299-313. https://doi.org/frxrnf

Roelofs, J., Rood, L., Meesters, C., te Dorsthorst, V., Bogels, S., Alloy, L. B., & Nolen-Hoeksema, S. (2009). The influence of rumination and distraction on depressed and anxious mood: a prospective examination of the response styles theory in children and adolescents. *European Journal of Child and Adolescent Psychiatry*, *18*(10), 635-642. https://doi.org/bsw595

Ruscio, A. M., Gentes, E. L., Jones, J. D., Hallion, L. S., Coleman, E. S., & Swendsen, J. (2016). Rumination predicts heightened responding to stressful life events in major depressive disorder and generalized anxiety disorder. *Journal of Abnormal Psychology*, *124*(1), 17-26. https://doi.org/gjvcjk

Saviola, F., Pappiannia, E., Monti, A., Grecucci, A., Jovicich, J., & De Pisapia, N. (2020). Trait and state anxiety are mapped differently in the human brain. *Scientific Reports*, *10*. https://doi.org/gg4564

Somer, E., & Herscu, O. (2017). Childhood trauma, social anxiety, absorption and fantasy dependence: Two potential mediated pathways to maladaptive daydreaming. *Journal of Addictive Behaviours, Therapy, & Rehabilitation*, *6*(3), 1-5. https://doi.org/ggxbqc

Sorjonen, K., Nilsonne, G., Melin, B., & Ingre, M. (2023). Uncertain inference in random intercept cross-lagged panel models: An example involving need for cognition and anxiety and depression symptoms. *Personality and Individual Differences*, *201*. https://doi.org/gq53td

Spielberger, C. D. (Ed.). (1966). *Anxiety and behaviour*. Academic Press.

Stanovich, K. E., & West, R. F. (1997). Reasoning independently of prior beliefs and individual differences in actively open-minded thinking. *Journal of Educational Psychology*, *89*(2), 342-357.

Stedman, N. L. P., Irani, T. A., Friedel, C., Rhoades, E. B., & Ricketts, J. C. (2009). Relationships between critical thinking disposition and need for cognition among undergraduate students enrolled in leadership courses. *NACTA Journal*, *53*(3), 62-70.

Sun, H., Tan, Q., Fan, G., & Tsui, Q. (2014). Different effects of rumination on depression: Key role of hope. *International Journal of Mental Health Systems*, *8*(53), 1-5. https://doi.org/jz4k

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Pearson.

Teasdale, J. D., Segal, Z., & Williams, J. M. G. (1995). How does cognitive therapy prevent depressive relapse and why should attentional control (mindfulness) training help? *Behaviour Research and Therapy, 33*, 25-39.

Venkatraman, M. P., & Price, L. L. (1990). Differentiating between cognitive and sensory innovativeness: Concepts, measurement, and implications. *Journal of Business Research*, *20*, 293-315.

Wang, P., Wang, X., Wu, Y., Xie, X., Wang, X., Zhao, F., Ouyang, M., & Lei, L. (2018). Social networking sites addiction and adolescent depression: A moderated mediation model of rumination and self-esteem. *Personality and Individual Differences*, *127*, 162-167. https://doi.org/gk5v42

Wass, S. V., Scerif, G., & Johnson, M. H. (2012). Training attentional control and working memory – Is younger, better?. *Developmental Review*, *32*(4), 360-387. https://doi.org/f4d4bd

Watkins, E. (2004). Adaptive and maladaptive ruminative self-focus during emotional processing. *Behaviour Research and Therapy*, *42*, 1937-1052.

Widiger, T. A., & Mullins-Sweatt, S. N. (2009). Five-factor model of personality disorder: A proposal for DSM-V. *Annual Review of Clinical Psychology*, *5*, 197-220. https://doi.org/cx25cw

Wu, C. H., Parker, S. K., & De Jong, J. P. J. (2011). Need for cognition as an antecedent of individual innovation behaviour. *Journal of Management, 40*(6). https://doi.org/fxvw2p

Zainal, N. H., & Newman, M. G. (2022). Curiosity helps: Growth in need for cognition bidirectionally predicts reduction in anxiety and depression symptoms across 10 years. *Journal of Affective Disorders*, *296*, 642-652. https://doi.org/jrc6

Zoccola, P. M., Dickerson, S. S., & Zaldivar, F. P. (2008). Rumination and cortisol responses to laboratory stressors. *Psychosomatic Medicine*, *70*, 661-667.

NEED FOR COGNITION

Appendices

Appendix A – Basic Demographic Items

1. What is your gender?

   a. Male ☐

   b. Female ☐

   c. Transgender ☐

   d. Non-binary ☐

   e. Other ☐

2. What is your age?

   _____

Appendix B – Need for Cognition Scale

For each statement below, please indicate whether or not the statement is characteristic of you or what you believe. For example. If the statement is extremely uncharacteristic of you or of what you believe about yourself (not at all like you) please place a *1* on the line to the left of the statement. If the statement is extremely characteristic of you or what you believe about yourself (very much like you) please place a *5* on the line to the left of the statement. You should use the following scale as you rate each of the statement below.

1	2	3	4	5
Extremely uncharacteristic of me	Somewhat uncharacteristic of me	Uncertain	Somewhat characteristic of me	Extremely characteristic of me

1. _____ I preferer complex to simple problems.
2. _____ I like to have the responsibility of handling a situation that requires a lot of thinking.
3. _____ Thinking is not my idea of fun**
4. _____ I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. **
5. _____ I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.
6. _____ I find satisfaction in deliberating hard and for long hours.
7. _____ I only think as hard as I have to. **
8. _____ I prefer to think about small daily project to long term ones. **
9. _____ I like tasks that require little thought once I've learned them. **

10. _____ The idea of relying on thought to make my way to the top appeals to me.

11. _____ I really enjoy a task that involves coming up with new solutions to problems.

12. _____ Learning new ways to think doesn't excite me very much. **

13. _____ I prefer my life to be filled with puzzles I must solve.

14. _____ The notion of thinking abstractly is appealing to me.

15. _____ I would prefer a task that is intellectual, difficult, and important than one that is somewhat important but does not require much thought.

16. _____ I feel relief rather than satisfaction after completing a task that requires a lot of mental effort. **

17. _____ It's enough for me that something gets the job done. I don't care how or why it works. **

18. I usually end up deliberating about issues even when they do not affect me personally.

Note. ** reverse score item.

Appendix C – Depression Anxiety Stress 21 Scale

Please read each statement and circle a number 0, 1, 2, or 3 which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 Did not apply to me at all.

1 Applied to me to some degree, or some of the time.

2 Applied to me to a considerable degree, or a good part of time.

3 Applied to me very much, or most of the time.

1. ____ I found it hard to wind down.

2. ____ I was aware of dryness of my mouth.

3. ____ I couldn't seem to experience any positive feeling at all.

4. ____ I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exhaustion).

5. ____ I found it difficult to work up the initiative to do things.

6. ____ I tended to over-react to situations.

7. ____ I experienced trembling (e.g. in the hands).

8. ____ I felt that I was using a lot of nervous energy,

9. ____ I was worried about situations in which I might panic and make a fool of myself.

10. ____ I felt that I had nothing to look forward to.

11. ____ I found myself getting agitated.

12. ____ I found it difficult to relax.

13. ____ I felt downhearted and blue.

14. ____ I was intolerant of anything that kept me from getting on with what I was doing.

15. ____ I felt I was close to panic.

16. ____ I was unable to become enthusiastic about anything.

17. ____ I felt I wasn't worth much as a person.

18. ____ I felt that I was rather touchy.

19. ____ I was aware of the action of my heart in the absence of physical exertion (e.g.

sense of heart rate increase, heart missing a beat).

20. ____ I felt scared without any good reason.

21. ____ I felt that life was meaningless.

Appendix D – Ruminative Responses Scale

People think and do so many different things when they feel sad, blue, or depressed. Please read each of the items below and indicate whether you almost never, sometimes, often, or almost always think or do each on when you feel down, sad, or depressed. Please indicate what you *generally* do, not what you think you should do.

The rating scale is as follows:

1 Almost never.

2 Sometimes.

3 Often.

4 Almost always.

1. _____ Think about how alone you feel.

2. _____ Think 'I won't be able to do my job if I don't snap out of this.

3. _____ Think about your feelings of fatigue and achiness.

4. _____ Think about how hard it is to concentrate.

5. _____ Think 'What am I doing to deserve this?'.

6. _____ Think about how passive and unmotivated you feel.

7. _____ Analyse recent events to try and understand why you are depressed.

8. _____ Think about how you don't seem to feel anything anymore.

9. _____ Think 'Why can't I get going?'.

10. _____ Think 'Why do I always react this way?'.

11. _____ Go away by yourself and think about why you feel this way.

12. _____ Write down what you are thinking and analyse it.

13. _____ Think about a recent situation, wishing it had gone better.

14. _____ Think 'I won't be able to concentrate if I keep feeling this way'.

15. _____ Think 'Why do I have problems other people don't have?'.

16. _____ Think 'Why can't I handle things better?'.

17. _____ Think about how sad you feel.

18. _____ Think about all your shortcoming, failings, faults, and mistakes.

19. _____ Think about how you don't feel up to doing anything.

20. _____ Go someplace alone to think about your feelings.

21. _____ Think about how angry you are with yourself.

NEED FOR COGNITION

Appendix E – Participant Information Sheet

You are being invited to take part in a psychological research study. Before you decide to participate, please read the information provided below which will explain why this research is being carried out and what it will require you to do. Should you have any questions, please feel free to contact me using the details at the end of this description.

What is this study about?

I am a final year student in the BA in psychology programme at the National College of Ireland. As part of our degree, we must carry out an independent research project. For my project, I aim to investigate whether an individual's preference for effortful thinking can predict the level of depressive and anxious symptoms they experience. Additionally, I aim to investigate whether repetitive negative thought processes can predict levels of anxiety and depression. The purpose of this research project is to understand the effect that effortful thinking may have on emotional processing. This project is supervised by one of my lecturers, Dr Caoimhe Hannigan.

What will taking part in the study involve?

If you decide to take part in this research, you will be asked to complete a questionnaire that will assess your preference for effortful thinking, your tendency to engage in repetitive negative thought processes, and whether you are experiencing any level of anxiety or depression. Before you begin the questionnaire you will be asked to provide your age and gender. The questionnaire should take approximately 5-10 minutes and you may take breaks should you so wish.

Who can take part?

You may take part in this study if you are between the ages of 18 and 85.

Do I have to take part?

Participation in this research is entirely voluntary and you are not required to take part. If you decide not to participate there will be no consequences for you. If you do decide to participate you may choose to withdraw from participation at any time by exiting the browser. Please keep in mind that once you have submitted your questionnaire, it will not be possible to redact the data. This is due to the fact that all data will be collected anonymously, and individual responses cannot be identified. This questionnaire includes items that will ask you about your depression and anxiety levels as well as the way you deal with depressive levels. There

is a small risk that these questions may cause some individuals upset or distress. If you feel that these questions may cause you to experience an undue level of distress, you should not take part in the study.

What are the possible risks and benefits of taking part?

There will be no direct benefits to you for taking part in this research. However, the data that will be collected will contribute to research that helps us to understand the effect of certain variables on levels of depression and anxiety. There is small risk that certain questions within the questionnaire may cause minor distress for some participants. Should you experience this, you are free to withdraw from participation by exiting the questionnaire. Contact information for relevant support services will be provided at the end of the questionnaire should you feel distressed.

Will taking part be confidential and what will happen to my data?

The questionnaire will be anonymous and stored securely in a password protected file on the researcher's computer. There will be no way to identify a participant based on their responses to the questionnaire. All data collected will be treated in strict confidence. Data will be retained and managed in accordance with the NCI data retention policy.

What will happen to the results of the study?

The results of this study will be presented in my final dissertation that will be submitted to the National College of Ireland. The results of the project may be presented at conferences and/or submitted to an academic journal for publication.

Who should contact for further information?

In order to contact the principal researcher please send an email to the following address: x20398211@student.ncirl.ie. In order to contact the researcher's academic supervisor, Caoimhe Hannigan affiliated to the National College of Ireland, please send an email to the following address: Caoimhe.hannigan@ncirl.ie.

Appendix F – Participant Consent Form

In agreeing to participate in this research I understand the following:

- The method proposed for this research project has been approve in principle by the Departmental Ethics Committee, which means that the Committee does not have concerns about the procedure itself as detailed by the student. It is, however, the above-named student's responsibility to adhere to ethical guidelines in their dealings with participants and the collection and handling of data.

- If I have any concerns about participation, I understand that I may refuse to participate or withdraw at any stage by exiting my browser.

- I understand that one my participation has ended, that I cannot withdraw my data as it will be full anonymised.

- I have been informed as to the general nature of the study and agree voluntarily to participate.

- All data from the study will be treated confidentially. The data from all participants will be compiled, analysed, and submitted in a report to the Psychology Department in the School of Business.

- I understand that my data will be retained and managed in accordance with the NCI data retention policy, and that my anonymised data may be archived on an online data repository and may be used for secondary data analysis. No participants will be identifiable at any point.

- At conclusion of my participation any questions or concerns I have will be fully addressed.

☐Please tick this box if you have read the above and agree with all of the information.

☐Please tick this box to indicate that you are providing informed consent to participate in the study.

Appendix G – Participant Debriefing Sheet

Thank you for your time and co-operation. You have successfully completed the question-naire and contributed to social sciences research. This experiment aimed to investigate the ability of effortful thinking and repetitive negative thought patterns to predict levels of de-pression and anxiety. Investigating this subject may contribute to the existing body of re-search.

If you are feeling distressed please get in contact with 50808 or Sosad. 50808 is a free 24/7 text service that provides everything from a calming chat to immediate support. In order to get in touch text TALK to 50808 and you will be assigned to a crisis volunteer. Alternatively, you may contact Sosad on 1800-901-909. This service is a free 24/7 helpline where you will be assigned a trained volunteer who can provide you with support.

If you are interested in knowing the results of the study once it is complete, or should you have any follow-up questions, please get in contact with the researcher at x20398211@stu-dent.ncirl.ie. The data collection for this study is still on-going so we ask you to please not share any specifics of this study with anyone. If you are asked about the study, please try to avoid phrases such as 'it was interesting'. We ask this in order to protect the validity of the data that is currently being collected. Should you like to contact the researcher's academic su-pervisor you may do so using the following address: Caoimhe.hannigan@ncirl.ie.

NEED FOR COGNITION

Appendix H – Statistical Analysis