

*Stress, Physical Self-Efficacy and Motives to Exercise in Aerobic and
Anaerobic Exercise*

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Abstract

Existing literature examines the effects of exercise on psychological phenomena like stress and physical self-efficacy (PSE). However, there is a major gap in the literature regarding different types of exercise and such phenomena, with particular lack of reference to anaerobic exercise. Hypothesis 1 stated that perceived stress would be lower in anaerobic exercisers than non-exercisers. Hypothesis 2 stated that PSE would be higher in anaerobic exercisers than in aerobic exercisers, and hypothesis 3 stated that specific motives to exercise would predict PSE. The sample (N = 152) was separated into 3 self-selected groups; aerobic, anaerobic and no exercise (n = 48, 48 and 56 respectively). This cross-sectional, observational study collected data purposively in two gyms (SV fitness, Dublin, and Platinum Physique, Meath). The control group was recruited via convenience sampling. Statistical analyses revealed a significant difference between exercisers and non-exercisers on perceived stress, regardless of exercise type, with both types scoring moderate to highly. Motives to exercise significantly predicted PSE, however only two specific motives were significant predictors of PSE; the fitness motive, (positively) and the health motive (negatively). Overall, existing literature and the current findings suggest that motives to exercise partly predict PSE, PSE predicts exercise behaviour, and such exercise behaviour (regardless of type) has an effect on stress levels. These findings advance existing knowledge on the examined phenomena, while highlighting areas in the field that require further research. These research findings can be practically applied by sports psychologists and other health professionals. Findings are discussed in light of the study's strengths and limitations.

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Introduction

Introduction

Definitively, stress is a phenomenon of profound subjectivity. Selye (1955, p.500) initially attempted to define stress as “the non-specific deviation from the normal resting state; caused by function or damage and stimulates repair.” Generally, it refers to emotional and/or physical tension at varying levels of intensity. It can be acute (short-lived, yet intense) or chronic (over a prolonged period of time). Individuals vary on preferred methods of stress management, but exercise is thought to be a remarkably effective mechanism. The term ‘exercise’ is often presumed to relate to solely aerobic exercise. The current literature review will discuss the association between exercise and stress, with reference to physical self-efficacy (PSE) and motives to exercise. PSE is an extension of the original ‘self-efficacy’ (Bandura, 1977) referring to an individual’s confidence in their capacity to execute the behaviours necessary to produce specific performance attainments. PSE applies self-efficacy to the domain of exercise, i.e. one’s belief in their ability to achieve fitness-related goals (Schwarzer & Renner, 2004) of strength or aesthetics, for example. Motives to exercise refer to the reasons for which an individual is motivated to exercise, e.g. health, aesthetics, etc.

The Relationship between Exercise and Stress

Chronic stress can be detrimental to physical and mental health. VanItallie (2002) suggested that a cumulative burden of chronic environmental stressors can cause dysregulation of the intricate stress system, thereby contributing to the development of severe illnesses, e.g. atherosclerosis, PTSD (in particularly high stress or traumatic

events), immune system depletion, etc. Also suggested by VanItallie (2002) was that long-term stress induces chronically elevated corticosteroid levels, which is linked to an adverse effect on hippocampal structure and function. Based on the role of the hippocampus in memory, this may influence cognitive deficits such as memory loss, for example. Other studies suggest a relationship between stress and insomnia or professional burnout (Backović et al., 2014), anger, guilt and less happiness (Chadwick, Zoccola, Figueroa & Rabideau, 2016), etc. Therefore, chronically elevated levels of stress are maladaptive both physiologically, and psychologically. It is crucial that knowledge on such maladaptive phenomena is optimised, in order to establish appropriate mechanisms that can be used to minimise such adverse effects.

Exercise is immensely beneficial for both acute and chronic stress management (Berger, 1994; Jackson, 2013). This research states that exercise is generally beneficial in stress management, however it does not account for exercise type, intensity, frequency, or duration. Some research suggests however that there is a dose-response relationship between such variables (exercise intensity, frequency and/or duration) and the stress response (Rejeski, Gregg, Thompson & Berry, 1991; Steptoe, Kearsley & Walters, 1993; Hamer, Taylor & Steptoe, 2006), in that with an increase of exercise intensity etc., the stress response will decrease. Conversely, time spent sedentary has been found to be related to negative mental health (as measured by stress, psychological distress, depressive symptomology, etc.) (Hoare, Milton, Foster & Allender, 2016). This finding was extracted from a meta-analysis, which may increase its power. However, these findings were based solely on adolescents, and although they may be representative of this population, they may not be generalisable to broader adult populations. Additionally, this meta-analysis stated no exclusion criteria regarding

sample size, and thus, may have included results containing outliers and lacking generalisability and statistical power. All exercise (whether aerobic or anaerobic) consists of some physical activity, which is greater than that of a sedentary lifestyle. Therefore, a similar effect is expected to be present for any form of exercise.

Rimmele and colleagues (2007) found that trained men had lower cortisol levels than untrained men. Cortisol, otherwise known as the ‘stress hormone’, is said to be related to many issues regarding fertility, weight gain, etc. (Aronson, 2009), some of which may also be considered external stressors. Cortisol has also been linked to anxiety and ultimately, stress (Weber, 2015). Conversely, it is said that there is an endorphin release in the brain when one exercises (Goldfarb & Jamurtas, 1997; Colt, Wardlaw & Frantz, 1981), which has been related to positive affect (Harte, Eifert & Smith, 1995) and is said to have a mediating role in stress (Amir, Brown & Amit, 1980).

It has been found that physical activity may provide a protective effect against the aforementioned stress-related problems (Rimmele et al., 2007). Such findings were based on a sample of young, healthy men (although the term ‘healthy’ may be subjective), which may decrease their generalisability. Further research supports the effect regarding physical activity and improved physical and psychological well-being (Bravata et al., 2007). This was based on a meta-analysis of both observational and experimental studies, potentially increasing the strength of these findings. This research also examined exercise as a general concept, as opposed to dissecting it into its subcategories, e.g. cardiovascular exercise, strength training, etc. In terms of exercise as a coping mechanism for stress, Barney, Benham and Haslem (2014) found that control

over stress can be achieved through general physical activity. This study also did not account for exercise type.

With regards to different exercise types, the types that will be investigated are aerobic exercise and anaerobic exercise. Exercise is considered 'aerobic' when the heart and lungs are stimulated, resulting in elevated heart and breathing rates. Conversely, anaerobic exercise refers to exercise that relies on energy sources stored in the muscles, as opposed to oxygen from the environment. Essentially, this refers to strength training, or weight-lifting.

A widely assumed view and empirically supported effect is that aerobic exercise is beneficial in terms of reducing stress (Crews & Landers, 1987; Steptoe et al., 1993; Roemmich, Lambaise, Salvy & Horvath, 2009; Rejeski et al., 1991). However, this research was related to psychophysiological stress, as opposed to perceived stress. Good aerobic fitness has also been suggested to be a protective factor against health-threatening reactions to acute psychological stress (Wyss et al., 2016). This was based on a sample of young, healthy males, which poses the question of whether such an effect would apply to broader populations. There may be emotional, hormonal, or circumstantial differences in other populations that may influence this effect, and so further research must be pursued. Generally, this research shows that aerobic fitness not only aids in managing stress, but may also prevent its maladaptive effects. Other research states that those who carry out regular aerobic exercise cope with stress better than placebo and control groups (Anshel, 1996). Overall, much of the literature regarding aerobic exercise is not contemporary, yet the effect of aerobic exercise on stress remains consistent.

Conversely, there is a major gap in the literature regarding stress and strength training. One study investigated this and found that its 18-week theraband resistance training program was significantly beneficial to its participants for stress (Trinidad, 1997). This study was based on a very small sample, however (n=18). Surprisingly, there is little to no other evidence that investigates this effect. It is plausible that this has been the case due to lack of a significant effect and therefore, publication bias, however it is evident that further research is required to determine the relationship at hand.

In conclusion, there is a large body of research to support the effects of exercise on stress, a potentially maladaptive phenomenon. Exercise has been found to improve stress management, and in turn, decrease stress levels. While many of the aforementioned studies are not contemporary, use small and/or specific samples and are not particularly generalisable, there remains a recurring effect among them, i.e. that exercise is beneficial in stress management and reduction. It is unlikely that each of these studies is based on 'outliers'. There is sufficient empirical research regarding the effects of aerobic exercise on stress. However, there is a substantial gap within the literature regarding the effects of strength training on stress. While it has been found that general physical activity is related to positive mental health, better stress management and reduced stress, it is proposed that this effect will also occur in strength training, as this is a form of physical activity. Therefore, hypothesis 1 of this study states that perceived stress will be lower in the anaerobic group than in the non-exercise group.

The Relationship between Exercise and Physical Self-Efficacy

Self-efficacy is a theoretical component of Social Cognitive Theory (Bandura, 1977). This theory suggests that knowledge is acquired through observing and imitating others in a social context. In relation to self-efficacy, this learning should occur under the assumption that an individual observes a model performing some behaviour(s), and holds a particular level of self-efficacy regarding their successive achievement of such behaviour(s) (Bandura, 1977). Physical self-efficacy (PSE) refers to one's confidence in their capacity to achieve their fitness-related goals (Schwarzer & Renner, 2004).

PSE plays a crucial role in exercise behaviour. There is a large body of evidence to suggest that it is a very strong, perhaps even the strongest predictor of exercise behaviour and adherence (Buckworth & Dishman, 2002; Schwarzer, 2014; Byrne, Barry & Petry, 2015; Kangas et al., 2015). Schwarzer (2014) found that self-efficacy to treadmill exercise predicted activity levels to a greater extent than medical data. There has also been evidence to suggest that PSE partially mediates the relationship between motivation to exercise and exercise behaviour (D'Angelo, Pelletier, Reid & Huta, 2014). Although this finding was extracted from a study on coronary heart disease patients, it provides support for the relationship of interest, and highlights the importance of PSE in exercise behaviour. Several researchers conclude from their research of self-efficacy and exercise that health and fitness interventions should facilitate PSE development, as it is likely to enhance exercise behaviour and adherence (Schwarzer, 2014; Byrne, Barry & Petry, 2015). In application, fitness professionals can utilise PSE development as a tool for increasing physical activity levels and decreasing dropout rates (Jackson, 2010). With such importance, comes the importance of

developing current knowledge of the construct, which is what the current study will attempt to do.

The literature suggests that PSE is higher in those who pursue regular exercise than those who do not (Vipene & Jona, 2012). Contradictory findings by DeLong (2006) found no difference in PSE between those who did and did not exercise, however participants were more self-determined at later stages of the process (of regular exercise). It remains unknown however as to the effect of different types of exercise and PSE.

Some evidence found that strength training can lead to improvements in PSE in previously sedentary older adults (Tsutsumi, Don, Zaichkowsky & Delizonna, 1997). Further support for this relationship was found by Silverman (1998), in a study that implemented different interventions (aerobic exercise, weightlifting, etc.) to different groups, and PSE improved in the weightlifting group. This finding must be interpreted in light of its small sample size ($N = 65$), the nature of the sample, i.e. emotionally disturbed adolescents, and potential methodological issues such as low measure reliability. More recent research has been carried out by Martin (2006) in which PSE was separated into confidence and ability subscales. In the confidence subscales, both aerobic and anaerobic groups increased in PSE as a result of the intervention, but the effect was stronger in anaerobic group. This finding was based on a relatively small all-female sample ($n=58$, split into aerobic and anaerobic groups).

It is vital to explore the evidence that grasps the role of aerobic exercise in PSE also. Focht and colleagues (2007) found that their participants had decreased PSE immediately following aerobic exercise. Alternatively, Lee and Kim (2007) found that

there was no significant effect of aerobic exercise on PSE. However, this was based on an all-female sample, all of which fit the criteria of 'overweight' or 'obese', therefore results may not be generalisable. A similar effect was encountered by Schlatter (2008) in which there was no difference in self-efficacy before and after an aerobic exercise intervention. The sample size in question was small (n=19), did not control for age (all participants were 'middle-aged'), was based on females only, and intervention time was short-moderate. Therefore, while some research has found that there is no effect of aerobic on PSE, the strength of many of these findings is not sufficient. Considering this, the literature suggests that anaerobic exercise will increase PSE, and aerobic exercise will either decrease, or have no effect on PSE. Much of this research is based on all-female samples, so it is unknown as to the effect that will occur in gender-controlled studies, and so the current study aims to examine this in a sample consisting of all genders.

Conversely, McAuley (1993) found that PSE was significantly related to aerobic exercise. This study practised good research methods, controlling for biological and behavioural influences that may have caused deviation in PSE, and so its results possess considerable strength. Another finding by Gomez-Paloma, Rio and D'Anna (2014) highlights the role of exercise intensity and frequency in relation to PSE, finding that PSE was significantly higher in competitive gymnastics (more frequent and intense training) over recreational gymnastics. Should this be valid, this advances our knowledge of PSE, suggesting that it is not constant across all levels of exercise. Perhaps PSE is also not constant across all forms of exercise (aerobic, anaerobic). This has not yet been confirmed, therefore it is crucial that research is carried out in order to investigate such an argument. In critique of this study, while this effect (higher PSE)

may have occurred due to intensity and frequency of training, the argument could also be made that these individuals only began training at a competitive level because they already had high levels of PSE prior to engaging in the sport at a competitive level.

In conclusion, PSE holds great importance in its practical applications, and in predicting exercise behaviour and adherence, etc. Existing literature suggests that those who exercise will have higher PSE than those who do not. However, there is great inconsistency within the literature on the basis of PSE between those who engage in aerobic versus anaerobic exercise. Several studies suggest that there may be a preference for anaerobic exercise, yet unsatisfactory research methods decrease validity and reliability of some of these findings. In order to further investigate the effect of interest, the current study hypothesises that there will be a difference in PSE between aerobic and anaerobic exercise. It is expected that PSE will be higher in the anaerobic group than in the aerobic group.

Motives to Exercise and Physical Self-Efficacy

Bandura (1994, p.1) stated that “Whatever other factors may serve as guides and motivators, they are rooted in the core belief that one can make a difference by one’s actions.” While motivation itself will not be a prime focus of the present study, causes of motivation (or ‘motives’) will be. As previously mentioned, there is existing evidence suggesting that PSE predicts exercise behaviours (Buckworth & Dishman, 2002; Schwarzer, 2014; Byrne, Barry & Petry, 2015; Kangas et al., 2015). Although this evidence is found consistently, researchers have struggled to identify models of health behaviour that accurately predict exercise behaviour (Nichols, 2013). An

aforementioned study, found that self-efficacy partially mediated the relationship between motivation to exercise and exercise behaviour (D'Angelo et al., 2014). This was found in a sample of coronary heart disease patients and so, further research is required to investigate the generalisability of such an effect. It is also unknown if this is true for all motives to exercise. Additionally, if self-efficacy mediates the relationship between motivation to exercise and actual exercise behaviour, the literature has brought us closer to an adequate and more comprehensive understanding of the relationship of interest.

Weight loss as a motive has been investigated by Dennis and Goldberg (1996) in which women with high weight loss self-efficacy and a motive to lose weight achieved significant weight loss results, in comparison with those who had the same motive, and low self-efficacy. This supports the idea that self-efficacy mediates the relationship between motivation to exercise and the exercise behaviour that is required to achieve desired fitness goals. Another motive that has been explored in relation to self-efficacy is mental health. Kwan and Bryan (2010) investigated those who experienced mental health improvements following the commencement of an exercise regime, and who continued exercising for this reason. They found that they reported higher PSE (and thus, intentions to exercise) 3 months after beginning their exercise regime than when they began. This suggests that exercising due to a mental health motive may predict PSE. These findings were based on a controlled, experimental study, therefore eliminating limitations that may have interfered with the variables in question, such as exercise intensity, duration, etc.

Research on motives to exercise suggests that females are more motivated by appearance, health, and stress management, whereas males are motivated by

performance, strength, challenge and social recognition (Pauline, 2013). Of this sample, males had higher PSE. This may be explained by two potential factors: their gender, or the fact that their motives for exercising were linked to higher PSE. The present study aims to investigate the latter.

A factor that may be vital to understanding the relationship between motives to exercise and PSE is whether such motives are intrinsically or extrinsically rooted. The motive of enjoyment (intrinsic) was investigated regarding its role in predicting PSE (Cohen, 2004). This study found that increasing the number of intrinsic motives (enjoyment in particular) for exercise participation may result in increased PSE. In turn, this should cause better exercise adherence also, because as aforementioned, exercise adherence is greatly determined by PSE.

An interesting finding has emerged in the literature stating that motives for sport participation are primarily intrinsic (i.e. enjoyment, challenge), and motives for general exercise are primarily extrinsic (i.e. appearance, stress management) (Kilpatrick, Hebert & Bartholomew, 2010). According to the literature, intrinsic motives such as enjoyment have been found to be much more desirable than extrinsic motives (e.g. appearance, stress management) in relation to behaviour adherence (Ryan et al., 1997). Such intrinsic motives are similar to those experienced by the males in Pauline's (2013) study, who had greater PSE than the females (extrinsic motives; appearance, stress management), which further supports this relationship. Therefore, it is evident that there is a relationship between motives to exercise and PSE, and that intrinsic motives seem to predict greater levels of PSE than extrinsic motives. However, further research is required regarding specific motives (e.g. health, etc.) and PSE.

To conclude, much of the literature suggests that motives to exercise predict PSE. While there are few studies that specify particular motives in this relationship, the effect remains. The literature also directs us towards the idea that intrinsic motives will predict increased greater PSE than extrinsic motives. However, there are more motives to exercise that have not yet been investigated. As per the literature, the relationship between motives to exercise and PSE may facilitate better adherence to exercise, therefore it is crucial to further investigate. Therefore, hypothesis 3 states that specific motives to exercise will predict physical self-efficacy (PSE).

Rationale

At this point, it is evident that chronic stress can be an immensely maladaptive phenomenon and exercise is extremely beneficial in stress management. Efforts are made by psychological researchers to determine relationships that will alleviate negative psychological experiences, and in this case, reduce stress in the lives of the average citizen. The issue within the literature currently is that while research does investigate exercise and stress, the majority of this research focuses on aerobic exercise, and there is not a great amount of literature that examines strength training in stress management. The current study aims to evaluate the role of anaerobic exercise (strength training) in particular, in stress management. Therefore, hypothesis 1, the core hypothesis of this study, states that perceived stress will be lower in the anaerobic group than in the non-exercise group.

It can be concluded from the literature that PSE is a great predictor of exercise behaviour, which improves stress management. As mentioned, PSE is a construct that

can, and should be maximised in any exercise programme to encourage adherence. The factor of exercise type has not been sufficiently investigated in relation to PSE. The literature suggests an effect of exercise on PSE for both exercise types, yet the evidence favours anaerobic exercise. While research methods in such studies are somewhat unsatisfactory, this study aims to investigate if one exercise type is more preferable if PSE is the desired outcome. Therefore, the 2nd hypothesis of this study states that PSE will be higher in the anaerobic group than in the aerobic group.

Finally, there is considerable evidence to suggest that motives to exercise predict PSE. While there are few studies that focus on specific motives in this relationship, the effect remains in the studies that do. There are also other specific motives that have not been sufficiently examined in relation to PSE thus far. Considering this, the third hypothesis will be exploratory. This is crucial to examine in this particular study because all of this study's variables are interlinked. According to the reviewed literature, PSE predicts exercise behaviour, and exercise behaviour improves stress management. This study aims to investigate motives to exercise as a precedent of this series, i.e. motives to exercise predicting PSE, which predicts exercise behaviour, which in turn, predicts stress management. Should this series occur, the present study will have remarkable value in its findings. This study aims to investigate specific motives to exercise in terms of the extent to which they predict PSE. Therefore, hypothesis 3 of the current study states that specific motives to exercise will predict PSE.

Method

Participants

The sample consisted of 152 young to middle aged adults (70 male, 81 female, 1 other). The mean age was 29.99 years, ranging from 18-58 years. Exercising participants were recruited via cluster sampling, i.e. the gym-going population was divided into separate gyms, two of which were selected for the study; SV fitness (IFSC, Dublin) and Platinum Physique (Ashbourne, Meath). The researcher recruited participants by requesting that they fill in a questionnaires upon their entry or exit of the gyms. Of the gym-going population, there were two groups; the aerobic group (n = 48), and the anaerobic group (i.e. strength training) (n = 48), by the participant's indication of which type of exercise they predominantly engage in.

The control group (i.e. no exercise) (n = 56) were initially recruited through purposive convenience sampling, i.e. easily accessible individuals (peers, family, etc.) to the researcher that fit the inclusion criteria (details below). 13 control participants were recruited using this method. To increase this sample size, an online version of the control survey was created via Google Forms, and was shared on the social media platform 'Facebook'. This allowed the remainder of the sample to be recruited through self-selection. 43 responses were submitted online.

Inclusion criteria required participants to have read and understood the terms and conditions of the study, provided informed consent, and confirmed that they were 18 years of age or older. There were also inclusion criteria regarding separate group allocation. Inclusion in the aerobic or anaerobic group required selection of the box related to cardiovascular exercise or strength training, respectively. Upon enquiry,

participants were filtered on the basis that they carry out at least 3 cardiovascular or strength training workouts per week, on average. Failure to fit this criteria resulted in exclusion from the study. Inclusion criteria specific to the control group simply required participants to carry out no regular exercise.

The exclusion criteria of the present study included instances in which participants selected more than one box for ‘type of exercise’, as this study aims to investigate differences between such exercise types. At the beginning of the data collection, there were several instances of misunderstanding with regards to the ‘type of exercise’ question; 1 participant did not tick any box, 3 participants enquired with the researcher the meaning of this question prior to responding, and 7 participants misunderstood initially and then changed their answers. Due to misunderstanding, the wording of the questionnaire was modified to minimise any further confusion. It was made clear that participants were required to select one box only, and the no exercise response to this question was updated by omitting the word ‘programme’ in the following sentence: “I do not participate in any regular exercise programme” (See Appendix C). Other exclusion criteria included instances in which participants did not carry out sufficient exercise, and instances in which participants omitted responses from one or more full section of the questionnaire. Considering this exclusion criteria, there were 15 participants excluded in total.

Measures

During the gym-based data collection of this study, surveys were completed with pen and paper. For data collection of the control group, surveys were also

completed on 'Google Forms', the link to which was posted on Facebook. The computer software used for statistical analysis was IBM SPSS Statistics.

There were 3 psychological measures used in the current study. The 'Motivation to Exercise Scale' (Newson & Kemps, 2007) consisted of 21 items, under four main factors; fitness (9 items), engagement (4 items), challenge (3 items) and health (3 items) (See Appendix D (i) – (iv)). There were two further items that did not significantly load onto any factor in this scale. They were labelled as 'no specific factor' (See Appendix D(v)). The scale is scored on a 5-point Likert scale ranging from 1 (not at all) to 5 (always). This scale was used to assess why participants were motivated to exercise. High scores on this scale do not indicate high motivation to exercise. High scores within separate factors indicate the extent to which people are motivated to exercise by certain factors, e.g. if a subject scores highly on the 'health' factor, then it can be said that their motivation to exercise is to an extent, rooted in health ideals. This scale was not completed by the control group. Cronbach's alpha in the current sample was .72 for the fitness factor, .81 for the engagement factor, .77 for the challenge factor, .44 for the health factor and .19 for the two items that fell under no specific factor.

To test for physical self-efficacy, the 'Physical Exercise Self-Efficacy Scale' (Schwarzer & Renner, 2004) was used (See Appendix E). This 5 item scale is based on a 4-point Likert scale, ranging from 1 (very uncertain) to 4 (very certain). There was no reverse coding in the use of this scale, therefore higher scores indicated greater PSE. Control participants were not required to complete this scale. Cronbach's alpha was .87 for PSE in this sample.

The ‘Perceived Stress Scale—Revised’ (Wickrama et al., 2013) is a 12-item scale, accounting for two psychological constructs; psychological competency (5 items) and psychological vulnerability (7 items) (See Appendix F). It is scored on a 5-point Likert scale ranging from 0 (never) to 4 (very often). High scores indicate greater psychological competency or psychological vulnerability, respectively. Psychological competency refers to one’s capacity to cope with the occurrence of stress (i.e. stress management), and psychological vulnerability is the extent to which an individual is internally affected by external stressors. There was no reverse coding required for this scale. All participants were required to complete this scale. Cronbach’s alpha coefficients were .77 and .82 for psychological competency and vulnerability respectively in this sample.

Design

The current study was based on an observational, quasi-experimental research design, as there were three naturally occurring groups (aerobic exercise, anaerobic exercise, and control (no exercise)). The study was also cross-sectional, as participants were recruited at one time point and no further information from participants was required. It was a field-based study, as it was partly based in two gyms (Platinum Physique in Ashbourne, Meath, and SV Fitness in the IFSC, Dublin).

Procedure

Prior to carrying out data collection for the aerobic and anaerobic groups of the study, information was provided to the managers of the gyms of interest (SV fitness,

IFSC, Dublin, and Platinum Physique, Ashbourne, Meath), and written permission was sought in order to proceed with data collection (See Appendices G & H). Once permission was acquired, data collection commenced.

Questionnaires were distributed to gym members upon their entry or exit of the gyms. All relevant information was provided on the Participant Information Sheet (See Appendix A) regarding the nature of the study, the researcher's contact details, ethical considerations, etc. With this knowledge, participants were invited to sign a consent form (See Appendix B) in order to provide informed consent, declaring their willingness to participate in the study. Subsequently, participants were invited to fill out their demographic information (See Appendix C), and complete three questionnaires. Upon completion, participants' inserted their surveys into one brown envelope, and their consent forms into a separate brown envelope, for data protection reasons. Both documents were labelled with co-ordinating participant numbers.

For data collection of the control group, convenience sampling was utilised. Surveys were distributed to those who were most accessible to the researcher (e.g. peers, etc.), and did not partake in regular exercise. As with the gym-going groups, control participants inserted their surveys into a brown envelope upon completion, and their signed consent forms into a separate brown envelope. Attempts to collect control data were actively made, however difficulties in maximising the sample size required the researcher to develop an 'online' version of this questionnaire on Google Forms, and post it to Facebook. Questionnaires for the control group consisted of demographic questions, and the questionnaire regarding perceived stress.

The data provided by participants will be stored under secure conditions for 5 years, and subsequently, will be destroyed, as per the National College of Ireland's Research Policy. This will ensure that participant information is protected, and that participants can withdraw their data at any stage.

Following the data collection, data scores were inputted on the IBM SPSS Statistics Software. Subsequently, statistical analyses were conducted on the data.

Data Analysis

Prior to conducting the analyses of this study, the descriptive statistics of categorical variables were carried out using the 'Frequencies' function in SPSS, and the descriptive statistics of continuous variables were carried out using the 'Explore' function in SPSS.

For hypothesis 1, a One-way Between-Groups Analysis of Variance (ANOVA) was used. While this was carried out primarily to assess the difference between the anaerobic and control groups (i.e. target groups for this analysis), the aerobic group was also included in order to comprehensively evaluate the strength of the difference between the two target groups, as it is accepted in the literature that aerobic exercise is strongly linked to lower stress levels. The Perceived Stress Scale—Revised (Wickrama et al., 2013) consists of two subscales; psychological competency and psychological vulnerability. Therefore, the ANOVA was carried out on the three groups for both of these variables, separately. The independent variable was exercise type, and the dependent variable was perceived stress (as measured by psychological competency and psychological vulnerability). It must be noted that all of the continuous variables in this

study were non-normally distributed (See Appendices I & J), however an ANOVA can be carried out despite this, as it is a sufficiently robust statistical test.

For hypothesis 2, a non-parametric test, the Mann-Whitney U test will be carried out, as the variables of interest were non-normally distributed (See Appendices I & J). The independent variable was exercise type, and the dependent variable was physical self-efficacy. This analysis was based on the Physical Exercise Self Efficacy Scale (Schwarzer & Renner, 2004).

For hypothesis 3, that particular motives to exercise can predict PSE, a standard multiple regression analysis was carried out. The predictor variables were extracted from the Motivation to Exercise Scale (Newson & Kemps, 2007), and they relate to specific motives to exercise. These predictor variables were as follows: Fitness, engagement, challenge, and health. The two items on the questionnaire that did not significantly load onto any specific factor on the scale, were excluded from this analysis. The criterion variable was PSE. While the continuous variables were non-normally distributed, this standard multiple regression was carried out because it is sufficiently robust.

Results

Descriptives

Categorical Descriptives

Table A

Frequencies for the current sample on gender and exercise type (N = 152)

Variable	Frequency	Valid Percentage
Gender		
Male	70	46.1%
Female	81	53.3%
Other	1	0.7%
Exercise Type		
Aerobic	48	31.6%
Anaerobic	48	31.6%
Control (no exercise)	56	36.8%

Continuous Descriptives

Table B

Descriptive statistics of all continuous variables

	Mean (95% Confidence Intervals)	Std. Error Mean	Median	SD	Range	Possible Range
Age	29.99 (28.06-31.93)	.98	25	12.07	18-58	18+
PSE	15.53 (14.87-16.19)	.33	16	3.25	5-20	5-20
PSSC	12.59 (12.08-13.09)	.26	13	3.17	3-20	0-20
PSSV	15.25 (14.50-15.99)	.38	15	4.62	6-28	0-28
Fitness Motive	40.49 (39.76-41.22)	.37	41	3.59	27-45	9-45
Engag. Motive	15.01 (14.34-15.68)	.34	15.5	3.29	6-20	4-20
Challenge Motive	10.48 (9.88-11.08)	.30	11	2.96	3-15	3-15
Health Motive	5.89 (5.46-6.31)	.22	6	2.11	3-14	3-15
No Specific Motive	6.42 (6.09-6.76)	.17	6	1.65	2-10	2-10

Note: PSE = Physical Self-Efficacy, PSSC = Perceived Stress Scale – Competency, PSSV = Perceived Stress Scale – Vulnerability, Engag. Motive = Engagement Motive.

Participants ranged from 18 to 58 years of age, and the mean age was 29.99. Therefore, the group consisted of entirely young to middle aged adults. The median age was 25, thereby indicating that there was a positive skew in the data, i.e. there were more young adults than middle aged adults.

Of the sample of exercisers (non-inclusive of the control group), PSE levels were moderate to high (mean score = 15.53), in relation to the mean score. There was however, a very wide range of answers, suggesting that participants of this sample varied greatly on PSE. Collectively, participants had moderate to high confidence in the

belief that they could achieve their fitness-related goals. See Appendix E for the measure of this variable.

Psychological competency in this sample (inclusive of the control group) was moderate, ($M = 12.59$, possible range = 0-20) on average, yet responses ranged from very low to very high, indicating varying levels of psychological competency. Collectively, participants showed a moderate level of capability to cope with stress. See Appendix F (i) for the measure of this variable. Similar descriptive statistics were found for psychological vulnerability in the sample, in that results varied greatly ($M = 15.25$, possible range = 0-28, actual range = 6-28), and on average, participants showed moderate liability to being internally affected by external stressors. See Appendix F(ii) for the measure of this variable.

The descriptive statistics of the fitness motive are particularly high in the sample of this study (not including the control group), in that the possible range is 0-45, and the mean is 40.49. Additionally, the actual range was 27-45. This indicates that on average, participants in the sample of exercisers are highly motivated to exercise by the fitness levels associated with exercise. See Appendix D(i) for the items related to this variable.

In terms of the motive of engagement in exercise, participants as a collective sample, scored moderately high on this variable, considering that scores varied from 6-20, and the possible range was 4-20. The mean score was 15.01. This indicates that generally, participants are motivated by being engaged in exercise to a moderately high extent. See Appendix D(ii) for examples of items related to this variable.

The descriptive statistics for the motive of challenge were moderate to high among this sample, on average ($M = 10.48$, possible range = 3-15, actual range = 3-15).

This indicates that participants (exclusive of the control group) were motivated to exercise by being challenged to a moderate to high extent, although responses varied greatly also. See Appendix D(iii) for this variable.

The participants of the study were somewhat low in value on the health factor in motivation to exercise ($M = 5.89$). The range of scores varied greatly also (possible range = 3-15, actual range = 3-14). This indicates that collectively, participants were not particularly motivated to exercise because of the associated health benefits. See Appendix D(iv) for the measure of this variable.

There were two items on the 'Motivation to Exercise Scale' (Newson & Kemps, 2007) that were not allocated to any factor, and so the 'No specific' factor is present in table B also. On this items, participants presented varied, yet moderate scores on average ($M = 6.42$, possible range = 2-10, actual range = 2-10). This does not have any direct indications for this particular sample (See Appendix D(v) for items).

All of the mentioned continuous variables were non-normally distributed. See Appendices I & J for normality tables and graphs.

Hypothesis 1

Table C

Group differences between exercise types on perceived stress

Variable	Group	N	M	SD	F	η^2
PSS-Competency	Aerobic	48	13.48	2.55	17.08***	.19
	Anaerobic	48	13.77	2.97		
	Control	56	10.80	3.07		
PSS-Vulnerability	Aerobic	48	14.31	4.20	10.66***	.13
	Anaerobic	48	13.73	3.86		
	Control	56	17.38	4.85		

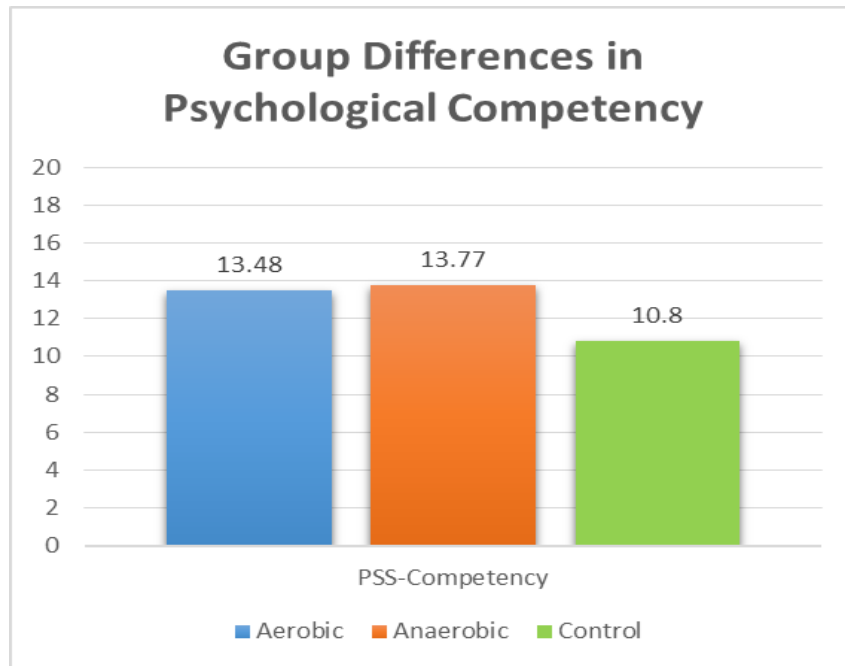
Note. PSS = Perceived Stress Scale; η^2 = eta squared; Statistical significance: * $p < .05$;

** $p < .01$; *** $p < .001$

Perceived Stress: Psychological Competency

Graph C (i)

Group Differences in Psychological Competency



A one-way between groups analysis of variance was conducted to explore the impact of exercise type on psychological competency scores. Participants were divided into three groups according to their exercise behaviours (aerobic exercise, anaerobic exercise and no exercise).

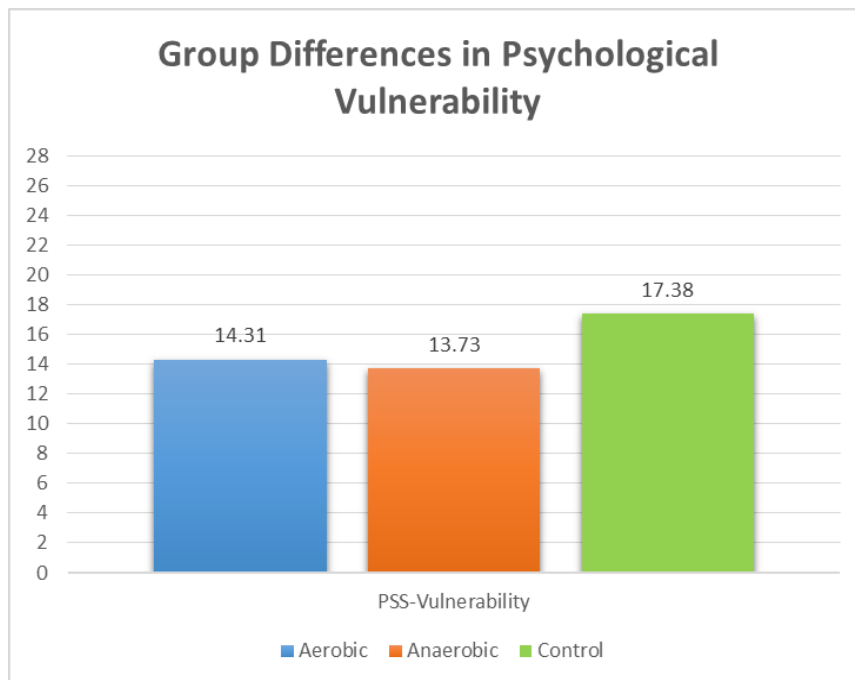
There was a statistically significant difference in level of psychological competency scores for the three exercise types $F(2, 149) = 17.076, p < .001$. The actual difference in mean scores between groups was quite large. The effect size, calculated using eta squared, was .19.

Post-hoc comparisons using the Tukey HSD test indicated that the mean score for the aerobic group (M = 13.48, SD = 2.55) was significantly higher ($p < .001$) than the control (no exercise) group (M = 10.80, SD = 3.07); and the anaerobic group (M = 13.77, SD = 2.97) was also significantly higher ($p < .001$) than the control group. There was no statistically significant difference in mean scores between the aerobic group and the anaerobic group ($p > .05$).

Perceived Stress: Psychological Vulnerability

Graph C (ii)

Group Differences in Psychological Vulnerability



A one-way between groups analysis of variance was conducted to explore the impact of exercise type on psychological vulnerability scores. Participants were divided

into three groups according to their exercise behaviours (aerobic exercise, anaerobic exercise and no exercise).

There was a statistically significant difference in level of psychological vulnerability scores for the three exercise types $F(2, 148) = 10.66, p < .001$. The actual difference in mean scores between groups was quite large. The effect size, calculated using eta squared, was .13.

Post-hoc comparisons using the Tukey HSD test indicated that the mean score for the aerobic group ($M = 14.31, SD = 4.20$) was significantly lower ($p < .001$) than the control (no exercise) group ($M = 17.38, SD = 4.85$); and the anaerobic group ($M = 13.73, SD = 3.86$) was also significantly lower ($p < .001$) than the control group. There was no statistically significant difference in mean scores between the aerobic group and the anaerobic group ($p > .05$).

Hypothesis 2

Table D

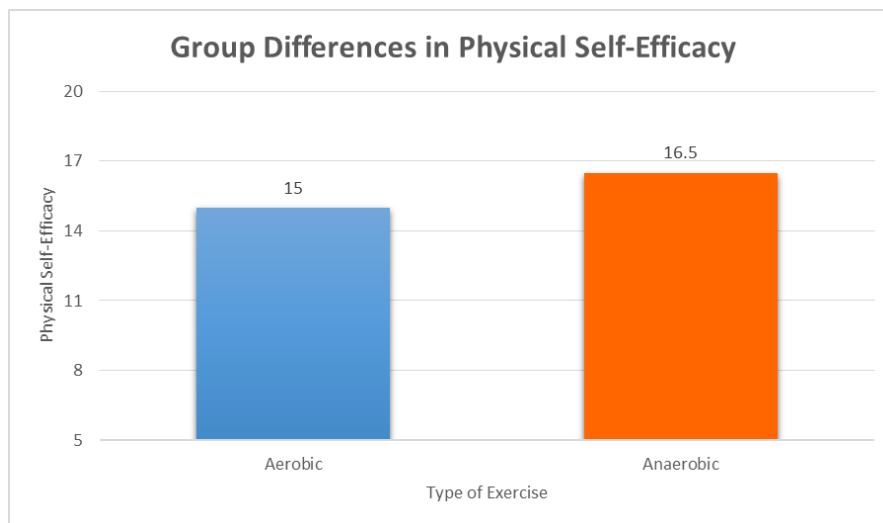
Group differences between exercise types for physical self-efficacy

Variable	Group	N	Median	Mean Rank	U	Z	R
PESE	Aerobic	48	15	43.58	916	-1.74	-.18
	Anaerobic	48	16.5	53.42			

Note. PESE = Physical Exercise Self-Efficacy; U = Mann-Whitney U value, R = Effect size; Statistical significance: * $p < .05$; ** $p < .01$; *** $p < .001$

Graph D

Group Differences in Physical Self-Efficacy



A Mann-Whitney U test was conducted to compare physical self-efficacy (PSE) levels between people who engage in aerobic and anaerobic exercise. This test was carried out under the assumptions of random samples and independent observations.

There was no statistically significant difference in scores between the two groups of exercisers, $U = 916$, $Z = -1.74$ $p > .05$, two-tailed.

The anaerobic group ($Md = 16.5$, $n = 48$) scored marginally higher than the aerobic group ($Md = 15$, $n = 48$), however the magnitude of the differences in the medians was small ($r = -.18$).

Hypothesis 3

Table E

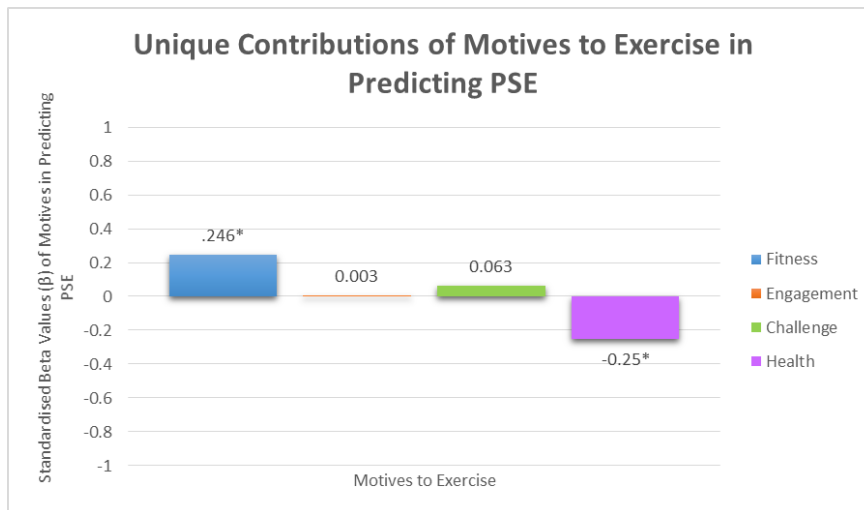
Multiple regression model predicting physical self-efficacy scores

	<i>R</i> ²	<i>β</i>	<i>B</i>	<i>SE</i>	CI 95% (<i>B</i>)
Model	.144**				
Fitness Motive		.25*	.22	.10	.02 / .42
Engagement Motive		.00	.00	.12	-.24 / .25
Challenge Motive		.06	.07	.13	-.19 / .33
Health Motive		-.25*	-.39	.15	-.68 / -.08

Note. N = 95; Statistical significance: **p* < .05; ***p* < .01; ****p* < .001

Graph E

Unique Contributions of Motives to Exercise in Predicting PSE



Note. PSE = Physical Self-Efficacy. Statistical significance: **p* < .05; ***p* < .01; ****p* < .001

Multiple regression was performed to investigate the ability of motives to exercise (specifically the fitness, engagement, challenge and health motives) to predict levels of physical self-efficacy. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. The assumption of normality was violated, however standard multiple regression is sufficiently robust in order to proceed with this analysis. Additionally, the correlations between the predictor variables included in the study were examined. All correlations were weak to moderate, ranging between $r = -.26, p < .01$ and $r = .45, p < .001$, except for one correlation which was moderate to large at $r = .56, p < .001$. This indicates that multicollinearity was unlikely to be a problem.

Since no a priori hypotheses had been made to determine the order of entry of the predictor variables, a direct method was used for the multiple linear regression analysis. The four independent variables explained 14% of variance in physical self-efficacy ($F(4, 91) = 3.84, p < .01$).

In the final model the fitness motive ($\beta = .25, p < .05$) and health motive ($\beta = -.25, p < .05$) were the only significant predictors of physical self-efficacy. This result indicates that increased levels of the fitness motive to exercise predict higher levels of physical self-efficacy, and increased levels of the health motive predict lower levels of physical self-efficacy. However, both of these beta values were relatively small, indicating only a small predictive effect. The reliability of the health motive was less than satisfactory, Cronbach's alpha = .44.

Discussion

Hypothesis 1: The Relationship between Exercise and Stress

As aforementioned, hypothesis 1, the core hypothesis of the study stated that perceived stress would be lower in the anaerobic exercise group than in the no exercise group. This was investigated with the aim to evaluate the role of anaerobic exercise in particular, in stress. Perceived stress was tested under two subscales; psychological competency, and psychological vulnerability. Psychological competency was significantly higher in participants who exercised than those who did not, with no difference between aerobic and anaerobic exercise. This indicates that regardless of exercise type, exercise is linked with greater abilities to gain control over stress. Furthermore, psychological vulnerability was significantly lower in the anaerobic group (and aerobic group) than the non-exercising group. This indicates that individuals who engaged in exercise were less likely to experience stress than individuals who did not exercise. Overall, this indicates that with regular exercise comes better psychological competency against stress, and less vulnerability to be psychologically affected by external stressors, thereby decreasing one's likelihood of experiencing stress for both reasons. Therefore, the null hypothesis is rejected, and the alternative hypothesis, that there is a difference in perceived stress between the anaerobic and no exercise groups, is accepted.

The literature in this area states that generally, exercise reduces, and is protective against stress (Berger, 1994; Hoare et al., 2016; Rimmele et al., 2007). The results of the current study comply with this, because both the aerobic and anaerobic groups were

significantly lower on psychological vulnerability, i.e. liability to perceived stress, than the no exercise group.

Much of the research stated that exercise in general was beneficial for gaining control over stress (Lalanza et al., 2014; Jackson, 2013; Barney et al., 2014). The other subtype of perceived stress that was tested in this study was psychological competency, the extent to which an individual is psychologically competent against stress, which relates to this concept of gaining control over stress. The current results comply with this research because individuals who engaged in exercise (regardless of type) showed significantly higher psychological competency than those who did not engage in any exercise. This indicates that they had a greater ability to gain control over stress than those that did not exercise. There was no difference between the aerobic and anaerobic groups on this variable, providing further support for the literature that states that exercise in general is beneficial for stress management.

There was substantial evidence to suggest that aerobic exercise protects against stress (Wyss et al., 2016; Hoare et al., 2016; Lalanza et al., 2015; Crews & Landers, 1987; Steptoe et al., 1993; Rommich et al., 2009; Rejeski et al., 1991; Anshel, 1996). This was supported by the current findings, as the aerobic group had moderately low stress levels. The literature regarding anaerobic exercise and stress was particularly lacking, however the current findings complied with this research also (Trinidad, 1997), as the anaerobic group also had moderately low stress levels. Therefore, anaerobic exercise is suggested to be beneficial for stress, alongside aerobic exercise.

A crucial question to consider is why such effects occur. As the findings comply with the reviewed literature, it is likely that these effects may have occurred due to

lower cortisol levels (Rimmele et al., 2007), the endorphin release in the brain when one engages in physical activity, etc. (Goldfarb & Jamurtas, 1997; Colt, Wardlaw & Frantz, 1981; Harte, Eifert & Smith, 1995; Amir, Brown & Amit, 1980). This effect may have also occurred for other reasons, such as psychosocial reasons, e.g. the social aspect of exercising, taking a psychological ‘break’ from external stressors, etc. This relationship occurs consistently throughout the literature and has been supported again in the current study, which in addition, controlled for exercise type.

Hypothesis 2: The Relationship between Exercise and Physical Self-Efficacy

Hypothesis 2 stated that PSE would be higher in the anaerobic group than in the aerobic group. This was investigated to determine if one exercise type was more preferable if PSE was the desired outcome. However, this study found no significant difference between exercise types on PSE. This indicates that exercise type does not influence one’s confidence in their ability to carry out the behaviours required to achieve their fitness-related goals. Therefore, the alternative hypothesis was rejected and the null hypothesis, that there is no difference in PSE between exercise types, was accepted.

The literature had found that PSE would be higher in individuals that exercised than in individuals that did not (Vipene & Jona, 2012). While the non-exercisers were not tested on this construct in the current study, PSE was moderate to high in both the aerobic and anaerobic groups, supporting the former, that PSE would be relatively high in individuals that exercise (or at least higher than in non-exercising individuals). However, other research found no difference in PSE between exercisers and non-

exercisers (DeLong, 2006), which was a contradictory finding, that was not supported by the present study as non-exercisers were not tested for PSE. It was expected that PSE would be moderate to high in anaerobic exercisers (Tsutsumi et al., 1997; Silverman, 1998; Martin, 2006). The latter study found this effect for both aerobic and anaerobic exercisers, yet it was slightly higher in the anaerobic group, and the present study complied with this research for the anaerobic group.

Prior to carrying out this study, it was unknown whether the aerobic group would also have moderate to high levels of PSE, because there were major inconsistencies within the literature. There was research to suggest a relationship between aerobic exercise and lower PSE levels (Focht et al., 2007), no effect of aerobic exercise on PSE levels (Lee & Kim, 2007), and that aerobic exercise and PSE were positively related (McAuley, 1993). This is why this hypothesis was investigated; due to this inconsistency. The current study's findings supports that of McAuley (1993), because those who engaged in aerobic exercise had high levels of PSE. In order to confirm such an effect, further research should be carried out in this field, because there is not yet sufficient research regarding aerobic exercise and PSE levels. The inconsistencies in this research area may have occurred due to methodological inconsistencies such as utilising different measures to measure PSE, as no two studies seemed to use the same measure for this construct. Considering there is no standardised universal measure of PSE, it is difficult to extract valid and reliable findings from such a large body of research.

It is crucial to attempt to explain why this may have occurred, however. In this study, both the aerobic and anaerobic participants were on average, moderate to high on PSE. Perhaps this was the case due to the fact that this was an observational study with

naturally occurring groups that engaged in exercise without any known intervention. Additionally, it is plausible that individuals may differ on PSE for different exercise types, e.g. one individual may have high PSE for aerobic exercise and low PSE for anaerobic exercise.

Hypothesis 3: Motives to Exercise and Physical Self-Efficacy

This study also aimed to investigate specific motives in terms of the extent to which they predict PSE. Hypothesis 3 stated that specific motives to exercise would predict PSE. The results found that generally, motives to exercise significantly predicted PSE, however this predictive effect was small, therefore it is plausible that there may have been other mediating factors. Only the fitness and health motives were significant predictors of PSE. This indicates the extent to which an individual is motivated by fitness and/or health will somewhat determine their PSE; positively for fitness, and negatively for health, as per the current findings. The other two factors of engagement and challenge showed no significant predictive effect on PSE. Overall, these findings partly support the hypothesis, and because the model was significant, the null hypothesis is rejected, and the alternative hypothesis is accepted.

The existing literature suggested that motives to exercise would have some effect on PSE, and may mediate the relationship between PSE and exercise behaviour (D'Angelo et al., 2014; Dennis & Goldberg, 1996) and this concept is supported by the current findings. The literature also suggested that intrinsic motives were greater predictors of PSE outcomes than extrinsic motives (Cohen, 2004; Pauline, 2013; Kilpatrick et al., 2010; Ryan et al., 1997). Two motives were significant predictors of

PSE in this study; health and fitness. This may have occurred due to the intrinsic/extrinsic motivation phenomenon as discussed. The items within the fitness factor were generally intrinsic, e.g. 'I enjoy exercising.' (See Appendix D(i)), which according to the literature, is more likely to predict PSE than extrinsic motives. This is reflected in the findings because the fitness motive predicted greater PSE. Conversely, items within the health factor were predominantly extrinsic, e.g. 'I exercise because my family/friends want me to.' (See Appendix D(iv)), and in this study they had a negative predictive effect. This can also be explained by the literature, because these items were extrinsic. It must be considered however that the motive of health had low reliability, and therefore it is difficult to hold great confidence in its derived results.

The solely intrinsic motives tested in this study were engagement and challenge, and showed no significant results, thereby not supporting the existing evidence. It is plausible that this may have occurred due to the items not being validly reflective of their respective factors, for example.

Strengths

The present study possessed strength in its nature, with particular reference to the core hypothesis. While much of the previous literature states that exercise, particularly aerobic exercise is beneficial for stress reduction, there is very little research that examines different types of exercise. In particular, there is very little research that attempts to evaluate anaerobic exercise in terms of its influence on stress, apart from one exception by Trinidad (1997), however this research is not contemporary, and used a very small sample size. Therefore, the current study possesses

strength in its nature because it gathers existing evidence on this topic and adds to it, finding that the type of exercise engaged in does not seem to have an effect on its stress reducing qualities.

This study also possessed strength in its generalisability. While the sample may not be nationally representative, exercising participants were recruited from two different gyms, alleviating some individual differences that may have influenced the variables of interest. In SV fitness (IFSC, Dublin), participants were more likely to be students studying, or individuals working in close proximity of the gym, for example. Conversely, 'Platinum Physique' (Ashbourne, Meath) is a bodybuilding gym in a more rural area. Therefore, the sample in general consisted of participants that may have varied as a result of such different gym locations.

The present study also consisted of strength in its ethical considerations. There were no major issues in this study regarding undesirable interventions that they would have had to adhere to, etc. This is one of the benefits of utilising a naturally occurring sample; participants' exercise behaviours are subject to their personal preferences. Furthermore, this study possessed ethical strength because participant data was anonymous (due to the attempts made to keep participant data and signatures separate) and protected, and participants were free to withdraw their data at any time.

Limitations

The current findings must be interpreted in light of a number of limitations. One of the general limitations of the current study related to the sample. Due to time restraints, the sample was relatively small, with 152 participants in total, which was

further separated into 3 groups. Each of the groups had a considerably small sample size and therefore, may not have been representative of their successive populations.

As this was an observational study, no exercise interventions were implemented. This indicates that within participants' exercise routines, there were a number of variables that were not accounted for, such as exercise intensity, duration, frequency, etc. (although inclusion criteria required participants to exercise 3 times per week at minimum). Some research suggested a dose-response relationship between such variables (exercise intensity, frequency, duration) and stress (Rejeski et al., 1991; Steptoe et al., 1993; Hamer et al., 2006), which may explain the extent to which these relationships occur. Further research is required in order to investigate this. Conversely, Tsutsumi and colleagues (1997) found that exercise intensity had no effect on PSE in a study of the effects of exercise on PSE, which may reduce the extent of this limitation.

There were a number of methodological limitations in this study also. In relation to data collection, participants were recruited upon their entry or exit of the gym. It is plausible that a single participants' responses would vary whether they participated in the study prior to, or subsequent to their workout. Similarly, there may have been participants who 'predominantly' engaged in one form of exercise, but had participated in the study subsequent to a workout of the opposite exercise type. If this occurred with several participants, this could have greatly impacted the study's findings.

Another major limitation of the current study was that the 'Motivation to Exercise Scale' (Newson & Kemps, 2007) consisted of an issue regarding reliability in one of its factors. Cronbach's alpha for the 'health' factor was .44 in this sample. This indicates that participants may not consistently produce the same results when providing

responses to this subscale. Therefore, although this was a significant negative predictor of PSE, its derived results are not reliable.

Furthermore, there were limitations in this study regarding research design. This was a cross-sectional study. This limits the study because it undermines perceived stress and PSE, ignoring external stressors or other extraneous variables that may influence such phenomena on a day-to-day basis. For example, it is plausible that some participants may have had more external stressors than others on the day of participation, potentially influencing their responses. Similarly, the present study does not consider the attempts individuals may make in their daily lives to alleviate their stress, e.g. meditation, socialising, time outdoors, etc. Therefore, the findings regarding stress must be interpreted in light of several limitations because external stressors and participants' attempts to decrease stress were not recorded, and such variables may have influenced participants' scores. Additionally, it is possible that individuals who refused to participate in the study upon entry/exit of the gyms due to time restraints had higher stress levels as a result of such restraints.

A limitation of measuring PSE in individuals that predominantly engage in one type of exercise is that an individual's PSE may vary depending on which type of exercise are responding to the questionnaire in relation to. For example, one of the items on the 'Physical Exercise Self-Efficacy Scale' (Schwarzer & Renner, 2004) was 'I can manage to carry out my exercise intentions even when I have worries and problems.' A participant may be very certain of this in relation to cardiovascular exercise, however this may not be the case for the same participant for strength training.

Future Research

In order to obtain more valid and reliable results, it is recommended that future research replicates the present study in light of a number of issues. To begin with, a larger sample size is recommended to obtain stronger findings. With regards to research design, it is recommended that the current study is replicated under a longitudinal research design, to control for potential instances that may have altered participant responses at the one time point in the current study. Furthermore, it is suggested that this study is replicated also under an experimental design, to control for extraneous variables that were acknowledged as potential limitations of the current study, such as exercise intensity, frequency, etc. In addition, it is recommended that future research investigates whether PSE varies within individuals on the basis of which type of exercise they respond in relation to, as it is possible that there are differences here.

Should this study be replicated, it is also recommended that another group type is incorporated; a combination group. Therefore, the aerobic and anaerobic groups would consist of individuals who partake in solely aerobic or anaerobic exercise, and the combination group would consist of the individuals who partake in both types of exercise.

Should future research further investigate motives to exercise, it is recommended that researchers take into consideration the fact that the measure used in this study, the 'Motivation to Exercise Scale' (Newson & Kemps, 2007) was not satisfactory. Two of the scale items did not load significantly onto any factors. It is plausible that they may have been included in the scale because they loaded onto the overall scale, however not any of its specific factors. Additionally, the reliability for one

of the factors of this scale, the ‘Health factor’, was also unsatisfactory, producing a Cronbach’s alpha value of .44 within the current sample. Therefore, this measure overall had multiple issues and it is recommended that future research either produces a new scale valid for testing motives to exercise, or a different scale is used to examine this construct.

Finally, it is recommended that future research investigates further into the field of interest. It is likely that there are extraneous variables that may mediate the effect(s) that the current findings have shown. Such extraneous variables may include exercise intensity etc., (as aforementioned), exercise location (outdoors versus a gym setting, etc.), time of day (of their workouts and/or participating in the research), and so on. In order to advance in knowledge in the field of sports psychology, stress research etc., it is crucial to further explore the effects that the current findings have shown, in an attempt to provide a full comprehensive explanation for why such effects may have occurred.

Implications

The knowledge acquired as a result of the present study holds great value, because it advances our understanding of the effects of exercise on stress, PSE, and how motives to exercise may influence or predict such variables. The acquired knowledge will inform future research for the reasons outlined above (see ‘Future Research’ section). It will also inform health and fitness professionals (e.g. personal trainers, team coaches, etc.) by increasing their knowledge of PSE, and motivation to exercise, both of which are particularly important constructs in sports psychology. The current research

will also inform the general public of the importance of exercise, with particular reference to reducing and maintaining stress levels. This is crucial for many reasons in order for citizens to perform optimally in their daily lives.

Conclusion

In conclusion, there was no difference between the two types of exercise groups on perceived stress. However, there was a large significant difference on this construct between non-exercisers and exercisers, regardless of exercise type. Exercisers were much more psychologically competent in their ability to manage stress, and much less psychologically vulnerable to being affected by stress than non-exercisers. Therefore, anaerobic exercise as a method of stress reduction and management should be valued highly, alongside aerobic exercise. It is recommended that in order to decrease one's likelihood of experiencing stress, individuals should engage in some form of regular exercise, regardless of exercise type.

Additionally from hypothesis 2, there was no significant difference between exercise types for PSE, contrasting with the researcher's expectations. Exercisers of both types seemed to be moderate to high on PSE. However, this was an observational study, i.e. participants' exercise behaviours were naturally occurring. Further research is required on different types of exercise and PSE in order to determine potential explanations for such an effect, or lack of.

In conclusion of hypothesis 3, it is suggested that motives to exercise played a small significant role in predicting PSE. However, of the four motives tested, only two factors significantly predicted PSE; fitness (positively) and health (negatively). This

indicates that greater motivation caused by the fitness factor would predict greater confidence in one's ability to achieve their fitness-related goals, and vice versa for the health factor. There were issues regarding the reliability of the health factor, however. Further research is required on motives to exercise and PSE, utilising a more reliable measure, and other motives to exercise that were not tested in the current study.

The present study consisted of a number of strengths, yet several limitations also. As a result, it is recommended that future research is carried out to alleviate the potential effects of this study's limitations, to add to existing knowledge on the examined phenomena, and to provide further practical applications for sports psychology, and for health and fitness professionals. Generally, it can be concluded that the exercise types tested do not differ on either stress or PSE. The present study concludes that motives to exercise seem to hold some importance in predicting PSE. Therefore, this supports the original rationale of why this research holds such great importance. In light of limitations, motives to exercise partly predict PSE, which in turn predicts exercise behaviour, which in turn predicts and/or is related to lower stress levels and improved stress management.

References

- Amir, S., Brown, Z. W. & Amit, Z. (1980). The role of endorphins in stress: Evidence and speculations. *Neuroscience & Biobehavioral Reviews*, 4(1), 77-86.
- Anshel, M. H. (1996). Effect of Chronic Aerobic Exercise and Progressive Relaxation on Motor Performance and affect following Acute Stress. *Behavioral Medicine*, 21(4), 186-196.
- Aronson, D. (2009). Cortisol – Its Role in Stress, Inflammation, and Indications for Diet Therapy. *Today's Dietitian*, 11(11), 38.
- Backović, D. V., Maksimović, M., Davidović, D., Zivojinović, J. I. & Stevanović, D. (2014). Stress and mental health among medical students. *Srpski arhiv za celokupno lekarstvo*, 141(11-12), 780-784.
- Bandura, A. (1977). *Self-efficacy: Toward a unifying theory of behavioural change*. *Psychological Review*, 84(2), 191-215.
- Bandura, A. (1994). *Self-efficacy*. John Wiley & Sons, Inc.
- Barney, D., Benham, L. & Haslem, I. (2014). Effects of college student's participation in physical activity classes on stress. *American Journal of Health Studies*, 29, 155-160.
- Berger, B. G. (1994). Coping with stress: The effectiveness of exercise and other techniques. *Quest*, 46(1), 100-119.
- Bravata, D. M., Smith-Spankler, C., Sundaram, V., Gienger, A. L., Lin, N., Lewis, R., Stave, C. P., Olkin, I. & Sirard, J. R. (2007). Using pedometers to increase

- physical activity and improve health: A systematic review. *Jama*, 298(19), 2296-2304.
- Buckworth, J. & Dishman, R. K. (2002). *Exercise Psychology*. Champaign, IL: Human Kinetics.
- Byrne, S., Barry, D. & Petry, N. M. (2015). Predictors of weight loss success. Exercise vs. dietary self-efficacy and treatment attendance. *Appetite*, 95, 593.
- Chadwick, A. E., Zoccola, P. M., Figueroa W. & Rabideau, E. M. (2016). Communication and Stress: Effects of Hope Evocation and Rumination Messages on Heart Rate, Anxiety, and Emotions After a Stressor. *Health Communication*, 31(12), 1-13.
- Cohen, B. S. (2004). Excercise: Differentiating the relapse stage of exercise behavior change in terms of perceived barriers, self-efficacy, and motives via an internet based data collection. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 64(11-B), 5767.
- Colt, E. W. D., Wardlaw, S. L. & Frantz, A. G. (1981). The effect of running on plasma β -endorphin. *Life Sciences*, 28(14), 1637-1640.
- Crews, D. J. & Landers, D. M. (1987). A meta-analytic review of aerobic fitness and reactivity to psychosocial stressors. *Medicine and Science in Sports and Exercise*, 19, 114-120.
- D'Angelo, M. E. S., Pelletier, L. G., Reid, R. D. & Huta, V. (2014). The roles of self-efficacy and motivation in the prediction of short- and long-term adherence to

exercise among patients with coronary heart disease. *Health Psychology*, 33(1), 1344-1353.

DeLong, L. L. (2006). *College Students' Motivation for Physical Activity* (Doctoral dissertation). Louisiana State University, Louisiana. Retrieved on 17th January, 2017, from

http://etd.lsu.edu/docs/available/etd-11062006-143723/unrestricted/DeLong_dis.pdf

Dennis, K. E. & Goldberg, A. P. (1996). Weight control self-efficacy types and transitions affect weight-loss outcomes in obese women. *Addictive Behaviors*, 21(1), 103-116.

Focht, B. C., Knapp, D. J., Gavin, T. P., Raedeke, T. D. & Hickner, R. C. (2007). Affective and self-efficacy responses to acute aerobic exercise in sedentary older and younger adults. *Journal of Aging and Physical Activity*, 15(2), 123-138.

Goldfarb, A. H. & Jamurtas, A. Z. (1997). β -Endorphin Response to Exercise. *Sports Medicine*, 24(1), 8-16.

Gomez-Paloma, F., Rio, L. & D'Anna, C. (2014). Physical self-efficacy in women's artistic gymnastic between recreational and competitive level. *Journal of Human Sport and Exercise*, 9(1).

Hamer, M., Taylor, A. & Steptoe, A. (2006). The effect of acute aerobic exercise on stress related blood pressure responses: A systematic review and meta-analysis. *Biological Psychology*, 71(2), 183-190.

- Harte, J. L., Eifert, G. H. & Smith, R. (1995). The effects of running and meditation on beta-endorphin, corticotropin-releasing hormone and cortisol in plasma, and on mood. *Biological Psychology*, *40*(3), 251-265.
- Hoare, E., Milton, K., Foster, C. E. & Allender, S. (2016). The associations between sedentary behaviour and mental health among adolescents: A systematic review. *International Journal of Behavioural Nutrition and Physical Activity*, *13*(1), 108.
- Jackson, D. (2010). How personal trainers can use self-efficacy theory to enhance exercise behavior in beginning exercisers. *Strength and Conditioning Journal*, *32*(3), 67-71.
- Jackson, E. M. (2013). Stress relief: The role of exercise in stress management. *ACSM's Health & Fitness Journal*, *17*(3), 14-19.
- Kangas, J. L., Baldwin, A. S., Rosenfield, D., Smits, J. A. J. & Rethorst, C. D. (2015). Examining the moderating effect of depressive symptoms on the relation between exercise and self-efficacy during the initiation of regular exercise. *Health Psychology*, *34*(5), 556-565.
- Kilpatrick, M., Hebert, E. & Bartholomew, J. (2010). College students' motivation for physical activity: Differentiating men's and women's motives for sport participation and exercise. *Journal of American College Health*, *54*(2), 87-94.
- Kwan, B. M. & Bryan, A. D. (2010). Affective response to exercise as a component of exercise motivation: Attitudes, norms, self-efficacy and temporal stability of intentions. *Psychology of Sport and Exercise*, *11*(1), 71-79.

- Lalanza, J., Sanchez-Roige, S., Cigarroa, I., Gagliano, H., Fuentes, S., Armario, A., Capdevila-Ortís, L. & Escorihuela, R. (2015). Long-term treadmill exercise promotes stress-coping strategies in male and female rats. *Scientific Reports*, 5.
- Lee, M. R. & Kim, W. S. (2007). Psychological benefits of bench-step aerobics program in overweight or obese women: its effects on anger, exercise self-efficacy, exercise-related affect, and body image. *Korean Journal of Health Education and Promotion*, 24(5), 119-135.
- Martin, M. Y. (2006). Effects of resistance and aerobic exercise on physical self-efficacy and social physique anxiety in female college students (Master's Thesis). Retrieved on 24th January, 2017, from <http://digitalcommons.georgiasouthern.edu/cgi.viewcontent.cgi?article=1088&context=etd>
- McAuley, E. (1993). Self-efficacy and the maintenance of exercise participation in older adults. *Journal of Behavioral Medicine*, 16(1), 103-113.
- Newson, R. S. & Kemps, E. B. (2007). Motivation to Exercise Scale [Database Record]. Retrieved on 8th October 2016, from <http://ezproxy.ncirl.ie:2113/ehost/detail/detail?vid=2&sid=c13a7288-76b1-4bfa-b6ac6560ef64c6c9%40sessionmgr4008&hid=4101&bdata=JnNpdGU9ZWVhc3QtbGl2ZQ%3d%3d#AN=9999-11121-000&db=pst>
- Nichols, M. D. (2013). Self-efficacy, outcome expectancy, and fear of failure as predictors of physical activity. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 74(6-B)(E).

- Pauline, J. S. (2013). Physical activity behaviors, motivation and self-efficacy among college students. *College Student Journal*, 47(1), 64-74.
- Rejeski, W. J., Gregg, E., Thompson, A. & Berry, M. (1991). The Effects of Varying Doses of Acute Aerobic Exercise on Psychophysiological Stress Responses in Highly Trained Cyclists. *Journal of Sport and Exercise Psychology*, 13(2), 188-199.
- Rimmele, U., Zellweger, B. C., Marti, B., Seiler, R., Mohiyeddini, C., Ehlert, U. & Heinrichs, M. (2007). Trained men show lower cortisol, heart rate and psychological responses to psychological stress compared with untrained men. *Psychoneuroendocrinology*, 32(6), 627-635.
- Roemmich, J. N., Lambaise, M., Salvy, S. J. & Horvath, P. J. (2009). Protective effect of interval exercise on psychophysiological stress reactivity in children. *Psychophysiology*, 46(4), 852-861.
- Ryan, R. M., Frederick, C. M., Lepes, D., Rubio, N. & Sheldon, K. M. (1997). Intrinsic Motivation and Exercise Adherence. *International Journal of Sport Psychology*, 28(4), 335-354.
- Schlatter, R. R. (2008). The impact of aerobic exercise on locus of control and self-efficacy in middle-aged women: Implications for mental health counsellors. *Dissertation Abstracts International: Section A: Humanities and Social Sciences*, 68(8-A), 3299.
- Schwarzer, R. & Renner, B. (2004). Health-specific self-efficacy scales. Retrieved on 21st November, 2016, from <http://userpage.fu-berlin.de/health/healsself.pdf>

- Schwarzer, R. (2014). *Self-efficacy: Thought control of action*. Taylor & Francis.
- Selye, H. (1955). Stress and disease. *The Laryngoscope*, 65(7), 500-514.
- Silverman, S. C. (1998). The effects of exercise on mood and self-efficacy in emotionally disturbed adolescents. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 58(9-B), 4717.
- Stephens, A., Kearsley, N. & Walters, N. (1993). Cardiovascular activity during mental stress following vigorous exercise in sportsmen and inactive men. *Psychophysiology*, 30(3), 245-252.
- Trinidad, P. (1997). Effects of theraband exercises, physiological skills training, and peer leadership program on selected measures of strength, flexibility, cognitive processes, mood and stress among racial minority elderly. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 58(10-B), 5356.
- Tsutsumi, T., Don, B. M., Zaichkowsky, L. D. & Delizonna, L. L. (1997). Physical fitness and psychological benefits of strength training in community dwelling older adults. *Applied Human Science*, 16(6), 257-266.
- VanItallie, T. B. (2002) Stress: A risk factor for serious illness. *Metabolism*, 51(6), 40-45.
- Vipene, J. B. & Jona, I. (2012). Physical self-efficacy levels of adults involved in programmed physical exercises in River State, Nigeria. *Asian Journal of Social Sciences & Humanities*, 1, 92-98.

- Weber, G. (2015). Ways to Lower Your Cortisol Levels and Your Anxiety. *Healthy Place*. Retrieved January 28th, 2017, from <http://www.healthyplace.com/blogs/treatinganxiety/2015/06/ways-to-lower-your-cortisol-levels-and-your-anxiety/>
- Wickrama, K. A. S., Ralston, P. A., O'Neal, C. W., Ilich, J. Z., Harris, C. M., Coccia, C., Young-Clark, I. & Lemacks, J. (2013). Perceived Stress Scale—Revised [Database record]. Retrieved 10th October 2016, from <http://ezproxy.ncirl.ie:2134/ehost/detail/detail?vid=30&sid=1764a378-9f1a-43f2b926d2814a0f0888%40sessionmgr120&hid=118&bdata=JnNpdGU9ZWVhc3QtbGl2ZQ%3d%3d#AN=9999-25065-000&db=pst>
- Wyss, T., Boesch, M., Roos, L., Tschopp, C., Frei, K. M., Annen, H. & La Marca, R. (2016). Aerobic fitness level affects cardiovascular and salivary alpha amylase responses to acute psychological stress. *Sports Medicine*, 2(1), 33.

Appendices

Appendix A: Participant Information Sheet

The Relationship between Exercise and Psychological Well-being

You are invited to take part in a research study regarding stress, self-efficacy, reasons for regular exercise, and different types of exercise. The aim of this study is to evaluate different types of exercise in relation to stress and self-efficacy. You will be asked to complete some questions about yourself, along with one or three short questionnaires (depending on your exercise behaviours). This should take approximately 4-5 minutes of your time.

You may withdraw from the study, or request that your data be withdrawn at any time without explanation. Should you wish to refuse to respond to a question, you may do so freely. Your participation is voluntary.

What is required from you as a participant is your age, gender, exercise behaviours, and responses to the questionnaire(s). Your data will not be linked back to you, and will be used for research purposes by the named researcher only. Following this study, data will be presented as part of the researcher's undergraduate thesis requirements.

There are no proposed benefits or risks for you in this study. However, if you experience any distress or upset following your participation in this study, you may contact the following helpline:

Samaritans Ireland 24-hour helpline: 116 123

If you wish to enquire about the final results of this study, you may contact me at:

Email: Kate.Philpott@student.ncirl.ie

Alternatively, if you have any further questions about the study, you may also contact my supervisor, Dr. Joanna Power, at:

Email: Joanna.power@ncirl.ie

*Note: The final results of the study will not be available until April 2017.

Appendix B: Informed Consent Form

By signing below, you agree that: (1) you have read and understood the above, and (2) you are taking part in this research study voluntarily.

*Participants wishing to preserve some degree of anonymity may use their initials.

*Participant's Name (Printed)**

Participant's signature

Date

Name of person obtaining consent (Printed)

Signature of person obtaining consent

Appendix C: Demographic Questions

Age: _____ years

Please indicate with a tick (✓) in the appropriate boxes:

Gender: Male Female Other

Type of exercise you *predominantly* engage in. Please tick one box only.

- Cardiovascular exercise (jogging, cycling, elliptical, etc)
- Strength training (weight-lifting)
- I do not participate in any regular exercise

Appendix D: Motivation to Exercise Scale (Newson & Kemps, 2007)

‘Please indicate with a tick (✓) in one column, how often you experience the following, in relation to exercise.’

(i) Fitness factor

	1. Not at all	2. Rarely	3. Sometimes	4. Very often	5. Always
1. Exercising makes me feel good					
2. Exercising gives me energy					
3. I am interested in physical activity					
4. I enjoy exercising					
5. I like the rewards of exercise					
6. I want to stay in shape					
7. I want to be physically fit					
8. I want to improve my fitness					
9. I exercise for health concerns					

(ii) Engagement Factor

10. I like to have something to do					
11. I like to do something I am good at					
12. I like to meet new people					
13. I like to get out of the house					

(iii) Challenge Factor

14. I like to be competitive					
15. I want to get rid of excess energy					
16. I want to improve my skills					

(iv) Health Factor

17. I exercise to lose weight					
18. I exercise because my family/friends want me to					
19. I exercise because a health professional advised me to					

(v) No Specific Factor

20. I exercise to control my stress/tension					
21. I like the social aspect of exercising					

Appendix E: Physical Exercise Self-Efficacy Scale (Schwarzer & Renner, 2004)

How certain are you that you could overcome the following barriers? Please indicate with a tick (✓) in one column.

‘I can manage to carry out my exercise intentions...

	1. Very uncertain	2. Rather uncertain	3. Rather certain	4. Very certain
1. ...even when I have worries and problems.’				
2. ...even when I feel depressed.’				
3. ...even when I feel tense.’				
4. ...even when I am tired.’				
5. ...even when I am busy.				

Appendix F: Perceived Stress Scale—Revised (Wickrama et al., 2013)

‘Please indicate with a tick (✓) in one column, how often you experience each of the following, in relation to the stress in your life.’

(i) Psychological Competency

	0. Never	1. Rarely	2. Sometimes	3. Often	4. Very Often
1. How often have you felt that you were effectively coping with important changes that were occurring in your life?					
2. How often have you felt confident about your ability to handle your personal problems?					
3. How often have you felt things were going your way?					
4. How often have you been able to control the irritations in your life?					
5. How often have you been able to					

control the way you spend your time?					
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(vi) Psychological Vulnerability

6. How often have you been upset because of something that happened unexpectedly?					
7. How often have you felt that you were unable to control the important things in your life?					
8. How often have you felt nervous and stressed?					
9. How often have you found that you could not cope with all the things that you had to do?					
10. How often have you been angered because of things that					

happened outside of your control?					
11. How often have you found yourself thinking about things that you have to accomplish?					
12. How often have you felt difficulties were piling up so high that you could not overcome them?					

Appendix G: Proof of Permission from SV Fitness (IFSC, Dublin)

SV Fitness Health Club



SV Fitness <sdunne@svfitness.com>

Mon 28/11/2016 14:00

To: Kate Philpott;



Hi Kate,

Just emailing you to give you permission to come in one day this week or next week to conduct your college survey amongst SV Fitness members.

Kind Regards,

Sonya McGinn,
Olympic Athlete Sydney,
SV Fitness Health Club.

Appendix H: Proof of Permission from Platinum Physique (Ashbourne, Meath)

(No subject)



Aisling Tracey <tracey.aisling@icloud.com>

Fri 18/11/2016 15:15

To: Kate Philpott;



Hi Kate just to confirm that your more than welcome to pop up and do the survey in platinum!!
Regards aisling

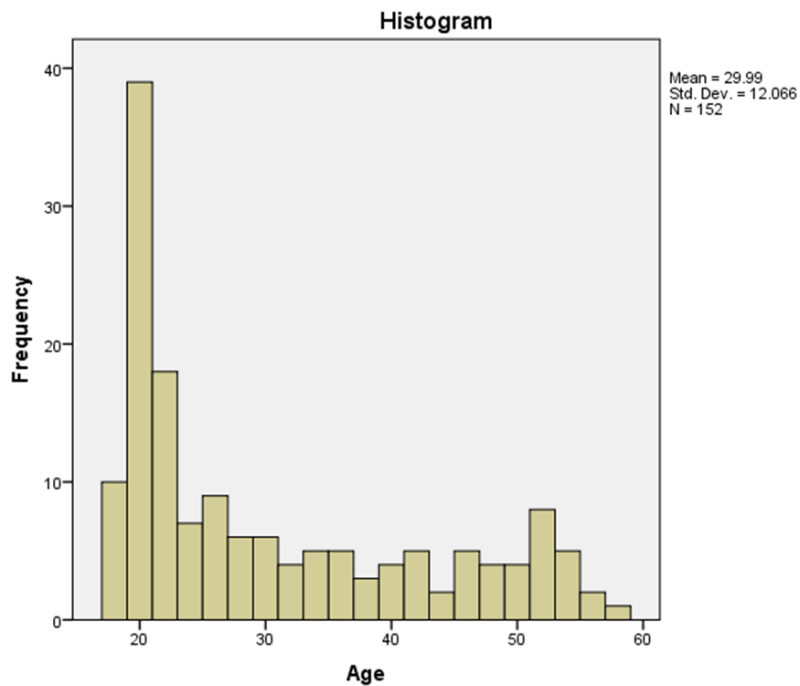
Sent from my iPhone

Appendix I: Normality Table

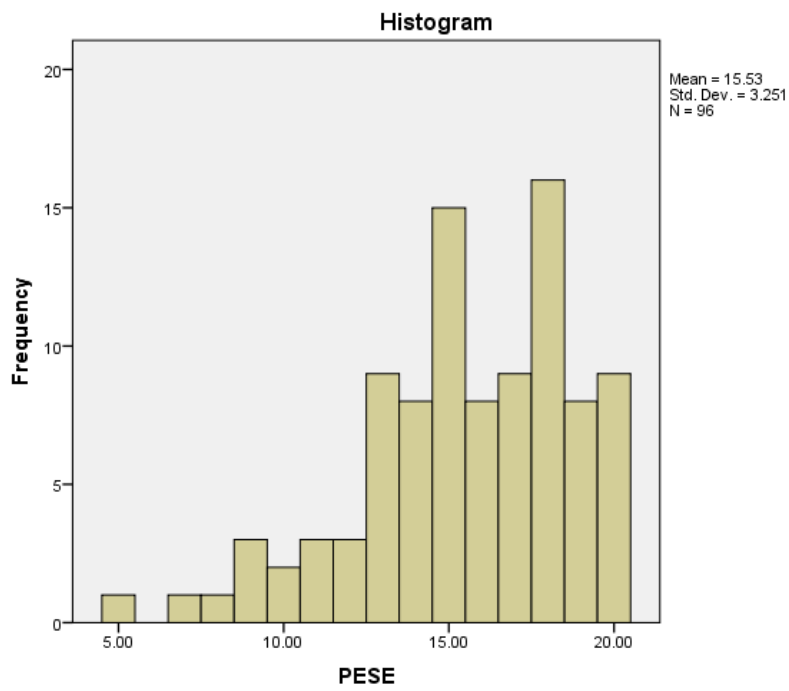
Variable	Kolmogorov – Smirnov (Sig. Value)
Age	.000
PESE	.002
PSS_Competency	.009
PSS_Vulnerability	.001
Fitness Motive	.000
Engagement Motive	.002
Challenge Motive	.005
Health Motive	.000
No Specific Motive	.000

Appendix J: Normality Histograms

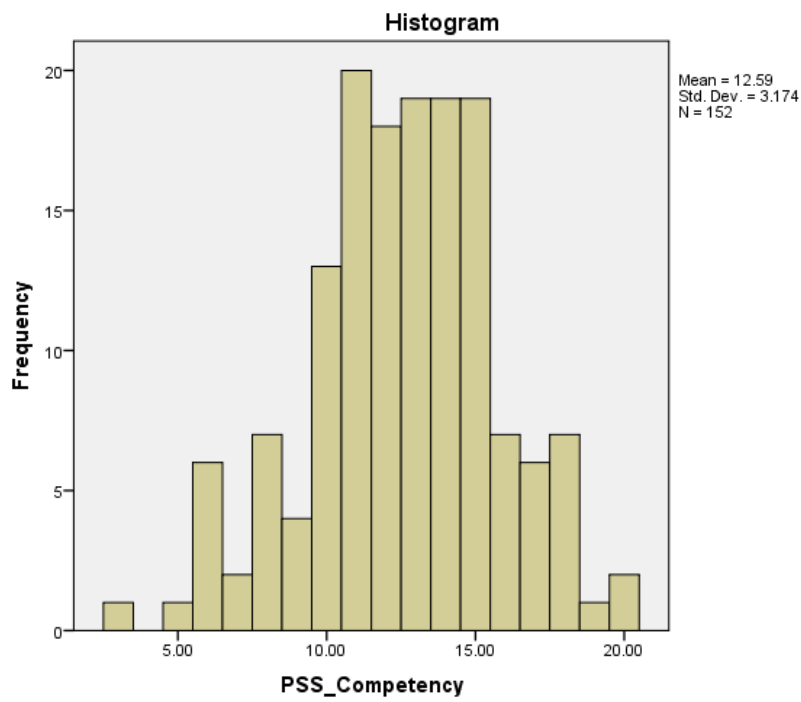
(i) Normality: Age



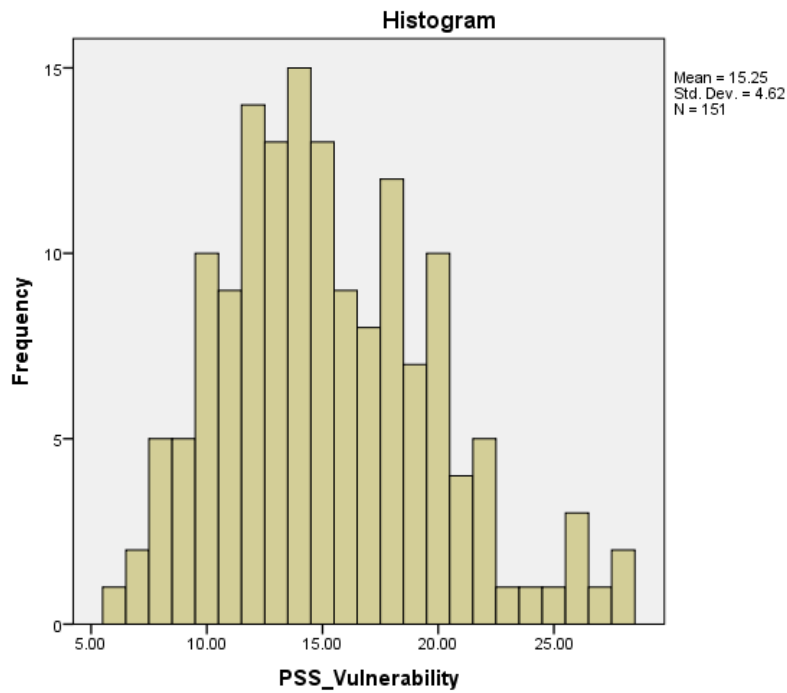
(ii) Normality: Physical Self-Efficacy



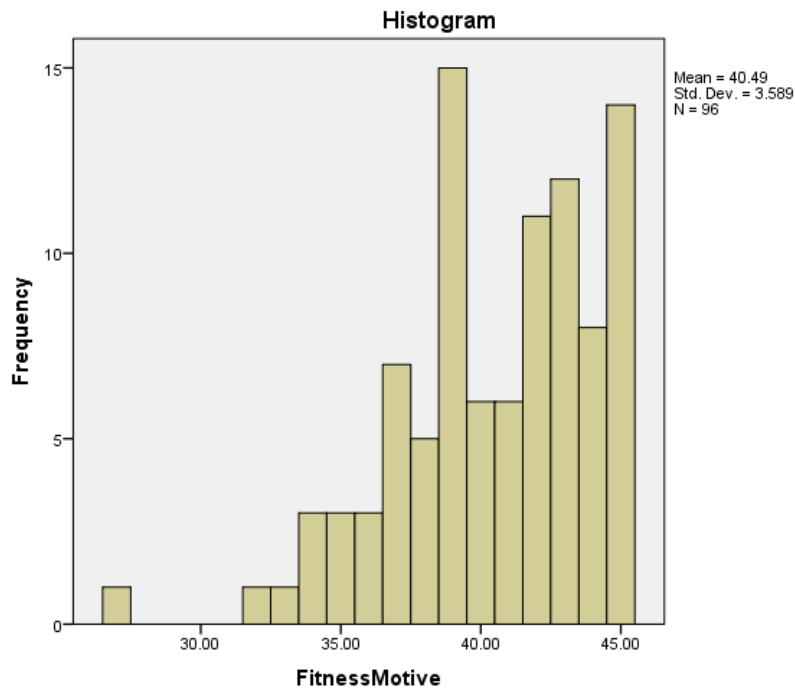
(iii) Normality: Perceived Stress – Psychological Competency



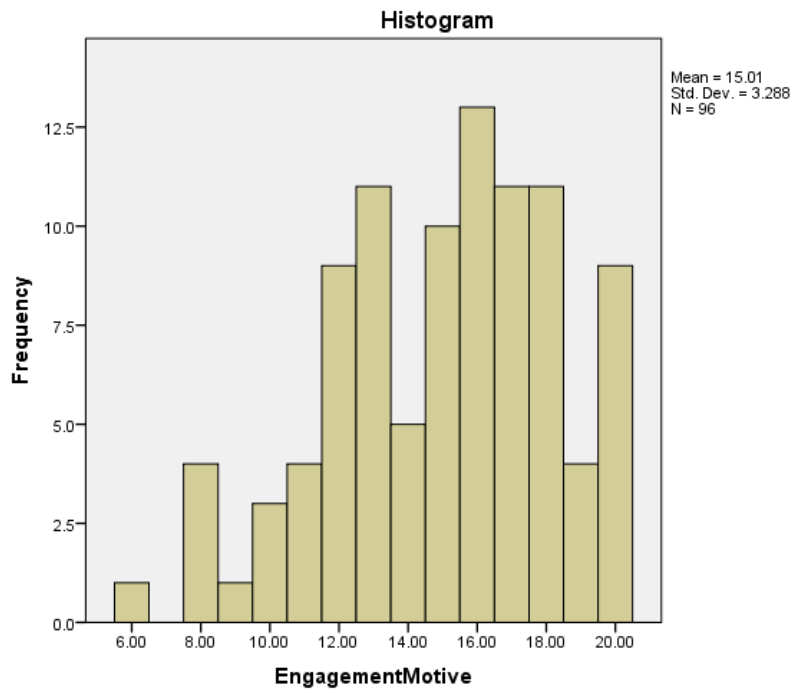
(iv) Normality: Perceived Stress – Psychological Vulnerability



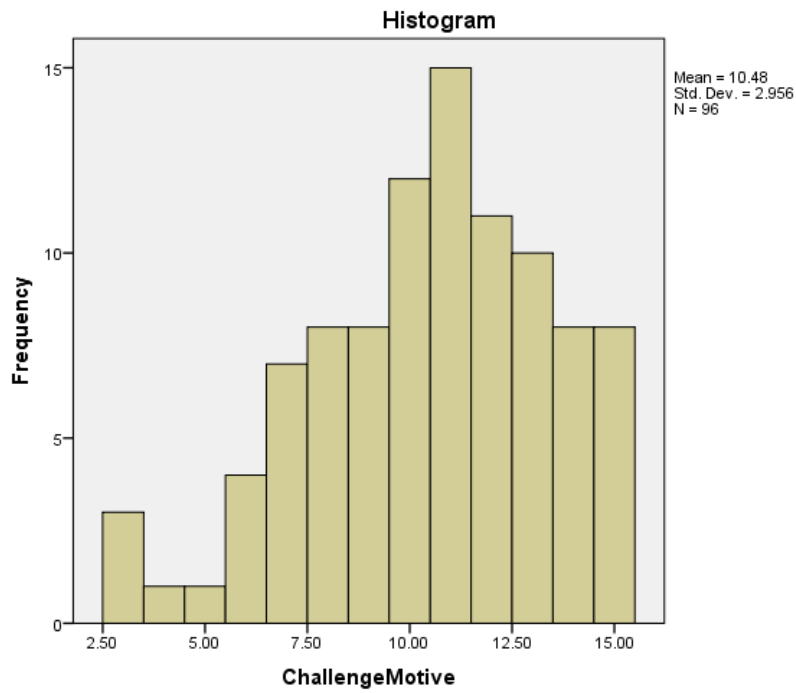
(v) Normality: Fitness Motive to Exercise



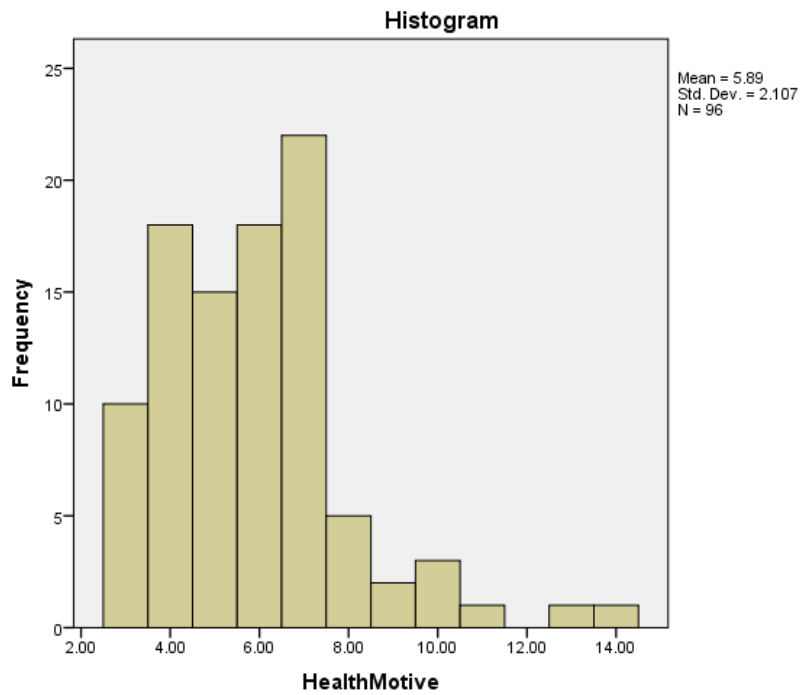
(vi) Normality: Engagement Motive to Exercise



(vii) Normality: Challenge Motive to Exercise



(viii) Normality: Health Motive to Exercise



(ix) Normality: No Specific Motive to Exercise

