

Examining possible differences in levels of Mindfulness and Perceived Stress  
between groups who practice Mind- Body exercise and those who practice traditional  
Cardiovascular exercise.

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## Abstract.

The main hypothesis of this research study was that Mind- Body exercise programs such as Yoga and pilates would result in lower levels of perceived stress and higher levels of mindfulness than cardiovascular exercise. Three groups were selected, the total number of participants (N = 70). The breakdown for gender was men (n= 33) and women (n= 37). Previous research indicates that physical exercise is beneficial in reducing levels of stress. It was found that those who practise yoga and pilates do experience increased levels of mindfulness, but do not lower levels of perceived stress as previous research would indicate. A possible weakness of this study is that stress was measured using a self- report questionnaire. Further research may benefit from a more accurate form of stress testing by analysing cortisol levels in saliva.

## **1. Introduction**

The aim of this study is to determine whether mind- body exercise such as yoga and pilates which focus on slow controlled movements and breathing will result in lower levels of stress and higher levels of mindfulness than traditional forms of cardiovascular exercise. Previous research which will be discussed in the course of the following paragraphs has shown that exercise techniques which rely on relaxation based techniques and slow, controlled movements results in increased levels of mindfulness and also in reduced levels of stress. This concept has been employed in stress management techniques such as Mindfulness Based Stress Reduction ( Kabat-Zinn, 1979) to treat stress, depression and anxiety disorders.

Granath, Ingvarsson, von Thiele & Lundberg (2006) state from the findings of their study that yoga is as effective as cognitive behavioural therapy in managing stress. This study will provide a clearer understanding of which form of exercise provides the most benefit in stress reduction and increased mindfulness. Since lower stress levels and increased levels of mindfulness have both been linked with increased immune functioning as mentioned below, this study aims to provide an insight into which exercise form is the strongest predictor of good health and well being.

### **1.1 The Conceptualization of Stress**

Stress is defined as being “a negative emotional experience accompanied by predictable biochemical, physiological, cognitive and behavioural changes that are directed either toward altering the stressful event or accommodating its effects” ( Taylor, 2009, p147). It is a reaction to a stressor which can either be a life changing event such as the death of a loved one or simply an everyday stressor such as traffic jams. Stress can be harmful because it has the ability to “disrupt emotional and physiological well being” ( Taylor, 2009, p147). Selye ( 1956 as cited in Taylor 2009) described the cumulative effects of repeated stress on an individual in his General adaptation Syndrome. He makes the point that repeated or prolonged exposure over time can result in wear and tear on the organisms system, which could result in physiological damage, ultimately leading to physical illness. Coricosteroids, one of which is Cortisol, are a group of stress hormones which are released when a person encounters a stressor. They have been shown to have immunosuppressive qualities, and prolonged cortisol secretion has been linked to the destruction of neurons in the hippocampus.

In this study, the author will be measuring perceived stress. It is important to remember that stress is a matter of individual perception and is dependant on the person- environment fit. There are “important individual differences in response to stress” ( Lazarus & Folkman, 1984, p6). Lazarus and Erikson (1958, as cited in Lazarus & Folkman, 1984, p7) found that in tests of failure related stress, there was more variance in scores rather than an average increase or decrease in performance effectiveness, meaning that performances were made much more variable by stress. The Perception of stress depends on the individual’s appraisal of any given situation. What one person may perceive as stressful may not seem so to someone else. People

have different experiences and these individual differences have an influence on perceived stress. Stress is a transaction, it is neither the result of the person nor the environment but is a combination of both ( Lazarus, 1998, p182).

As perceived stress is dependant on the individual, there is also a contextual component to account for when studying perceived stress. An experiment to test the contextual element of perceived stress ( Speisman, Lazarus, Mordkoff & Davidson, 1964, as cited by Taylor, 2009, p150) showed that the conditions participants experienced prior to the stressor had an effect on how stressful they judged a situation to be. Participants were primed before being shown a gruesome video showing tribal initiation rites by either being informed of its gruesome nature, or by being directed to consider the anthropological aspect of what they were about to see. Those who viewed the video in light of the aspect of pain involved reported more stress afterwards than those who were primed to view it in a more subjective fashion.

Bearing in mind that stress is both subjective and context dependant, the perceived stress scale will measure individual stress by self report. However, for future research more concrete evaluations of stress levels such as testing autonomic arousal may be useful in gathering data.

## 1.2 Cardiovascular Exercise & Stress

A study of elite athletes and stress levels (Perna & McDowell, 1995, as cited in Taylor, 2009, p153) divided participants into groups depending on their levels of stress experienced in their every day lives. They then measured cortisol levels following vigorous training. It was found that those who experienced more everyday stress took longer for their cortisol levels to return to normal. This would indicate that stress has a direct impact on the immune system and therefore physical health.

Finding a way to manage stress would obviously be beneficial for overall well being. To measure levels of stress in participants, individuals will complete the Perceived Stress Scale (Cohen et al, 1983) which is a self reporting measure. The Perceived Stress scale is thought to be a better indicator of stress those other instruments (such as the social readjustment scale) which measure whether a person has been exposed to specific stressful events (Taylor, 2009, p163).

There have been many studies conducted on the beneficial effects that physical activity has on stress. Previous research in the form of a meta-analysis, which examined the results of 27 narrative reviews conducted between 1960-91 found that in 81% of cases the authors concluded that physical activity/fitness was related to a reduction in anxiety levels following exercise (Landers & Petruzello, 1994).

Anxiety in this context is described as a “stress- related emotion” which is “a form of negative self appraisal characterised by worry, self doubt, and apprehension”(Landers, 1999).

In a paper by Calfas & Taylor (1994), they concluded that physical activity was consistently related to improvements in self esteem, self concept, depressive symptoms and anxiety and stress. They also pointed out that they were unable to find

any negative effects of physical activity whatsoever. From the same paper, Calfas and Taylor (1994) conclude that greater amounts of occupational and leisure time physical activity are generally associated with increased positive mood, and therefore lower levels of stress.

Landers (1999) reports that both aerobic and anaerobic activity were beneficial to mental health and Calfas & Taylor (1994) proposed on the basis of their findings that adolescents should engage in moderate to vigorous physical aerobic activity approximately three times per week for about 60 minutes each time.

Landers (1999) cites six meta-analyses on the subject of the effect of exercise on mental health (Calfas & Taylor, 1994; Kugler, Seelback, & Kruskemper, 1994; Landers & Petruzzello, 1994; Long & Van Stavel, 1995; McDonald & Hogdon, 1991; Petruzzello, Landers, Hatfield, Kubitz, & Salazar, 1991) which all found that exercise was significantly related to a reduction in anxiety.

The bulk of the literature available on the subject of the effects of physical activity on mental health seem to focus mainly on the area of aerobic and anaerobic activity.

There is less literature to be found on alternative types of physical exercise and how they affect levels of stress in individuals. Even less work again exists with reference to which form of exercise, the traditional aerobic/ anaerobic exercise is more beneficial in reducing stress levels.

Landers & Petruzzello (1994) found that “although exercise differs from no treatment control groups (i.e. in reducing anxiety levels), it is usually not shown to differ from other known anxiety-reducing treatments (e.g., relaxation training)”. With this in mind, this study has been formulated to test the theory that non traditional forms of exercise, usually referred to as “mind – body” exercise will be as effective if not more so at

reducing levels of stress in individuals as traditional exercise is. By measuring exercise type, frequency and total time spent exercising by participants, it may be possible to determine the relationship between cardiovascular exercise and stress and mindfulness, and also how this relationship compares to that of mind body exercise, stress and mindfulness. This is what this current study will attempt to achieve by analysing and comparing data collected from all three groups of participants, and by using Independent t- tests and correlational coefficients to test the relationships between various combinations of variables collected.

### **1.3 The Conceptualization of Mindfulness**

According to Germer ( 2005, p1), mindfulness is “ a deceptively simple way of relating to experience”. Mindfulness meditation as a practice is used to illuminate a wider range of objects as they arise in awareness. The benefits of which are a greater understanding of the conditioning of our mind and an awareness of our current surroundings so that we may experience it in an alert and relaxed way ( Germer, 2005, p17). To achieve the aim of this study, participants of all groups will complete a measure of mindfulness. The purpose of this is to prove or disprove a link between mindfulness and mind body exercise, and to also show how this compares to the effect cardiovascular exercise may have on levels of mindfulness. A study examining the effects of an eight week meditation based stress reduction intervention found that there was an overall reduction in self reported anxiety, and levels of overall psychological distress were reduced ( Shapiro, Schwartz, & Bonner, 1998). The measure to be used to measure mindfulness in this study is the Mindful Attention Awareness scale which is a self- report measure. This scale is designed to assess

dispositional mindfulness, specifically an individual's awareness of and attention to what is happening in the present. It also predicts self regulation. The scale is calculated using the mean score of fifteen items, with higher scores reflecting higher levels of mindfulness. Levels of mindfulness will then be compared across types of exercisers to determine if any specific exercise type is a stronger predictor of mindfulness than another.

## **1.4 Mind- Body Exercise, Mindfulness & Stress**

When we speak about mind- body exercise we are referring to programs such as Yoga and Pilates which use slow and controlled movements and incorporate elements of deep breathing and meditation as part of this type of exercise program. On the other hand, traditional exercise in this case refers to aerobic and anaerobic activity (cumulatively known as cardiovascular exercise) such as sports training, running, swimming and cycling to name but a few.

Granath, Ingvarsson, von Thiele, & Lundberg (2006) studied the difference between cognitive behavioural therapy as a stress management technique and Yoga (specifically Kundaliniyyoga). Their results indicated that there was no significant difference between the two programs, showing that yoga is a viable alternative to cognitive behavioural therapy as a form of stress management. However Miller and Cohen found that stress management interventions including relaxation show the most consistent benefits ( Miller & Cohen , 2001, as cited in Taylor, 2009, p371).

In another paper, Caldwell, Harrison, Adams, Quin, & Greeson (2010) examined whether “mindfulness increased through participation in movement-based courses and

whether changes in self-regulatory self-efficacy, mood and perceived stress mediated the relationship between increased mindfulness and better sleep”. The results showed that total mindfulness scores increased overall. From this they concluded that movement-based courses led to increased mindfulness which in turn led to positive changes in mood and perceived stress.

A report published by Kirkwood, Rampes, Tuffrey, Richardson & Pilkington (2005) supports the theory that yoga can have positive results in treating stress disorders, however there is no indication as to whether it is more or less effective at treating anxiety or stress than traditional aerobic/ anaerobic exercise.

Caldwell, Harrison, Adams, & Triplett (2009) investigated the effects of a college semester of either Pilates or Taiji quan training on levels of perceived self-efficacy, mood and sleep quality of college students. They surmised that Pilates is an effective mode of exercise to “improve mental parameters in college-age individuals” and helps to improve mood.

Training in mindfulness meditation has also been proven to produce demonstrable positive effects on immune functioning ( Davidson et al., 2003, as cited by Taylor, 2009, p370). This could be because of the effect mindfulness may have on stress levels which have been proven to affect the immune system. From their studies Kiecolt- Glaser et al concluded that yoga promotes relaxation, and relaxation may help mute the negative effects of stress on the immune system ( Kiecolt- Glaser et al., 1985, as cited by Taylor, 2009, p370). A four year qualitative study examined the influence of teaching a mindfulness based stress reduction course to counselling graduate students. The student’s practiced hatha yoga over a fifteen week course, and it was found that participants reported positive physical, emotional mental and spiritual changes ( Schurz,, Christopher, & Christopher, 2008).

## 1.5 Stress & Personality

As personality is a mediator of stress, for the purpose of this study, measures of personality will also be used. A person's optimism or pessimism can influence levels of stress. Segerstrom et al (1998) found that optimism and active coping strategies were protective against stress ( Segerstrom et al., 1998 as cited by Taylor, 2009, p 369). People with high negative affectivity also appear more vulnerable to stress as it is associated with raised levels of cortisol ( Van Eck et al., 1996). The personality traits that will be measured in the course of this study are neuroticism, psychoticism and extraversion/ introversion. In the course of this research, correlational measures will be taken to determine if there is a link between levels of stress and personality, and personality and levels of mindfulness.

The research discussed shows that there is a well established link between exercise and improved mental health, and also that there has been some evidence to show that mind-body exercise programs like yoga and pilates can also be beneficial in terms of stress management.

However, these studies primarily compare exercise types with either no- treatment groups, or in the case of Granath, Ingvarsson, von Thiele & Lundberg (2006), with cognitive behavioural therapy groups.

The purpose of this study is to investigate the differences between traditional exercise programs and non-traditional exercise programs in reducing/ managing stress levels

and increasing levels of mindfulness. This study will add to existing research by determining which form of exercise ,if any, is most beneficial in lowering levels of stress in individuals. It will do this by comparing levels of stress across the three groups of participants previously mentioned with their levels and types of exercise. This study will also show to what extent exercise contributes to mindfulness, and more specifically, which type of exercise program (if any) has the greater effect on mindfulness.

By recording the frequency and level of exercise of subjects (e.g. how many times per week subjects participate in a particular exercise program and for how long), it will be possible to identify a correlation between frequency and the extent to which stress levels and mindfulness are affected. The purpose of this is to try to isolate either a minimum or maximum level and frequency of exercise necessary to produce a change in stress levels and mindfulness. It will also be possible to determine which type of exercise program, if any, will produce the most significant changes in stress levels and mindfulness in the shortest amount of time. For example, in previous meta-analyses it was found that greater effects of exercise on anxiety are evident when the aerobic training program is at least 10 weeks long and preferably greater than 15 weeks long ( Landers & Petruzzello, 1994) . In this study, participants will be surveyed only once and so the data collected will represent a “snap shot” of the measures to be collected. This may lead to the need to conduct more in- depth longitudinal research in the future.

As there has not been a large amount of research measuring how traditional exercise differs from mind-body exercise in terms of their effects on stress and mindfulness, there may be other trends that could be highlighted through a study such as this.

A study of this type could be beneficial in identifying the most effective type of exercise for the reduction and management of stress. Exercise has been proposed as an alternative to or to be used in conjunction with more traditional approaches for treating depression ( Hales & Travis, 1987; Martinsen, 1987, 1990 )

Traditional approaches being psychotherapy, pharmaceutical intervention, and stress management techniques. In comparison to these, exercise is more cost effective, can be enjoyable and also has additional benefits for physical health and fitness. The benefit of this study is that it could highlight the effectiveness of one form of exercise program over another. The results therefore could have implications for health care professionals, those who suffer from anxiety or stress, those within the fitness industry, the medical field and be extremely beneficial in the field of Health Psychology, not to mention the world of employment where millions of Euros are spent each year in employee absence due to work related stress and stress related illness. Increased awareness of the benefits of one program over another would be invaluable.

Therefore the hypothesis that will be tested with this study is that non-traditional mind-body exercise such as yoga and Pilates will result in lower levels of stress in individuals than traditional aerobic and anaerobic exercise will.

To test this hypothesis, three groups of thirty participants will be surveyed. The three groups will be chosen as follows; those who participate in programs consisting of traditional exercise, those who participate in mind-body exercise and a control group of those who do not participate in any type of physical activity.

## **2. Methodology**

This research was a between groups cross sectional survey. It was a quantitative design using purposive sampling. This research project used Independent t-tests to test the null hypothesis, and correlation to identify similarities of measures.

Non psychological data was obtained using questions designed by the author in the form of a demographic questionnaire. Data on gender, age, type of exercise performed, total time per session and total time per week was collected.

The exercise types listed were yoga, pilates, running, spinning classes, gym workouts, organised sports, and walking. The participants could choose between 0 times per week up to and including 7 times per week to indicate how often they performed each type of exercise for.

The options to indicate time spent in total exercising per week ranged from 0 minutes up to 7 hours or more per week.

There were three measures used in obtaining the psychological data needed. These were the 14 question Perceived Stress Scale (Cohen et al, 1983), the 15 item Mindful Attention Awareness Scale (Brown & Ryan, 2003), and the 48 question Eysenck Personality Questionnaire (Eysenck & Eysenck, 1992).

## **2.1 Materials**

The materials used were pen and paper questionnaires. Participants completed a questionnaire with a total of one hundred and twelve questions. These questions included demographic details such as age and gender. They also included specific questions on exercise habits, frequency and type of exercise chosen. More specifically, there were lists of the most common forms of exercise along with pilates and yoga columns, and participants were asked to circle the form of exercise they participated in, and to indicate how many times per week they did so for each form of exercise they circled.

There were also options given for those who did no exercise to indicate this, and if they participated in a form of exercise that did not appear on the given list they were invited to write down what that may be and how often they did so.

After which, participants were asked to indicate how many hours of exercise per week they felt that they did in total.

Along with this information, the author combined three additional questionnaires which are recognised to be valid and reliable. These were the Perceived Stress Scale ( PSS- 14) , the Eysenck Personality Questionnaire ( 48 question) , and the Mindful Attention Awareness Scale.

## **2.2 Measures**

These measures were chosen for the validity and reliability, and also to measure levels of perceived stress and mean levels of mindfulness across participants in differing types of exercise and those who do not exercise at all. The measures are easily understood and posed no problem in terms of comprehension among the groups surveyed.

The Eysenck Personality Questionnaire comprised of 48 questions, to be marked yes or no in answer to statements regarding issues such as irritability, mood, views on social perceptions and social interactions. It is used to measure levels of psychoticism, neuroticism and extraversion/ introversion. The purpose of recording this data was to determine if any connection existed between personality types and type of exercise preferred by individuals.

The PSS- 14 was used to measure levels of perceived stress in individuals, and to determine if there are correlations between perceived stress and type of exercise that individuals participate in. It was also used to determine if there is a correlation between low levels to no exercise and higher levels of stress.

The PSS was graded on a likert scale over 14 questions, asking questions relating to how effectively the participants feel that they have coped with upset, life irritations and hassles in the last month. The answers labelled 0 to 4 ranged from “ never” to “ very often”.

The MAAS is a 39 question survey also measured using a likert scale ranging from “never or very rarely true” to “ very often or always true” . Mindfulness is the trait of being aware of or paying close attention to ones present situation and surroundings. This survey was used to measure levels of mindfulness in participants, with a view to comparing levels of mindfulness across groups of exercisers, including yoga and pilates groups and non exercisers.

The three surveys along with demographic information and the survey designed by the author to measure levels and types of exercise were combined into one questionnaire. The total number of questions was 112 and took between 10 – 15 minutes to complete. Instructions were included on how to complete each section, and the key codes were added to the top of each page in order to more easily facilitate completion.

## **2.3 Participants**

The participants chosen for this research project were chosen using purposive sampling. The author had direct access to the pilates and yoga group and the traditional cardio exercisers group. The base line group of non exercisers were chosen using purposive sampling ( hand picked using the authors knowledge of their exercise patterns ) and using random sampling from the general public in order to gain a sufficient number of participants for this group.

Participants totalled ( N= 70 ) and were made up of base line non exercisers ( n =18 ), Pilates and yoga exercisers ( n= 24 ) and traditional cardio exercisers ( n= 28). The pilates and yoga group could be further broken down as follows ; pilates ( n=10) and yoga ( n= 14).

The ages of participants ranged from 18 to 70. The gender breakdown was male ( n =33) and female ( n= 37).

Participants volunteered to take part in the survey, and were briefed as to the purpose of the investigation prior to starting. On completion, participants were debriefed and directed to a number of psychological support contacts relating to the issues discussed in the survey that were included on the final page of the questionnaire.

## **2.4 Possible Confounding Variables**

Given the nature of the purposive sampling used by the author, it is possible that there may be a certain level of variation in the length of time individuals may have been involved in their particular exercise of choice. For example, though the participants were asked to estimate how long they exercise per session and how long that would amount to in the space of a week, there is no way of assessing whether a member of the yoga group had been so for a number of weeks or a number of months. In this way it is difficult to gauge if any correlations are effected by longevity of the exercise programs. This was not a problem with the base line non exercisers however.

Another confounding variable could be the dominance of certain genders and age groups within the sample groups. The mean age of participants was 31 – 35, but the youngest participant was 18, with the eldest being 70.

Although the overall gender breakdown is relatively equal, males ( n= 33) to females ( n= 37), a further look into the breakdown within the groups shows that in certain groups the number of males dominates the number of females and vice versa. For

example, in the cardio group men ( n= 21) are more numerous than women ( n= 7), for pilates men (n= 2 ) whereas women (n = 8). For yoga men (n = 3) are again outnumbered by women ( n = 11). However the base line ( Non Exercisers) is slightly more even in that men ( n= 7) and women (n= 11).

## **2.5 Design**

The research in this project was conducted using three psychological measures, the Eysenck Personality questionnaire to assess personality type, the Perceived Stress Scale (PSS-14) to measure levels of perceived stress and the Mindfulness Attention Awareness Scale to measure the mean levels of mindfulness per individual.

This is an experimental design. Participants are divided into three groups. The first group is to consist of non exercisers who will form the base line group for the study. Secondly, a traditional exercise group consisting of cardiovascular/ aerobic and anaerobic exercisers will be surveyed. And finally the third group will consist of non traditional mind/ body exerciser which can be broken into two sub- groups: pilates and yoga.

The dependent ( criterion) variables to be used are total perceived stress, mean levels of mindfulness and also but to a lesser extent, personality tendencies such as neuroticism and extroversion/ introversion.

The independent ( predictor) variables will be age, gender, exercise type, exercise frequency and total exercise time per week.

Independent t- tests will be carried out between dependent and independent variables to test the null hypothesis and highlight significant differences.

In order to test the strength and direction of any relationship which may exist, a number of correlation analyses will be conducted among variations of dependent and independent variables.

## **2.6 Procedure**

Participants for this research project were selected using purposive sampling due to the fact that the author was looking for participants with specific exercise patterns, or in the case of the base line group, those who specifically did not exercise. However, as it was difficult to isolate as many non exercisers as were needed for the survey, some random sampling was used for this group whereby people were randomly invited to complete the questionnaire and those who fit the criteria for the base line group were then selected.

The traditional cardio exercise group were selected from a rugby club in Carlow along with gym members in a gym in Carlow Town. The Yoga group that was surveyed was from a regular group in Naas, Co. Kildare.

In each instance, the participants ( N=70) were given a questionnaire comprised of 12 demographic questions along with the previously mentioned psychological measures. The yoga, pilates and cardio groups were asked to complete there surveys following

their exercise sessions. They were briefed before beginning the surveys as to what the study was about, and also told that it would take roughly 10 to 15 minutes to complete.

As the base line group were hand picked as mentioned, they were given the surveys and briefed before being allowed to take them away to fill out and return. In order to protect anonymity, surveys were placed into a folder by the participants in any order they chose so as to ensure the author was unable to trace a survey back to a particular participant.

In relation to the remainder of the base- line group which were chosen from random sampling, these random samples were taken from final year Psychology student in Dublin Business School. Again, participants were told to place their own surveys randomly into a group of other surveys in a folder in order to ensure anonymity.

In addition to being briefed as to the purpose of the study and the length of time needed to complete the questionnaires, participants were also advised of their right to withdraw from the study at any time without any ramifications. Following completion of the survey, participants were debriefed and directed to the list of contact numbers on the last page of the handout which included agencies set up to deal with issues touched on in the main body of the questionnaire.

## **2.7 Data Analysis**

The statistical analysis used in the interpretation of the data was parametric testing and descriptive statistics. An independent samples t test was used to determine if there is a significant difference in the levels of stress between participants, and also levels of mindfulness.

To determine the correlational values, the author used a pearsons correlational coefficient.

### **3. Results**

*Table 1.* Descriptive statistics and correlations for all continuous variables (N= 70).

	<b>Mean</b>	<b>SD</b>	<b>N</b>
<b>Mindfulness</b>	2.8312	.45786	70
<b>Perceived Stress</b>	28.9571	4.69485	70
<b>Neuroticism</b>	5.7429	3.19731	70
<b>Extra/Introversion</b>	7.7286	3.18930	70
<b>Psychoticism</b>	3.1739	2.26194	70

### **3.1 Independent samples t- tests:**

The Relationship between Gender and Mindfulness/ Perceived Stress:

*Table 2*

<b>Gender</b>	<b><u>N</u></b>	<b><u>Mean</u></b>	<b><u>SD</u></b>	<b><u>DF</u></b>	<b><u>T</u></b> <b><u>value</u></b>	<b><u>Sig-</u></b> <b><u>one</u></b> <b><u>tailed</u></b>
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<b>Mean Mindfulness: male</b>	33	2.66	.484	68	- 3.116	***
<b>female</b>	37	2.98	.377			0.001
<b>Perceived Stress: male</b>	33	28.18	4.482	68	- 1.312	0.09
<b>female</b>	37	29.64	4.831			

\* p < 0.05 \*\*p < 0.01 \*\*\*p < 0.001

There is a significant difference in levels of mindfulness between men (m= 2.66, sd= .484) and women, with women showing higher levels of mean mindfulness ( m= 2.98, sd= .377), (t= - 3.116, df= 68, p = .001 1- tailed ).

There is no significant difference in perceived stress levels between men (m= 28.18, sd= 4.482) and women ( m= 29.64, sd = 4.831), (t= -1.312, df= 68, p = 0.09 1-tailed).

The Relationship between Yoga and Mindfulness:

Table 3.

<b>Yoga</b>	<b><u>N</u></b>	<b><u>Mean</u></b>	<b><u>SD</u></b>	<b><u>DF</u></b>	<b><u>T</u></b>	<b><u>Sig- one</u></b>
					<b><u>value</u></b>	<b><u>tailed</u></b>

<b>Mean Mindfulness:</b>	<b>No Yoga</b>	52	2.74	.442	60	- 2.90	**0.002
	<b>Yoga once a week</b>	10	3.18	.458			
<b>Mean Mindfulness:</b>	<b>No Yoga</b>	52	2.74	.442	60	- 2.977	**0.002
	<b>Once a week or more</b>	18	3.09	.407			

\* p < 0.05    \*\*p < 0.01    \*\*\*p < 0.001

Results for significance testing for both groups shows that there is a significant difference in levels of mindfulness between those who do not do yoga (m = 2.74, sd= .442) and those who do yoga only once a week ( m= 3.18, sd= .458), ( t= -2.90, df= 60, p = 0.002, 1-tailed) , and those who never do yoga (m= 2.74, sd= .442) versus those who do yoga more than once a week (m= 3.09, sd= .407), ( t = -2.97, df= 60, p= 0.002, 1-tailed).

#### The Relationship between Yoga and Perceived Stress:

*Table 4.*

<b>Yoga</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>DF</b>	<b>T value</b>	<b>Sig- one tailed</b>	
<b>Perceived Stress:</b>	<b>No Yoga</b>	52	28.09	4.32	68	- 2.72	**0.004
	<b>Once a week or more</b>	18	31.44	4.94			

\* p < 0.05    \*\*p < 0.01    \*\*\*p < 0.001

There was a significant difference in levels of perceived stress between those who never do yoga (m= 28.09, sd= 4.32) and those who do yoga one or more times per week (m= 31.44, sd= 4.94), ( t= -2.72, df= 68, p = .004, 1- tailed).

The Relationship between Pilates and Mindfulness:

Table 5.

<b>Pilates</b>		<b><u>N</u></b>	<b><u>Mean</u></b>	<b><u>SD</u></b>	<b><u>DF</u></b>	<b><u>T</u></b>	<b><u>Sig- one</u></b>
						<b><u>value</u></b>	<b><u>tailed</u></b>
<b>Mindfulness:</b>	<b>No Pilates</b>	58	2.77	.423	68	- 2.55	**0.006
	<b>Once a week or more</b>	12	3.12	.517			

\* p < 0.05 \*\*p < 0.01 \*\*\*p < 0.001

There is a significant difference in levels of mindfulness between those who never practice pilates (m= 2.77, sd= .423) and those who do it once or more per wk (m= 3.12, sd= .517), ( t= -2.55, df = 68, p= .006,1- tailed).

The Relationship between Pilates and Perceived Stress:

Table 6.

<b>Pilates</b>		<b><u>N</u></b>	<b><u>Mean</u></b>	<b><u>SD</u></b>	<b><u>DF</u></b>	<b><u>T</u></b>	<b><u>Sig- one</u></b>
						<b><u>value</u></b>	<b><u>tailed</u></b>
<b>Perceived Stress:</b>	<b>No Pilates</b>	58	28.81	4.27	68	- .572	0.284
	<b>Once a week or more</b>	12	29.66	6.55			

\* p < 0.05 \*\*p < 0.01 \*\*\*p < 0.001

There does not appear to be any difference in levels of perceived stress between those who do not do pilates ( m= 28.81, sd= 4.27) and those who do pilates one or more times per week ( m= 29.66, sd= 6.55), ( t= -.572, df = 68, p = 0.284,1- tailed).

The Relationship between Organised Sport, Mindfulness and Perceived Stress:

Although each of the exercise type variables were analysed ( running, spinning classes, gym workouts) , only those who said that they participated in organised sport showed any significant difference in levels of perceived stress and mindfulness than those who did not.

Table 7.

<b>Organised Sport</b>		<b><u>N</u></b>	<b><u>Mean</u></b>	<b><u>SD</u></b>	<b><u>DF</u></b>	<b><u>T value</u></b>	<b><u>Sig- one tailed</u></b>
<b>Mean Mindfulness:</b>	<b>No Sport</b>	49	2.93	.410	68	2.90	**0.002
	<b>Once a week or more</b>	21	2.59	.484			
<b>Perceived Stress:</b>	<b>No Sport</b>	49	29.63	4.68	68	1.87	*0.03
	<b>Once a week or more</b>	21	27.38	4.43			

\* p < 0.05 \*\*p < 0.01 \*\*\*p < 0.001

There is a significant difference in levels of mean mindfulness between those who do not participate in organised sports (m= 2.93, sd= .410) compared with those who do participate once or more per week (m= 2.59, sd= .484), ( t= 2.90, df= 68, p = .002, 1-tailed).

There is also a significant difference in levels of perceived stress between those who do no sport (m= 29.63, sd= 4.68) and those who do sport once or more a week ( m= 27.38, sd= 4.43) ( t= 1.87, df= 68, p = .03, 1- tailed).

The Relationship between Cardiovascular exercise and Mindfulness:

To determine if all of the exercise variables combined (excluding the yoga and pilates groups) would result in a statistically significant difference in levels of perceived stress and mindfulness a group labelled “Cardio” was set up. This group consists of all those who participate in one or more of the following exercise types: running, spinning classes, gym workouts and organised sports.

Table 8.

<b>Cardio</b>		<b><u>N</u></b>	<b><u>Mean</u></b>	<b><u>SD</u></b>	<b><u>DF</u></b>	<b><u>T</u></b> <b><u>value</u></b>	<b><u>Sig- one</u></b> <b><u>tailed</u></b>
<b>Mean Mindfulness:</b>	<b>No Cardio</b>	29	2.89	.381	68	1.04	0.14
	<b>Once a week or more</b>	41	2.78	.504			
<b>Perceived Stress:</b>	<b>No Cardio</b>	29	29.03	3.80	68	.115	.454
	<b>Once a week or more</b>	41	28.90	.504			

\* p < 0.05 \*\*p < 0.01 \*\*\*p < 0.001

There was no significant difference in levels of mindfulness between those who did no cardiovascular exercise (m= 2.89, sd= .381) and those who did so once or more per week ( m= 2.78, sd= .504), ( t= 1.04, df = 68, p = 0.14, 1-tailed).

There was similarly no statistical difference in levels of perceived stress in those who did not perform cardiovascular exercise (m= 29.03, sd= 3.80) and those who did (m= 28.90, sd= .504), ( t= .115, df= 68, p = .454,1-tailed).

#### The Relationship between Yoga/ Pilates combined and Mindfulness:

To determine if both yoga and pilates combined as the total of the mind- body exercise types would show a statistical significant difference in levels of perceived

stress and mindfulness they were both added to a group labelled “Yoga\_pilates” and this group represents those who do yoga or pilates, or both.

Table 9.

<b>Yoga_pilates</b>	<b><u>N</u></b>	<b><u>Mean</u></b>	<b><u>SD</u></b>	<b><u>DF</u></b>	<b><u>T</u> <u>value</u></b>	<b><u>Sig- one</u> <u>tailed</u></b>
<b>Mean Mindfulness: No Yoga_pilates</b>	43	2.67	.429	68	- 3.948	***0.000
<b>Once a week or more</b>	27	3.07	.393			
<b>Perceived Stress: No Yoga_pilates</b>	43	28.25	4.56	68	- 1.59	.057
<b>Once a week or more</b>	27	30.07	4.76			

\* p < 0.05 \*\*p < 0.01 \*\*\*p < 0.00

There was a significant difference in mean mindfulness in that those who do either yoga or pilates or both at least once or more a week (m= 3.07, sd= .393) reported significantly higher levels of mindfulness than those who didn't (m= 2.67, sd=.429), ( t= - 3.94, df= 68, p = .000, 1-tailed).

There was no significant difference in mean levels of perceived stress between those who did no yoga or pilates ( m= 28.25, sd= 4.56) and those who did ( m= 30.07, sd= 4.76), ( t= - 1.59, df = 68, p = .057,1-tailed).

The Relationship between Total exercise and Mindfulness/ Perceived Stress:

The following table shows the mean levels of mindfulness and perceived stress of those who do either cardio or yoga or pilates, or a combination of two or more of

them against those who do neither yoga, pilates or cardio exercise. It has been labelled “total exercise” to denote that it includes all exercise variables of both a traditional cardiovascular nature and a mind- body nature.

*Table 10.*

<b>Total exercise</b>		<b><u>N</u></b>	<b><u>Mean</u></b>	<b><u>SD</u></b>	<b><u>DF</u></b>	<b><u>T</u></b>	<b><u>Sig- one tailed</u></b>
						<b><u>value</u></b>	
<b>Mean Mindfulness:</b>	<b>No exercise</b>	53	2.76	.444	68	- 2.36	**0.01
	<b>Once a week or more</b>	17	3.05	.440			
<b>Perceived Stress:</b>	<b>No exercise</b>	53	28.66	4.43	68	.933	.177
	<b>Once a week or more</b>	17	29.88	5.47			

\* p < 0.05 \*\*p < 0.01 \*\*\*p < 0.001

There is a significant difference in mean mindfulness between those who participate in any of the types of exercise investigated ( m=3.05, sd= .440) and those who do not (m= 2.76, sd= .444),(t = -2.36, df = 68. p = 0.01,1- tailed).

There was no significant difference in levels of perceived stress however between the group who participated in cardio exercise (m= 29.88, sd= 5.47) and those who did not ( m= 28.66, sd= 4.43), ( t= .933, df = 68, p = .177,1-tailed).

### **3.2 Correlations:**

Mindfulness and Perceived Stress:

*Table 11.*

<u>Mindfulness</u>	<u>Perceived Stress</u>
<b>Pearsons Correlation</b>	***. 430
<b>Sig 2</b>	.000
<b>N</b>	70

\* p < 0.05   \*\*p < 0.01   \*\*\*p < 0.001

There is a medium positive correlation between levels of mindfulness and levels of perceived stress ( r = .430, df = 68, p = 0.000).

Mindfulness and Personality:

*Table 12.*

<u>Mindfulness</u>	<u>Neuroticism</u>	<u>Psychoticism</u>
<b>Pearsons Correlation</b>	*-.205	*.205
<b>Sig 1 tailed</b>	.046	.044
<b>N</b>	70	70

\* p < 0.05   \*\*p < 0.01   \*\*\*p < 0.001

There is a small negative correlation between mindfulness and neuroticism ( r= -.205, df = 68, p = .046 one tailed).

There is also a small positive correlation between mindfulness and psychoticism ( r = .205, df = 68, p = .044 one tailed).

The other aspect of personality that was tested was Extraversion/ Intraversion, but this did not produce any statistically significant results.

Perceived Stress and Personality:

Table 13.

<u>Perceived Stress</u>	<u>Psychoticism</u>
<b>Pearsons Correlation</b>	*- .260
<b>Sig 2</b>	.031
<b>N</b>	70

\* p < 0.05 \*\*p < 0.01 \*\*\*p < 0.001

There is a small negative correlation between perceived stress and psychoticism (  $r = -.260$ ,  $df = 70$ ,  $p = .031$ ). Other aspects of personality such as neuroticism and Extraversion/ Intraversion were also assessed and no statistical relationship was found.

## 4. Discussion

The aim of this study was to investigate whether participation in mind- body exercise results in lower levels of stress than cardiovascular exercise due to its relaxation properties. It was also part of the aim to determine whether or not mind- body exercise would result in higher levels of mindfulness than other types of exercise, and if so, to what extent.

It has been reported that yoga promotes relaxation, and that relaxation can help to mute the effects of stress on the immune system ( Kiecolt- Glaser, 1985, as cited in Taylor, 2009, p370). Schure et al ( 2008) found that yoga can lead to “ positive physical, emotional, mental and spiritual changes. Caldwell et al (2010) reported that yoga and other movement based programmes led to increased mindfulness, which in turn led to positive changes in mood and perceived stress. In this study, it was found that those who participated in yoga programs once a week or more had significantly higher levels of mindfulness than those who didn't. However, as mindfulness increased, perceived stress levels also increased ( $p = 0.004$ ). This is in conflict with the belief that yoga reduces anxiety and overall psychological distress ( Shapiro et al, 1998), and that stress management interventions that include relaxation produce the most consistent benefits ( Miller & Cohen, 2001, as cited in Taylor, 2009, p371). Granath et al ( 2006) reported that yoga was a viable alternative to cognitive behavioural therapy as a form of stress management. The findings of this study seem to confirm that yoga increases mindfulness, but the fact that in this case stress levels increased rather than decreased seems to dispute previous findings.

Previous research found that Pilates programmes are an effective mode of exercise to “improve mental parameters” and also that it helps to improve overall mood (Caldwell et al, 2009). The results of statistical analysis confirmed that among the participants of this study, levels of mindfulness did indeed go up significantly in those who participate in pilates programmes in comparison with those who didn’t, but again the data showed no reduction in perceived stress levels. There was no significant difference in levels of perceived stress between those who did pilates and those who did not. Previous studies have established that high levels of mindfulness can be a predictor of reduced levels of stress. One study found that “higher trait mindfulness was found to predict lower emotional stress responses” (Barnes, Brown, Krusemark, Campbell & Rogge, 2007). Brown (2003) found decreases in mood disturbance and stress following mindfulness interventions, and Garland (2009) also found declines in stress levels after mindfulness interventions. This research is at odds with the findings of the current study which show that although yoga increases mindfulness, stress levels have not been shown to decrease in tandem.

When the yoga and pilates groups were combined and analysed as one complete group, the results showed that there was a significant increase in levels of mindfulness compared to the control group, which is in agreement with previous research.

Analysis of the perceived stress levels of this combined group however again showed no significant difference in levels of perceived stress between the combined mind body group and the control group.

Analysis of the relationship between organised sports and mindfulness shows that those who participate in organised sports one or more times a week show significant

decreases in levels of mindfulness, and also significantly decreased levels of stress. This concurs with the previous research which showed that exercise is significantly related to a reduction in anxiety and stress ( Landers, 1999). Landers & Petruzello (1994) also concluded that physical activity and fitness was positively related to a reduction in stress levels following exercise.

The combined group of cardiovascular exercisers showed no significant differences in either levels of mindfulness or perceived stress between those who were part of the cardiovascular exercisers group and those who weren't. The cardio group consists of those who are involved in any type of exercise listed that could be considered cardiovascular as opposed to mind body. Although there is a slight reduction in stress, it was not statistically significant. The lack of significance is at odds with the current research cited above, and also with the findings of this study with relation to the analysis of the organised sports group. The fact that those who participate in organised sports experienced a significant reduction in levels of perceived stress and those who participated in all other cardiovascular exercise types listed did not may indicate that further research is needed in this area.

When all exercise groups were combined, i.e. pilates and yoga along with all cardiovascular exercise, it was found that levels of mindfulness were higher in this group compared to levels of mindfulness in those who do no exercise whatsoever. Although there was a slight increase in levels of perceived stress, it was not enough to be statistically significant. In response to the fact that stress levels showed an increase in some cases where mindfulness increased, instead of showing a decrease as previous research would suggest, a Pearsons r correlation was employed to indicate what the

relationship between the two was and in which direction. It was found that there was a medium positive correlation between mindfulness and perceived stress. As this is in stark contrast with the findings of studies detailed above, this area would warrant further research into the relationship between mindfulness and perceived stress.

Personality was also one of the variables tested in this research project. Using the EPQ the author aimed to determine what, if any was the relationship between personality type and mindfulness and stress levels. Segerstrom et al ( 1998) reports that optimism and active coping strategies were protective against stress, and those with high negative affectivity are more vulnerable to stress ( Van Eck et al, 1996). This would seem to indicate that those who scored high on neuroticism in the EPQ would have lower levels of mindfulness and higher levels of stress. The findings of this study show that there is indeed a small negative correlation between neuroticism and mindfulness, whereby as mindfulness increased neuroticism decreased. However this study did not find any correlation between neurotic personality types and levels of perceived stress. Correlational analysis of personality types also found that there is a small negative correlation between levels of perceived stress and psychoticism. Those who scored high on perceived stress scored low for psychoticism on the EPQ and vice versa. Interestingly, an analysis of the relationship between mindfulness and psychoticism showed a small positive correlation. The data showed no relationship between extraversion/ introversion and levels of mindfulness or perceived stress.

When gender was examined in relation to levels of mindfulness and perceived stress, it was found that women scored significantly higher in measures of mindfulness than

men did. Women also showed slightly higher mean stress than men did but it was not enough to show a significant statistical difference.

The main hypothesis of this research projects was that mind body exercise such as yoga and pilates would result in lower levels of stress than individuals who participate in cardiovascular exercise. The results show that levels of perceived stress were actually higher in those who did yoga in comparison with those who did not. Stress levels did not show a significant difference in the pilates group either, meaning that pilates neither raised nor lowered levels of stress in individuals.

In relation to cardiovascular exercise, we can determine from the findings that organised sport results in a significantly lower levels of perceived stress compared to those who do not do organised sport. The combined cardio group showed a slight reduction in levels of perceived stress against those who do not do cardio exercise but it is not statistically significant. When we look at the mind body groups of yoga and pilates and combine them we can determine that members of the combined Yoga\_pilates group did not experience lower levels of perceived stress than their counterparts.

Using this data we can then conclude that the organised sports group were the group which experienced the most significant difference in levels of perceived stress. Those who were part of the yoga group actually experienced higher levels of perceived stress rather than lower levels, and so using this data we can reject the hypothesis that yoga and pilates will result in lower levels of perceived stress than cardio exercise, and accept the null hypothesis.

This study also aimed to determine which type of exercise would result in the highest levels of mindfulness. The hypothesis stated that mind body exercise ( yoga & pilates) would result in higher levels of mindfulness than cardiovascular exercise. Mindfulness was found to be significantly higher in those who do yoga in comparison with those who did not. Mindfulness was also found to be significantly higher in those who did pilates one or more times per week compared with those who did not. When the yoga and pilates groups were combined to give the total of mind body participants, this group also showed significantly higher levels of mindfulness compared to those who did not participate in mind body exercise. In contrast, those who were in the organised sport group showed lower levels of mindfulness than their counterparts who did not participate in organised sport at all. Mindfulness did also decrease slightly in the cardio group, but it was not enough to be statistically significant. However the combined group of cardio and yoga/pilates exercisers did show higher levels of mindfulness compared to those who did no exercise whatsoever. With these results in mind we can accept the hypothesis that mind body exercise such as yoga and pilates does result in higher levels of mindfulness than cardiovascular exercise.

It was also hypothesised that personality would be shown to be a predictor of stress levels and levels of mindfulness. The data has shown that there is a negative correlation between mindfulness and neuroticism. Those who are more mindful in general are less neurotic. There is also a similar correlation between perceived stress and psychoticism. The data has shown that the higher a participant scored on the psychoticism scale the lower their levels of perceived stress were. According to the

data which shows a positive correlation, the inverse seems to be true for mindfulness and psychoticism. Based on these findings we can accept the hypothesis that personality type may be a predictor of levels of perceived stress and mindfulness.

Based on the results of an independent t- test, it was found that women have significantly higher levels of mindfulness than men. Based on this information we can accept the hypothesis that gender is a predictor of mindfulness.

One main weakness of this research is the small group numbers. It was decided that for the purpose of this study, groups should consist of no less than 30 participants each. However in practice, it was more difficult to obtain participants than originally thought. A significant amount of time was spent trying to locate a yoga group who were willing to fill out surveys for the study. Due to the sparsity of these groups in the authors local area, the total of the yoga group was just 14 ( $n = 14$ ) as opposed to 15, i.e. half of the 30 participants needed to populate the mind body group. There was some overlap between groups though where participants who were sourced as part of one group could also be counted as members of other groups simultaneously. For example, a participant may be part of the cardio group but also record that they do (n=10) which was less than the 15 participants needed to make sure that the yoga and pilates groups were even and therefore a representative sample. There was no problem in sourcing participants for the cardio group ( $n= 28$ ), but it was more difficult to populate the control group of non exercisers. For this, participants were selected specifically by virtue of the fact that they didn't exercise at all. Gathering this information can sometimes be a sensitive issue, especially if exercise is already an issue for the participant, it may be insulting or add to stress levels if a participant

feels that the criteria which led to their inclusion in a group reflects negatively on their self image. This control group was also smaller than had been originally planned (n= 18).

So the total N =70, instead of a projected 90. A larger sample would be needed if further research is to be conducted in this area as the uneven, and in some cases, small group sizes could have an impact on the overall results.

Another weakness of the study may have been the gender breakdown. As gender was used as a predictor of personality type, it may have been more representative of the general population if the gender breakdown had been more even. Also, as the data shows a significant difference between levels of mindfulness between men and women, and more women than men were part of the mind body group, this may have had an impact on the levels of mindfulness in these mind body groups for reasons other than that increased mindfulness being a result of the movement based techniques. In the mind body group, the gender breakdown is as follows, men (n= 5) and women (n= 19). This is unbalanced, and the author feels that further research may benefit from a more balanced gender sample, especially since gender is a predictor of mindfulness. The control group of non exercisers was more balance, with slightly more female than male participants, but the cardio group was not proportionally representative. Men (n= 21) outnumbered women (n= 7) significantly. This could be considered a weakness of the study since gender has been shown to be a predictor of mindfulness, this could influence the direction of any correlations. If this study is to be expanded in the future, groups should be more balanced in terms of gender.

One final point that may be considered a weakness of this study is that the measurements of perceived stress and mindfulness were both self report measures. Self report measures require the participant to be completely honest when filling out the survey, and in some cases due to time constraints when collecting data either before or after classes or training sessions, the participant has the potential to rush completion of the questionnaire which may lead to inaccurate or conflicting information. One way to avoid this would be to implement other measures of stress and mindfulness in subsequent versions of this study. For example, instead of a pen and paper questionnaire technique, the author could study levels of stress hormones such as Cortisol in saliva swabs, or measure autonomic arousal such as skin conductance and heart rate. Perceived stress, as previously mentioned depends both on the individual and on the context. It is possible that during the course of this study, participants who may have simply had a “bad day” may have filled out their questionnaire accordingly, but this may not be representative of their general countenance. Physiological testing however cannot lie. Another possible solution to this problem could be to use longitudinal measures to record data on stress levels and levels of mindfulness. Physical exercise is most beneficial when the program is undertaken for a minimum of ten weeks and preferably longer than fifteen weeks ( Landers & Petruzzello, 1994). In the study by Schure et al (2008) the hatha yoga programme that participants were involved in was fifteen weeks long and the study itself was undertaken over a four year period. This type of longitudinal approach may yield more substantial results as it would eliminate the type of bias that can arise from recording a once of “snap shot” of participants perceived stress on a particular day.

Continuing along the same lines, it may be a requirement of further research to fine tune the section of this study which documents the exercise habits of participants and more specifically the frequency and duration of exercise. A minor aspect which may influence the overall results of this study was noticed by the author and this was that people tend to over- estimate the amount of exercise they do on a weekly basis. This was a feature of the control group of non exercisers, some of whom were asked prior to completion of the survey if they did any exercise on a regular basis. Those who said no were asked to complete the survey as honestly as they could. In entering the data it was found that a portion of those who were included as part of the control group specifically because they had no regular exercise routine had filled out the survey to give information to the contrary. If further research into this area is to be undertaken, it would be interesting to delve deeper into this phenomenon i.e. why people could admit that they had no exercise routine prior to being surveyed, and yet filled out information on their surveys which did not correspond to this statement. One possible way to avoid discrepancies such as these would be to record data using a longitudinal approach and supervising exercise sessions. A predetermined and specific exercise programme would ensure that the variables of frequency and duration of exercise could then be strictly controlled and monitored.

This research has possible implications in the area of stress management. If these findings can be replicated, it would mean that as organised sports resulted in lower stress levels and yoga did not then organised sports, or exercise of this type would be a more effective tool in stress management than mind body exercise is. Yoga and pilates however do result in higher levels of mindfulness, and mindfulness in itself has been reported to lessen the effects of stress on the immune system ( Kiecolt-Glaser et

al., 1985, as cited in Taylor, 2009, p370). Therefore Yoga or Pilates could be used as viable alternatives to cognitive behavioural therapy.

This information could conceivably be used in many different settings. For example, in organisational psychology, team sports could possibly be introduced to help to improve employee moral and overall mood. Some companies are already providing yoga and pilates programs for employees within a work setting.

Further research into the gender aspect of this study could give clues as to whether women really do have higher levels of mindfulness than men. If so is this because the majority of the mind body group were female and the majority of the cardio group were male, and if this is the case, do specific exercise types have differing effects on stress and mindfulness across genders. The implications for health psychology in promoting well being are endless.

In Conclusion, it was found that although mind body exercise did result in higher levels of mindfulness than traditional cardiovascular exercise did, it did not result in lower levels of perceived stress. Therefore we must reject the hypothesis in this case and accept the null hypothesis.

## REFERENCES:

Brown, K. W. & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in Psychological well-being. *Journal of Personality and Social Psychology*, 84, 822 -848. DOI: 10.1037/0022-3514.84.4.822.

Caldwell, K., Harrison, M., Adams, M. & Triplett, T., (2009). Effects of Pilates and Taiji quan training on self-efficacy, sleep quality, mood, and physical performance of college students. *Journal of body-work and movement therapies*, Vol 13, Issue 2.  
<http://dx.org/10.1016/j.jbmt.2007.12.001>

Caldwell, K., Harrison, M., Adams, M., Quin, R., Greeson, J., (2010). Developing Mindfulness in College Students through Movement- Based Courses. *Journal of American College Health*, Vol 58, Issue 5.  
DOI: 10.1080/07448480903540481

Calfas, K.J., & Taylor, W.C. (1994). Effects of Physical Activity on Psychological Variables in Adolescents. *Pediatric Exercise Science*, 6, 406-423.

Cohen, S., Kamarck, T., & Mermestein, R. (1983). A Global Measure of Perceived Stress, *Journal of health and Social Behaviour*, 24, 385- 96.

Eysenck, H. J. & Eysenck, S.B.G. (1975) *Manual of the Eysenck Personality Questionnaire*. London. Hodder and Stoughton.

Garland, E. (2009). The Role of Mindfulness in Positive Reappraisal. *Explore-The Journal of Science and Healing*. Vol 5, 1, 37-44.  
DOI: 10.1016./j.explore.2008.10.001.

Germer, C. (2005). *Mindfulness and Psychotherapy*. New York. Guilford Publications.

Granath, J., Ingvarsson, S., von Thiele, U., & Lundberg, U. (2006). Stress Management; a Randomized Study of Cognitive Behavioural Therapy and Yoga. *Cognitive Behavioural Therapy*, Vol 35, Issue 1.  
DOI: 10.1080/16506070500401292

Hales, R., & Travis, T.W., (1987). Exercise as a treatment option for anxiety & depressive disorders. *Military Medicine*, 152, 299-302.

Kirkwood, G., Rampese, H., Tuffrey, V., Richardson, J. & Pilkington, K. (2005).

Yoga for Anxiety: A systematic review of the research evidence. *British Journal of Sports Medicine*. 39 (12), 884-91.

DOI: 10.1136/bjism.2005.018069

Landers, Daniel M. (1999). The Influence of Exercise on Mental Health. Series 2, No 12, PCPPFS Research Digest .

Landers, D.M., Petruzello, S.J. (1994). *Physical Activity, Fitness and Anxiety*. Champaign, Illinois. Human Kinetics Publisher.

Lazarus (1998). *Fifty Years of the Research & Theory of R. S. Lazarus*. New Jersey. Lawrence Erlbaum Associates.

Lazarus, R.S. & Folkman, S. (1984). *Stress and Coping*. New York. Springer Publishing.

Martinsen, E.W., (1987). The role of aerobic exercise in the treatment of depression. *Stress medicine*, 3, 93-100. Martinsen, E.W., (1990). Benefits of exercise for the treatment of depression. *Stress Medicine*, 9, 380- 389.

Shapiro, S., Schwartz, G.E, Bonner, G (1998). Effects of Mindfulness based stress reduction on medical & premedical students. *Journal of Behavioural Medicine*, 21, 6. DOI: 10.1023/A:1018700829825.

Taylor, S.E. (2009). *Health Psychology 7<sup>th</sup> Ed.* New York. McGraw Hill.

Van Eck, M., Berkhoff, H., Nicolson, N., & Sulon, J. ( 1996). The Effects of Perceived Stress, Traits, Mood States and Stressful Daily Events on Cortisol. *Psychosomatic Medicine*, Vol 58, 5, 447-458.

**Dear Participant,**

I am a final year Psychology student and am conducting research into the effects of exercise on levels of stress.

Please take the time to answer the questions. There is no right or wrong answer and complete anonymity is guaranteed. Your questionnaire answers will be merged with those from other people and we will not be able to trace your answers back to you, and we will not ask you to give your name or identification details. *You have the right to withdraw at any stage during the completion of this survey.*

All you have to do is complete the questionnaire, which will take about 10-15mins and just work through the questions, in each case indicating to the extent to which you feel about each of the statements.

**Thank you for your interest in attitudinal research.**

## Demographic Details

Are you (please circle):                      Male                      Female

Age \_\_\_\_\_

**What types of exercise do you participate in and how often? (Please circle):**

**None :** i.e. please circle if you have no *regular* weekly exercise routine

**Yoga:** 0 times per week    1 time per week    2 times per week    3 times per week  
4 times per week    5 times per week    6 times per week    7 times per week

**Pilates:** 0 times per week    1 time per week    2 times per week    3 times per week  
4 times per week    5 times per week    6 times per week    7 times per week

**Running:** 0 times per week    1 time per week    2 times per week    3 times per week  
4 times per week    5 times per week    6 times per week    7 times per week

**Spinning classes:** 0 times per week    1 time per week    2 times per week    3 times per week  
4 times per week    5 times per week    6 times per week    7 times per week

**Gym Workouts:** 0 times per week    1 time per week    2 times per week    3 times per week  
4 times per week    5 times per week    6 times per week    7 times per week

**Organised Sports:** 0 times per week    1 time per week    2 times per week    3 times per week  
4 times per week    5 times per week    6 times per week    7 times per week

**Walking:** 0 times per week    1 time per week    2 times per week    3 times per week  
4 times per week    5 times per week    6 times per week    7 times per week

**Other** (please specify): \_\_\_\_\_  
0 times per week    1 time per week    2 times per week    3 times per week  
4 times per week    5 times per week    6 times per week    7 times per week

**Roughly, how much time would these exercise session's total, if combined, *per week* ?** ( Please circle):

0 minutes ( if no regular exercise routine)

30 minutes or less

1 hour or less

2 hours or less

3 hours or less

- 4 hours or less
- 5 hours or less
- 6 hours or less
- 7 hours or more

**Part 1:**

**INSTRUCTIONS:** The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate.

For each question choose from the following alternatives:

**0 = never**

**1 = almost never**

**2 = sometimes**

**3 = fairly often**

**4 = very often**

1. In the last month, how often have you been upset because of something that happened unexpectedly?
2. In the last month, how often have you felt that you were unable to control the important things in your life?
3. In the last month, how often have you felt nervous and stressed?
4. In the last month, how often have you successfully dealt with irritating life hassles?
5. In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?
6. In the last month, how often have you felt confident about your ability to handle your personal problems?
7. In the last month, how often have you felt that things were going your way?
8. In the last month, how often have you found that you could not cope with all the things you had to do?

9. In the last month, how often have you been able to control irritations in your life?

10. In the last month, how often have you felt that you were on top of things?

**0 = never**

**1 = almost never**

**2 = sometimes**

**3 = fairly often**

**4 = very often**

11. In the last month, how often have you been angered because of things that happened that were outside of your control?

12. In the last month, how often have you found yourself thinking about things that you have to accomplish?

13. In the last month, how often have you been able to control the way you spend your time?

14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

**Part 2:**

**INSTRUCTIONS: PLEASE ANSWER EACH QUESTION BY PUTTING A CIRCLE AROUND “YES” OR “NO” FOLLOWING THE QUESTIONS. THERE ARE NO RIGHT OR WRONG ANSWERS, AND NO TRICK QUESTIONS. WORK QUICKLY AND DO NOT THINK TOO LONG ABOUT THE EXACT MEANING OF THE QUESTIONS.**

**PLEASE REMEMBER TO ANSWER EACH QUESTION:**

1. Does your mood often go up and down?

YES / NO

2. Do you take much notice of what people think?

YES/ NO

3. Are you a talkative person?

YES/ NO

4. If you say you will do something, do you often keep your promise no matter how inconvenient it might be?

YES/ NO

5. Do you ever feel “just miserable” for no reason?

YES/ NO

6. Would being in debt worry you?

YES/ NO

7. Are you rather lively?

YES/ NO

8. Were you ever greedy by helping yourself to more than your fair share of anything?

YES/ NO

9. Are you an irritable person?  
YES/ NO
10. Would you take drugs which may have strange or dangerous effects?  
YES/ NO
11. Do you enjoy meeting new people?  
YES/ NO
12. Have you ever blamed someone for doing something you knew was really your fault?  
YES / NO
13. Are your feelings easily hurt?  
YES/ NO
14. Do you prefer to go your own way rather than act by the rules?  
YES/ NO
15. Can you usually let yourself go and enjoy yourself at a lively party?  
YES/ NO
16. Are *all* your habits good and desirable ones?  
YES/ NO
17. Do you often feel “fed up”?  
YES/ NO
18. Do good manners and cleanliness matter much to you?  
YES/ NO
19. Do you usually take the initiative in making new friends?  
YES/ NO
20. Have you ever taken anything ( even a pin or a button) that belonged to someone else? YES/ NO
21. Would you call yourself a nervous person?  
YES/ NO
22. Do you think marriage is old fashioned and should be done away with?  
YES/ NO
23. Can you easily get some life into a rather dull party?  
YES/ NO
24. Have you ever broken or lost something belonging to someone else?  
YES/ NO
25. Are you a worrier?  
YES/ NO
26. Do you enjoy cooperating with others?  
YES/ NO
27. Do you tend to keep in the background in social situations?  
YES/ NO
28. Does it worry you if you know there are mistakes in your work?  
YES/ NO
29. Have you ever said anything bad or nasty about anyone?  
YES/ NO
30. Would you call yourself tense or “highly-strung”?  
YES/ NO
31. Do you think people spend too much time safeguarding their future with savings and insurance?  
YES/ NO
32. Do you like messing with people?  
YES/ NO

33. As a child were you ever cheeky to your parents?  
YES/ NO
34. Do you worry too long after an embarrassing experience?  
YES/ NO
35. Do you try not to be rude to people?  
YES/ NO
36. Do you like plenty of bustle and excitement around you?  
YES/ NO
37. Have you ever cheated at a game?  
YES/ NO
38. Do you suffer from “nerves”?  
YES/ NO
39. Would you like other people to be afraid of you?  
YES/ NO
40. Have you ever taken advantage of someone?  
YES/ NO
41. Are you mostly quiet when you are with other people?  
YES/ NO
42. Do you often feel lonely?  
YES/ NO
43. Is it better to follow society’s rules than go your own way?  
YES/ NO
44. Do other people think of you as being very lively?  
YES/ NO
45. Do you always practise what you preach?  
YES/ NO
46. Are you often troubled about feelings of guilt?  
YES/ NO
47. Do you sometimes put off until tomorrow what you ought to do today?  
YES/ NO
48. Can you get a party going?  
YES/ NO

PLEASE CHECK THAT YOU HAVE ANSWERED ALL THE QUESTIONS

**Part 3:**

**INSTRUCTIONS:** Please rate each of the following statements using the scale provided. Write the number in the blank that best describes your own opinion of what is generally true for you.

	1	2	3	4	5	
	Never or very		rarely	sometimes	often	very
<b>often or</b>						
	rarely true	true	true	true	true	always true

- \_\_\_\_\_ 1. When I’m walking, I deliberately notice the sensations of my body moving.
- \_\_\_\_\_ 2. I’m good at finding words to describe my feelings.
- \_\_\_\_\_ 3. I criticize myself for having irrational or inappropriate emotions.
- \_\_\_\_\_ 4. I perceive my feelings and emotions without having to react to them.

- \_\_\_\_\_ 5. When I do things, my mind wanders off and I'm easily distracted.
- \_\_\_\_\_ 6. When I take a shower or bath, I stay alert to the sensations of water on my body.
- \_\_\_\_\_ 7. I can easily put my beliefs, opinions, and expectations into words.
- \_\_\_\_\_ 8. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Never or very rarely true</b>	<b>rarely true</b>	<b>sometimes true</b>	<b>often true</b>	<b>very often or always true</b>

- \_\_\_\_\_ 9. I watch my feelings without getting lost in them.
- \_\_\_\_\_ 10. I tell myself I shouldn't be feeling the way I'm feeling.
- \_\_\_\_\_ 11. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.
- \_\_\_\_\_ 12. It's hard for me to find the words to describe what I'm thinking.
- \_\_\_\_\_ 13. I am easily distracted.
- \_\_\_\_\_ 14. I believe some of my thoughts are abnormal or bad and I shouldn't think that way.
- \_\_\_\_\_ 15. I pay attention to sensations, such as the wind in my hair or sun on my face.
- \_\_\_\_\_ 16. I have trouble thinking of the right words to express how I feel about things
- \_\_\_\_\_ 17. I make judgments about whether my thoughts are good or bad.
- \_\_\_\_\_ 18. I find it difficult to stay focused on what's happening in the present.
- \_\_\_\_\_ 19. When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it.
- \_\_\_\_\_ 20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.
- \_\_\_\_\_ 21. In difficult situations, I can pause without immediately reacting.
- \_\_\_\_\_ 22. When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words.
- \_\_\_\_\_ 23. It seems I am "running on automatic" without much awareness of what I'm doing.
- \_\_\_\_\_ 24. When I have distressing thoughts or images, I feel calm soon after.
- \_\_\_\_\_ 25. I tell myself that I shouldn't be thinking the way I'm thinking.
- \_\_\_\_\_ 26. I notice the smells and aromas of things.
- \_\_\_\_\_ 27. Even when I'm feeling terribly upset, I can find a way to put it into words.

- \_\_\_\_\_ 28. I rush through activities without being really attentive to them.
- \_\_\_\_\_ 29. When I have distressing thoughts or images I am able just to notice them without reacting.
- \_\_\_\_\_ 30. I think some of my emotions are bad or inappropriate and I shouldn't feel them.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Never or very rarely true</b>	<b>rarely true</b>	<b>sometimes true</b>	<b>often true</b>	<b>very often or always true</b>

31. I notice visual elements in art or nature, such as colours, shapes, textures, or patterns of light and shadow.
- \_\_\_\_\_ 32. My natural tendency is to put my experiences into words.
- \_\_\_\_\_ 33. When I have distressing thoughts or images, I just notice them and let them go.
- \_\_\_\_\_ 34. I do jobs or tasks automatically without being aware of what I'm doing.
- \_\_\_\_\_ 35. When I have distressing thoughts or images, I judge myself as good or bad, depending on what the thought/image is about.
- \_\_\_\_\_ 36. I pay attention to how my emotions affect my thoughts and behaviour.
- \_\_\_\_\_ 37. I can usually describe how I feel at the moment in considerable detail.
- \_\_\_\_\_ 38. I find myself doing things without paying attention.
- \_\_\_\_\_ 39. I disapprove of myself when I have irrational ideas.

**THANK YOU FOR YOUR PARTICIPATION!**

