

The influence of exercise on depression and psychological well-being
amongst students at the University of Limpopo (Turfloop Campus)

By

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Declaration

I declare that the mini-dissertation hereby submitted to the University of Limpopo, for the degree of Masters in clinical psychology and the influence of exercise and psychological well-being amongst students at the University of Limpopo (Turffloop Campus) has not previously been submitted by me for a degree at this or any other university; that is my work in design and in execution, and that all material contained herein has been duly acknowledged.

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Tshikovhele K L

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Date

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Abstract

Research using a cross-sectional survey design was conducted to determine the influence of exercise on the psychological well-being and reported rates of depression on a sample of regular exercisers and non-regular exercisers registered at the University of Limpopo (Turffloop campus). Two standardized questionnaires were used to collect data from a non-proportional quota sample of 60 (30 regular exercisers and 30 non-regular exercisers), male and female (30 females and 30 males) undergraduate students. Data were analyzed using the following statistical measures, descriptive statistics, using frequency tables and figures. The chi square test was used to find out if there were any significant relationships between the regular exercisers and non-regular exercisers and male and female participants in terms of depression and psychological well-being. Students who exercised regularly showed a positive psychological well-being while non-regular exercisers showed a more negative psychological well-being. There were no significant differences in reported feelings of depression across the male and female sample of regular and non-regular exercisers. Female regular and non-regular exercisers however, showed a more positive psychological well-being than males, this was a significant result ($p=0.001$).

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CHAPTER 1: INTRODUCTION

1.1 Introduction

In recent years prescription rates for anti-depressants medication have increased steeply. However, anti-depressants are not equally effective for all individuals. It must be noted that many individuals are reluctant to take anti-depressants for long periods, often due to their side effects, which can lead to non-compliance with medication or not seeking further treatment. Psychological therapies for example, Cognitive Behavioural Therapy (CBT), have become more widely available but there are still waiting lists for free and low cost services. Physical activity, for some individuals, is recommended as an alternative treatment approach for depression. It can be used as a stand-alone treatment approach, or in combination with medication and/or psychological therapy. It has very few side effects and does not have the stigma that is attached to taking anti-depressants or attending counselling (Kirsch et al., 2008).

In addition physical activity is available to all, has few costs attached and is an empowering approach that can support self-management. The evidence for the benefits of physical activity for depression is not however, universal (Chalder et al., 2012).

A recent review of 30 randomised controlled trials concluded that exercise improved depressive symptoms in people with a diagnosis of depression (including mild to severe clinical symptoms) when compared with no treatment or a control intervention (for example, sedentary social activity). A further review of thirteen randomised trials looked at the effect of physical activity for people diagnosed with moderate to severe depression. The effect of exercise on clinical depression was significant, but weaker than in a previous review, suggesting the effectiveness of physical activity as a treatment for depression may vary according to the severity of the depression (Krogh, Nordentoft, Sterne & Lawlor, 2011).

Researchers have also compared the effectiveness of physical activity interventions with the effectiveness of medication and psychological therapy and found similar effects. Rimer et al. (2012), summarised the findings from three trials that compared exercise with anti-depressants medication. They reported that there was no significant difference in the effect of the two treatment approaches. The authors also stated that they reviewed six trials that compared exercise with cognitive therapy as treatments for depression. The results of the study indicated that there were no significant

differences between the two interventions in terms of their impact on different levels of depression. In another review of the literature on exercise and depression, undertaken by Perraton, Kumar and Machotka (2010), it was concluded that exercise is effective when used independently and in combination with other treatments such as medication or Cognitive Behavioural Therapy (CBT). A recent study by Trivedi et al. (2011), looked at physical activity in terms of doses. They compared different doses of physical activity for people whose depression had not remitted after a course of anti-depressants medication. It was concluded that a high dose of physical activity was more effective than a low dose (28% and 15% remission rate respectively) in combating depression. The majority of published trials, which have found a positive outcome for physical activity in treating depression, have used aerobic physical activity (any activity that uses large muscle groups, can be maintained continuously, and is rhythmic in nature), which could be aerobic classes given by an instructor at a gym or aerobic activity at home, using a treadmill, for instance (Perraton et al., 2010).

Furthermore, all modes of physical activity, no matter what their location (home or gym) were found to be equally effective, although outdoor locations were not studied as these provide access to sunlight and open green spaces. It has been shown that sunlight and outdoor activity have an impact on well-being and can help reduce minimal to moderate depression. Effective intervention programmes were supervised but whether the supervisor was an exercise professional or not, did not impact on the programme's effectiveness. Both group and individual physical activity programmes were found to be equally effective in helping reduce many aspects of depression (Callaghan, Khalil, Morres & Carter, 2011).

Callaghan et al. (2011), suggests that the implications of the aforementioned research suggests that meeting public health guidelines (in most countries) for physical activity seems to offer greater benefits for health as compared to lower levels of physical activity. Individual preference about physical activity type (for instance, swimming, dancing or any sport) can and should be accommodated into physical activity programmes. The personal preferences of individuals with regard to physical activity locations, and whether they want to be active in groups or individually, should also be considered. Conversely, research also suggests that exercising at the individual's preferred intensity results in greater reductions in depression as compared to exercising at a prescribed intensity. In other words, when people are given choice and control over their physical activity, they report greater benefits to their mental health than if it is prescribed.

Blake (2012) posits that mental health problems continue to present a global challenge and contribute significantly to the burden of human disease. Depression is the most common psychiatric disorder and is thought to affect 121 million adults worldwide. It was rated as the fourth leading cause of disease burden in 2000, projected to become the highest cause of disease burden by 2020 (Moussavi et al., 2007).

According to Sadock and Sadock (2007) exercise is one of the most under recommended treatments for people with mild to moderate depression. As exercise increases serotonin levels in the brain it helps relieve mild and sometimes moderate depression. However, in practice even mild depression is often treated with medication and psychotherapy. The inclusion of suitable age appropriate fitness level exercise programmes, in the treatment approach, would allow the symptoms of depression to be combated more holistically. The depressed individual would also be able to participate more fully in his or her treatment outside of therapy, rather than being passive in this process. It must be noted that exercise should be medically appropriate. It is also not indicated in cases of severe depression (Edwards, 2006).

Edwards, Ngcobo, Edwards and Palvar (2005) compared psychological well-being and the physical self-perception of persons who regularly engage in various forms of physical activity, exercise and sport with a control group of non-exercisers. Different physical activities included health club exercisers (mainly resistance training), hockey players (a team sport), and running (a mainly aerobic exercise). Main findings were that persons engaging in regular physical activity perceived themselves as having more autonomy, personal growth, environmental mastery, purpose in life, positive relations with others, and self-acceptance and sport competence than non-exercisers. Regular exercisers also attached more importance to sport, physical conditioning, body attractiveness and strength than non-exercisers. Interestingly, hockey players (a team sport) perceived themselves as having more positive relations with others and sport competence than either health club members or runners.

Another study conducted by Bydowell (2005) investigated the impact of exercise, as a treatment option for depression and low levels of psychological well-being, over a two-month period at an institution for people diagnosed as suffering from mental illnesses. This sample had not previously exercised. Both the quantitative and qualitative results of the study showed a trend toward exercise positively affecting levels of depression in the mentally ill.

In the first decade after democracy Edwards, Ngcobo and Pillay (2004) recognised that the assessment of psychological well-being in South Africa was critical. They noted that as the country neared the celebration of its tenth year of democracy. Its people were affected by significant stressors, including high levels of crime, violence and unemployment. They concluded that the psychological well-being of young people and students in particular, is of special significance as they are the leaders of the future. Edwards et al. (2004), became interested in examining this variable in students at a historically disadvantaged university (intake composed of 98% black Africans). While complete American data were not available to permit detailed statistical comparisons, a simple percentage comparison of total psychological well-being mean scores suggested that while the American subjects perceived themselves to be 83% psychologically well (14.9 out of a possible score of 18), the South Africans perceived themselves to be 67% psychologically well (12 out of a possible score of 18). There was one significant gender difference in the American sample where women scored higher than men on the scale of positive relations with others. No differences were noted in the South African sample.

Sadock and Sadock (2007) state that the positive effect of exercise on immune system functions are well documented. These benefits extend to the cognitive and emotional realms. The positive role that physical exercise can play in the prevention and treatment of a range of medical conditions has received a great deal of attention over recent years. In addition, research has identified the long term protection that regular exercise affords against many somatic complaints, including coronary heart disease and a number of cancers and diabetes. Exercise thus improves quality of life through better physical function, reduced morbidities and improved mental health.

The relationship between exercise and psychological well-being is widely recognised as a key factor in determining personal and public health globally, with physical activity increasingly recommended as a means of addressing prevalent, debilitating psychological problems such as depression and many other physical health conditions (for instance, hypertension). Exercise, appropriately recommended also offers individuals an opportunity to play an active role in their recovery from many different illnesses (Edwards, 2004; Lawlor & Hopker, 2001; Sadock & Sadock, 2007).

The current study examined the impact of exercise on both the psychological well-being and depression levels of a sample of University of Limpopo (Turfloop campus) students. This addresses a gap in the literature, as the link between physical exercise and reported levels of depression

amongst students registered at a previously disadvantaged tertiary institution in South Africa, had not previously been investigated.

1.2 Background to the study

According to the World Health Organisation (2010) depression is the most common mental health problem in the developed world. It affects millions of people worldwide and has a high prevalence in almost every society. About 450 million people globally suffer from mental disorders. Depression is in the top twenty leading causes of mental health problems amongst all ages globally (Saraceno & Saxena, 2002). Depression not only disrupts the affected individual's emotions and their quality of life, but their role in society as a whole. If the debilitating effects of this disorder can be reduced, and the psychological well-being of the affected individual improved, this would benefit both the individual, community at large, and national health systems globally (Sadock & Sadock, 2007). Exercise has been shown to ameliorate depression, anxiety, and Post-Traumatic Stress Disorder (PTSD), improve cognitive function and self-esteem. These effects can be accounted for neuro-psychochemically, because exercise promotes the secretion of neurotransmitters such as serotonin, adrenaline and endogenous opiates (Sadock & Sadock, 2007).

Although a number of studies stress the importance of using aerobic exercise in the treatment of clinical depression, Martinsen (1993) found that the anti-depressants effects of non-aerobic exercise (a short-term, high intensity activity such as weight lifting) was equally effective. He also found that those who continued to exercise regularly, after the termination of a one year training programme, continued to have lower depression scores than those who were inactive. In addition, the individuals themselves were found to appreciate the use of exercise as a form of treatment and, as Martinsen (1993, p. 3) states ranked exercise as, "the most important element in a comprehensive treatment programmes for depression."

1.3 Research problem

The prevention of illness and the promotion of health has become the focus of much research (Edwards, Edwards & Basson, 2004). Many studies have demonstrated that exercise reduces depression, anxiety and stress and demonstrates that physical exercise impacts positively on the overall well-being of individuals (Fox, 2000; Scully, 1998; WHO, 2010). Research has taken place

at universities and national health clubs which supports the aforementioned statements (Edwards, 2003; Fox, 2000).

Exercise and its effect on reducing depression and enhancing the overall psychological and physical well-being of individuals has been the focus of research amongst different groups. For instance, Van Der Vliet et al. (2003), focused on how exercise helped reduce the incidence of depression in females. Kircaldy, Shephard and Siefen (2002), focused on the positive effects of exercise on depression and the general well-being of German adolescents and Rojas, Schlicht and Hautzinger (2003) in another German study, found that HIV positive individuals benefitted both psychologically and physically from specific exercise intervention programmes.

The research therefore investigated the effect that exercise had on reported levels of depression and psychological well-being of students registered at the Univeristy of Limpopo (Turfloop campus). The study focused on students at the institution who exercised regularly with a control group of those who did not exercise regularly.

1.4 Study aim

The aim of this study was to determine the influence of exercise on depression and the psychological well-being of students registered at the University of Limpopo (Turfloop campus).

1.5 Study objectives

- To determine whether undergraduate students who exercise regularly (regular exercisers) have a more positive state of psychological well-being than students who do not exercise (non-regular exercisers) regularly.
- To determine whether undergraduate students who are regular exercisers display less indicators of depression that those who are non-regular exercisers.

1.5.1 Research questions

Research questions for the study are related to the objectives in 1.5:

- Do undergraduate students who exercise regularly display more positive psychological well-being as compared to those who do not exercise on a regular basis?

- Do undergraduate students who exercise regularly display less indicators of depression as compared to those who are non-regular exercisers.

1.6 Significance of the study

In contemporary society much attention has been given to non-traditional methods of combating mental health problems. Amongst these methods, physical exercise is increasingly recommended for the maintenance and enhancement of overall mental health. It is generally accepted that regular exercise offers a variety of psychological benefits such as promoting feelings of well-being and self-efficacy. The findings of the current study will help to broaden research on the impact of exercise on depression and psychological well-being amongst student populations particularly those which are previously disadvantaged. Furthermore, the recommendations that arose out of the current study will help guide future interventions in terms of enhancing student health and psychological well-being at the University of Limpopo (Turfloop campus).

1.7 Summary

The chapter gives an overview of the study noting the research problem, aim, objectives and significance of the investigation. The following chapter reviews literature relevant to the topic.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter is concerned with a review of literature on the prevention of mental illness and promotion of health with special reference to physical activity as an intervention. While the message originating from physiological research has noted the general advantages of exercise in terms of physical health, the equivalent psychological literature has revealed a more complex relationship pertaining to mental illnesses such as depression.

2.2 Physical activity and psychological well-being

The World Health Organisation (WHO, 2010) report that depression can be characterised by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy and poor concentration. These problems can become chronic or recurrent, substantially impairing an individual's ability to cope with daily life.

According to Helson and Srivastava (2001) psychological well-being is influenced by personal, interpersonal and environmental factors and changes regularly within the context of life stages and developmental tasks. Research has demonstrated that psychological well-being develops through a combination of emotional regulation, personality characteristics, and self-identity and life experience. It has also been noted that psychological well-being can be promoted through regular sport participation and exercise (Edwards et al., 2004; WHO, 2013).

Exercise can be used as a medium for health promotion as it has both physical and psychological health benefits (Edwards, 2002). According to Edwards et al. (2004), who investigated the relationship between sports and various components of psychological well-being and self-perception, the exercising participants were generally more psychologically well and had more positive self-perception than the non-exercising participants. This supported an earlier study by Edwards (2003) who investigated the relationship between physical exercise and psychological well-being in twenty six exercisers in a city in Northern KwaZulu-Natal, over a period of six months. The findings revealed that regular exercise was associated with significant improvements in total psychological and physical well-being.

Van Der Vliet et al. (2003) evaluated the nature of psychological change in depressed psychiatric in-patients involved in a multi-disciplinary study with various interventions (or treatments). One of the treatments was a physical activity programme designed to improve psychological well-being. The results revealed that patients with depression demonstrated significant improvements in terms of depression, anxiety, global self-esteem and physical self-worth.

2.2.1 Influences on psychological well-being

Edwards et al. (2004), report that positive mental health and psychological well-being have many dimensions. These consist of autonomy, environmental mastery, personal growth, purpose in life, positive relations with others and self-acceptance. These dimensions develop through a combination of emotional regulation, identity-growth, personality characteristics, life experience and environmental factors. Psychological well-being has been found to increase with age, higher educational levels, extraversion, self-awareness and to decrease through neuroticism, which is a personality trait characterised by anxiety, moodiness, worry, envy, and jealousy. These dimensions can be influenced by personal, interpersonal and environmental factors and changes within the context of developmental tasks and life stages (WHO, 2010).

2.2.2 Previous literature on psychological well-being

There are many aspects of health and ways to promote health. However, the literature that is cited in this study focused on promoting psychological well-being through the use of exercise. Helson and Srivastava (2001) conducted research using the Psychological Well-Being Scale (see appendix 6) and found that psychological well-being develops through a combination of emotional regulation, personality characteristics, and self-identity plus life experience. Each psychological well-being dimension can be viewed as a form of life challenge for instance, seeking autonomy through self-determination, developing and maintaining positive relationships with others, self-acceptance, and environmental mastery. Edwards et al. (2004), suggest that this is similar, to Erikson's (1959) developmental theoretical perspective (see appendix 4).

2.3 Depression and physical activity

According to the World Health Organisation (WHO, 2013) many methods have been utilised in treating depression which do not all belong to the medical model approach to illness. It was noted that priority should be given to both prevention and promotion of interventions that encourage

psychological well-being in the field of mental health. The organisation reports that physical activity is supported by many health workers as a preventative measure to many forms of illness including depression.

2.4 Mental illness

Morgan, Parker, Alvarez-Jimenez and Jorm (2013) report that the incidence of mental disorders, in particular depression, is on the increase. In the past emphasis has been placed on reducing the incidence and prevalence of these disorders through the use of different interventions such as psychopharmacology and psychotherapy. An additional approach was established in the field of mental health to reduce the increasing burden of mental disorders through the promotion of health activities such as exercise (WHO, 2013).

Furthermore, Morgan et al. (2013), indicate that research in adults with schizophrenia shows that exercise programmes can improve certain kinds of mental health symptoms (for instance, blunted emotions, loss of sex drive and thinking difficulties), but are less effective for other symptoms (for example, delusions and hallucinations). Exercise programmes also improve other psychological outcomes, such as social competence, self-esteem, and well-being. Exercise is also important in improving the physical health of individual schizophrenics as these individuals die 16 to 20 years earlier than the general population, with this differential mortality gap growing in recent decades. Two-thirds of these premature deaths are related to physical health risk factors resulting from poor access to medical care, poor diet, little exercise and medication-induced weight gain. It has been noted that, up to 86% of patients treated with antipsychotic medication experience significant weight gain. It is likely that regular exercise could be a mediating factor in weight loss regimes for schizophrenic individuals.

2.5 Depression

During their life span individuals experience a wide range of emotion and have a wide range of affective expressions and are generally able to regulate their moods and affects. When an individual is suffering from depression this sense of control is lost and is experienced with subjective distress (Sadock & Sadock, 2007). Depression can be described as a mood state characterised by intense sadness, withdrawal from others and feelings of futility and worthlessness (Sue et al., 1997). Sufferers tend to describe themselves as being hopeless, worthless and experiencing agonising

emotional pain. The symptoms are often so severe that contemplation of suicide is common, with 10% to 15% of depressed individuals committing suicide (Sadock & Sadock, 2007).

The depressed mood has a distinct quality that differentiates it from the normal emotion of sadness. The symptoms can be experienced in a mild form during which sufferers seem unaware of their depression, are able to continue with daily tasks and do not complain of mood disturbances although they withdraw from friends and family. Others experience a more severe depression where many, if not all aspects of their life are affected such as their thoughts, mood, feelings, behaviours and physical health. This condition does not respect socio-economic status, educational qualifications or personal qualities. It afflicts individuals from all socio-economic levels (Sue et al., 1997).

Emmerson (2009) posits that depression is a common event in young adults. The demands of work and school, traumatic events, loss and loneliness are just some factors which contribute to the increase in the number of diagnosed depression symptoms in adolescents and young adults. In addition to medical assessment and diagnosis, some doctors are including physical activity as part of the medical treatment plan to help with improving mood. Physical exercise such as aerobics and sports participation is helpful for those suffering from mild to moderate depression. For many years depression has been noted to have a strong correlation with obesity. With depression and obesity becoming a global phenomenon, the author notes that it is important to look for innovative ways of treating the disorder. It must also be noted that males and females experience and express the symptoms of depression differently which means practitioners who treat depressed individuals need to recognise this. Females tend to be able to express their feelings (and hence their depression) more adeptly than males.

In the last decade depression has been taken seriously for teenagers and young adults whereas previously it was thought that teenage hormones caused mood swings and depressive difficulties. Research indicates that adding exercise to a treatment plan under medical supervision has a positive effects on improved mood in mild depression, while addressing issues related to obesity in young people (Emmerson, 2009).

2.5.1 Incidence and prevalence of depression

Sadock and Sadock (2007) revealed that of the high percentage of people with major depression there is a generally recognised fact that there is a 50% greater prevalence in women than in men,

irrespective of culture or country. This is in line with the American Psychiatric Association (2000) findings indicating that the lifetime risk for a major depressive episode is between 10% and 25% for women and 5% and 12% for men. The reasons for this have been hypothesised to involve hormonal differences, the effects of childbirth, differing psychosocial stressors, and behavioural models of learned helplessness. The average age for the onset of a major depressive episode is forty years. Major depression however, can begin in childhood or old age. The World Health Organisation has estimated that by the year 2020 depression will become the second leading disease burden globally (WHO, 2013).

2.5.2 Course and prognosis

According to Sadock and Sadock (2007) and Emmerson (2009) at least half of people presenting with a major depressive episode have experienced significant depressive symptoms prior to the first identified episode. The first depressive episode occurs before the age of forty in fifty percent of sufferers. A later onset of the mood disturbance is often associated with an absence of mood disorders, antisocial personality disorder and alcohol use in the family. Major depressive disorder tends to be chronic and, even when treated, many sufferers relapse. The relapse rate has been found to be about twenty five percent in the first six months, thirty to fifty percent in the first two years and fifty to seventy five percent in the first five years. It is generally recognised that as a sufferer experiences more and more depressive episodes, the time between the episodes decreases while the severity of each episode increases.

2.5.3 DSM-5-criteria for a Major Depressive Episode (Clinical Depression)

According to the DSM - 5 Depressive Disorders include Disruptive Mood Dysregulation Disorder, Major Depressive Disorder (including Major Depressive Episode), Persistent Depressive Disorder (Dysthymia), Premenstrual Dysphoric Disorder, Substance/Medication-Induced Depressive Disorder, and Unspecified Depressive Disorder. Major Depressive Disorder represents the classic condition in this group of disorders. It is characterised by discrete episodes of at least two weeks involving clear changes in affect, cognition and neuro-vegetative functioning with inter-episode remission (DSM 5, 2013).

2.5.4 Major Depressive Disorder diagnostic criteria (adapted from DSM 5, p. 160)

The Major Depressive Disorder diagnostic criteria of the DSM 5 are listed below. These symptoms are severe but can be mis-diagnosed in athletes as too much stress before big events (Edwards, 2002).

A. Five (or more) of the following symptoms have been present during the same two week period and represent a change from previous functioning, at least one of the symptoms is either 1) depressed mood or 2) loss of interest or pleasure.

1) depressed mood most of the day, nearly every day, as indicated by either subjective report (for example, feels sad or empty) or observations made by others (for example, appears tearful)

2) Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly everyday

3) Significant weight loss when not dieting or weight gain

4) Insomnia or hypersomnia nearly everyday

5) Psychomotor agitation or retardation nearly everyday

6) Fatigue or loss of energy nearly everyday

7) Feelings of worthlessness or excessive or inappropriate guilt nearly everyday

8) Diminished ability to think or concentrate, or indecisiveness, nearly everyday

9) Recurrent thoughts of death (not fear of dying), recurrent suicidal ideation without specific plan, or a suicidal attempt or a specific plan for committing suicide.

B. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.

C. The episode is not attributed to the physiological effects of a substance or to another medical condition.

D. The occurrence of the major depressive episode is not better explained by Schizoaffective Disorder, Schizophrenia, Schizophreniform Disorder, Delusional Disorder, or other specified and unspecified schizophrenia spectrum and psychotic disorders.

E. There has never been a manic episode or a hypomanic episode.

2.5.5 Non Clinical Depression

Non-clinical depression is not recognised in the DSM – 5 (nor previous versions of the manual). It is defined as a reaction to the every-day happenings of life. In this type of depression brain function, unlike in clinical depression when neurotransmitters are out of order, is usually normal. Non-clinical depression does not usually need medication or therapy however, if the problem goes on for a period of time it is possible that clinical depression and major-depression can set in. It is uncertain why some people are prone to becoming depressed and not able to address the problem or stressor behind the non-clinical depression. It is thus important to recognise the stressors that underpin any kind of depression and work to lessen them, otherwise there is the possibility of developing clinical depression (CMHA, 2014).

2.6 Therapy for depression

The following paragraphs describe different therapies available for depression both clinical and non-clinical depression.

2.6.1 Electroconvulsive therapy

According to Havelson (2012) Electroconvulsive Therapy (ECT) is a highly effective treatment for clinical depression that does not respond to medication. Sometimes, depending on the severity of the depression it can be used as the first treatment choice. The onset of action may be more rapid than that of drug treatments, with benefits often seen within one week of commencing treatment. A course of ECT (usually up to 12 sessions) is the treatment recommended for patients who are very severely depressed, do not respond to drug therapy, are psychotic, or are suicidal or dangerous to them.

The indications for the use of ECT include the following:

- Need for a rapid anti-depressants response.
- Failure of drug therapies.
- History of good response to ECT.
- Patient preference.
- High risk of suicide.
- High risk of medical morbidity and mortality.

Although advances in brief anesthesia and neuromuscular paralysis have improved the safety and acceptability of ECT, it does have many risks. These include those associated with general anesthesia, confusion after waking up and short-term memory difficulties. In older patients this must be taken into account and their physical health, particularly cardiovascular issues, must be taken into consideration (Havelson, 2012).

2.6.2 Cognitive-behavioural therapy

Corey (2001) posits that Cognitive Behavioural Therapy (CBT) provides a structured, focused, active approach that focuses on the individual's inner world. This type of structured therapy is focused on the here and now and can be effective in a short period of time. A combination of cognitive and behavioural strategies teaches an individual the following: to identify negative, self-critical thoughts (cognitions) that automatically occur and to note the connection between negative thoughts and the resulting depression. It also teaches individuals suffering from depression to carefully examine each negative thought and decide whether it can be supported. The therapy helps the individual in trying to replace distorted negative thoughts with a realistic interpretation of each situation.

According to Havelson (2012), CBT is first choice of treatment for depression. It is directed and time limited, usually involving between 10 and 20 treatments. Cognitive Behavioural Therapy (CBT) was specifically designed to treat depression and is based on the principle that patients who are depressed have a distorted view of themselves, the world and their future. These cognitive distortions contribute to their depression and can be identified and counteracted with CBT. It is effective in patients of all ages. It is particularly valuable for use with elderly patients, who may be more prone to the side effects of medications. In children and adolescents, four studies have shown group CBT to be better than no intervention at all, in the reduction of depressive symptoms and improvement of self-esteem. In most paediatric clinical samples, CBT was found to be better than other psychological treatments, including relaxation training and family and supportive therapy. However, for non-clinical depression it was found that the therapist must first help the individual define the stressor or stressors which are making him or her depressed. It is suggested that in this case, relaxation techniques and supportive therapy are indicated before CBT. However, all clinical studies of CBT found a high rate of relapse on follow-up, suggesting the need for continued or additional treatment. The high rate of relapse and recurrence of depression indicates that continuation therapy is recommended for all individuals (children included) for at least 6-12 months.

2.6.3 Relaxation techniques

Relaxation techniques such as relaxed breathing, progressive relaxation and meditation are often very effective. They influence the parasympathetic branch of the nervous system to have the exact opposite reaction to the sympathetic branch, where the initial *fight or flight* reactions are stimulated by the stress response (Holden, 1992). There are various relaxation techniques, which can be used together or separately. The following are adapted from Edwards (2002).

1. An individual must learn to know his or her state of tension/relaxation by tensing his or her entire body while counting to ten, then alternatively relaxing while counting to ten. An individual may also practice this with different muscle groups from head to toe. It should also be practiced until deep instant relaxation is obtained purely by saying *relax* and counting to ten.
2. Secondly, belly breathes by focusing on his or her stomach, not chest, moving slowly in and out.
3. Third the individual should relax and belly breathe (see appendix 5)
4. Fourth, an individual should relax and visualize a calm scene of the sea or a meadow.
5. Fifth an individual should relax and consciously ask him or herself what she can feel, hear, see, smell, taste and touch.
6. Lastly, one must practice dynamic relaxation while moving by adjusting his or her level of tension.

Learning relaxation involves cultivating a muscle sense, to develop the muscle sense further, individuals are taught to isolate and contract specific muscle groups' one at a time (Sadock & Sadock, 2007).

2.6.4 Physiological benefits of relaxation exercises

According to Greenwald (2012), Progressive Muscle Relaxation (PMR) is a relaxation technique that requires an individual to focus on flexing and holding a certain set of muscles and then slowly relaxing those same muscles. As the individual flexes and releases those muscles from head to toe they feel a deep sense of relaxation. Progressive Muscle Relaxation (PMR) is an adapted version of Jacobson's (1934) Relaxation Technique (see appendix 5) developed in the 1930s. Progressive Muscle Relaxation (PMR) is currently used in clinical and non-clinical settings to reduce the effects

of anxiety and sleeplessness brought about by stress. The long-term goal of this relaxation technique is to be able to identify when body muscles are suffering the effects of stress. The technique is used to help relax the individual and the individual's muscles. The premise is that an individual cannot be relaxed and stressed at the same time (Greenwald, 2012).

2.6.5 Physical activity

The World Health Organisation (WHO, 2013) reports that interventions other than medication have been used in the treatment of mental health disorders. As the prevalence of mental health disorders, particularly depression, is high worldwide the organisation promotes prevention as costs of treatment and cost to life is high. The organisation makes particular reference to physical activity and exercise as a preventative measure for specific physical and psychological illnesses.

2.7 Psychological well-being

The term psychological well-being is relatively new. It is explored in the following paragraphs.

2.7.1 Development of the term psychological well-being

In Ryff's (1989) study exploring the meaning of psychological well-being it was noted that there has been extensive literature aimed at defining positive psychological functioning. Many theorists such as Maslow (1968), Erikson (1959), Buhler (1935), Neugarten (1973) and Jahoda (1958) have given their perspectives on this concept (Ryff, 1989). Initially Bradburn (1969) focused on happiness as the outcome of the variable of psychological well-being. However, further studies found that happiness was not the only indicator of positive psychological functioning. Life satisfaction and high morale were also found to be constructs in the basic structure of psychological well-being (Ryff, 1989). According to Ryff (1989) many theorists had written formulations about positive psychological well-being however, when these formulations were reviewed, it became apparent that they all had similar features on which Ryff (1989) based the scale of psychological well-being.

2.7.2 Dimensions of psychological well-being

The core dimensions of psychological well-being integrate mental health, clinical and life span developmental theories and are noted as follows (adapted from Ryff, 1989). These dimensions are still relevant in contemporary society thus his scale is used in this research.

- Self-acceptance is defined as a central feature of mental health as well as a characteristic of maturity, self-actualisation and optimal functioning.
- Positive relations with others. This dimension emphasises the importance of warm and trusting interpersonal relationships. Fundamentally, having the ability to love, having strong feelings of empathy and affection for all and being capable of close friendships. This ability is considered a criterion of maturity as one is able to achieve intimacy and maturity.
- Autonomy puts emphasis on qualities such as independence, self-determination and regulation of behaviour from within. Being able to self-actualise, having an internal locus of control and being able to individuate ultimately giving one a sense of freedom from norms that govern everyday life.
- Environmental mastery is defined as active participation in and mastery of the environment. These include the ability to create or choose environments suitable to an individual's needs. It requires an individual to have the ability to manipulate and control complex environments, taking environmental opportunities where appropriate.
- Purpose in life is another aspect of mental health which defines beliefs as giving an individual the feeling that there is purpose and meaning in life. Having a clear comprehension of life's purpose, a sense of directedness, and intentionality all contribute to an individual's level of maturity.
- Personal growth requires that an individual achieves the above characteristics and, in addition, achieves continued development of individual self-potential.

2.8 Physical activity and stress

Physical activity has been defined as a term describing any bodily movement produced by the skeletal muscles resulting in energy expenditure (Biddle, Fox & Boutcher, 2000). A recent survey published by the Mental Health Foundation (2013a) in Britain, found that 59% of British adults felt their life was more stressful than it was five years ago. Forty seven percent (47%) of the survey respondents said they felt stressed every day, and a further 24% said they felt stressed every few

days. The Health and Social Care Information Centre (2013), in the same country, also published data which showed hospital admissions for stress have risen by 7% yearly in the past decade.

Stress causes the body to produce more of the *fight or flight* chemicals which prepare it for an emergency. Adrenaline and noradrenaline raise blood pressure and increase heart rate and perspiration. They can also reduce blood flow to the skin and reduce stomach activity. The body produces cortisol which, in turn, causes fat and sugar to be released into the bloodstream (but also reduces the efficiency of the immune system). All these changes are the body's way of making it easier to fight or run away. Unfortunately, these changes are less helpful for individuals who are sedentary (that is they do not work out-doors and sit at a desk). They cannot fight and cannot run away. Because of this, they cannot use up the chemicals their own bodies have produced to protect them. Over time these chemicals, and the changes they produce, can cause serious damage to health. For example, people suffering from stress may start to experience headaches, nausea and indigestion. Longer term stress can lead to feelings of strain, worry, insomnia and exhaustion, and increased risk for health problems such as heart attacks and strokes (Mental Health Foundation, 2013a)

Physical activity may offer an alternative approach to reducing or managing stress. Cross-sectional studies on adults who are employed have found that highly active individuals tend to have lower stress and depression rates as compared to low active individuals. Several mechanisms have been suggested to explain how physical activity may reduce the harmful effects of stress (Mental Health Foundation, 2013a). Gerber and Puhse (2008) however, report that higher levels of fitness, brought about by physical activity, result in a more efficient stress regulation (for instance, reduced secretion of hormones, lowered blood pressure) or enhanced recovery from stress. These effects are referred to as stress-buffering.

Gerber and Puhse (2008) do state that research testing the stress-buffering effect of physical activity has mixed results. A review of 31 studies found 16 reported physical activities did have a stress-buffering effect whereas 15 found it did not. Furthermore, it was noted that even though physical activity may not always reduce stress, there was no evidence that engaging in physical activity during periods of high stress increased stress levels. The authors conclude that further efforts are required to understand what dose and intensity of physical activity is optimal for triggering stress-

buffering effects and reducing depression and whether the effect is moderated by the exercise environment.

2.8.1 Physical activity and positive moods

The mood individuals are in has an impact on how they experience day-to-day situations. Thayer (1996, p.3) made the following statement.

“Even an unpleasant social situation can be tolerable if our mood is positive. On the other hand, if we are in a bad mood, an activity that usually is very pleasant, one that otherwise gives us great enjoyment, can be boring and uninteresting. When our mood is low, even the most positive events become meaningless.”

Therefore individuals generally try to regulate their moods to be positive and use a variety of strategies to do so. Example of such strategies are for instance, eating a nice meal, speaking to a good friend, watching a comedy on film or television and/or going for a brisk walk (Mental Health Foundation, 2013b).

Pasco et al (2001) posit that there is accumulating evidence that walking and physical activity more generally, can be an effective way to enhance positive moods. For example, people with high levels of regular physical activity have been shown to have higher levels of positive emotions such as interest, excitement, enthusiasm and alertness as compared to people with moderate and low levels of physical activity. A review of studies which have investigated the impact of exercise interventions on positive moods have shown that regular aerobic exercise results in moderate increases in positive moods more specifically, it was found that exercise interventions increased feelings of activation (how energised a person feels) and pleasant feelings. People who experienced lower energy and more unpleasant feelings at baseline showed greater increases in these factors. The review also found that higher exercise frequency and lower exercise intensity were associated with more pleasant feelings and higher activation. Overall the results indicated that low intensity aerobic exercise, for 30–35 min, on 3–5 days per week for 10–12 weeks was best for improving positive moods.

The Mental Health Foundation (2013b) in the United Kingdom (UK), in one of their reports, state that the impact of physical activity on day-to-day moods has been investigated in more detail.

Individuals rated their mood immediately after periods of physical activity (for example, going for a walk or doing housework) and periods of inactivity (such as reading a book or watching television). Individuals reported feeling more content, more awake and calmer directly after being physically active compared to periods of inactivity. They also found that the largest beneficial effect of physical activity on mood (that is, greatest change in mood score) occurred when mood was initially low.

2.8.2 Physical activity and self-esteem

Self-esteem is a key indicator of psychological well-being. People with high self-esteem tend to have high life satisfaction, resilience and greater achievement in education and work. On the other hand low self-esteem is associated with mental illness, anxiety and hopelessness. Self-esteem can be defined as the sum of an individual's perceptions of their competence in several areas of their life for example, academic, emotional, social and physical areas. Of these areas the physical aspect of self-esteem (that is an individual's competence to perceive him or herself positively pertaining to his or her stamina, strength, sport ability and body attractiveness) has been shown to have a strong effect on overall self-esteem (Mental Health Foundation, 2013b; Pasco et al., 2011).

2.8.3 Physical activity and anxiety

Symptoms of anxiety vary from mild to severe. Feelings of anxiety are normal in some situations for instance, just before writing a final exam or going to a job interview. However, people with Generalised Anxiety Disorder (GAD) find it hard to control their worries. Their feelings of anxiety are more constant and often affect their daily life. Generalised Anxiety Disorder affects 1 in 20 adults in Europe. Other conditions where anxiety is the main symptom include Panic Disorder, Phobias and Post-Traumatic Stress Disorder (National Health Survey, 2012)

According to the CMHA (2013), anxiety often occurs together with depression. Treatments for anxiety include anxiolytic medication and psychological therapy. Limitations to the use of medication and psychological therapy in the treatment of anxiety are similar to the limitations to their use to treat depression. Also similar to the treatment of depression, there is growing evidence that physical activity is beneficial as a treatment for people with both mild and severe (clinical) anxiety. A review of 19 intervention studies, which investigated the effect of physical activity on healthy adults, found that increasing physical resulted in reduced anxiety. Further analyses of these

studies revealed that interventions were most effective when participants engaged in moderate or high intensity physical activity; physical activity was supervised; the intervention was delivered to individuals (rather than group based); and when participants were encouraged to continue exercising at a fitness centre following the intervention (rather than at home).

Merom et al. (2008) in a review of 49 randomised controlled trials that investigated the effect of physical activity interventions on anxiety in non-clinical and clinical populations found physical activity significantly reduced anxiety compared to no-treatment control groups. However, the majority of the studies in this review included participants with non-clinical levels of anxiety. Analysis of the dose response relationship between physical activity and anxiety was limited by the fact that the majority of the physical activity interventions reviewed has used the same dose: aerobic exercise with a frequency of 3–4 times per week. Data does indicate there are lower rates of clinical anxiety amongst people who are active than people who are not and intervention studies have shown that exercise holds promise for reducing symptoms of clinical anxiety. Several smaller studies focused on a particular type of anxiety (such as Panic Disorder or Post-Traumatic Stress Disorder) and shown positive effects for exercise in reducing anxiety symptoms.

2.9 Physical activity, dementia and cognitive decline in older people

The Mental Health foundation (2013b) contends that improvements in healthcare have led to increasing life expectancy and a growing population of people, particularly in developed countries, over 65 years. Alongside this increase in life expectancy has been a rise in the number of people living with dementia and cognitive decline. The main symptom of dementia is memory loss. It is a progressive disease which results in people gradually becoming more impaired over time. Despite encouraging research developments, a cure for dementia has not yet been found. Cognitive decline also occurs with ageing in people who do not go on to develop dementia for example, attention, memory and concentration decline. Although they are not as disabling as dementia, these declines in cognitive functioning lead to decreased quality of life. The foundation notes that exercise seems to have an effect in decreasing the onset of these conditions.

2.9.1 Dementia

Geda et al. (2011), report that physical activity during the lifespan seems to have a positive effect on cognition and a protective effect against developing dementia. Research suggests that all types of

physical activity are equally beneficial. Higher levels of physical activity seem to be more protective than lower levels. It seems that physical activity needs to be performed at least twice a week and that three or more times a week is probably more beneficial. The impact of physical activity intensity is less well understood. Geda et al. (2011) found that the higher the intensity of physical activity the greater the protective effect; however, a more recent study found that moderate intensity physical activity had a protective effect, but very light intensity and vigorous intensity physical activity did not. For individuals who have developed dementia, physical activity has been shown to be effective in delaying and reducing the severity of symptoms. For example, physical activity has been shown to improve cognition or slow its deterioration, improve symptoms such as depression or agitation, and improve physical functioning such as endurance, strength, balance, mobility, gait and flexibility.

2.9.2 Cognitive decline

Researchers have investigated whether being physically active can reduce and even reverse cognitive decline which occurs with aging in people without dementia. A review of 15 studies which had followed individuals over 1 to 12 years found that being physically active at the start of the study was a significant protective factor against developing cognitive decline during the follow up period. Thirty nine people who participated in high levels of physical activity at baseline had a 38% lower risk of experiencing cognitive decline than people who were sedentary. The protective effect of physical activity was similar (35%) for people who participated in low to moderate intensity physical activity compared to those who were sedentary. The effect seemed to be stronger in women than in men. However, although data from observational cohort studies are fairly strong with respect to physical activity reducing risk for cognitive decline, evidence from intervention trials is weaker. Observational studies occur over longer time periods than intervention trials and it was recommended that intervention studies lasting for one or more years should be run to see whether the results of short - term observational studies can be replicated in these longer-duration intervention studies (Mental Health Foundation, 2013b; Sofi et al., 2011).

2.10 Physical activity and quality of life for people with severe mental health problems

According to Alexandratos, Barnett and Thomas (2012) physical activity has the potential to improve the quality of life of people with severe mental health problems, such as schizophrenia and bipolar disorder, through improvements in physical and mental health. People with these conditions have the same physical health needs as the general population, but are more likely to be sedentary

and have high rates of obesity, confounded by the side effects of medication. Consequently, this group is at high risk for chronic medical conditions associated with inactivity, such as cardiovascular disease, diabetes and obesity. For people with severe mental health problems participating in physical activity may lead to improvements in quality of life. The authors reviewed 16 studies which included a physical activity intervention for people with severe mental illness found physical activity can contribute to improved quality of life through social interaction, meaningful use of time, purposeful activity and empowerment.

Several studies have focused specifically on people with schizophrenia and a review of three such randomised controlled physical activity interventions found exercise improves negative symptoms of schizophrenia compared to standard care. Yoga showed potential as a beneficial form of physical activity (Gorczyński & Faulkner, 2010). However, Bonsakseni and Lerdal (2012) found no relationship between physical activity and quality of life for 18 hospitalised patients with severe mental illness. They did note however, that physical activity levels in people with severe mental illness tends to be very low, and was described as hazardously low. It was suggested that in some individuals even small increases in physical activity might have important physical health benefits, as well as enhancing quality of life.

2.11 Negative effects associated with physical activity

For most individuals, physical activity is beneficial for well-being and mental health. However, physical activity can have a negative effect for some individuals who participate in very high levels of physical activity. Over-training can result in a range of short-lived negative effects such as fatigue, low mood and irritability. Often this can be corrected by resting or changing exercise patterns, such as reducing intensity levels of exercise or altering the type of activity to one that uses different muscle groups (Quinn, 2011).

Overtraining may reflect a more unhealthy relationship with physical activity where there is a shift from the person choosing to take part in physical activity as part of a healthy lifestyle, to feeling compelled to take part even when the benefits are outweighed by adverse consequences. The problems that can emerge from this compulsion include planning an individual's life around exercise to the exclusion of other spheres of daily life. Seven diagnostic criteria have been suggested to assess exercise dependence a) tolerance to increasing amounts of exercise; b)

withdrawal symptoms from not exercising; c) lack of control over exercise; d) consistently doing more exercise than was intended; e) spending a lot of time exercising; f) reduction in other activities and g) continuing to exercise despite physical, psychological and interpersonal problems (Mental Health Foundation, 2013b).

The actual volume of exercise may be less important than the motives underlying this behaviour. It has been suggested that the likelihood of an addiction increases for those who exercise with the goal of escaping unpleasant feelings or transforming their appearance to improve self-esteem as compared to those who exercise with the goal of improving performance and fitness. However, the extent to which exercise dependence is an addictive behavior. It is for instance, common for anorectics and bulimics to over-exercise (Johnston, Reilly & Kremer, 2011). According to Freimuth, Moniz and Kim (2011), eating disorders are the most common disorders to co-occur with exercise dependence, approximately 39 – 48% of people suffering from an eating disorder also suffer from exercise dependence. There is strong evidence of a relationship between exercise dependence and body image problems. An issue with this co-morbidity is that often only the eating disorder is treated.

2.11.1 Intensity of physical activity

Physical activity intensity varies along a continuum from sedentary (physically inactive) to vigorous (high intensity activity). Moderate intensity physical activity is in-between sedentary and vigorous intensity physical activity along the continuum. It requires a reasonable amount of effort and noticeably accelerates the heart rate and breathing rate. Examples include brisk walking, housework, gardening, dancing and walking the dog. Vigorous intensity physical activity requires a large amount of effort, causes rapid breathing and a substantial increase in heart rate for instance, running, aerobics, sports such as football or hockey and walking quickly up a hill. When taking part in vigorous intensity physical activity it is difficult to talk without pausing for a breath which is not the case with moderate physical activity (Mental Health Foundation, 2013b)

2.11.2 Types of physical activity

According to the Mental Health Foundation (2013b), there are many different types of physical activity. Walking is a type of physical activity which many individuals find practical and accessible because it can be done at low, moderate or vigorous intensity. Other examples are dance, cycling

following keep fit videos at home, tennis and martial arts. These different types of physical activity can have a number of different physical outcomes.

- Many types of physical activity increase aerobic fitness, or stamina; for example, running and cycling. Some types of physical activity increase muscle strength for example, weight training, or using resistance bands.
- Some types of physical activity increased flexibility and balance; for example, yoga and stretching exercises.

The different types of physical activity are sometimes grouped under the following headings.

- Sport - structured and competitive physical activity.
- Exercise - planned and purposive physical activity to improve fitness, health or performance.
- Play - unstructured physical activity carried out for fun and enjoyment.
- Daily physical activity - which is carried out as part of a daily routine.

Each of these four types of physical activity can be carried out at both moderate and vigorous intensity depending on how it is performed (Mental Health Foundation, 2013b).

2.12 The impact of physical activity on well-being

The following paragraphs describe the impact of physical activity on an individual's well-being.

2.12.1 Physiological adaptations

Many individuals believe that the biological explanation for experiencing enhanced mood and well-being following exercise is that exercise causes the brain to release endorphins. Endorphins are naturally produced chemicals which have similar properties to heroin and morphine, hence the term *endorphin high* is sometimes used (Dishman & O'Connor, 2009; Mental Health Foundation, 2013b). In a review paper Dishman and O'Connor (2009), explain that this mechanism was first proposed when research linked endorphins with disorders of mood and personality. Further research found changes in endorphin-receptors in the brains of rats following exercise, and that in people endorphin levels increased in the blood following exercise. However, no evidence was found for a direct link between exercise-induced changes in mood and endorphin levels measured in either the blood or the brain. The review concludes that the hypothesis that endorphins are responsible for the changes in

moods during and after exercise remains possible, but has been perpetuated based on little evidence. With developments in neuroscience and increased understanding of how the brain functions, it has become clear that changes in states of mind (such as the changes in mood that occur following exercise) will involve complex interactions of many neural circuits and the release and uptake of many chemicals in the brain (such as acetylcholine and dopamine).

According to Dishman and O'Connor (2009) advances in brain imaging techniques are opening up new avenues for exploration, and may soon lead to a fuller understanding of the biological mechanisms underpinning the relationship between exercise and mood. Despite that there is still uncertainty as to the biological reasons for enhanced mood following exercise, there have been recent advances in understanding the impact of physical activity on overall brain health. For example, it has been shown that physical activity can improve brain plasticity, or the capacity of the brain to develop new neural pathways and for new neurons to grow during adulthood. This effect seems to be particularly strong in the hippocampus (an area of the brain involved in memory) and frontal cortex (involved in movement, decision-making, problem solving, and planning). Increased brain plasticity has been suggested as a mechanism by which physical activity enhances brain functioning, especially in later life, and protects against neurodegenerative diseases, such as dementia.

2.12.2 Sleep as a factor in mental well-being

The importance of sleep for mental well-being was highlighted in a recent report by the Mental Health Foundation (2013b). This report highlighted the fact that up to one-third of the global population may suffer from insomnia (lack of sleep or poor quality sleep). Insomnia can negatively affect mood, energy and concentration levels, relationships, and people's ability to stay awake and function during the day. Physical activity may enhance sleep quality which in turn improves wellbeing. In support of this a recent survey collected objective physical activity data and responses to questions on sleep from 3081 adults and found that higher levels of physical activity were associated with fewer reports of feeling overly sleepy during the day and less difficulty concentrating when tired (Passos et al., 2011).

Passos et al. (2011) report that research with people who have long-term difficulties with initiating and maintaining sleep (chronic primary insomnia) has found physical activity can be used as an

intervention to enhance sleep quality and improve quality of life. A single session of fifty minutes of moderate intensity aerobic exercise was found to reduce pre-sleep anxiety and improve sleep in patients with chronic primary insomnia. A six-month physical activity intervention (50 minute's moderate intensity exercise, 3 times per week) resulted in improved sleep, greater quality of life and reduced tension, depression and anger.

2.12.3 Mastery experiences related to physical activity at a psychological level

According to Carek, Laibstainb and Carek (2011), at a psychological level, physical activity can lead to greater feelings of mastery, or the belief that one is able to influence his or her environment and bring about desired outcomes, which in turn leads to greater wellbeing. For example, completing an exercise session that was previously thought impossible, or running a 5km race for the first time, may enhance feelings of confidence and self-esteem. It has been suggested that as exercisers become more confident and gain mastery of their physical skills, they may take this feeling of control and success into their everyday lives.

A controlled study with 19 women with depression found that involvement in a 9-week exercise programme provided a meaningful mastery experience through which confidence in their ability to engage in a variety of coping responses was increased and level of depression decreased (Mental Health Foundation, 2013b). It was also suggested that mastery experiences from exercise-related successes may counteract negative thinking styles of anxious individuals. Therefore it is suggested that physical activity interventions emphasise opportunities for participants to experience mastery and success, and provide positive feedback (Carek et al., 2011).

2.12.4 Social interaction

According to a report from The Mental Health Foundation (2013b), a further mechanism by which physical activity has a positive impact on well-being and mental health is by providing opportunities for social contact and social interaction. Where physical activity is carried out in a group, or brings an individual into contact with other people, there is an opportunity for individuals to increase their social networks and make friends. The Mental Health Foundation (2013b) report that there is extensive research that shows that good social relationships and networks promote, and are a protective factor for, well-being and mental health. This social relationship may come from being part of a team (for instance, football, rugby and volleyball) or taking part in an activity that requires

more than one person (salsa dancing, squash, fencing). It could also come from taking part in physical activity that takes you to places where you meet others who are doing the same physical activity, or have a similar interest (dog walking, hill walking, and paragliding).

The well-being and mental health benefits of the social aspects of physical activity are applicable to all age groups throughout the life course. They can be important in terms of making friends, developing social skills (such as negotiating, working as a team, learning to deal with competition, sharing etc.) and expanding social networks. The social aspect can be of a particular benefit to those who are isolated, as building social relationships can help people develop social skills that they did not have before, which can aid social inclusion by improving people's confidence and competence in interacting with others. This can lead to the development of friendships and supportive peer relationships, which may be particularly important for older people (Heaney and Israel, 2008; (Mental Health Foundation, 2013b)

2.13 Recent research on the role of exercise in mental health and wellness

According to Morgan, et al. (2013), the population impact of mental disorders is principally on disability rather than on mortality. In Australia, mental disorders are the third largest source of disease burden after cancers and cardiovascular diseases, but the largest source of disability burden. This disability burden arises in part because mental disorders often begin early in life and have a relapsing course. For anxiety and affective disorders, the major treatment options are psychological therapy and anti-depressants medication, with the latter being appropriate for more severe cases. For psychotic disorders, antipsychotic medication is a key component of treatment, but needs to be accompanied by psychosocial intervention and practical support. Mental disorders are common, and they are a significant contributor to disability in the community. There is growing interest in the effectiveness of exercise interventions for improving mental and physical health in individuals with mental disorders.

However, the relationship between physical activity and mental health is likely to be complex and bi-directional. Physical inactivity may be the cause and/or the consequence of poor mental health, and there may be common factors (such as overlapping genetic vulnerabilities) that predict poor or positive mental health (De Moor, Boomsma, Stubbe, Willemsen & de Geus, 2008). Consistent with the relationship between physical activity and mental health is that individuals with a mental

disorder are at higher risk of chronic physical conditions such as heart disease, diabetes, arthritis, and asthma (Wedekind et al., 2010).

2.14 Exercise interventions in the treatment of depression and psychological well-being

For treating depression and anxiety, most studies have evaluated aerobic exercise rather than resistance or mixed exercise interventions. One meta-analysis suggested that aerobic exercise may be less effective than resistance or mixed exercise, but effect size confidence intervals overlapped, and other meta-analyses have not shown a moderating effect from types of exercise. Only a few studies have directly compared the effectiveness of aerobic and resistance exercise for mental disorders (Mead et al., 2009).

According to Morgan et al. (2013), exercise has been investigated for its potential to improve mental health outcomes in a variety of mental disorders, but there is a rarity of high-quality research. Apart perhaps from depression, exercise is not considered an established treatment for mental disorders, and it is typically evaluated as an adjunctive treatment to pharmacotherapy or psychological therapy. Most research to date has been conducted on the benefits of exercise as a treatment for depression. Several recent meta-analyses of randomised controlled trials indicate that compared to controls, exercise has a moderate to large effect size for individuals with a depressive disorder. The benefits from exercise may not be long-lasting however, as research suggests no difference at follow-up between exercise and control groups, or a reduced effect size compared to effects at the end of the exercise intervention. Participants in these studies typically have mild to moderate depression rather than severe depression. Exercise is also mildly effective at improving depressive symptoms in individuals with a chronic physical illness such as cardiovascular disease and chronic pain.

Though exercise has been evaluated in over 25 randomized controlled trials, there are few well-conducted studies on which to make conclusions about how effective it is and how to optimize its effectiveness for depression. Despite these concerns, it does appear reasonable to recommend exercise as a treatment for depression. The National Institute for Health and Clinical Excellence (2010) in the United Kingdom recommends that a structured group programme of exercise should be considered as a first step in the treatment and management of people with persistent sub-threshold depressive symptoms or mild to moderate depression.

2.15 International research on physical activity and psychological well-being

According to Morgan et al. (2013), mental health lies on a continuum from having no symptoms and being fully functioning to having a severe mental disorder. Mental disorders are not categorically distinct, but rather label the part of the continuum where symptoms last longer and cause disability. They are characterised by problems in thinking, emotional state, and behaviour. Regular physical exercise has been characterised as a positive health behaviour having physiological benefits. It may also yield psychological. Morgan et al. (2013) conducted a study in Finland the purpose of which was to explore the association between physical exercise frequency and a number of measures of psychological well-being in a large population-based sample. A total of 3403 participants (1856 women and 1547 men) ranging in age between 25 and 64, completed questionnaires. Besides answering questions concerning their exercise habits and perceived health and fitness, the participants also completed the Beck Depression Inventory, the State –Trait Anger Scale, the Cynical Distrust Scale, and the Sense of Coherence inventory. The results of the cross-sectional study suggested that individuals who exercised at least two to three times a week experienced significantly less depression, anger, cynical distrust, and stress than those exercising less frequently or not at all. Furthermore, regular exercisers perceived their health and fitness to be better than less frequent exercisers did. Finally, those who exercised at least twice a week reported higher levels of sense of coherence and a stronger feeling of social integration than their less frequently exercising counterparts. The results indicate a consistent association between enhanced psychological well-being, as measured using a variety of psychological inventories, and regular physical exercise.

Another study by Carek et al. (2011), revealed that depression and anxiety are the most common psychiatric conditions seen in the general medical setting, affecting millions of individuals in the United States of America (USA). The authors noted that treatments for depression and anxiety are many and have varying degrees of effectiveness. Physical activity has been shown to be associated with decreased symptoms of depression and anxiety. Physical activity was consistently shown to be associated with improved physical health, life satisfaction, cognitive functioning, and psychological well-being. Conversely, physical inactivity was associated with the development of psychological disorders. Specific studies supported the use of exercise as a treatment for depression. Exercise compared favourably to anti-depressants medications as a first-line treatment for mild to moderate depression and was also shown to improve depressive symptoms when used as an addition to

medications. While not as extensively studied, exercise has been shown to be an effective and cost-efficient treatment alternative for a variety of anxiety disorders. While effective, exercise was not shown to reduce anxiety to the level achieved by psycho-pharmaceuticals. A follow-up to that study found that exercise's effects lasted longer than those of anti-depressants. The researchers checked up on 133 of the original patients six months after the first study ended. They found that the people who exercised regularly after completing the study, regardless of which treatment they were on originally, were less likely to relapse into depression.

2.16 South African research on physical activity and psychological well-being

In a South African study, Edwards (2004) incorporated a qualitative, phenomenological research approach into a study investigating the community effects of the exercise experience. The participants exercise experience was explored and noted. The results revealed that participants had a generally positive experience of exercise while none had purely negative experiences of exercise. The community effects were also explored revealing that exercise was a positive collective shared experience by the community who participated in the research. In support of this Fox (2000) stated that it was widely reported by regular exercisers that activity produced a sense of well-being. In addition those who were involved in recreational exercise and sport found it provided fun, relaxation, good stress management, a sense of achievement and positive social interaction.

However, in another study using Australian and South African participants, it was found that there were negative effects associated with exercise for instance, exercise addiction, exercise expenses, negative labelling of women exercising in some communities where exercise is perceived in a negative manner (Edwards, 2002).

Edwards (2006) reported that depression is one of the most debilitating, widespread and costly health problems worldwide and has a high prevalence in almost every society. He suggested that depression affects an individual's work engagement levels, burnout levels and the occurrence of stress-related ill health symptoms. In a survey to investigate these phenomena the following results were noted. Results indicated that 18.3% of the sample reported that they suffered from depression and received medical treatment, 16.7% of the sample reported that they were unsure whether they suffered from depression and 65% reported that they did not suffer from depression. Furthermore, it was found that depression significantly influenced work engagement levels negatively and that it

significantly influenced burnout levels and the re-occurrence of stress-related ill health symptoms (Edwards, 2006).

2.17 Summary

This chapter discussed literature relevant to the study. Generally literature suggests that individuals who are involved in any physical activity show positive psychological well-being and are less prone to depression and anxiety or stress. However, some negative consequences were noted such as exercise dependence and body image issues.

CHAPTER 3: THEORETICAL FRAMEWORK

3.1 Introduction

This chapter focuses on the theoretical framework that was used to guide the study. The framework used is Self Determination Theory (SDT) as developed by Ryan and Deci (2008).

3.2 Operational definitions

In this research the following definitions will be used as they are appropriate for the study.

3.2.1 Exercise

Edwards (2002) defined exercise as a subset of physical activities that are planned and purposeful which attempt to improve health and wellness. In this study, regular exercise will refer to any physical exercise which is undertaken on a regular basis that is, three times a week for thirty minutes over a period of two months or more. Non-regular exercise refers to those who do not exercise at all.

3.2.2 Depression

This is a mental state characterised by feelings of sadness, loneliness, despair, low self-esteem, and self-approach accompanying signs include psychomotor retardation or, at times, agitation, withdrawal from interpersonal contact, and other symptoms such as insomnia and lack of interest (or too much interest) in eating (Sadock & Sadock, 2007).

3.2.3 Clinical Depression

For clinical depression, you must have five or more of the following symptoms over a two-week period, most of the day, nearly every day. At least one of the symptoms must be either a depressed mood or a loss of interest or pleasure (See 2.5.4).

3.2.4 Non-Clinical Depression

Non-clinical depression is not recognised in the DSM – V (nor previous version of the manual). It is defined as a reaction to the every-day happenings of life. Non-clinical depression does not usually need medication or therapy however, if the problem goes on for a period of time it is possible that clinical depression can set in (CMHA, 2013).

3.2.5 Psychological well-being

Psychological well-being is concerned with positive experiences, health, strength, emotional resources, individual competencies and skills (Edwards, 2004).

3.3 Self – Determination Theory (SDT) as developed by Ryan and Deci (2008)

Motivation is a critical factor in supporting sustained exercise, which in turn is associated with important health outcomes. Accordingly, research on exercise motivation from the perspective of self-determination theory (SDT) has grown considerably in recent years. Self-determination theory (SDT) is an empirically based theory of human motivation, development, and wellness developed by Ryan and Deci (2008). The theory focuses on types, rather than just amounts of motivation, paying particular attention to autonomous motivation, controlled motivation, and amotivation as predictors of performance and well-being outcomes. The theory focuses on volitional or self-determined behaviour(s) and the social and cultural conditions that promote it. SDT also postulates a set of basic and universal psychological needs, namely those for autonomy, competence and relatedness, the fulfilment of which is considered necessary and essential to vital, healthy human functioning regardless of culture or stage of development.

The theory maintains that well-being is not captured by hedonic (devoted to pleasure) conceptions of happiness but includes other dimensions such as depression and anxiety. The theory relates to the present study in terms of how individuals are motivated to function in a manner that maintains their positive psychological well-being and how self-determined behaviour(s) either promote or do not promote this state.

Physical activity and exercise, when undertaken regularly, are highly beneficial for health, and for physical and psychological well-being. Only a minority of adults in modern society report engaging in physical exercise at a level compatible with most public health guidelines (Teixeira, Carraça, Markland, Silva & Ryan, 2012). For instance, 2009 data indicate that, on a typical week, 60% of adults in Europe engaged in no physical exercise or sports. In the USA, less than 50% of adults are considered regularly physically active, while in Canada new data shows that only 15% of adults meet national physical activity recommendations. Such findings suggest that many people lack sufficient motivation to participate in the 150 minutes of moderately intense exercise or physical

activity per week recommended (Teixeira, et al., 2012). There is no data available in South Africa for the population in terms of exercisers and non-exercisers.

According to Ryan, Williams, Patrick and Deci (2009), lack of motivation can broadly be explained by two factors. Firstly, people may not be sufficiently interested in exercise, or value its outcomes enough to make it a priority in their lives (essentially through lack of knowledge). Secondly, many individuals experience competing demands on their time from educational, career, and family obligations, possibly at the expense of time and resources that could be invested in exercising regularly. Some people may not feel sufficiently competent at physical activities, feeling either not physically fit enough or skilled enough to exercise or they may have health limitations that present a barrier to activity (Korkiakangas, Alahuhta & Laitinen, 2009). Whether it be low interest or low perceived competence, physical activity participation data indicates that many people are either unmotivated (or amotivated), having no intention in being more physically active, or are insufficiently motivated in the face of other interests or demands on their time which could lead to earlier onset of illness owing to an unhealthy lifestyle (Teixeira, et al., 2012).

3.4 Summary

In this section the theoretical framework employed in this study was explained in relation to the topic. The following chapter details the research methodology used to complete the research.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

The following chapter deals with how the research was conducted. It gives an overview of the research design, sampling, data collections, tools used for data collection, data analysis, research propositions, reliability, validity and bias. It also states the ethical considerations taken into account by the researcher.

4.2 Research design

The research was quantitative in nature and used a cross-sectional survey design. Cross-sectional surveys are studies aimed at determining the frequency (or level) of a particular attribute, such as a specific exposure, disease or any other health-related event, in a defined population at a particular point in time. This research design was relevant to the current study in that the research was aimed at accumulating data about specific issues (depression levels, psychological well-being), in a defined population (exercisers and non-exercisers) at a specific moment in time.

4.3 Area of the study

The study was conducted amongst students at the University of Limpopo (Turfloop campus). The institution is situated in the Mamabolo area next to Mankweng hospital, 3 kilometres east of Polokwane, in the Capricorn District.

4.4 Sampling method

In this study the non-probability sampling method that was used was non-proportional quota sampling. This method is the non-probabilistic equivalent of stratified random sampling. It is typically used for smaller groups which meet specific criteria to ensure that all strata are adequately represented in a sample. The method of sampling was used as it enabled the researcher to pick respondents from different strata that is, those who were regular exercisers and those who were not regular exercisers. It allows the researcher to get a good representation of specific groups without over-representation and it makes the comparison of these groups possible. This method of sampling was relevant to the current study because the sample consisted of a) all registered undergraduate students who participated in a sporting code and who exercised regularly according to study criteria

and b) all registered undergraduate students who did not participate in any sport or exercise activity at all.

The undergraduate students who did not participate in any exercise activities were found in 1st, 2nd and 3rd year undergraduate classes. At each level the researcher asked for volunteers to participate in the research (5 females and 5 males at each level to ensure gender representativeness). The active or exercising students were found through approaching the Director of Sports at the University of Limpopo (Turfloop Campus). Participants were undergraduates students from 1, 2 and 3rd year who participated in exercise (sport) at the designated level.

A sample of 30 students who were non-regular exercisers (did not exercise at all) which consisted of (15 females and 15 males) and 30 students who exercised at the designated level (15 females and 15 males) was considered appropriate, as it was difficult to find a larger sample of males and females who exercised according to the required inclusion criteria.

4.4.1 Inclusion criteria

a) All registered undergraduate students (male and female) who exercised as defined for the purposes of this study. Exercise referred to any physical exercise that was undertaken on a regular basis that is, three times a week for about thirty minutes over a period of two months or more (Edwards, 2002).

b) The sample of non - regular exercisers was defined as those who did not take part in any physical sporting code or participate in any fitness activities. Participants were male and female.

4.4.2 Exclusion criteria

a) Students who were previously diagnosed with any form of depression.

b) Students who could not exercise due to a medical/physical and/or psychiatric condition.

c) Students who took chronic medication for any psychological/psychiatric and/or medical condition.

4.5 Data collection

Data were collected from the two groups namely, the regular exercise group and the control group of those who did not exercise at all. Self-report surveys are a set of questions which are completed by the respondents at their own pace. The researcher used self – reports surveys in this study as they

were relatively quick and easy to administer and costs of printing were relatively low (the researcher had no access to funding). The researcher obtained permission from the 1st, 2nd and 3rd year undergraduate coordinators of classes to hand out questionnaires in class to students who made up the control group who didn't participate in exercise. Respondents were approached at the end of a lecture period and asked to fill in the questionnaires which did not take longer than 15 minutes to fill in. They were told the reason for the study and that participants who did not exercise at all were required. The researcher waited for the questionnaires to be completed and collected them. Participants were informed that if they self-reported moderate to severe indicators of depression they would be contacted by the researcher and referred to appropriate professionals. The researcher approached the Director of Sport at the university and requested permission to hand out questionnaires at the various sports clubs. The researcher asked participants to fill in the questionnaire after, or before they trained (their choice) and collected them thereafter. The researcher informed participants about the research and designated level of exercise required by the study. After the questionnaires were returned the researcher checked questionnaires for accuracy and discarded any that were not filled in properly or those of participants who did not meet the inclusion criteria or who met the exclusion criteria required by the study.

4.5.1 Study instruments

4.5.1.1 The Becks Depression Inventory (BDI - 11)

The BDI - 11 is used to screen for the presence and intensity of depression (See appendix 2). The BDI 11 was originally introduced by Beck, Ward, Mendelson, Mock and Erbaugh in 1961 and was later revised. The BDI - 11 is a 21 item self-report rating inventory measuring characteristic attitudes and symptoms of depression. It is self-administered and takes about ten minutes to complete. The BDI - 11 has been found to be valid in South African contexts (Pillay, Edwards, Gambu & Dhlomo, 2002).

Beck, Steer and Garbin (1988) found the BDI to have high levels of internal consistency ranging from .73 to .92 with a mean of .86. The Cronbach Alpha coefficients were found to be .86 and .81 for psychiatric and non-psychiatric populations, respectively. Groth-Mamat (1990) reported that test re-test reliabilities range from .48 to .86, depending on the interval between re-testing and the type of population. The author found through the use of meta-analytical studies that the BDI - 11 has high content validity and discriminant validity in differentiating between depressed and non-depressed people. The norms of the BDI - 11 are based on a sample, which included 226 psychiatric

in and out patients. It is suggested to be useful in research and in clinical settings. The BDI - 11 has been found to be valid in South African contexts (Pillay et al., 2002). For the purpose of this study, the scale has an acceptable validity for research. Each item of the BDI is concerned with particular aspects of the experience and symptomatology of depression (see appendix 3 and 7).

4.5.1.2 The Psychological Well-Being Scale

Ryffs (1989) Psychological Well-Being profile has been standardised by comparing it with subjective measures of psychological well-being (life satisfaction, positive and negative) and has been found to be linked significantly to personality factors (Edwards, Edwards & Basson, 2004; Schmutte & Ryff, 1997). The six subscales have been found to have high levels of internal consistency (Cronbach Alpha): positive relations with others .88; autonomy .83; environmental mastery .86; personal growth .85; purpose in life .88 and self-acceptance .91. The six subscales have also been found to have high levels of correlation with the original parent scale: positive relations with others .98; autonomy .97; environmental mastery .98; personal growth .97; purpose in life .98 and self-acceptance .99. This scale has a .89 level of Adjusted Goodness-of-Fit Index (AGFI), which suggests that it is a well-fitting model (see appendix 3 and 6)

4.6 Data analysis

The study used descriptive statistics to give a clear picture of the data. The results are presented using frequency tables and figures as they give a clear and coherent overall picture of the data.

According to Bryman and Cramer (2009) the chi square (X^2) statistic is used to investigate whether distributions of categorical variables differ from one another. In this study the statistical inference was used whereby the chi square test was employed to determine the relationship between regular and non-regular exercisers and depression and psychological well-being amongst students registered at the University of Limpopo (Turfloop Campus).

4.7 Research proposition

The research proposition for the study **was** as follows.

The influence of exercise reduces self-reported feelings of depression and increases the feelings of psychological well-being of undergraduate students registered at the University of Limpopo (Turfloop campus).

4.8 Reliability, validity and bias

4.8.1 Reliability

Reliability is concerned with the consistency of measures. An instrument that produces different scores every time it is used to measure an unchanging value has low reliability. It cannot be depended upon to produce an accurate measurement. On the other hand, an instrument that has always gives the same score when used to measure an unchanging value can be trusted to give an accurate measurement and is said to have high reliability (Bless, Higson-Smith & Sithole, 2013). In this study the surveys used are standardised and thus reliable and valid. Internal validity is assured as internal consistency (Cronbach alpha) is reported for the measures used under 4.5.1.1 and 4.5.1.2 and is shown to be appropriate for self-report surveys. The six subscales have been found to have high levels of internal consistency: positive relations with others .88; autonomy .83; environmental mastery .86; personal growth .85; purpose in life .88 and self-acceptance .91. The six subscales have also been found to have high levels of correlation with the original parent scale: positive relations with others .98; autonomy .97; environmental mastery .98; personal growth .97; purpose in life .98 and self-acceptance .99. This scale has a .89 level of Adjusted Goodness-of-Fit Index (AGFI), which suggests that it is a well-fitting model (Edwards, Edwards & Basson, 2004; Schmutte & Ryff, 1997).

4.8.2 Validity

Within validity, the measurement does not always have to be similar, as it does in reliability. However, a test cannot have high validity unless it also has high reliability. It is vital for a test to be valid in order for the results to be accurately applied and interpreted. According to Bless et al. (2013), there is internal validity and external validity. The questions have face validity and relate to the topic as they have been used in similar studies (Ryffs (1989) Psychological Well-Being profile has been standardised by comparing it with subjective measures of psychological well-being (life satisfaction, positive and negative) and has been found to be linked significantly to personality factors (Edwards, Edwards & Basson, 2004; Schmutte & Ryff, 1997).

4.8.3 Bias

According to Bless et al. (2013), bias is defined as any tendency which prevents unprejudiced consideration of a question. In research, bias occurs when systematic error is introduced into sampling or testing by selecting or encouraging one outcome or answer over others. In this research standardized measures were used to ensure that there were no ambiguous or badly defined questions. Other threats to reliability and validity occur through administrator bias when for instance, the researcher gives cues to how he or she would like a question answered. Awareness and insight into this fact helped give the researcher objectivity to administrator bias. Response bias is more pronounced with self-completed questionnaires since non-response is not a random process. This was partly controlled as although the questionnaire was self-report in nature respondents were asked to fill the survey in during a lecture period, which always improves response rates.

4.9 Ethical considerations

Ethical procedures maximise the protection of the participants and enhance the quality of the research. Ethical guidelines as laid down by the Health Professions Council of South Africa (Psychology Division) were followed when conducting the research (see appendix 2).

4.9.1 Informed consent

The coaches of the relevant sport clubs/teams were approached for consent for the athletes to participate in this study. Once consent had been obtained, the information letter was given to the participants notifying them of the purpose of the research, as well as their right to decline participation and withdraw from the study at any time, without any negative consequence, in order for them to participate freely. The researcher also addressed the athletes and gave the same information verbally. Athletes were required to complete a consent form before filling out the questionnaire. In addition to this participants were given the opportunity to ask clarifying questions from the researcher. The same procedure was followed for the non-exercisers.

4.9.2 Confidentiality

The participants' right to privacy was observed throughout the study. The information that was obtained was treated confidentially. Further, in the interest of confidentiality, the questionnaires were kept separately from the consent forms (after they have been collected) and no identifying details were included on the questionnaires (see appendix 1).

4.9.3 Permission

Permission to conduct the research was gained through the relevant University of Limpopo (Turfloop campus) ethics committees. The coaches of the relevant sport clubs/teams were approached for consent for the athletes to participate in this study as were the athletes themselves. Permission was also obtained from class co-ordinators for 1, 2, and 3rd level students to approach possible participants. Participants (non-exercisers) were also asked to give consent if they agreed to participate in the study.

4.10 Summary

This chapter discussed the research methodology used in this study. It explained the research design that was selected for the purpose of the study. It further explained the rationale for the research population and sample that was included in the study. It also clarified the data collection and analysis procedures. The survey tools used to collect the information were named and described. The chapter further explained issues related to reliability, validity and bias related to the research. Ethical considerations were also discussed. The following chapter presents the research results and analysis.

CHAPTER 5: RESULTS AND ANALYSIS

5.1 Introduction

This chapter will present the results of the study. Firstly, the study demographics will be presented in section A, results from the Becks Depression Inventory 11 (Beck et al., 1961) will be presented in section B and lastly results from the Psychological Well Being Scale (Ryff, 1989) will be presented in section C.

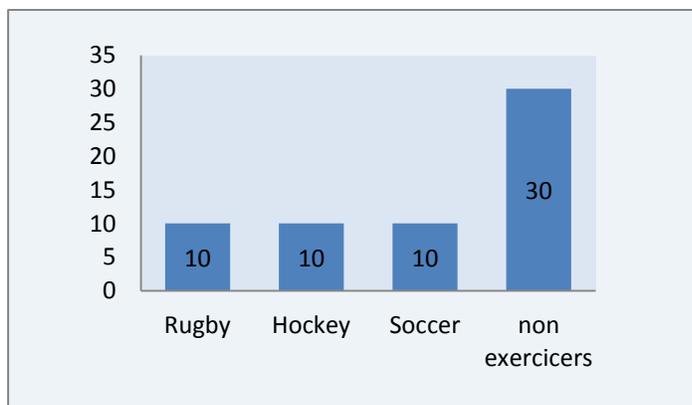
5.2 Section A: Demographics

This section focuses on the study demographics and is presented using frequency tables and figures, where appropriate. If statistics were the same it was not considered necessary to use figures to illustrate data. All participants were African (Black).

Frequency table 1: Regular exercisers (sports) versus non- regular exercisers

	Frequency	Percent (%)
Rugby	10	16.7
Hockey	10	16.7
Soccer	10	16.7
Non-exercisers	30	16.7
Total	60	100%

Figure 1: Regular exercisers (sports) versus non- regular exercisers



Frequency Table 1 and Figure 1 indicate that 16.7% of the regular exercisers were Rugby players (10 participants), 16.7 % of the regular exercisers were Hockey players (10 participants), 16.7% of the exercisers were soccer players (10 participants) and 50 % of the respondents were non – regular exercisers (30 participants) which makes a total of 60 participants.

Frequency table 2: Female and male non-regular exercisers

	Frequency	Percent (%)
Male	15	50
Female	15	50
Total	30	100

Frequency table 2 indicates that half (50%) of the participants who were non-regular exercisers are male and 50% female.

Frequency table 3: Male regular exercisers

	Frequency	Percent (%)
Hockey	5	8.3
Rugby	5	8.3
Soccer	5	8.3
Total	15	25

Frequency table 3 indicates that of the male regular exercisers 5 or 8.3% of each of the participants play hockey, rugby or soccer.

Frequency table 4: Female regular exercisers

	Frequency	Percent (%)
Hockey	5	8.3
Rugby	5	8.3
Soccer	5	8.3
Total	15	25

Frequency table 4 indicates that of the female regular exercisers 5 or 8.3% of each of the participants play hockey, rugby or soccer.

Frequency table 5: Gender

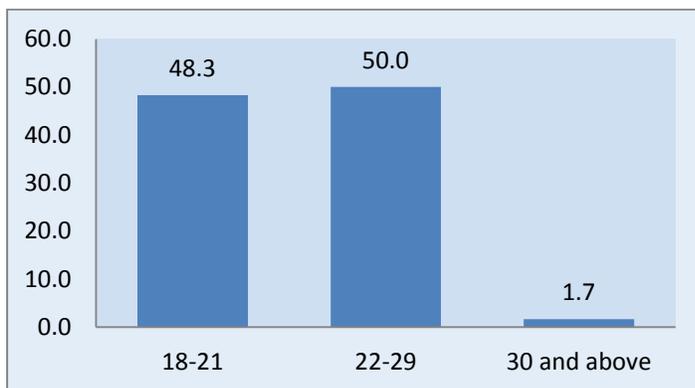
	Frequency	Percent (%)
Male	30	50
Female	30	50
Total	60	100

Frequency table 5 indicates that 50% of the respondents were females (30 participants) and 50% of the respondents were males (30 participants).

Frequency table 6: Age

	Frequency	Percent (%)
18-21	29	48.3
22-29	30	1
30 and above	1	1.7
Total	60	100

Figure 2: Age

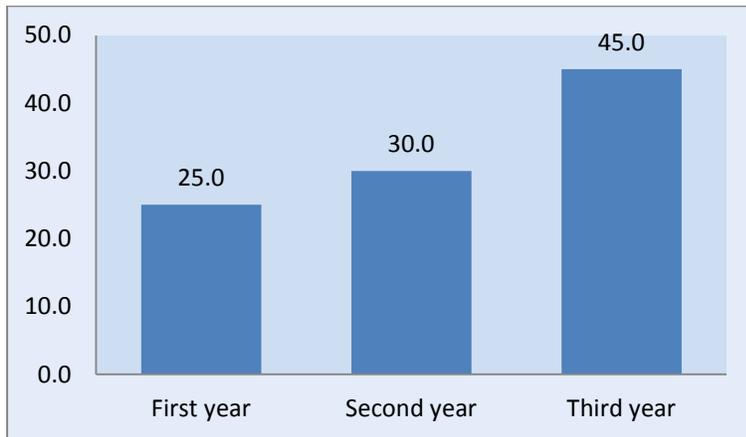


Frequency table 6 and figure 2 indicate that 48.3 % (29 participants) of the respondents were age 18-21 years, 50.0 % (0 participants) of the respondents were age 22-29 years, and 1 % (1 participant) of the respondent was age 30 and above.

Frequency table 7: Level of study

	Frequency	Percent (%)
First year	15	25.0
Second year	18	30.0
Third year	27	45.0
Total	60	100

Figure 3: Level of study



Frequency table 5 and figure 3 indicate that 25 % (15 participants) of the respondent's level of study was first year, 30 % (18 participants) of the respondent's level of study was second year and 45 % (27 participants) of the respondent's level of study was third year.

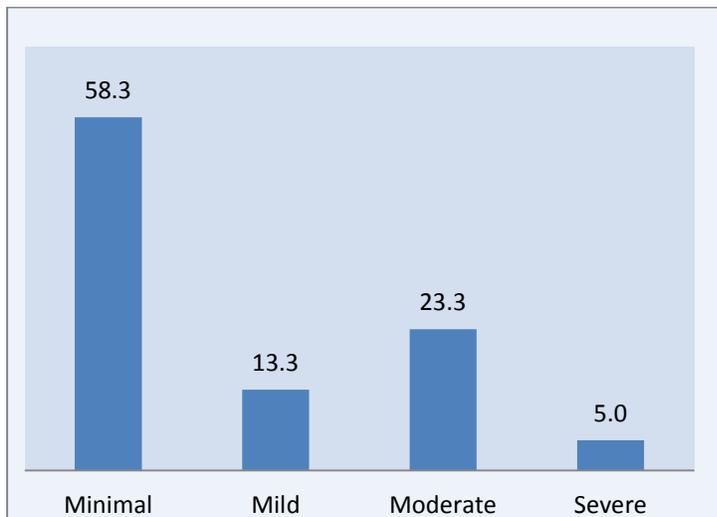
5.3 Section B: Results from the Becks Depression Inventory 11, BDI - 11 (Beck et al., 1961).

The following results were obtained from the BDI – 11. The results are presented with a brief explanation for each table, figure and chi-square. Chi square results are deemed significant marked effects significant if $p \leq 0.05$.

Frequency table 8: Levels of depression on the BDI - 11

	Frequency	Percent (%)
Minimal	35	58.3
Mild	8	13.3
Moderate	14	23.3
Severe	3	5.0
Total	60	100

Figure 4: Levels of depression on the BDI – 11



Frequency table 8 and figure 4 indicate that 58.3 % of the respondents (35 participants) were minimally depressed, 13.3 % of the respondents (13 participants) were mildly depressed, 23.3 % of the respondents (14 participants) were moderately depressed and 5.0 % (3 participants) were severely depressed.

Frequency table 9: Regular exercisers versus non- regular exercisers

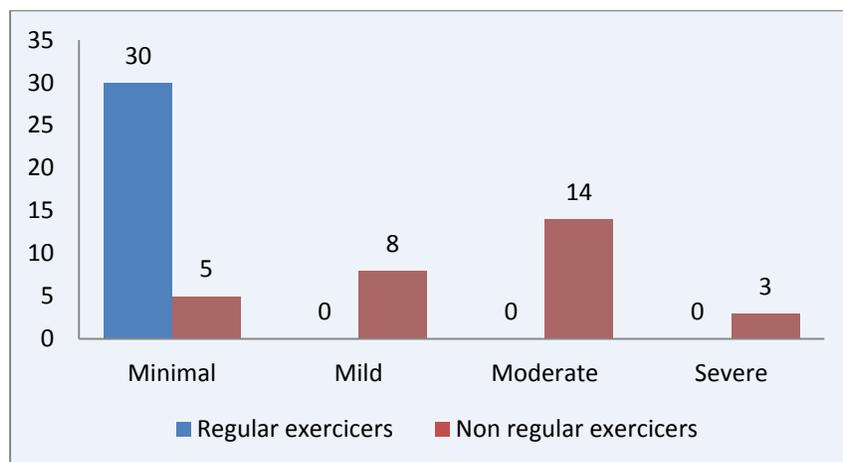
	Frequency	Percent	Valid Percent	Cumulative Percent
Regular exercisers	30	50.0	50.0	50.0
Non - exercisers'	30	50.0	50.0	100.0
Total	60	100.0	100.0	

Frequency table 9 indicates that 50 % of the respondents (30 participants) were non- regular exercisers and 50% of the respondents (30 participants) were regular exercisers (thus no need for a figure).

Cross-tabulation table 1: Regular exercisers versus non –regular exercisers and depression

			Depression				Total
			Minimal	Mild	Moderate	Severe	
Sport	Regular exercisers'	Count	30	0	0	0	30
		% of Total	50.0%	0.0%	0.0%	0.0%	50.0%
	Non exercisers'	Count	5	8	14	3	30
		% of Total	8.3%	13.3%	23.3%	5.0%	50.0%
Total		Count	35	8	14	3	60
		% of Total	58.3%	13.3%	23.3%	5.0%	100.0%

Figure 5: Regular exercisers versus non –regular exercisers and depression



Cross tabulation table 1 and figure 5 indicate that 50% of the respondents (30 participants) who are regular exercisers presented with minimal depression whereas 8.3% of the respondents (5 participants) who are non-regular exercisers presented with minimal depression, 13.3% (8) of the non-regular exercisers presented with moderate depression and 5% (3) of the non regular exercisers reported severe depression.

Chi-square table 1: Exercise and effect on depression

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	42.857 ^a	3	.000
Likelihood Ratio	54.470	3	.000
Linear-by-Linear Association	34.782	1	.000
N of Valid Cases	60		

According to the results reported in chi-square table 1, the p-value is 0.000 which is a significant difference as less than $p \leq 0.05$. The results suggest that exercise has a positive impact in on depression.

Chi square table 2: Levels of depression across the entire sample of exercisers versus non- regular exercisers

Depression		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
	N of Valid Cases	3				
depression	Pearson Chi-Square	11.380	1	.001	.002	.001
	Continuity Correction	9.697	1	.002		
	Likelihood Ratio	11.789	1	.001		
	Fisher's Exact Test					
	Linear-by-Linear Association	11.191	1	.001		
	N of Valid Cases	60				

According to the results presented in chi square table 2 the p value is $p=0.001$ which is a significant difference as less than $p \leq 0.05$. The results suggest that there is a significant difference amongst exercisers and non-exercisers in relation to exercise having a positive impact on depression and psychological well-being.

5.3.1 Gender and levels of depression regular exercisers versus non-regular exercisers

Generally, depression is diagnosed more in males than females. It is thought that this is because females are more likely to be able to verbalise and communicate feelings of depression as opposed to males (DSM – 5, 2013).

Cross tabulation table 2: Reported depression in male and female exercisers and non - regular exercisers

Sport			Depression				Total
			Minimal	Mild	Moderate	Severe	
Regular exercisers	Gender	Male	15				15
		Female	15				15
		Total	30				30
Non – regular exercisers	Gender	Male	2	5	6	2	15
		Female	3	3	8	1	15
		Total	5	8	14	3	30
Total	Gender	Male	17	5	6	2	30
		Female	18	3	8	1	30
		Total	35	8	14	3	60

Cross tabulation table 2 indicates that of the sample of regular exercisers 15 male and 15 female participants reported minimal or non-clinical depression and none reported mild, moderate or severe depression. Of the non-exercisers 2 males and 3 females reported minimal depression, 5 males and 3 females reported mild depression, 6 males and 8 females reported moderate depression and 2 males and 1 females reported severe depression. In the non-exercising sample 17 of the participants (more than 50%) reported moderate to severe depression which could possibly lead to clinical depression. These individuals were referred to appropriate professionals on campus. The table does not support statements in the DSM – 5 which indicate that males are less likely to report depression than females.

Chi square table 3: Depression in male and female regular exercisers and non – regular exercisers

Gender		Value	df	Asymp. Sig. (2-sided)
Male	Pearson Chi-Square	22.941 ^b	3	.075
	Likelihood Ratio	29.274	3	.075
	Linear-by-Linear Association	17.413	1	.075
	N of Valid Cases	30		
Female	Pearson Chi-Square	20.000 ^c	3	.075
	Likelihood Ratio	25.369	3	.075
	Linear-by-Linear Association	16.789	1	.075
	N of Valid Cases	30		
Total	Pearson Chi-Square	42.857 ^a	3	.075
	Likelihood Ratio	54.470	3	.075
	Linear-by-Linear Association	34.782	1	.075
	N of Valid Cases	60		

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.50.

b. 6 cells (75.0%) have expected count less than 5. The minimum expected count is 1.00.

c. 6 cells (75.0%) have expected count less than 5. The minimum expected count is .50.

According to the results reported in chi-square table 3, the p-value is 0.075 which is not a significant difference as more than $p \leq 0.05$. The results suggest that both male and female regular and non-regular exercisers report similar levels of depression. This does not support the statement in the DSM – 5 (2013) that males are less likely to report depression than females.

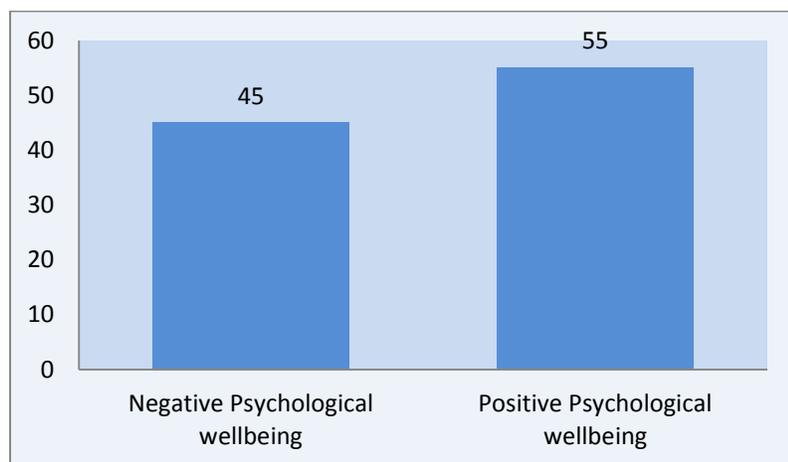
5.4 Section C: Results from the Ryffs Psychological well-being scale (1989)

The following results were obtained from the Psychological well-being scale (Ryff, 1989). The results are presented with a brief explanation for each table, figure and chi-square test (marked effects significant $p \leq 0.05$).

Frequency table 10: Levels of psychological well-being

	Frequency	Percent
Negative Psychological wellbeing	27	45.0
Positive Psychological wellbeing	33	55.0
Total	60	100

Figure 6: Levels of psychological well-being

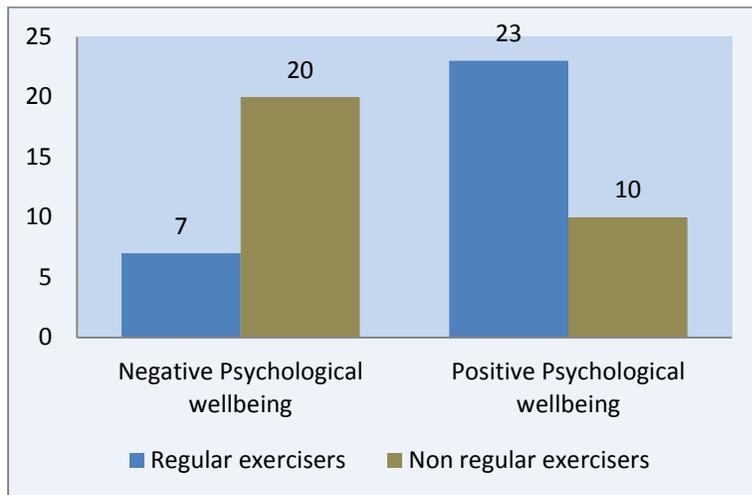


Frequency table 10 and figure 6 indicate that 45% of the respondents (27 participants) had a negative psychological well-being and 55% of the respondents (33 participants) had a positive psychological well-being.

Cross tabulation 3: Regular exercisers versus non-regular exercisers and psychological well-being

			Psychological		Total
			Negative Psychological wellbeing	Positive Psychological wellbeing	
Sport	Regular exercisers	Count	7	23	30
		% of Total	11.7%	38.3%	50.0%
	Non regular exercisers	Count	20	10	30
		% of Total	33.3%	16.7%	50.0%
Total		Count	27	33	60
		% of Total	45.0%	55.0%	100.0%

Figure 7: Regular exercisers versus non-regular exercisers and psychological well-being



Cross tabulation 2 and figure 7 indicate that 11.7% of the respondents (7 participants) who are regular exercisers had a negative psychological well-being and 38.3% of the respondents (23 participants) who are regular exercisers had a positive psychological well-being. It further indicated that 33.3% of the respondents (20 participants) who are non-exercisers had a negative psychological well-being and 16.7% of the respondents (10 participants) who are non-exercisers had a positive psychological well-being.

Chi-square table 4: Exercise and psychological well-being

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11.380 ^a	1	.001		
Continuity Correction ^b	9.697	1	.002		
Likelihood Ratio	11.789	1	.001		
Fisher's Exact Test				.002	.001
Linear-by-Linear Association	11.191	1	.001		
	60				

According to the results reported in chi-square test in table 4, the p-value is 0.001 which is a significant difference as less than $p \leq 0.05$. The results suggest that exercise has a positive impact on psychological well-being.

5.4.1 Gender and psychological well-being regular exercisers versus non- regular exercisers

The following table indicates gender and psychological well-being amongst regular exercisers and non-regular exercisers in the sample.

Cross tabulation 4: Gender and psychological well-being regular exercisers versus non-regular exercisers

Sport			Psychological		Total
			Negative Psychological wellbeing	Positive Psychological wellbeing	
Regular exercisers	Gender	Male	6	9	15
		Female	1	14	15
	Total		7	23	30
Non regular exercisers	Gender	Male	14	1	15
		Female	6	9	15
	Total		20	10	30
Total	Gender	Male	20	10	30
		Female	7	23	30
	Total		27	33	60

Cross tabulation table 4 indicates that of the regular exercisers 6 (10%) males and 1 female (1.66%) report a negative psychological well-being while 9 (15%) of the males and 14 (23.33%) of the females report a positive psychological well-being. Of the non-regular exercisers 14 males (23.33%) and 6 (10%) females report a negative psychological well-being and 1 male (1.66%) and 9 females (15%) report a positive psychological well-being. Fundamentally, more regular exercisers report positive psychological well-being (38.33%) and more females (23.33%) than males (15%) reported a positive psychological well-being.

Cross tabulation 5: Overall psychological well-being exercisers versus non regular exercisers

Sport				Depression				Total
				Minimal	Mild	Moderate	Severe	
Regular exercisers	Psychological	Negative Psychological wellbeing	Count % of Total	7 23.3%				7 23.3%
		Positive Psychological wellbeing	Count % of Total	23 76.7%				23 76.7%
	Total		Count % of Total	30 100.0%				30 100.0%
Non regular exercisers	Psychological	Negative Psychological wellbeing	Count % of Total	2 6.7%	5 16.7%	10 33.3%	3 10.0%	20 66.7%
		Positive Psychological wellbeing	Count % of Total	3 10.0%	3 10.0%	4 13.3%	0 0.0%	10 33.3%
	Total		Count % of Total	5 16.7%	8 26.7%	14 46.7%	3 10.0%	30 100.0%
Total	Psychological	Negative Psychological wellbeing	Count % of Total	9 15.0%	5 8.3%	10 16.7%	3 5.0%	27 45.0%
		Positive Psychological wellbeing	Count % of Total	26 43.3%	3 5.0%	4 6.7%	0 0.0%	33 55.0%
	Total		Count % of Total	35 58.3%	8 13.3%	14 23.3%	3 5.0%	60 100.0%

Cross tabulation table 5 indicates that 7 regular exercisers (23.7%) reported minimal depression while no regular exercisers (male or female) reported mild, moderate or severe depression. Twenty three exercisers (76.7%) reported positive psychological well-being. Of the non-regular exercisers 2 (6.7%) reported minimal depression and indicated a negative psychological well-being, 5 (16.7%) reported mild depression and indicated a negative psychological well-being, 10 (33.3%) reported moderate depression and indicated a negative psychological well-being while none (0%) reported severe depression and indicated a negative psychological well-being. Of the non-exercisers who indicated a positive psychological well-being 26 (43.3%) reported minimal depression, 3 (5%) reported mild depression and 4 reported moderate depression.

Chi-square table 5: Exercise and psychological well-being

Gender		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Male	Pearson Chi-Square	9.600 ^c	1	.002		
	Continuity Correction ^b	7.350	1	.007		
	Likelihood Ratio	10.653	1	.001		
	Fisher's Exact Test				.005	.003
	Linear-by-Linear Association	9.280	1	.002		
	N of Valid Cases	30				
Female	Pearson Chi-Square	4.658 ^d	1	.031		
	Continuity Correction ^b	2.981	1	.084		
	Likelihood Ratio	5.058	1	.025		
	Fisher's Exact Test				.080	.040
	Linear-by-Linear Association	4.503	1	.034		
	N of Valid Cases	30				
Total	Pearson Chi-Square	11.380 ^a	1	.001		
	Continuity Correction ^b	9.697	1	.002		
	Likelihood Ratio	11.789	1	.001		
	Fisher's Exact Test				.002	.001
	Linear-by-Linear Association	11.191	1	.001		
	N of Valid Cases	60				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.50.

b. Computed only for a 2x2 table

c. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.00.

d. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.50.

According to the results reported in chi-square test table 4, the p-value is 0.001 which is a significant difference as less than $p \leq 0.05$. The results suggest that female regular exercisers and non-regular exercisers are more likely to have a positive psychological well-being than male regular exercisers and non-regular exercisers.

5.5 Summary

This chapter presented and analysed the results of the study. The following chapter discusses the results and presents the research conclusion.

CHAPTER 6: DISCUSSION OF RESULTS AND CONCLUSION

6.1 Introduction

This chapter discusses the results presented in the previous chapter underpinned by the study framework and research proposition.

6.2 Discussion of results

The results of the research support the study proposition as noted below.

The influence of exercise reduces self-reported feelings of depression and increases the feelings of psychological well-being of undergraduate students registered at the University of Limpopo (Turfloop campus).

The following discussion supports the proposition statement which is further strengthened when discussed in terms of Deci and Ryan's (2008) self-determination theory (SDT).

This study focused on the 1st, 2nd and 3rd undergraduate students of the University of Limpopo (Turfloop Campus), 60 participants (30 males and 30 females), from ages 18 to 30 and above (see frequency table 2, 3, 5, 6, and 7). According to the results the majority of students who exercised regularly reported minimal feelings of depression and positive psychological well-being whereas students who did not exercise regularly reported higher feelings of depression and negative psychological well-being (see cross tabulation 2). The results were obtained from the chi-square tests on the two scales (BDI-II and Psychological well-being scale) used in the study (see chi square tables 1, 2 and 3 and cross tabulation table 3). Exercisers have the required motivation and behaviour patterns which are requirements for independence and competence in relation to healthy human functioning as required by the Self Determination Theory (Ryan & Deci, 2008). However, non-exercisers display amotivation and behaviours (by not participating in exercise at all) which are likely to lead to an unhealthier lifestyle which could lead to earlier decline of cognitive function or obesity, for instance (Teixeira, et al., 2012). However, it must also be noted that a few students who exercised regularly (7 or 23.3%) reported minimal depression, which is equivalent to normal or non-clinical depression. It is likely that this portion of the sample experienced and reported minimal or non-clinical depression because collection of data took place before exams which causes some level of anxiety and stress in student populations.

The students who were not regular exercisers showed more negative psychological well-being and reported more feelings of depression, which is a challenge or stumbling block for them when coping with academic (for instance, exams) and social life (for instance, peer group relationships) on campus. Females showed a more positive psychological well-being than males in the study, the reason for this needs further exploration. Males and females overall showed no significant difference in terms of reported depression. This does not relate to DSM – 5 (2013) reports that females are more likely to report depression than males, however the sample size was small which must be taken into account. A factor that hinders non-exercisers from exercising is motivation. Motivation is required for individuals to want to participate in any physical activity. According to Ryan et al. (2009), lack of motivation can be explained by insufficient interest, lack of knowledge about the value of exercise outcomes and competing demands on their time. Lack of knowledge about the benefits of exercise can be remedied through interventions during 1st year orientation and presentations by sports clubs throughout the year.

6.3 Conclusion

Research in South Africa of a similar nature (Bydawell, 2005; Edwards, 2001; Edwards et al., 2004; Edwards et al., 2005) also supports the results and conclusion of the present study namely that exercise enhances psychological well-being and reduces feelings of anxiety, stress and/or depression. Most international studies support the fact that exercise reduces feelings of depression and increases psychological well-being be it in communities, universities, amongst mature adults, students, elderly or mentally ill patients (for instance, Carek et al., 2011; De Moor et al., 2013; Morgan et al., 2013). Negative side effects are few but are indicated in individuals with exercise dependence and are usually related to eating disorders (Freimuth et al., 2011). In the present study students who exercised regularly did benefit positively in terms of overall well-being and less indicators of particularly moderate and severe as opposed to those who did not exercise regularly. This was indicated by the quantitative results which supported factors in Ryan & Deci's (2008) self-determination theory (SDT). It was further noted that the element required in order for non-exercising students to participate in any physical activity is motivation and knowledge which is also underpinned by SDT. Females in the study reported significantly more positive psychological well-being than males and both males and females did not differ significantly in terms of reported depression.

CHAPTER 7: RESEARCH STRENGTHS, LIMITATIONS AND RECOMMENDATIONS

7.1 Introduction

This chapter gives the research strengths, limitations and recommendations arising out of the study.

7.2 Research recommendations

The results of this research indicate that research has a beneficial effect on depression and psychological well-being it is recommended that:

- A larger study should be conducted using a random sample.
- Results of the study are made available to appropriate university bodies so that interventions at first year recommending that students join sports clubs and/or exercise regularly are instituted.
- Regular workshops on the benefits of exercise and well-being are conducted at the University of Limpopo (Turfloop campus).
- Further research is needed to investigate why females reported a more positive psychological well-being as compared to males.

7.3 Research evaluation

7.3.1 Methodological weaknesses

- Sample size – a larger random sample would have been better in terms of reliability and validity.
- Open-ended questions aimed at finding out more about why students do (motivation) or do not exercise (amotivation) would have been beneficial in terms of gaining a more in-depth knowledge of student behaviour.

7.3.2 Methodological strengths

- The scales were standardised and thus reliable and valid.
- The sample size was appropriate for an exploratory study at the campus.

7.4 Summary

The chapter summarised the research weaknesses, strengths and recommendations of the study.

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APPENDIX 1: Cover letter

UNIVERSITY OF LIMPOPO (Turfloop
campus)

Department of Psychology

Dear student:

Invitation to participate in a research study titled: The influence of exercise on depression and psychological well-being amongst students at the University of Limpopo (Turfloop Campus)

My name is Tshikovhele Khodani Lucky; I am a Masters student in Clinical Psychology. I would like to invite you to participate in the study. The aim of this study is to investigate the relationship between regular exercise, depression and psychological well-being amongst undergraduate students registered at the University of Limpopo (Turfloop campus).

Your answers to this questionnaire will be treated confidently. Your co-operation will be highly appreciated. For further inquiries you can e mail me at: kholvot@yahoo.com or e-mail my supervisor Prof K A Nel at: knel@ul.ac.za

Thank you

Tshikovhele K.L

Masters Student (Clinical Psychology)

Supervisor Prof Kathryn Nel (Dept. Psychology)

APPENDIX 2: TRECS Ethical Clearance forms

FORM B – PART I

PROJECT TITLE: THE INFLUENCE OF EXERCISE ON DEPRESSION AND PSYCHOLOGICAL WELL-BEING AMONGST UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF LIMPOPO (TURFLOOP CAMPUS)

PROJECT LEADER: TSHIKOVHELE KL

DECLARATION

I, the signatory, hereby apply for approval to conduct research described in the attached research proposal and declare that:

1. I am fully aware of the guidelines and regulations for ethical research and that I will abide by these guidelines and regulations as set out in documents (available from the Secretary of the Ethics Committee); and
2. I undertake to provide every person who participates in this research project with the relevant information in Part III. Every participant will be requested to sign Part IV.

Name of Researcher: TSHIKOVHELE KL

Signature:.....

Date:

For Official use by the Ethics Committee:approved/Not approved

Remarks:.....

.....

Signature of Chairperson:.....

Date:.....

PART II: PROJECT TITLE: THE INFLUENCE OF EXERCISE ON DEPRESSION AND PSYCHOLOGICAL WELL-BEING AMONGST UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF LIMPOPO (TURFLOOP CAMPUS)

PROJECT LEADER: TSHIKOVHELE KL

Protocol for conducting research using human participants

1. Department: Psychology
Title of project: The influence of exercise on depression and psychological well-being amongst students in the University of Limpopo

3. Full name, surname and qualifications of project leader: TSHIKOVHELE KL . MASTERS IN CLINICAL PSYCHOLOGY 1

4. List the name(s) of all persons (Researchers and Technical Staff) involved with the project and identify their role(s) in the conduct of the experiment:

Name:**TSHIKOVHELE KL**Qualifications:**M1 CLIN PSYCH** Responsible for:**Tshikovhele KL MA Clinical Psychology**

5. Name and address of principal researcher: Tshikovhele K L, PO Box 386, Shayandima, 0945.

6. Procedures to be followed: Participants will be informed about the nature, significance and relevance of the study and will be asked to sign a consent form.

7. Nature of discomfort: The research may hold some psychological risks, participants may experience uncomfortable feelings after filling in the survey questionnaire.

8. Description of the advantages that may be expected from the results of the study:

Signature of Project Leader:.....

Date:

PART III: INFORMATION FOR PARTICIPANTS

PROJECT TITLE: THE INFLUENCE OF EXERCISE ON DEPRESSION AND PSYCHOLOGICAL WELL-BEING AMONGST UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF LIMPOPO (TURFLOOP CAMPUS)

PROJECT LEADER: TSHIKOVHELE KL

1. You are invited to participate in the following research project:
2. Participation in the project is completely voluntary and you are free to withdraw from the project (without providing any reasons) at any time.
3. It is possible that you might not personally experience any advantages during the project, although the knowledge that may be accumulated through the project might prove advantageous to others.
4. You are encouraged to ask any questions that you might have in connection with this project at any stage. The project leader and her/his staff will gladly answer your question. They will also discuss the project in detail with you.
5. It may be that you experience or feel discomfort when filling in the questionnaire. You may contact me at kholvot@yahoo.com if this happens and I will ensure that you are referred to someone that you can discuss the issue with. If you prefer you may contact the project leader Prof K A Nel knel@ul.ac.za who will also ensure that you get the help you need. The advantage of talking to someone will be that the individual will be a professional and able to understand the position you are in. Female students will be better able to understand their use of alcohol when they have completed the survey, this will give them insight into whether they have a problem or not. The results of the study will help guide future research regarding areas that still need investigating on the subject
6. Should you at any stage feel unhappy, uncomfortable or is concerned about the research, please contact **Ms NokoShai-Ragoboya at the University of Limpopo, Private Bag X1106, Sovenga, 0727, tel: 015 268 2401.**

PART IV: CONSENT FORM

PROJECT TITLE: THE INFLUENCE OF EXERCISE ON DEPRESSION AND PSYCHOLOGICAL WELL-BEING AMONGST UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF LIMPOPO (TURFLOOP CAMPUS)

PROJECT LEADER: TSHIKOVHELE KL

I, hereby voluntarily consent to participate in the following project: THE INFLUENCE OF EXERCISE ON DEPRESSION AND PSYCHOLOGICAL WELL-BEING AMONGST UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF LIMPOPO (TURFLOOP CAMPUS)

I realise that:

1. The study deals with the influence of exercise on depression and psychological well-being amongst undergraduate students registered at the University of Limpopo (Turfloop campus)
2. The procedure or treatment envisaged may hold some risk for me that cannot be foreseen at this stage.
3. The Ethics Committee has approved that individuals may be approached to participate in the study.
4. The research project, ie. the extent, aims and methods of the research, has been explained to me.
5. The project sets out the risks that can be reasonably expected as well as possible discomfort for persons participating in the research, an explanation of the anticipated advantages for myself or others that are reasonably expected from the research and alternative procedures that may be to my advantage.
6. I will be informed of any new information that may become available during the research that may influence my willingness to continue my participation.
7. Access to the records that pertain to my participation in the study will be restricted to persons directly involved in the research.
8. Any questions that I may have regarding the research, or related matters, will be answered by the researcher/s.

9. If I have any questions about, or problems regarding the study, or experience any undesirable effects, I may contact a member of the research team or Ms NokoShai-Ragoboya.
10. Participation in this research is voluntary and I can withdraw my participation at any stage.
11. If any medical problem is identified at any stage during the research, or when I am vetted for participation, such condition will be discussed with me in confidence by a qualified person and/or I will be referred to my doctor.
12. I indemnify the University of Limpopo and all persons involved with the above project from any liability that may arise from my participation in the above project or that may be related to it, for whatever reasons, including negligence on the part of the mentioned persons.

SIGNATURE OF RESEARCHED PERSON

SIGNATURE OF WITNESS

SIGNATURE OF PERSON THAT INFORMED PARENT/GUARDIAN
THE RESEARCHED PERSON

Signed at _____ this ____ day of _____ 20__

APPENDIX 3: QUESTIONNAIRE

SECTION A: DEMOGRAPHIC INFORMATION

Instructions: Please tick where appropriate.

1. Gender

MALE	
FEMALE	

2. AGE

18-21	
22-29	
29-30	

3. RACE

BLACK	
WHITE	
COLOURED	
INDIAN/ASIAN	

4. LEVEL OF STUDY

FIRST YEAR	
SECOND YEAR	
THIRD YEAR	

SECTION B: BECKS DEPRESSION INVENTORY - 11 (BDI – 11)

SECTION C: PSYCHOLOGICAL WELL-BEING SCALE (Ryff, 1989)

The following set questions deals with how you feel about yourself and your life. Please remember that there are no right or wrong answers.

Circle the number that best describe your present agreement or disagreement with each statement.	Strongly disagree	Disagree Somewhat	Disagree slightly	Agree slightly	Agree Somewhat	Strongly agree
1.I tend to be influenced by people with strong opinions						
2.I think it is important to have new Experiences that challenge how you think about yourself						
3.In general I feel I'm in charge of the situation in which I live						
4.I live life one day at a time and don't really think about the future						
5. Maintaining close relationships has been difficult and frustrating for me						
6.When I look at the story of life, i am pleased with how things have turned out						
7. I have confidence in my opinions, even if they are contrary to the general consensus.						
8. For me, life has been a continuous process of learning, changing and growth						
9.The demands of everyday life often get me down						
10.Some people wonder aimlessly through life, but I am not one of those people						

11. People would describe me as a giving person willing to share my time with others						
12. I like most aspects of my personality						
13. I judge myself by what I think it's important, not by values of what others think is important						
14. I gave up trying to make big improvements or changes in my life a long time ago						
15. I am quite good at managing the many responsibilities of my daily life						
16. I sometimes feel as if I've done all there is to do in life						
17. I have not experienced many warm and trusting relationships with others						
18. In many ways, I feel disappointed about my achievements in life						

APPENDIX 4

Psychosocial theory (Erik Erikson)

Erikson he was interested in how children or human socialize and how this affects their sense of self. Erikson believed that each stage of development was focused on overcoming a conflict. According to the theory successful completion of each stage results in a healthy personality and successful interactions with others while failure to successfully complete a stage can result in the reduced ability to complete further stages and therefore a more unhealthy personality and sense of self.

Stage (age)	Psychosocial crisis	Significant relations	Psychosocial modalities	Psychosocial virtues	Maladaptations & malignancies
I (0-1) -- infant	trust vs mistrust	mother	to get, to give in return	hope, faith	sensory distortion -- withdrawal
II (2-3) -- toddler	autonomy vs shame and doubt	parents	to hold on, to let go	will, determination	impulsivity -- compulsion
III (3-6) -- pre-schooler	initiative vs guilt	family	to go after, to play	purpose, courage	ruthlessness -- inhibition
IV (7-12 or so) -- school-age child	industry vs inferiority	neighbourhood and school	to complete, to make things together	competence	narrow virtuosity -- inertia
V (12-18 or so) -- adolescence	ego-identity vs role-confusion	peer groups, role models	to be oneself, to share oneself	fidelity, loyalty	fanaticism -- repudiation
VI (the 20's) -- young adult	intimacy vs isolation	partners, friends	to lose and find oneself in a another	love	promiscuity -- exclusivity
VII (late 20's to 50's) -- middle adult	generativity vs self-absorption	household, workmates	to make be, to take care of	care	overextension -- rejectivity
VIII (50's and beyond) -- old adult	integrity vs despair	mankind or "my kind"	to be, through having been, to face not being	wisdom	presumption -- despair

APPENDIX 5: Jacobson's (1934) relaxation technique

Progressive Muscle Relaxation (PMR) is a relaxation technique that requires an individual to focus on flexing and holding a certain set of muscles and then slowly relaxing those same muscles. As the individual flexes and releases those muscles from top to bottom they will feel a deep sense of relaxation. Progressive Muscle Relaxation is an adapted version of the Jacobsons Relaxation Technique developed in the 1930's.

An individual has to allow him or herself 15–20 minutes to complete this relaxation technique. He or she must find a place that is warm, quiet and free from disturbances. If possible dim the lights and tell people that you should not be disturbed – you may want to switch off any phones. Make yourself comfortable on the floor, on the bed or in a chair. Snuggle down and settle your body so that it feels limp.

What a person needs to do is as follows

- Gently breathe in – hold – and let go.
- Gently pull your toes up towards your knees – just a little – hold briefly – and let go. Recognise the difference.
- Press your heels into the floor – hold – and let go.
- Pull your knees together – hold briefly – now let them drift apart a little. Be aware of the new position.
- Squeeze your buttocks together – hold – now let go.
- Gently pull in your tummy muscles towards your spine – hold briefly – now let go. Feel the difference.
- Shoulders – gently pull them up towards your ears, just enough to recognise the tension – hold briefly – now let go. Recognise the new position.
- Gently press your elbows and upper arms to the sides of your body – hold for a moment – now let go.
- Hands – gently clench – hold – and let go.
- Push your head forward slightly – hold briefly – now let your head go back to a balanced position. Feel the difference.
- Grit your teeth together – hold briefly – now let your jaw sag slightly. Feel the difference.
- Lips – press together – now let go until hardly touching. Purse your lips – now let go and feel the difference.
- Press your tongue briefly to the roof of your mouth – hold – and let it drop loosely. Feel the new position.
- Eyes – screw them up a little – hold – and let go.
- Forehead – frown a little – hold – now let go.

APPENDIX 6: Description of Ryff's (1989) Psychological well-being scale

This standardised scale of objective psychological well-being is theoretically grounded on Maslow's (1968) conception of self-actualisation, Rogers' (1961) view of the fully functioning person, Jung's (1933) formulation of individuation, Allport's (1961) conception of maturity, Erikson's (1959) psychosocial model, Buchler's (1935) basic life fulfilment tendencies, Neugarten's (1973) descriptions of personality change in adulthood and old age and Jahoda's (1958) six criteria for positive mental health (Keyes, Shmotkin & Ryff, 2001; Edwards, Edwards & Basson, 2004). For the purposes of this study the 18 item scale will be used to assess the participants on the following six dimensions of well-being: positive relations with others, autonomy, environmental mastery, personal growth, purpose in life and self-acceptance.

Ryff's (1989) Psychological Well-Being profile has been standardised by comparing it with Subjective measures of psychological well-being (life satisfaction, positive and negative) and has been found to be linked significantly to personality factors (Edwards, Edwards & Basson, 2004; Schmutte & Ryff, 1997). The six subscales have been found to have high levels of internal consistency: positive relations with others .88; autonomy .83; environmental mastery .86; personal growth .85; purpose in life .88 and self-acceptance .91. The six subscales have also been found to have high levels of correlation with the original parent scale: positive relations with others .98; autonomy .97; environmental mastery .98; personal growth .97; purpose in life .98 and self-acceptance .99. This scale has a .89 level of Adjusted Goodness-of-Fit Index (AGFI), which suggests that it is a well-fitting model. The scale is in the public domain thus can be used for research purposes without permission.

APPENDIX 7: Aspects of the BDI – 11 (Beck et al., 1961)

Each item of the BDI is concerned with the following particular aspects of the experience and symptomatology of depression (see Appendix 7)

1. Mood
2. Pessimism
3. Sense of failure
4. Self-dissatisfaction
5. Guilt feelings
6. Punishment
7. Disappointment
8. Self-blame
9. Self-punishment
10. Crying fits
11. Irritation
12. Withdrawal
13. Indecisiveness
14. Body image
15. Work performance
16. Sleep disturbance
17. Lethargy
18. Appetite
19. Weight
20. Somatic complaints
21. Libido

In order to gauge at what level the individual is functioning a score needs to obtain from the responses on the BDI 11. The responses are added up for each of the twenty-one questions and a total is obtained. Only one score per question is added. Once the responses are added the different scores determine the level of depression at which the individual is functioning. This format *gives* a symptom profile at a glance. It is, however important to remember that the results can be of little value when used with a depressed patient who denies or is unaware of his or her distress, as is the case with all self-report measures According to the original norms the depression scores can be interpreted as follows (Beck et al., 1961).

Total score: level of depression

- 1-10 considered as representing normal ups and downs
- 11-16 mild mood disturbance
- 17-20 borderline clinical depression
- 21-30 moderate depression
- 31-40 severe depression
- over 40 extreme depression