THE IMPACT OF EXERCISE ON DEPRESSION

AND

PSYCHOLOGICAL WELL-BEING

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Abstract

There is an increasing international need for additional interventions to be established that prevent mental illness and promote mental health. This study set out to investigate the impact of exercise as a treatment option for depression and low levels of psychological well-being over a two-month period. A comprehensive literature review examining previous studies using exercise as a treatment approach for depression and psychological well-being formed a foundation from which this study could be based. The design of this study used both a quantitative and qualitative approach. Data was collected through standardized questionnaires and completed pre and post-test by forty participants randomly assigned to an experimental and control group. Additional data was attained through two open-ended questions given to participants in the experimental group. The quantitative results were not statistically significant however did indicate clear trends towards positive changes in certain variables. These results in conjunction with the qualitative findings suggested that exercise does have a positive impact on depression and psychological well-being.

TABLE OF CONTENTS

Chapter 1: Introduction

This chapter consists of the introduction and motivation, aim of the study, hypothesis, research methodology and the value of the study.

1.1 Introduction and motivation

According to the World Health Report (WHO, 2001), about four hundred and fifty million people alive today suffer from mental disorders. Out of the total Disability-Adjusted Life Years (DALY'S) for all disorders, depression is among the top twenty leading causes for disease among all ages (Saraceno & Saxena, 2002). Depression not only disrupts the affected individuals' 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 the individual and the community at large.

Exercise is one of the most under recommended treatments for people with depression. Instead depression is treated readily with medication and psychotherapy. But by including a suitable exercise program in the treatment approach the symptoms of depression might be combated more holistically. The depressed individual would be able to participate more fully in his or her treatment outside of therapy rather than being passive in this process. Participation could empower and motivate the individual to more effective functioning from a personal and societal perspective. By proving exercise to be an effective intervention to combat depression the symptoms of this disorder would be reduced more rapidly and holistically, and in addition offer individuals an opportunity to play an active role in their recovery.

1.2 The aim of the study

The aim of this study will be to investigate the cause-effect relationship between regular exercise, depression and psychological well-being over a period of two months.

If exercise is proven to have the same kind of positive impact on mental illness and mental health as other recognized approaches such as medication and psychotherapy, it can be recommended more readily as an effective treatment option.

Although this study aims to investigate the effects of exercise on depression and psychological well-being the focus will also be on the reasons why exercise has these positive effects, particularly on depression and psychological well-being. There are different hypotheses about why exercise has such positive effects but these are all seen in isolation. Some of these hypotheses are the endorphin hypothesis, monomine hypothesis, thermogenic hypothesis, distraction hypothesis and the mastery hypothesis (Dishman, 1988). There is still no literature on whether it is actually the accumulated effect of all or some of these different mechanisms that bring about the positive effects of exercise on depression and psychological well-being. This study will be able to establish a new hypothesis that combines hypotheses that have already been established therefore providing the necessary grounding for further research in the development of a new exercise model.

This investigation will evaluate in a single study if exercise can both prevent illness, for example depression, and promote health, for example psychological well-being. It is a preventative and promotional study

1.3 Statement of the problem

The prevention of illness and the promotion of health is fast becoming the focus of much research today (Edwards, Edwards & Basson, 2004). Many research studies have demonstrated that exercise reduces depression, anxiety and stress (Fox, 2000; Morris & Summers, 1995; Scully, 1998; Weinberg & Gould, 1999). There have been numerous studies that demonstrate the effectiveness of exercise on the psychological well-being of individuals (Edwards, 2002a). Samples have included health club members and students (Edwards, 2003). Other research has focused on women (Van De Vliet, Knapen, Onghen, Fox, David, Van Coppenolle, Pieters, Probst, 2003), German adolescents (Kirkcaldy, Shephard & Siefen, 2002), or individuals who are HIV positive (Rojas, Schlicht & Hautzinger, 2003).

1.4 Hypothesis

It is hypothesized that the influence of exercise will reduce depression and increase the psychological well-being of the individuals taking part in the experiment.

1.5 Definition of key terms

1.5.1 Exercise

Edwards (2002a) defined exercise as a subset of physical activities that are planned and purposeful attempts to improve health and wellness. For the purposes of this study exercise will refer to a combination of aerobics, Tae-Bo and running activity which will be done three times a week for about thirty minutes over a period of two months.

1.5.2 Depression

Depression is defined as a great feeling of sadness. In the DSM-IV-TR the symptoms of major depression include a depressed mood or loss of interest or pleasure, including weight loss or gain, sleep difficulties, fatigue, feelings of worthlessness, inability to concentrate and recurrent thoughts of death (American Psychiatric association, 2000).

1.5.3 Psychological well-being

Psychological well-being refers to a particular theoretical and empirical construct that measures the integration of various psychological components of well-being. It is concerned with positive experiences, health, strength, resources, supplies, competencies and skills (Edwards, 2004a).

1.5.4 Mental health model

The mental health model includes both prevention of illness and promotion of health. Prevention and promotion can be on three different levels, primary, secondary and

tertiary. These interventions can be indicated, selective or universal depending on the target and aim of the intervention (Edwards, 2004c; Saracena & Saxena, 2002).

1.5.4.1 Prevention

Prevention is aimed at preventing problems in living and reducing illness, disability, handicap and abuse of human rights in individuals. It can be targeted at high risk people in very disempowering contexts, people at risk in disempowering contexts or at all people in all contexts.

1.5.4.2 Promotion

The World Health Organisation has defined promotion as ' the process of enabling people to increase control over, and to improve their health' (Saracena & Saxena, 2002). Promotion refers to improving solutions for living and increasing the incidence of health, strengths, skills and individuals human rights. It can be targeted at people of much health potential in very empowering contexts, people of potential health in empowering contexts or all people in all contexts.

1.6 Sample

The participants for this study will include male and female subjects of all ages and cultures. These subjects will include individuals from a crisis centre in Pinetown. The sample will comprise of sixty non-exercising subjects who show symptoms of depression and low levels of psychological well-being.

1.7 Research methodology

This research will be a quantitative study that will include a qualitative component.

1.7.1 Quantitative approach

For the quantitative aspect a randomized control trial will be used as it includes the

establishment of an experiment and control group by random assignment of subjects from the study population. Pretest and post-test measures will be administered to both groups at the outset of the experiment, which will provide a score for causal inferences to be made. The experimental group will then be required to take part in an exercise program for a minimum of two months. The exercise programme consists of thirty minutes of aerobic exercise three times per week over a two-month period. The control group will not take part in this exercise program. After the two-month period the measuring instruments will be administered to both groups again.

Exercise is the independent variable and the scores on the depression and psychological well-being measures are the dependent variables. A large sample will be used to increase reliability and validity and the probability of the results to be true and relevant.

Once the experiment is complete, the data will then be collected and analysed using the SPSS statistical programme. The data from the pre-test and post-test of each group will reveal whether exercise has had an influence in terms of reduction of depression and increase in psychological well-being of the subjects.

There was careful planning in the choice of objective, standardized measuring instruments for this research. The Beck Depression Inventory will be used to assess the participants' feelings, which are associated with depression. This instrument consists of twenty-one symptoms of depression as items and each item is to be rated by the subject on a four-point scale (Foxcroft & Roodt, 2001). Ryff's (1989) psychological well-being profile will be used to measure the feelings of psychological well-being.

1.7.2 Qualitative approach

For the qualitative aspect of this study all participants from the experimental group will be asked to answer two open-ended questions in a qualitative interview after the intervention is complete. These questions will explore each participant's individual experience of the exercise and feelings related to their experience and will explore the reasons why they thought the exercise had that particular effect on

them. For the qualitative data a phenomenological analysis will be used. This type of analysis focuses on understanding the experience of each subject rather than trying to find causal links in order to give an explanation. Using this approach in the qualitative analysis allows for the evaluation of subjective perceptions, which can only be understood through the eyes of each subject.

1.8 Value of the study

The research provided an alternative or additional treatment option for mental health professionals treating depression and to the individuals themselves who suffer with this mood disorder and low levels of psychological well-being.

1.9 Limitations

There may be limitations when finding the sample for this study as it will assess the depressive symptoms experienced or displayed by individuals. Due to the fact that depression is a mental illness the participants' may be reluctant to participate as they are unsure of confidentiality. Confidentiality and informed consent will therefore be addressed at the outset of the study. Commitment of the subjects to the experiment for the time period required may also be problematic, so a contract will be used to counteract this anticipated problem. The participants' exercise programmes may also need to be monitored to ensure that they are taking part in the required amount of time and to also make sure that they are not overdoing the exercise.

1.10 Resume`

This chapter serves as an introduction to the following chapters. The next chapter will discuss findings of previous literature relating to this study.

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.

2.2 Mental illness

The incidence of mental disorders', in particular depression are 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 (WHO, 2001). Much literature has been published that uses physical activity as an approach to prevent mental illness, in particular depression or to promote health indicatively, selectively or universally. However the focus, instruments and samples used in the past literature differ from that of this research.

2.2.1 Depression

Usually a person will experience a wide range of emotions, have an equally large repertoire of affective expressions and generally feel in control of their moods and affects. When a person is suffering with depression this sense of control is lost and this can be experienced with subjective distress (Sadock & Sadock, 2003). Depression can be described as a mood state characterized by intense sadness, withdrawal from others and feelings of futility and worthlessness (Sue, Sue & Sue, 1997). Sufferers may describe themselves as being blue, hopeless, worthless, in the dumps and as experiencing agonizing emotional pain. The symptoms are often so severe that contemplations of suicide are frequent, with 10% to 15% actually committing suicide (Sadock & Sadock, 2003). The depressed mood often 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 ones thoughts, mood, feelings, behaviour and physical health. This condition does not respect socioeconomic status, educational attainments, or personal qualities, it may afflict one whether rich or poor, successful or unsuccessful, educated or not (Sue, Sue & Sue, 1997).

2.2.2 Incidence and prevalence

In 1992 depression was found to be the most common complaint of individuals seeking mental health care (Sue, Sue & Sue, 1997). Pillay, Edwards, Gambu and Dhlomo (2002) considered depression to be probably the most common psychological condition manifesting in local settings and in the general population. In addition Pillay and Sargent (1999) showed that 28% of a community sample had scores on the Beck Depression Inventory classified as 'moderate' or 'severe' (Pillay, Edwards, Gambu & Dhlomo, 2002). If one moves away from a community sample and looks at the prevalence of depression in the South African population the statistics are estimated at 2 355 768 out of an estimated population of 44 448 470 squared (Statistics about depression, 2005).

Of this very high percentage of people with major depression Sadock and Sadock (2003) found that there is an almost universal observation of a twofold 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 hypothesized to involve hormonal differences, the effects of childbirth, differing psychosocial stressors, and behavioural models of learned helplessness.

The mean age for onset of a major depressive episode is forty years, with onset between ages twenty and fifty at 50%. Major depression, however can begin in childhood or old age (Sadock & Sadock, 2003). With these statistics in mind it is not surprising that the World Health Organisation has estimated that by the year 2020 depression will become the second leading cause for disease burden (WHO,

2001). The need to find preventative measures to assist in reducing or eliminating this condition could not be more crucial.

2.2.3 Course and prognosis

According to Sadock and Sadock (2003) 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 50% of sufferers. A later onset of the mood disturbance is associated with an absence of mood disorders, antisocial personality disorder and alcohol in the family. Major depressive disorder tends to be chronic and even when treated many sufferers relapse. The relapse rate has been found at about 25% in the first six months, 30 to 50% in the first two years and 50 to 75% in the first five years. It is the general consensus that as a sufferer experiences more and more depressive episodes, the time between the episodes decreases while the severity of each episode increases.

2.2.4 DSM-IV-TR criteria for major depressive episode

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 (e.g., feels sad or empty) or observations made by others (e.g., 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

a specific plan, or a suicidal attempt or a specific plan for committing suicide.

B. *The symptoms do not met criteria for a mixed episode.*

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

D. The symptoms are not due to the direct physiological effects of a substance (e.g., drug abuse, medication), or a general medical condition.

E. The symptoms are not better accounted for by bereavement.

2.2.5 DSM-IV-TR criteria for major depressive disorder, single episode

A. Presence of a single major depressive episode.

B. *The major depressive episode is not better accounted for by schizoaffective* disorder and is not superimposed on schizophrenia, schizophreniform disorder, delusional disorder, or psychotic disorder not otherwise specified.

C. There has never been a manic episode, a mixed episode, or a hypomanic Episode.

2.2.6 Treatment approaches for depression

Barlow and Durand (1999) recommended a variety of approaches in treating depression. These range from psychotherapy, to electroconvulsive therapy and psychopharmacology.

2.2.6.1 Psychotherapy and behavioural treatments

There are a variety of psychological treatments used worldwide with much success such as psychoanalysis, behavioural therapy and family therapies. There are however two approaches that have been very effective in the treatment of depressive disorders: interpersonal psychotherapy and cognitive-behavioral therapy.

2.2.6.1.1 Interpersonal psychotherapy

This is a short-term, psychodynamic-eclectic type of treatment for depression that targets the client's interpersonal relationships, using strategies found in psychodynamic, cognitive-behavioural and other forms of therapy. The assumption of this approach is that depression occurs within an interpersonal context and therefore interpersonal relationship issues must be addressed. The main focus would be on the conflicts and problems that have occurred or are occurring in these relationships. This approach is primarily focused on the present relationships even though it does resemble psychodynamic approaches in acknowledging early life experiences and traumas.

Ways of making these relationships more pleasant and even satisfying could be:

- improving communications with others
- identifying role conflicts
- increasing social skills.

2.2.6.1.2 Cognitive-behavioural therapy

Cognitive therapy provides a structured, focused, active approach that focuses on the client's inner world. This structured therapy is focused on the here and now and can treat depression in a relatively short space of time (Corey, 2001).

The combination of cognitive and behavioural strategies teaches the client the following:

- to identify negative, self-critical thoughts (cognitions) that automatically occur.
- to note the connection between negative thoughts and the resulting depression.
- to carefully examine each negative thought and decide whether it can be supported.
- to try replace distorted negative thoughts with realistic interpretations of each situation.

Cognitive therapists believe that distorted thoughts cause problems such as depression and that in order to eliminate depression the distorted thoughts need to be changed. This is done by asking the client to monitor his / her negative thoughts and to list them on a chart from the beginning of therapy. It is important for the client to include all their thoughts and emotions about each distressing event that takes place each day. The client is asked to bring the chart to the session each week and alternatives to the negative thoughts on the chart are discussed. By doing this it is demonstrated that it is the clients own unnecessary negative thoughts that are causing their distress. The client then makes a conscious effort to adopt the new, more positive alternatives when faced with a difficult situation. The goal of this approach is to train the client to automatically substitute logical interpretations for self-defeating thoughts. It is assumed that when a client's thoughts about him / herself become more consistently positive, their emotions will follow suit.

Behavioural therapy, being the second part of cognitive-behavioural therapy, is used in cases when the depression is severe and the person is virtually inactive. These patients often withdraw from others and then interpret their self-imposed isolation as a sign of being inadequate or unpopular. This problem is addressed by the patient being asked to keep a daily schedule of life events, hour to hour, and to rate the 'pleasantness' of each event. By doing so the patient becomes aware of their inactivity and generally their activities become more frequent. Also by increasing their activities the chance of them engaging in more pleasant, reinforcing activities increases. The chart also enables the therapist to point out to the patient the activities that he or she felt positive about and encourage them to take part in that activity more often. Once the patient with severe depression becomes active, he or she may be encouraged to attend social skills training programmes, which usually help them to become more socially involved and can be rewarding.

By asking clients to complete easy tasks first, that they can succeed at they will be slightly more optimistic. The aim here is to encourage the client to be of the assumption that *doing something is better than doing nothing.*

2.2.6.2 Biomedical treatments

These interventions alter the physical or biomedical state of the patient.

2.2.6.2.1 Medication

According to a cognitive-affective perspective mood is normally mediated by specific neuron circuits, it has been found that similar circuits are dysfunctional in people with depression. Serotonin innervates these circuits, and SSRI's (Selective Serotonin Re-uptake Inhibitors) act to normalise this neurocircuitry. There are other antidepressants, which are also used to treat depression such as: tricyclic's and monoamine oxidase inhibitors (MAOI's).

2.2.6.2.1.1 The role of the neurotransmitter

Neurotransmitters are chemical messengers that carry messages between neurons (nerve cells) and effect many mental and physical processes. Two of the neurotransmitters that play a role in depression are serotonin and noradrenaline. These neurotransmitters are released into the synapse (gaps) between neurons and help transmit nerve impulses from one nerve cell to another. There are two mechanisms which could be the cause of insufficient neurotransmitters in the synapse (Stein, 2003):

1) neurotransmitters are chemically broken down or depleted by the enzyme MOA, or
2) neurotransmitters are reabsorbed by the releasing neuron in the re-uptake process.

When the levels of these neurotransmitters are low in areas of the brain that control mood and emotion depression may result.

Somatic-dendritic autoreceptors usually serve as a 'brake' on serotonin neurotransmission so that only so much serotonin can be absorbed. This is why medication usually takes so long to have a response. The SSRIs however effectively release the 'brake' by gradually desensitising the serotonin receptors

resulting in increased neurotransmitter transmission. There is now an optimal level of serotonin to allow for normalisation of activity in the prefrontal, paralimbic and striatal regions.

The tricyclics's block the re-uptake of certain neurotransmitters, allowing them to pool in the synapse, and eventually desensitise the transmission of that particular neurotransmitter (so that less of that chemical is transmitted).

The MOAI's block the enzyme monoamine oxidase that breaks down such neurotransmitters as serotonin and norepinephrine. The result is the same as the tricyclics. Because the neurotransmitters are not broken down they pool in the synapse therefore desensitising the transmission.

In acute treatment some improvement is usually seen within the first ten days to two weeks of treatment, but it usually takes up to six to eight weeks before the patient feels 'back to normal'. If there is still no response after the six to eight week period the dose can be increased or the anti-depressant changed. It is recommended that drug treatment go beyond the termination of a depressive episode, perhaps up to six to twelve months, to prevent relapse. Thereafter the drug can be gradually withdrawn over a few weeks or months. There is still not enough evidence to show how stressors experienced by individuals have a negative impact on neurociruitry.

2.2.6.3 Electroconvulsive therapy (ECT)

This is a dramatic treatment used for cases of very severe depression that has not improved with other treatments. This treatment approach has been abused in the past but has since changed and is considered to be safe and reasonably effective. Patients are given anaesthetic to reduce discomfort and given muscle-relaxing drugs to prevent bone breakage from convulsions during seizures. Electric shocks are then administered through the brain for less than a second, producing a seizure and a series of brief convulsions that usually last for several minutes. It is not really known why ECT works. It might be that repeated seizures induce massive functional and perhaps structural changes in the brain, which seem to be therapeutic (Barlow & Durand, 1999).

Psychotherapy and pharmacotherapy can be very costly and may not even be an option for some therefore alternative treatment methods are needed (Stein, 2003).

2.2.6.4 Physical activity

Some people who are faced with feelings of depression are able to handle these feelings in a natural way by taking steps to restore themselves to calm and equilibrium. However some people's simple adaptive routines may not be adequate to deal with these disruptive feelings of sadness. These people need an intervention that will help improve their state of psychological well-being therefore allowing them to handle the disruptive feelings or stressors in a more adequate manner. Physical activity has been proven to be a useful intervention.

Very little literature recommends physical activity as a treatment approach to depression, even though physical activity has been proven to have a positive effect on people with mental disorders, especially depression (Department of Health, 2004).

Many methods have been tried and tested to prevent or treat depression and many are useful however these utilize only the conventional treatment approaches. These methods also only focus on the preventative aspect of the mental health model. The World Health Organisation (WHO, 2001) is of the opinion that priority should be given to both prevention and promotion in the field of mental health. This is necessary considering the increasing rate of mental disorders, especially depression. Every opportunity to reduce these statistics should be taken. In addition to preventing illness promoting health would encourage a more healthy population. It would therefore be more beneficial to tackle health and illness from both preventative and promotional sides rather than using either in isolation.

2.3 Mental Health

A vast amount of time and energy is spent developing strategies to prevent or treat mental illness but very rarely is attention given to strengthening or promoting mental health. The term health has been defined, not only as the absence of disease but including complete physical, mental and social well-being (WHO, 1946).

2.3.1 Psychological well-being

2.3.1.1 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 great theorists such as Maslow (1968), Rogers (1961), Jung (1933), Allport (1961), Erikson (1959), Buhler (1935), Neugarten (1973) and Jahoda (1958) have shared their perspectives on this concept (Ryff, 1989). Initially Bradburn (1969) and colleagues focused on happiness as the outcome variable of psychological well-being. However, further studies found that happiness was not the only indicator of positive psychological functioning. Life satisfaction and morale were also found to be valuable constructs in the basic structure of psychological well-being (Ryff, 1989). Ryff (1989) argued that although many theorists had written formulations about positive psychological well-being, when these formulations were reviewed, it became evident that although they all varied they had written about similar features of positive psychological functioning. These prior theories form the core formulation of psychological well-being, which Ryff (1989) used as the basis for the development of her scale of psychological well-being.

2.3.1.2 Dimensions of psychological well-being

The core dimensions integrate mental health, clinical and life span developmental theories (Ryff, 1989). They are as follows:

Self-acceptance is defined as a central feature of mental health as well as a

characteristic of maturity, self-actualisation and optimal functioning. It has also been emphasized by life span theories that this includes acceptance of oneself and of one's past life.

Positive relations with others, this dimension emphasizes the importance of warm and trusting interpersonal relationships. Having the ability to love, having strong feelings of empathy and affection for all, and being capable of close friendship, greater love and more complete identification with others. This ability is considered a criterion of maturity as one is able to achieve intimacy and generativity.

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 one's psychic conditions. Being able to participate in a significant sphere of activity outside of one's self is seen as a requirement of maturity. It requires one to have the ability to manipulate and control complex environments, taking environmental opportunities and to be able to advance in the world and change it through physical and mental activities creatively.

Purpose in life is another aspect of mental health, which defines beliefs as giving one the feeling there is purpose and meaning in life. Having a clear comprehension of life's purpose, a sense of directedness, and intentionality all contribute to one's level of maturity. In order to function positively you need to have a sense of direction and goals, which can vary and change with time.

Personal growth requires that one achieve the above characteristics and in addition achieve continued development of one's potential to grow and expand as a person. The need to self-actualize and to realise one's potential is central to this dimension. A fully functioning person is one who is open to experience, continually developing and becoming, confronting new challenges or

developmental tasks.

2.3.1.3 Influences on psychological well-being

Positive mental health and/or psychological well-being has many dimensions, which have been discussed above. These consist of autonomy, environmental mastery, personal growth, purpose in life, positive relations with others and self-acceptance. These dimensions have been demonstrated to develop through a combination of emotional regulation, identity, personality characteristics, and life experience. Psychological well-being is said to increase with age, education, extraversion and consciousness and decrease through neuroticism (Edwards, Edwards & Basson, 2004). These dimensions can be influenced by personal, interpersonal and environmental factors, and by changes within the context of developmental tasks and life stages (Edwards, Ngcobo & Pillay, 2002).

2.3.1.4 Previous literature on psychological well-being

There are many aspects of health and ways to promote health; however the literature that has been cited in this study has focused on promoting psychological well-being through the use of exercise. Helson and Srivastava (2001) researched the psychological well-being scale and found that psychological well-being develops through a combination of emotional regulation, personality characteristics, identity and life experience. Each psychological well-being dimension can be viewed as articulating a form of life challenge; seeking autonomy through self determination and personal authority; developing and maintaining positive relations with others; self acceptance of personal strengths and limitations; mastering the environment to meet needs and desires; finding personal meaning through purpose in life and optimizing unique abilities and talents through personal growth, which are all similar to Erikson's (1959) theoretical perspective (Edwards, Edwards & Basson, 2004).

The goal of many is to ensure that psychological well-being is maintained in order to have optimal mental health. However if one's state of psychological well-being is fragile the development of mental illness is more likely to occur just as a physical illness is likely to strike when one is not physically well. Considering

this, every effort should be made to optimise psychological well-being and in so doing decrease the development or precipitation of depression. Prevent mental illness and promote health.

2.4 Prevention and promotion

Prevention of mental illness and promotion of mental health are two aspects of the model of mental health.

2.4.1 Mental health model

The mental health model incorporates both prevention of illness and promotion of health with emphasis on optimizing health, strengths, competencies, skills, resources and supplies, aimed at an ever changing, dynamic balance of optimal harmony and order. This intervention model is based on a continuum of prevention and primary, secondary and tertiary promotion (Edwards, 2004c).

According to Edwards (2004c) prevention is aimed at preventing problems in living and to reduce illness, disability, handicap, and human rights abuse in individuals. Promotion refers to improving solutions for living and increasing the incidence of health, strength, skills and human rights in individuals. Prevention and promotion can be used on three different levels, primary, secondary and tertiary. With regards to prevention the level of focus depends on whether the strategy prevents the disease itself, the severity of the disease or the associated disability. The level of focus in terms of promotion would be determined by the target of the intervention such as promoting health in all persons in all contexts, people in already empowering contexts or people in already very empowering contexts. The preventative or promotional interventions can be indicated, selective or universal depending on the aim of the intervention (Edwards, 2004c; Saracena & Saxena, 2002).

Tertiary prevention is indicated intervention aimed at individuals at high risk in very disempowering contexts, to prevent problems in living and reduce illness, disability, handicap and human rights abuse. An example is incorporating a gentle form of hatha yoga in the treatment plan for

people infected with HIV/Aids to encourage integration of body, mind and breath and strengthening of the immune system (Williams, 2005).

Secondary prevention is a selected intervention aimed at people at risk in disempowering contexts, to prevent problems in living and reduce prevalence of illness, disability and handicap. An example is using exercise to treat anxiety, depression and psychological well-being in prisoners (Mahlaba, 2004).

Primary prevention is a universal intervention aimed at people in all contexts to prevent problems of living and reduce prevalence of illness. An example of this type of intervention is introducing a walk for life programme in an informal settlement (Naidoo, 2004).

Tertiary promotion is an indicated intervention aimed at people of much health in very empowering contexts to improve solutions for living and increase health, strength, skills and human rights. An example is incorporating psychological counseling in the training of health club members (James, 2003; Edwards, 2003).

Secondary promotion is a selective intervention aimed at people of potential health in empowering contexts to improve solutions for living and increase prevention of health, strengths, and skills. An example is introducing breathing and mental skills programmes in the training of soccer players (Khanyile & Hadebe, 2004).

Primary promotion is a universal intervention aimed at all people in all contexts to improve solutions of living and increase incidence of health. An example is offering exercise classes to the students on a university campus to strengthen their psychological well-being (Mathe, 2004).

2.5 Physical activity

Physical activity has been defined as an umbrella term describing any bodily movement produced by the skeletal muscles resulting in energy expenditure (Biddle, Fox & Boutcher, 2000). Exercise is defined in many different ways depending on the author, however in this study it is defined as "a subset of

physical activity that is planned, structured, volitional, repetitive and aimed at *improvement or maintenance of an aspect of fitness or health*" (Biddle, Fox & Boutcher, 2000).

2.5.1 Exercise

Exercise may range from minor movements used in routine jobs or household tasks, to walking as a form of transport, to relaxation exercises or higher-intensity exercise or sport. For some it may be aerobic activities such as brisk walking, running, swimming and cycling and for other it may be gardening, cooking or painting. The kind of exercise one participates in can vary according to type, frequency, duration and intensity at which it is conducted. Research shows that in order to achieve optimum benefits a basic fitness requirement is to engage in regular exercise for at least thirty minutes a day three times a week (Edwards, 2002a). It has also been found that most people who suffer from fatigue do not incorporate exercise into their daily routines (Holden, 1992). Exercise can refresh, revitalize and re-energise you.

2.5.1.1 Relaxation exercise

For many years the value of quietness and rest in illness has been emphasised. From an instinctual level, animals that are sick or injured tend to seek out a quiet and solitary place and reduce their levels of physical activity to a minimum. This behaviour is very similar to the way humans behave in similar situations. When we experience acute stress or tension we often find that the normal background noise levels become too loud and we have a need to seek quietness and solitude for a while. Reducing the environmental impact, however is not enough to restore equilibrium in the stressed individual, pain needs to be relieved and healing facilitated.

2.5.1.1.1 Relaxation techniques

Relaxation techniques such as relaxed breathing, progressive relaxation, autogenics and meditation are often very effective. They influence the parasympathetic branch of the nervous system to have almost the exact opposite reaction to the sympathetic

branch, where the initial 'fight or flight' reactions are conjured up by the stress response (Holden, 1992).

Edwards (1995) suggested various relaxation techniques, which can be used together or separately, these include the following:

1) Learn to know your state of tension/relaxation by tensing your entire body while counting to ten, then alternatively relaxing while counting to ten. (You may also practice this with different muscle groups from head to toe. Practice this often until deep instant relaxation is obtained merely by saying 'relax' and counting to ten.)
2) Belly breathe by focusing on your stomach, not chest, moving slowly in and out.
3) Relax, belly breathe and tell yourself 'the air breathes me'.
4) Relax and visualize a calm scene of the sea or a meadow.
5) Relax and consciously ask yourself what you can feel, hear, see, smell, taste and touch.
6) Practice dynamic relaxation while moving by adjusting your level of tension.

Johannes H. Schultz devised autogenics, which focuses on restoring and enhancing the harmony of mind and body's natural 're-creation system'. The technique is a combination of breath control, hypnotherapy and mental affirmation and may also combine creative visualisations and progressive relaxation. Autogenics therefore embodies an eclectic approach to deep relaxation.

Edmund Jacobson developed a method called Progressive Muscle Relaxation. He found that when individuals experience increased tension, their muscles contract which causes an uncomfortable subjective feeling of anxiety. Therefore it was suggested that deep muscular relaxation would reduce emotional arousal. Patients were taught to relax muscle groups so that when they experienced feelings of increased tension and muscle contraction they would be able to relax their muscles and in so doing decrease their raised blood pressure and pulse rate. Learning relaxation involves cultivating a muscle sense, to develop the muscle sense further, patients are taught to isolate and contract specific muscle groups one at a time (Sadock & Sadock, 2003).

Joseph Wolpe modified Jacobson's original method by shortening the sessions, once patients had mastered the procedure (typically after three sessions). Basic muscle groups are combined into larger groups and finally patients practice relaxation without tensing the muscles (Sadock & Sadock, 2003).

2.5.1.2 Eastern influences

Quietness can be defined as the deep muscular relaxation that is accompanied by subjective feelings of calmness and well-being. Many of the quieting techniques work well with one who is somatically anxious whereas one who is cognitively anxious might benefit from meditation where emphasis is on cognitive quieting, such as using one's imagination.

2.5.1.2.1 Meditation

Meditation is used as a means of attaining a deep sense of calm and often a heightened inner awareness. Techniques of meditation are used as a means of attaining altered consciousness, which can lead to the achievement of nirvana, cosmic awareness, still deep centre of the self and reaching God. Whatever the spiritual purpose of meditation may be it produces a deep and satisfying sense of well-being in those that practice it successfully. Herbert Benson used concepts developed from transcendental meditation in which a patient maintained a more passive attitude, allowing relaxation to occur on its own, working with different muscle groups over fifty sessions, such as yoga. All these techniques emphasize a position of comfort, peaceful environment, passive approach and pleasant mental image on which one can concentrate (Sadock & Sadock, 2003).

As with relaxation training, the feelings experienced tend to extend beyond the time practicing the technique into daily life. Some of the meditation techniques involve the use of exercises or specific movements and postures such as yoga and Tai Chi where emphasis remains on changing thoughts and feelings.

2.5.1.2.2 Yoga

Yoga is a Hindu philosophical system, which incorporates physical aspects. There

are several forms of yoga but the most commonly used in the West is Hatha yoga. There are eight stages: yama (self-control), niyama (prayer), asana (postural techniques), pranayama (breathing techniques), a pratyahara (sensual withdrawal), dharana (concentration on some body part for example the belly), dhyana (meditation on the Supreme Being) and samadhi (profound contemplation, detachment and transcendence from the physical world). The last three stages (samyana) lead to awakening, where there is awareness of previously reincarnated lives, a fusion with creation and a vision of God. This is in keeping with the accepted doctrine of karma whereby a person is morally accountable for present and past lives in a world permeated by a conscious spiritual principle (Edwards, 1995). Most people who practice yoga regularly find that it enhances feelings of good health and well-being and is a calming influence on the mind.

2.5.1.2.3 Tai chi

Tai chi is a healthful and relaxing form of exercise, based on a series of gentle, circular and rhythmic movements. It is based on an ancient Chinese philosophy concerned with balancing various forces in the body and promoting the flow of *chi* (energy, life-force). It teaches calm abdominal out-breathing patterns that stimulate the relaxation inducing parasympathetic division of the automatic nervous system. It provides an alternative to more competitive and vigorous exercise activities so common in our post-modern world (Edwards, 2002c). The health gains are:

1) increased energy flow in the muscles creates greater physical power, increasing strength in the legs and particularly the lower abdomen, which is the main source of real power.
3) more effective use of oxygen and muscular skill allows greater physical endurance.
4) greater control of emotional expression results from the sinking emotional energy in the chest to the body center of gravity and movement.
5) greater control and stamina in sexuality results from increased awareness and energy as it's sunk from the emotional to the body centre.
5) less need for sleep, as well as deeper, more restful sleep, results from more effective energy use, decrease of aerobic needs and decreased emotionality.
6) by practicing relaxed, effective movements there is less need for oxygen and

therefore less need for cardiovascular strain.

7) less need for food intake therefore it becomes more controlled.
8) less intense emotional requirements result from more control of emotional energy.
9) more calm and inner peace from the above points.
10) more stamina and energy from the above points.

2.5.1.3 Aerobic exercise

The more vigorous types of exercise include brisk walking, jogging, aerobic dance, swimming, cycling and Tae-Bo during which heart rate is increased.

2.5.2 Benefits of exercise

The benefits of exercise whether it be in the form of relaxation or aerobic exercise are many. These benefits range from individual, physiological, psychological, social and cultural through to spiritual levels of being.

2.5.2.1 Benefits of relaxation exercises

The benefits of relaxation exercises are very similar to that of physical exercise however they are achieved by creating more of a calming effect than by increasing the heart rate through rigorous exercise. Relaxation exercises are especially useful when treating phobic anxiety, headache and stress.

2.5.2.1.1 Physiological

Regulates heart beat, lowers blood-pressure, reduces muscle tension, relaxes the breathing, soothes the nerves, improves body posture, calms brain waves, relieves physical pain, conserves energy and boosts the immune system.

2.5.2.1.2 Psychological

The mind is able to both relax and to concentrate better. This improves ones mental and emotional health and performance so that intellectual and emotional gains in

strength and efficiency can be experienced.

2.5.2.2 Benefits of aerobic exercise

2.5.2.2.1 Physiological

By taking part in physical exercise quality of life is improved through prevention of illness such as heart attacks and strokes, better eating and sleeping habits and loss of unnecessary weight. In addition it enhances aerobic and cardiovascular fitness.

2.5.2.2.2 Psychological

Exercise decreases anxiety, depression and mental stress, enhances creativity and problem-solving, develops a hardy personality, responsibility, self-determination, humility, realistic self-appreciation and an enhanced sense of psychological well-being. Participation in exercise can lead to personal growth, feelings of confidence, mastery, competence and self-esteem. In addition keeping a record of achievements can be rewarding and motivating. Edwards (2002b) quotes Balcam (1986) in his statement that 'one will also experience themselves and our natural environment differently, 'I think that by examining and resonating more with our own experience of health, or embodied well-being, and fitness, or the bodily exploration of human possibilities, we will come to a greater appreciation of our beautiful, composite natures'.

2.5.2.2.3 Social

Research also shows that social aspects of exercising are emphasized in terms of promotion of social support, interacting, connection, cohesion and harmony through the shared community experience and context, this is exemplified in the Comrades marathon.

2.5.2.2.4 Spiritual

Exercise initially allows us to become a bodily centred moment in the world, this

here and now experience and presence are a precondition for meaning and transcedence. Exercise has a spiritual dimension as it facilitates contact with one's Maker, creator or God, ultimate reality and being (Edwards, 1995). The spiritual benefits mentioned here can be experienced in relaxation or vigorous exercise practices.

2.5.3 Previous research on physical activity

2.5.3.1 Physical activity and depression

Most of the initial research into the role of exercise and mental health was in the 1960's (Morgan, 1968; Dishman, 1988). Morgan found that fitness levels of both male and female psychiatric patients were lower than non-hospitalised controls, which led to his experimental work in using exercise as part of a treatment regime (Biddle, Fox & Boutcher, 2000). Morgan's findings were later replicated by Martinsen, Strand, Paulson and Kaggestad (1989), using Norwegian psychiatric patients.

In 1990 a meta-analysis study statistically summarized eighty studies of exercise and depression. North, McCullagh and Tran (1990) concluded from their study that:

- exercise was a beneficial treatment both immediately and over the long term.
- exercise was most effective for those most physically and / or psychologically unhealthy at the start of the exercise programme.
- exercise significantly decreased depression across all ages, with a particularly significant decrease in the older participants.
- exercise was an equally effective antidepressant for both genders.
- both aerobic or anaerobic exercise were effective in lessening depression to some degree.
- an increase in the frequency and length of the exercise sessions resulted in a greater decrease in depression.
- the most power antidepressant effect resulted from a combination of exercise and antidepressants.

The study above suggests that depression can be treated with exercise however the treatment is more success when using a combination of exercise and medication. Blumenthal, Babyak, Moore, Craighead, Herman, Khatri, Waugh, Napolitano, Forman, Appelbaum, Doraiswamy and Krishnan (1999) later investigated how exercise compared with medication as a treatment option for depression. The investigation consisted of a number of systematic studies of patients diagnosed with major depressive disorder using the two treatment conditions of exercise and medication. Comparisons were made between patients responses to aerobic exercise and psychotropic medication (Zoloft, an SSRI), or a combination of the two. After the four-month experimental period patients receiving any of these treatments were significantly less depressed with two-thirds no longer being depressed at all.

A follow-up study was done with the same patients six months after the original study was completed (Babyak, Blumenthal, Herman, Khatri, Doraiswamy, Moore, Craighead, Baldewicz & Krishman, 2000). The results indicated that patients who had been in the exercise group were more likely to be partially or fully recovered than those who were in the medication or group with combined exercise and medication. These results are encouraging as the findings are repeatedly pointing to the power of exercise in the treatment of depression, whether it be as a single treatment approach or in combination with more traditional treatment methods.

2.5.3.2 Physical activity and psychological well-being

Research has found that psychological well-being can be promoted through regular sport and exercise (Edwards, Edwards, Basson, 2004).

Exercise can be used as a medium for health promotion as its use is based on international research evidence for the general and mental health benefits of physical activity, exercise and fitness interventions (Edwards, 2002a). Edwards, Edwards and Basson (2004) investigated the relationship between sports, involving diverse types of regular exercise, and various components of psychological well-being and self-perception. The results revealed that the exercising participants were generally more psychologically well and had more positive self-perception than the non-exercising participants.

The relationship between physical exercise over a period of six months and psychological well-being in twenty six exercisers at health clubs in Richards Bay, South Africa was investigated by Edwards (2003). The findings were that regular exercise was associated with significant improvements in total well-being. This literature which investigated the effects of exercise on psychological well-being and other elements was based on a South African sample using Ryff's (1989) psychological well-being scale or a wellness profile which was constructed using various questionnaires.

In addition to this quantitative research there have also been qualitative aspects that formed part of studies previously mentioned. In one particular study, Edwards (2001) incorporated a qualitative, phenomenological research approach into a study investigating the community effects of the exercise experience. The participants essential exercise experience was explored and noted. The results generally revealed positive experiences of exercise, with some participants only experiencing positive feelings, some both positive and negative and none purely negative experiences. The essential community effects were also explored revealing that the effects were essentially collectively shared individual experiences. Through the shared community experience and context he social aspects were especially emphasized in terms of promotion of social support, interaction, connection, cohesion and harmony. Other diverse positive community effects were noted and some negative effects. The negative effects included: exercise addiction, exercise expenses, mocking, derision or labeling of women exercising in some communities, a shallow sense of self-worth, negative self-evaluations, harsh physical instructors, negative attitudes in communities where exercise is described as useless, time wasting, painful, unrewarding, difficult, unexciting and uninteresting, guilt feelings at seeing others exercise, communal pressures and selfish coaches interested in their own gain (Edwards, 2002d). This research was based on a sample of Australian and South African post-graduate students and staff.

Fox (2000) also stated that it was widely reported by regular exercises that activity produced a sense of well-being and a healthy glow. In addition those who were involved in recreational exercise and sport found it provided fun, relaxation,

good stress management, mental challenges, a sense of achievement and positive social interaction.

Van De Vliet, Knapen, Onghen, Fox, David and Van Coppenolle (2003) evaluated the nature of psychological change in depressed psychiatric in-patients attending multi-disciplinary treatment, which included physical activity, designed to improve mental well-being. The results revealed that the patients with depression demonstrated significant improvements in depression, anxiety, global self-esteem and physical self-worth. In another study on the effects of a sixteen week exercise intervention on several aspects of psychological and physical well-being in a sample of HIV-I positive individuals, it was suggested that a moderate exercise intervention enhanced the health related quality of life in these individuals (Rojas, Schlicht & Hautzinger, 2003). The results gained from these studies are based on a German sample.

2.5.4 Limitations to previous research

The literature above has explored the use of exercise in the prevention and treatment of depression and the promotion of health through improving psychological well-being. This literature however either only focuses on people with depression when incorporating prevention or only focuses on people of good health when utilizing a promotional approach. It is a challenge to find literature that both focuses on preventing depression and improving psychological well-being of depressed individuals through the use of exercise. Although the literature referred to above provides information of great importance to future studies consideration needs to be given to the fact that the majority of this evidence is based on a foreign sample and the findings may therefore be limited to this sample. The studies that have been discussed above defined and measured psychological well-being in terms that differ from this study. No previous research in this area of study has used the Beck Depression Inventory and Ryff's psychological well-being profile together.

With this literature and the limitations it has with regards to a South African context it is important to continue gathering evidence to promote the benefits of exercise on mental health and illness, in particular depression and psychological well-

being.

2.6 Exercise Intervention in the treatment of depression and psychological well-being

2.6.1 Under recommendation of exercise as a treatment option

The literature that has been cited in this study has provided evidence for the positive effects of physical activity on mental health and mental illness. Despite this growing evidence exercise is still the most under recommended treatment for people with mental disorders, in particular depression. According to Dishman (1988) the reason for this was that the American Psychiatric Association had not been persuaded to endorse exercise as a treatment option for depression. The explanation for this may be that the body and mind are seen as separate entities and that exercise is considered as a treatment for the body and not the mind. Perhaps when people start to realise that the body and mind are inseparable entities they may start to understand that if the body is benefiting from the treatment the mind will simultaneously benefit.

2.6.2 Professional involvement

When prescribing physical activity to people suffering from depression one may be easily seduced by all the positive aspects of this alternative treatment. However it is vitally important that the limitations to this treatment option be considered and monitored by the afflicted individual and the professional treating this condition.

Before a mental health practitioner prescribes physical activity a screening process should be carried out to establish whether there may be any co-morbid conditions For example, a person with depressive symptoms may also have an underlying eating disorder. In this case prescribing physical activity becomes more complicated as anorexia nervosa is a psychological disorder characterized by excessive weight loss through dieting or over-exercising motivated by a false sense of fatness (Biddle, Fox & Boutcher, 2000). The mental health practitioner needs to be careful not to promote a treatment that becomes a tool for further

physical and psychological damage. If a screening process is carried out it will alert the mental health practitioner to any co-morbid conditions so that the necessary steps can be taken. Once physical activity is offered as an alternative option monitoring of each persons exercise regime must be carried out.

This treatment approach can be prescribed by any health professional as long as they are working in the best interests of the individual they are treating. The scope of practice for some mental health practitioners is limited and in this case it is important that they work within a multidisciplinary team and appropriate referrals be made to health practitioners whose expertise is focused in the exercise arena such as sport psychologists. The referring practitioner should however remain involved in the treatment programme of the person referred, therefore providing a multidisciplinary approach.

2.6.3 Exercise as an alternative to traditional methods

Physical activity has proven to be a relatively cheaper treatment to psychotherapy and pharmacological solutions (Fox, 2000). Due to the encouraging reports on the positive effects and experiences of exercise it has been used in much research as a tool in the prevention of mental illness and promotion of mental, physical and psychological health. One experiences the release of energy, positive experience of self and the environment, and builds social relationships through physical exercise while learning self-control, reduction of tension in the body. It can be done alone or in the company of others. Physical exercise can be used as an alternative to the traditional treatment methods or in conjunction with medication and/or weekly psychotherapy. By giving the person suffering with depression the opportunity to use exercise as an everyday technique feelings of empowerment and motivation to take an active role in their recovery process can be achieved.

2.8 Resume'

This chapter looked at previous literature in relation to the present study. The next chapter will look at the data obtained from participants and offer a discussion regarding the results of the data analysis.

Chapter 3: Methodology

3.1 Introduction

The main aim of this study was to investigate the effect of exercise on depression and psychological well-being therefore evaluating an alternative intervention in the prevention and treatment of mental illness and promotion of mental health. This chapter serves as a layout for all the procedures that were utilized to accomplish this aim.

3.2 Research approaches used

Stone (1986) looked at the issue of measurement versus meaning and supported a statement made by Giorgi (1970) that while measurement was the most useful form of description for quantitative data it was equally unsuitable for qualitative data. These two aspects of data analysis seem to fall on opposite sides of a continuum. They focus on very different aspects of data yet can reveal quite a holistic picture of the data being analysed when used together. This study used both a quantitative and qualitative approach.

3.2.1 Quantitative research

Quantitative research is based on collecting data in the form of numbers and then using statistical types of data analysis. This kind of approach begins with a series of predetermined categories, usually embodied in standardized quantitative measures, and the data is used to make broad and generalisable comparisons. In this study a randomized control trial was used, which included the establishment of an experimental and control group by random assignment of subjects from the study population with pretest and post-test measures in both groups. Exercise was the independent variable and the scores on the depression and psychological well-being measures the dependent variables. Validity and reliability of the study was increased through the use of objective and standardized measuring instruments such as the Beck Depression Inventory and Ryff's psychological well-being profile.

3.2.2 Qualitative research

Qualitative research is open-ended and flexible. It can be used to formulate rich descriptions and explanations of human phenomena. It is based on collecting data in the form of written language or by observations that are recorded in language. Data is analysed by identifying and categorizing themes (Terre Blanche & Durrheim, 1999). An example of a qualitative analysis is a phenomenological analysis. Due to the limited number of participants in the quantitative sample a qualitative component was included in the study to allow for a more in-depth investigation. The qualitative aspect consisted of two open-ended questions, which participants in the experimental group were requested to answer. These questions required participants to describe their experience of the exercise, how it made them feel and why they thought exercise had an impact on them. Each participant was asked to answer these questions from their own individual perspective of the exercise experience.

The following sections in this chapter are based on the quantitative aspect of this study.

3.3 Sampling

There were sixty participants selected for this study however due to certain limitations only forty participants were able to participate for the required time period of two months. The limitations included: some of the participants not wanting to take part in the study, being non-compliant with the exercise programme and some not completing the post-tests before leaving the centre. Other limitations included incomplete questionnaires, which could not be used and participants not putting identifying data on the questionnaires so follow-up was impossible. There was a concern that if participants experienced additional psychosocial stressors during the study these would impact on the results. The person supervising the participants at the center was alerted to this concern and she agreed to keep a note of any incidences that may occur and the participants affected.

The sample attained from a bridging home in KwaZulu-Natal. The bridging home is

attended, on a voluntary basis, by people with varying emotional and psychological problems such as substance abuse, eating disorders, emotional difficulties, family problems, relationship problems, sexual or physical abuse. The reason for selecting this sample is that the participants were reported to be presenting with symptoms of depression and low levels of psychological well-being. The sample included male and female subjects, with an age range of fourteen years to thirty-five, from all socio-economic groups and consisted of the all diverse conventional South African research race categories as used by the National Research Foundation. The subjects were informed of the nature of the study and what would be required of them. They were assured of confidentiality and honesty from each subject was encouraged. The subjects lived at the bridging home for the two-month research period.

3.4 Psychological techniques

Basic biological information was needed at the start of the study to individualise each subject. Once this information was obtained the research needed to investigate the effect exercise had on depression and psychological well-being. In order to achieve this the variables had to be measured at baseline and after the intervention. In this study this was achieved by administrating two standardized and objective measures at baseline and after intervention.

3.4.1 Biological inventory

The biological inventory was used to obtain information with regard to name, age and sex of each participant.

3.4.2 Beck Depression Inventory (BDI)

(See Appendix 1)

The instrument used to assess the presence and intensity of depression in each subject was the Beck Depression Inventory (BDI). It has been stated that although the author of the BDI is associated with the development of the

cognitive theory of depression, the BDI was designed to assess depression independent of any particular theoretical bias. The BDI was originally introduced by Beck, Ward, Mendelson, Mock and Erbaugh in 1961 and was later revised. The BDI 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. This investigative tool has the advantage of being economical and is not subject to the prejudice of the tests (Beck et al, 1961).

The BDI has been found to be a reliable instrument. 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 alpha coefficients were found to be .86 and .81 for psychiatric and non-psychiatric populations, respectively. Groth-Marnat (1990) reported that test re-test reliabilities range from .48 to .86, depending on the interval between re-testing and the type of population. Richter, Werner, Heerlim, Kraus and Sauer (1998) found through the use of meta-analytical studies that the BDI has high content validity and discriminant validity in differentiating between depressed and non-depressed people. The norms of the BDI 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 has been found to be valid in South African contexts (Pillay et al, 2002) it is accepted that for the purpose of this study, the scale has an acceptable validity for research.

Each item of the BDI is concerned with the following particular aspects of the experience and symptomatology of depression:

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 gage at what level the individual is functioning a score needs to obtained from the responses on the BDI. 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 hi s / her distress, as is the case with all self report measures

According to the original norms the depression scores can be interpreted as follows:

Total score	Level of depression
I-10	considered as representing normal ups and downs
II-16	mild mood disturbance
17-20	borderline clinical depression
21-30	moderate depression
31-40	severe depression
over 40	extreme depression

This 21-item inventory yields scores ranging from a minimum score of O and a maximum score of 63 with cut-off scores indicating the severity of depression. The BDI and the psychological well-being scales were given to the participants at baseline and after the intervention.

3.4.3 Psychological well-being scale

(See Appendix 2)

This standardized 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, Buhler's (1935) basic life fulfilment tendencies, Neugarten's (1973) descriptions of personality change in adulthood and old age and Jahoda's (1958) six criteria of positive mental health (Keyes, Shmotkin & Ryff, 2001; Edwards, Edwards & Basson, 2004). Make sure all above references appear in reference section

Originally the scale was a 20-item questionnaire. However the scale has since been standardised in 3-, 9- and 14-item forms. For the purposes of this study the 18 item scale was 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 (1989).

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 AGFI (adjusted goodness-of-fit index), which suggests that it is a very-well-fitting model. An overall well-being percentage can also be gained by combining the scores of the six dimensions (Edwards, Edwards & Basson, 2004).

3.4.4 Exercise programme

The exercise programme that was introduced included: each subject in the experimental group to take part in thirty minutes of aerobic activity such as running, brisk walking, kick-boxing, aerobics or dancing, three times per week over a two month period.

3.5 Design

The subjects were randomly assigned to the experimental and control groups, equally. The measuring instruments were then administrated to both groups. The experimental group then took part in the exercise program for a minimum of two-months. The control group did not take part in the exercise program. After the two-month period the measuring instruments were re-administered to both the groups again.

3.6 Data analysis

3.6.1 Quantitative analysis

Statistical testing with SPSS statistical package was used to analyse the data using a variety of statistics. These will include pre and post test means of the experimental and control groups, a *t*-test which is useful whenever there are two groups to be compared and a *F*-test, which is often indicated when a randomized design contains more than two groups. The *F*-test is a frequently used statistic based on the analysis of variance (ANOVA) (Rosnow & Rosenthal, 1996). Once the analyses are complete the results will be discussed.

3.6.2 Qualitative analysis

With regards to the qualitative aspect of this study the participant responses collected and analysed using a phenomenological approach.

3.6.2.1 Phenomenological analysis

In order to understand this type of analytical approach it is useful to first gain an understanding of the concept of phenomenology.

3.6.2.1.1 Phenomenology

To simplify this definition Kant (1952) made the distinction between 'noumena' (objects as they actually are, independent of sensations and knowledge) and 'phenomena' (sensory knowledge of things in the external world). According to Meyer, Moore and Viljoen (1997) phenomenology examines phenomena or manifestations as they occur, without imposing personal theories or specific systems upon the phenomena. They should be comprehended and understood in their full reality as they manifest themselves. This reality is the world as the person sees it and for any one else to understand it they would have to be open-minded and prepared to enter into that person's world from that specific perspective. It also means in depth investigations of essential structures of reality (Edwards, 2004b).

3.6.2.1.2 The process of phenomenological analysis

When adopting this approach the researcher's attitude of the world changes from a natural, which is usually based on the perspective of the natural sciences, to a transcendental attitude. In this framework the researcher strives to consciously suspend, or to bracket personal preconceptions and presuppositions, therefore allowing phenomena to reveal themselves in their fresh, original reality. This process of bracketing is referred to as phenomenological reduction. This is not an easy process as one is often distracted by one's own perceptions so continued bracketing is necessary. Through the process of adopting a transcendental attitude and phenomenological reductionism the pre-reflective life-world is brought to the level of reflective awareness where it manifests itself in psychological meaning (Stone, 1986).

In order for meaning to be found the themes of the protocol of the phenomenon need to be made explicit. The researcher needs an intuitive and holistic grasp of

the data, reading it repeatedly, each time with a more reflective attitude enabling her to retain a sense of wholeness of the data during the subsequent phases of dissection.

The protocols need to be broken down into Naturally Meaning Units (NMU), each conveying a particular meaning. Each unit termed a natural meaning unit is defined as a statement made by the subject, which is self-definable (Stone, 1986). The researcher then reduces the NMU to central themes, and transforms the intension of each unit from the subject's language into a psychological perspective of the phenomenon thereby conveying clear meanings of the themes. The final stage of analysis requires the researcher to synthesize the insights attained by taking into account all the expressed intensions derived from the NMU. The findings may then be conveyed using a specific description or as a general description of a situated structure. The general description will be used in this study.

3.7 Resume'

This study investigated the effects of exercise on depression and psychological well-being. These procedures included an exercise programme, and questionnaires that were used for pre and post-testing. The next chapter will focus on data analysis and a discussion of results.

Chapter 4: Presentation of data and discussion of results

4.1 Introduction

In this chapter the data collected in the study is presented, analysed and discussed.

4.2 Presentation of quantitative data

Data is presented in tabular form and a brief explanation follows each table.

4.2.1 Biographical information

Table 1. Age distribution within the sample

Ages	%
15-25	47.5
26-35	22.5
36-45	12.5
45 and over	17.5

The table 1 shows that all participants were above the age of fifteen. Although the sample included a variety of age groups a large portion of the subjects were between the ages of fifteen and twenty five years. The reason for this concentration of young people is that the center where the experiment was run has a very high number of adolescent and young adults staying there.

Table 2. Gender distribution within the sample

Gender	%
Male	35
Female	65

The table 2 shows that just under two thirds of the sample consisted of females and just over one third males. This result is not surprising as the percentage of women suffering with depression and related low levels of psychological well-being are significantly higher than that of their male counterparts. These results are in line with the findings that women are at higher risk for developing and presenting with depression than males are.

4.2.2 Quantitative analysis of data and results

4.2.2.1 Initial analysis

Table 3. Pre and post-test means of experimental (e) and control (c) groups (grp)

grp	bdi	a1	em1	pg1	pr1	pil1	sa1	bdi2	a2	em2	pg2	pr2	pil2	
e	14.3	12.8	12.8	12.9	13.1	8.9	11.2	6.5	13.1	13.0	13.4	11.8	11.1	12
c	14.7	12.5	12.5	13.0	11.5	10.9	11.2	14.7	12.2	12.7	13.1	11.9	11.3	11

Inspection of the above table 3 indicating pre and posttest mean scores revealed the following results (See Appendix 3). There appear to be clear trends towards changes in scores from the pretest to the posttest. For example there is a decrease in the depression (bdi) score from 14.3 to 6.5 and slight increases in the variables such as autonomy (a), environmental mastery (em), personal

growth (pg), purpose in life (pil) and self-acceptance (sa). The scores appear to have remained quite static in the control group from baseline to the end of the two-month period. It is important to note that although there are clear trends indicating positive changes in many of the variables of the experimental group the overall statistical analysis revealed that these changes were not significant.

4.2.2.2 Further analysis of the data

Further analysis consisted of a between groups comparisons with repeated measures (ANOVA) and within group comparisons (*t*-testing).

4.2.2.2.1 Between groups comparisons

Analysis of variance with repeated measures yielded no significant differences between the experimental and control group. *F* ratios for between group comparisons were as follows: bdi, F =2.9; a, F =0.8; em, F=0.04; pg, F =0.02; pr, F =0.8; pil, F=2.8;sa, F=0.3.

4.2.2.2.2 Within group comparisons (*t*-testing)

The t-test allows for comparisons between two groups. This can be between the experimental and control group or it can be used for comparisons of variables within a single group at baseline and at the end of the experiment. Comparisons were made of the variables within the experimental group and then within the control group in this study control group.

The paired samples *t*-testing of the variables within the experimental group indicated that physical activity was associated with a significant change in three of the paired variables, namely bdi (depression), t =5.0 $p<0.05$; pr (personal relations) t=2.6 $p<0.05$; pil (purpose in life) t=-2.9 $p<0.05$.

These results indicate that there is a significant difference between the means of some of the paired samples above at pre and post testing. For the bdi and the pil this change was positive as the levels of depression decreased and there was an increase in pil. These changes can also be attributed to the possibility of

spontaneous remission, where the depression improved over the two-month period independently. There is also the possibility that during this period of remission certain aspects of the participant's psychological well-being improved. It is difficult to determine whether these changes were associated with physical activity, spontaneous remission or combinations and interactions of these factors. Although changes were noted in the pr paired sample this change was caused by a decrease rather than an increase indicating a negative result. Reasons for this may be that individual rather than social exercise, which was encouraged and this may have been instrumental in less relating with others. The remaining paired samples were not significant.

No significant changes were found in the comparison of the variables within the control group at pre and post testing.

Taking into consideration the slight changes noted in the pre and post test means of the experimental and control groups and the paired samples *t* testing that were found to be significant there is a trend towards the findings supporting the research hypothesis, even though the results are not significant. If the overall profile had been significant rather than just indicating a few trends towards positive changes it would allow for more definite empirical interpretations of the interactions between the variables.

4.3 Qualitative analysis of data

Of the twenty participants in the experimental group fourteen agreed to take part in this aspect of the study. Their responses were divided according to the two questions that were given.

Question 1: "How did the exercise make you feel?"
Question 2: "Why do you think it made you feel that way?"

The reason for asking these particular questions was to gain an understanding of the exercise experience from each participant's perspective and to explore the participant's reasons for their experience.

4.3.1 Process of analysis

The individual responses to the questions will be presented (See Appendix 4), these will be followed by a summary of the responses, which will be discussed and interpreted.

4.3.1.1 Individual responses to question 1

Question 1: "How did the exercise make you feel?"

"Makes me feel better emotionally and physically"

"During exercise the feeling of muscles working is grand. Heart rate being elevated feels fantastic"

"Exercise makes me feel great, because by exercising I use my body which makes me feel alive. By exercising I not only benefit physically but also mentally. I feel that if more people used exercise time to focus on themselves (internally) it will assist them in dealing with their stuff"

"It depends. I enjoy Tae-bo, aerobics, that sort of stuff makes me feel energised, happy and great"

"Exercise makes me feel truly fantastic, it makes me feel stronger, more awake and it makes me feel the strength in my body. I feel as my body is getting constantly fitter and stronger. I like to feel the muscles in my body such as, when I gym. I am very fortunate to have the body I have as my body is shaped to be a potential for many sports, for example gym, skateboarding, martial arts etc"

"Relatively great sometimes and hard"

"Makes me feel good or happy about myself"

"I feel good"

"Exercise makes me feel more energetic and awake afterwards. During the exercise, I feel tired and feel that I can't finish. I never feel like exercising but afterwards I am always glad I did"

"It makes me feel more confident. Makes me feel like I'm having victory in my recovery"

"It makes me feel uneasy and a waste of time at first but after a while it becomes easy and worthwhile. Exercise also makes me feel confident about myself"

"It revitalizes me, makes me feel refreshed, healthy, happy, fit and ready to take on the long day. It keeps my mind off the bad past I had. Keeps me focused and it's a good way to spend my time"

"Makes me feel good but not so early in the morning"

4.3.1.1.1 Summary of individual responses

The responses from the participants although individual seemed to interrelate with one another. Common experiences were around feeling great, fantastic, awake, alive, refreshed, healthier, energized, stronger, fitter and more confident. Some reflected on how they are able to use the time productively while exercising, for example by focusing internally and working through your difficulties, using it as a healthy way of coping, focusing energy on personal growth and as a distraction from past memories. Some responses indicated the exercise was a way f to take part in one's own recovery, giving a sense of achievement and motivation to start the day. There were some responses that indicated some degree of negativity initially as the exercise was perceived as an effort, tiring and a waste of time however with persistence the exercise became easier and worthwhile.

4.3.1.1.2 Interpretation of responses

There were some common themes that emerged but they should not be viewed in isolation but rather as interrelated. Among these themes were an increased

sense of self-acceptance, where confidence was gained and a feeling of emotional and physical contentment was achieved. Personal growth and the ability to master ones environment were among the themes as participants experienced physical, emotional and mental changes within themselves and their abilities. These included feeling one's body changing, being able to adapt to a new and healthier way of life and developing new skills. It was interesting how some participants developed this awareness of particular parts of themselves, their location, how they feel and what you can do with them. This is important in terms of being able to focus, develop interest and find aspects of self that can be strengthened. In addition, a sense of autonomy emerged as some became aware of their role in their own treatment, striving to reach potential and exploring ways of helping themselves.

The initial negative experience felt by some is understandable as starting the exercise process can be very exhausting and perceived as physically draining especially if ones fitness levels are quite low and one is not easily motivated. However, as the exercise becomes more regular, ones body begins to adapt, endorphins are released and the experience starts to become pleasurable, as found in the above statements.

The overall profile of the responses from the participants was positive and indicated that taking part in the exercise had impacted on each participant in a constructive and beneficial way. The themes that emerged indicated that by taking part in exercise can in fact produce changes in levels of psychological well-being and depression in a positive way.

4.3.1.2 Individual responses to question 2

Question 2: "Why do you think it made you feel that way?"

"When I first started doing exercise the thought of the effort I needed to put in put me off completely. But when I got used to it, its fine. I felt confident cause I feel fit and healthy"

"Achieving something good is great"

"My body derives pleasure from exercise, even though exercise can be strenuous and painful, I feel good to 'burn' a muscle or push myself to be stronger, it brings me 'self-confidence'"

"Because it's revitalizing and warms up the body. It sends a flow of oxygen to the brain"

"Because there are no distractions other than the exercise"

"Gets me out into a different environment with different scenery"

"Cause I'm looking after my body and keeping fit"

"I feel that I'm contributing to my health"

"Stimulates my brain (endorphins)"

"Because I like to keep fit and healthy"

"It makes my body feel good, makes me feel good. It keeps me active all the time"

"Because it keeps me focused, happy and knowing in God that he is giving me a second chance in life to make the best of this wonderful life I was granted with"

"Previously drugs were my exercise. They made me feel confident. Now I'm replacing the spare time with exercise. I'm hooked on having a healthy life"

"It clears my head and makes my body feel alive. I like feeling that my muscles are sore afterwards. Makes me feel that exercise has achieved something"

4.3.1.2.1 Summary of individual responses

Some of the responses given for this second question were very similar to the responses of the first question, which related to how the exercise made participants feel. The repeated responses were that it makes one feel alive, confident, happy, fit, healthy and revitalized. Some of the responses did however give reasons for these feelings. These included the changes they felt within the body such as the burning sensations and soreness in the muscles, which contributed to the sense of achievement and being alive. Being fit and healthy came up quite strongly and was related to feeling good and confident. Others reported the reasons to be having a distraction, being in a different environment with different scenery while exercising, using it to fill a space and as a way to clear one's head and focus. There were some responses that explained the experience as resulting from a release of endorphins and increased flow of oxygen to the brain.

4.3.1.2.2 Interpretation of the responses

Most of the participants were able to give a clear reason for the changes that they had experienced. Some were quite individualistic while others emerged under common themes.

Positive feelings were seen as a result of becoming stronger, fitter and healthier, which relate to how one perceives and feels about oneself. If one's self-perception is positive and a point of acceptance and contentment is reached this will inevitably impact on how tone feels. Others explained their feelings as the result of finding a sense of confidence and achievement, and recognizing their capability of making changes in their lives. These explanations highlight how an increased self-esteem can improve the way one evaluates oneself and one's abilities. These results reinforce findings of previous literature (Biddle, Fox & Boutcher, 2000).

Explanations given in the past for the positive impact of physical exercise have included the distraction hypothesis, theromgenic hypothesis and the serotonin and endorphin hypotheses (Dishman, 1998). Having a distraction, an increase in

the body's temperature and increased activity in the brain are all responses given by participants, which support the above hypotheses.

4.3.1.3 Bringing the interpretations together

Although some participants' answers reflected more depth than others did, it is important to reiterate that there is no right or wrong response. Each experience and explanation had meaning and depth for the participant that shared it. With this in mind it became quite a challenge to separate what feeling the exercise aroused from what was found to be the reason for the generation of these feelings, for example one persons feeling about the exercise experience may be the trigger for a different feeling in another person. This is perhaps why the most useful way to interpret the information gained from this qualitative study is by understanding it as an integrated whole.

The participants that responded to the two questions all took part in the exercise process. All felt it was beneficial and positive even though for some the experience was initially quite challenging, and they were all able to relay the reasons why they felt the exercise had made them feel that particular way. Whilst interpreting this data it became apparent that a cycle of this healing process seems to form where a person begins the exercising, starts to experience positive changes such as becoming stronger, fitter and healthier. They then begin to challenge previous perceptions of themselves, for example that they are unattractive. This change in self perception then leads to an increased self-esteem for example, feeling more confident and having an internal locus of control. However, when one has a history of depression or poor state of psychological well-being one may be quite vulnerable to falling back in the trap of negativity.

So the cycle needs to continue with regular exercise as the key component as it has been suggested in previous literature that people who participate in frequent exercise are most likely to have partial or full recovery from depression (Babyak et al, 2000).

4.4 Resume'

This chapter dealt with the presentation and analysis of the quantitative and qualitative data collected in the questionnaires and interviews. The analysis revealed that the quantitative results were not significant enough to indicate changes in the experimental group pre and posttest scores. However the results did indicate clear trends towards a decrease in depression and an increase in some of the psychological well-being dimensions, which tied in with the positive responses gained in the qualitative study. From the limited findings of the present study it can be concluded that the research hypothesis of exercise having a positive effect on depression and psychological well-being was supported.

Chapter 5: Conclusion

5.1 Introduction

The World Health Organisation has spent a great deal of time investigating ways to prevent illness and promote health internationally. Many researchers have found physical activity to be a tool impacting positively on human functioning, especially physiological and psychological functioning (Edwards, 1995). For example, physical activity has been found to help reduce cardiovascular problems, and to assist in the treatment of generalised anxiety disorders, stress, and even the psychological well-being of patients with schizophrenia and to be useful as an additional treatment for drug and alcohol rehabilitation (Department of Health, 2004).

This study set out to investigate a hypothesis that if people suffering with depression and low levels of psychological well-being took part in physical activity three times per week for at least thirty minutes per day there would be an improvement in their psychological functioning, with special reference to a decrease in their level of depression and an increase in their psychological well-being. This is the first study to be done on this topic using the BDI and Ryff's psychological well-being profile together.

5.2 Main findings

The sample was collected, consent was attained, the pre-testing was carried out, the exercise programme was introduced to the experimental subjects and after the two-month period post-testing was completed. The participants in the experimental group took part in qualitative interviews, which explored their experience of the exercise process. The data was then collected and analysed.

The analysis revealed that the quantitative results were not significant except for the variables depression and purpose in life, which were significant when comparing the pre and post-test of the experimental group. Even though a large portion of the results were not significant enough to validate changes in the

variables over the two months there were slight changes. These changes indicate clear trends towards a decrease in depression and slight increase in some of the psychological well-being dimensions for example, autonomy; personal growth; environmental mastery; purpose in life and self acceptance. The variables in the control group remained the same pre and post-test. These results are consistent with the findings of Edwards, Edwards and Basson (2004) study, which revealed that exercising participants were generally more psychologically well and had more positive self-perception than non-exercising participants.

The qualitative aspect of this study explored the participants essential exercise experience and their reasons for their experience. The results generally revealed positive experiences of exercise, with some participants only experiencing positive feelings, some both positive and negative and none purely negative experiences. The participants were generally optimistic about the exercise, felt a definite change in their overall functioning and were able to give really insightful explanations. These results are consistent with findings noted in Edwards (2002b), where the feelings expressed by the participants about the exercise experience were essentially positive.

In order to give a true reflection of the findings of the study, the results need to be integrated, analysed and reported holistically. The quantitative results alone indicated that there was no significant change in the participants levels of depression or psychological well-being after exercising. However, by analyzing this data further and incorporating a qualitative aspect to the study findings emerged that contradicted the previous results. It is concluded that exercise does in fact reduce depression and increase psychological well-being.

5.3 Limitations and implications

At the outset of the study limitations were predicted and some of these became apparent during the study.

Finding the sample for this experiment proved to be quite challenging as the participants had to agree to the requirements of the study, such as taking part in the exercise programme or refraining from treatment as a whole. Some

participants were inconsistent and did not adhere to the requirements for the two-month period. One of the biggest difficulties faced during the study was making sure participants completed the post-tests before leaving the centre. Many agreed to take part in the study, completed the pre-tests, took part in the exercise or refrained from it and then left before completing the post-tests. Another difficulty was some participants did not complete the questionnaires fully and these could not be used in the study.

The issue of confidentiality was reinforced frequently to the participants however some were possibly unsure of the limits so they did not fill in their details on the questionnaires making it impossible for follow-up.

It was suggested at the outset of the study that the participants' exercise programme would need to be monitored to ensure that they were taking part in the required amount of time and to ensure that they were not overdoing the exercise. This did not prove to be a problem as the exercise programme was monitored by an employee at the centre where the research project was carried out.

It is uncertain whether there were any difficulties such as psychosocial problems, encountered by participants during the time of the investigation, which may have impacted on their psychological functioning and in turn their responses. There was indication of any problems reported by the supervisor of the participants. If there were they would need to be considered as confounding variables in the study.

Due to the small sample the results cannot be generalised out to the population. This would only be possibly if viewed in conjunction with previous literature with similar findings.

5.4 Recommendations

In light of the above limitations it is recommended that a larger sample and a more controlled environment be used to ensure more reliable and significant results.

Although this study revealed some of the reasons for exercise having positive

effects on people such as it being a distraction and release of endorphins, the responses were limited due to the sample size. It may be useful for further investigates to be done into these causes, using a more thorough and scientific approach. If this can be achieved further steps to developing an exercise model to aid in promoting this approach may be a possibility.

Another point that needs to be made is that during the study it became apparent that there is a vast amount of literature indicating the positive influence of physical activity on mental illness and health. Yet there is still the question of why it is so under recommended by health professionals. It may be useful for an investigation to be done to explore reasons behind this and what it is going to take to ensure that physical activity be placed on the list of recommended treatment approaches.

5.5 Conclusion

Previous literature established that physical activity has a positive impact on the psychological functioning of people (Biddle, Fox & Boutcher, 2000). The present study extended this earlier quantitative and qualitative research. Although the quantitative aspect of this study revealed limited results the trends towards positive results were noted and were consistent with the positive responses found in the qualitative study. This study used an objective and experiential approach in its investigation and although many limitations were encountered it was found that exercise did generally impact positively on levels of depression and psychological well-being. It can be concluded that exercise can be used as a tool in the prevention of mental illness and the promotion of mental health. In addition this study allowed for focused recommendations for future studies.

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| MALE | FEMALE | | RURAL | URBAN | AGE:_____yrs

Please circle the statement that best describes the way you have been feeling over the past week.

APPENDIX I

[1]
0 I do not feel sad.
1 I feel sad.
2 I am sad all the time and I can't snap out of it.
3 I am so sad or unhappy that I can't stand it.

[2]
0 I am not particularly discouraged about the future.
1 I feel discouraged about the future.
2 I feel I have nothing to look forward to.
3 I feel that the future is hopeless and that things cannot improve.

[3]
0 I do not feel like a failure.
1 I feel like I have failed more than the average person.
2 As I look back at my life, all I can see is a lot of failures.
3 I feel I am a complete failure as a person.

[4]
0 I don't feel particularly guilty.
1 I feel guilty a good part of the time.
2 I feel guilty most of the time.
3 I feel guilty all of the time.

[5]
0 I don't feel I am being punished.
1 I feel I may be punished.
2 I expect to be punished.
3 I feel I am being punished.

[6]
0 I get as much satisfaction out of things as I used to.
1 I don't enjoy things the way I used to.
2 I don't get real satisfaction out of anything anymore.
3 I am dissatisfied or bored with everything.

[7]
0 I don't feel disappointed in myself.
1 I am disappointed in myself
2 I am disgusted with myself.
3 I hate myself.

[8]
0 I don't feel I am any worse than anybody else.
1 I am critical of myself for my weaknesses or mistakes.
2 I blame myself all the time for my faults.
3 I blame myself for everything bad that happens.

[9]
0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.

[10]
0 I don't cry anymore than usual.
1 I cry more now than I used to.
2 I cry all the time now.
3 I used to be able to cry, but now I can't cry even though I want to.

I am no more irritated now than I ever am.

1 I get annoyed or irritated more easily than I used to.

2 I feel irritated all the time now.

3 I don't get irritated at all by the things that used to irritate me.

[12] 0 I have not lost interest in other people.

1 I am less interested in other people than I used to be.

2 I have lost most of my interest in other people.

3 I have lost all of my interest in other people.

[13] 0 I make decisions about as well as I ever could.

1 I put off making decisions more than I used to.

2 I have greater difficulty in making decisions than before.

3 I can't make decisions at all anymore.

[14] 0 I don't feel I look any worse than I used to.

1 I am worried that I am looking old or unattractive.

2 I feel that there are permanent changes in my appearance that make me look unattractive.

3 I believe that I look ugly.

[15] 0 I can work about as well as before.

1 It takes an extra effort to get started at doing something.

2 I have to push myself very hard to do anything.

3 I can't do any work at all.

[16] 0 I can sleep as well as usual.

1 I don't sleep as well as I used to.

2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.

3 I wake up several hours earlier than I used to and cannot get back to sleep.

[17] 0 I don't get more tired than usual.

1 I get tired more easily than I used to.

2 I get tired from doing almost anything.

3 I am too tired to do anything.

[18] 0 My appetite is no worse than usual.

1 My appetite is not as good as it used to be.

2 My appetite is much worse now.

3 I have no appetite at all anymore.

[19] 0 I haven't lost much weight, if any, lately.

1 I have lost more than 5 pounds (2 kg).

2 I have lost more than 10 pounds (4.5 kg).

3 I have lost more than 15 pounds (10kg).

I am purposely trying to lose weight by eating less. | YES | NO |

[20] 0 I am no more worried about my health than usual.

1 I am worried about physical problems such as aches and pains, or upset stomach, or constipation.

2 I am very worried about physical problems and it's hard to think of much else.

3 I am so worried about my physical problems, that I cannot think about anything else.

[21] 0 I have not noticed any recent change in my interest in sex.

1 I am less interested in sex than I used to be.

2 I am much less interested in sex now.

3 I have lost interest in sex completely.

APPENDIX 2

Name:
Age:
Gender
Home language:
Address and contact number:

The following set of 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 describes 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.	1	2	3	4	5	6
2. I think it is important to have new experiences that challenge how you think about yourself and the world.	1	2	3	4	5	6
3. In general, I feel I am in charge of the situation in which I live.	1	2	3	4	5	6
4. I live life one day at a time and don't really think about the future.	1	2	3	4	5	6
5. Maintaining close relationships has been difficult and frustrating for me.	1	2	3	4	5	6
6. When I look at the story of my life, I am pleased with how things have turned out.	1	2	3	4	5	6
7. I have confidence in my opinions even if they are contrary to the general consensus.	1	2	3	4	5	6
8. For me, life has been a continuous process of learning, changing and growth.	1	2	3	4	5	6
9. The demands of everyday life often get me down.	1	2	3	4	5	6
10. Some people wander aimlessly through life, but I am not one of them.	1	2	3	4	5	6
11. People would describe me as a giving person, willing to share my time with others.	1	2	3	4	5	6
12. I like most aspects of my personality.	1	2	3	4	5	6
13. I judge myself by what I think is important, not by the values of what others think is important.	1	2	3	4	5	6
14. I gave up trying to make big improvements or changes in my life a long time ago.	1	2	3	4	5	6
15. I am quite good at managing the many responsibilities of my daily life.	1	2	3	4	5	6
16. I sometimes feel as if I've done all there is to do in life.	1	2	3	4	5	6
17. I have not experienced many warm and trusting relationships with others.	1	2	3	4	5	6
18. In many ways, I feel disappointed about my achievements in life.	1	2	3	4	5	6