PERCEIVED HEALTH BENEFITS OF PARTICIPATING IN PHYSICAL ACTIVITY AMONGST ELDERLY PEOPLE IN VHEMBE DISTRICT, LIMPOPO PROVINCE SOUTH AFRICA

BY

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.DECLARATION

I,' Ndadza Madzhie declare that this mini dissertation titled 'perceived health benefits of participating in physical activity amongst elderly people in Vhembe district, Limpopo Province South Africa' here by submitted in partial fulfillment for degree of Master of Public Health Degree at the University of Venda, is my own work and it has not been submitted by me anywhere else. Various sources used in this project have been acknowledged.

Mr. Ndadza M.

Signature.....Date.01/02/2016

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DEDICATION

This study is dedicated to all elderly people who realized that it has become a matter of increasing urgency to look for ways to maintain and improve the functional abilities of ageing people; and that it is necessary to combat the high levels of physical inactivity amongst elderly people in South Africa, high levels of chronic diseases and high deaths rates due to chronic diseases related to physical inactivity and took their precious time to participate in this study.

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ABSTRACT

Purpose: The purpose of this study was to describe the perception of the elderly people of Vhembe District concerning the health benefits of participating in physical activity. By identifying factors that these elderly people feel help or hinder their involvement in physical activity, measures can be taken to enable optimal participation.

Methods: This quantitative descriptive cross-sectional study involved a total population sample of 422 elderly persons registered to participate in eight sports and recreational hubs in Vhembe District, Limpopo province. A self-designed questionnaire was used for data collection. Data were analysed using descriptive and inferential statistics.

Results: Majority 187 (44.3%) of respondents showed negative perceptions regarding the physiological benefits associated with regular physical activity participation as compared to 87 (20.6%) were positive while 148 (35.1%) were neutral. Regarding physical benefits, the majority 254 (60.2%) respondents showed negative perceptions when compared to only 78(18.5%) who showed positive perceptions whereas 90 (21.3%) were neutral. Concerning psychological benefits, the majority 190 (45.1%) respondents also showed negative perceptions while 136 (32.2%) were positive.

Conclusion & Recommendations: Elderly people of Vhembe district have negative perceptions regarding the health benefits associated with regular physical activity participation, signifying that it has become a matter of increasing urgency to look for ways of eradicating these negative perceptions.Intervention strategies should be instituted to educate and inform elderly people about the health benefits of participating in physical activity.

KEYWORDS: Perception, health benefits, physical activity, elderly people, participation

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LIST OF ACRONYMS

Activity Daily Living (ADL).

Alzheimer's disease (AD)

Allele of the Apo lipoprotein E (APOE)

Basic Activity Daily Living (BADL)

Blood pressure (BP)

Body Mass Index (BMI)

Breast Cancer Antigen (BCRA)

Bone Mineral Density (BMD

Cardiovascular Disease (CVD)

Disease control and prevention (CDC)

Coronary Heart Disease (CHD)

Disability-adjusted life years (DALYs)

Hazard ratio (HR)

In non-respondents group (NPG)

Metabolic rate (MET)

Mini-Mental Status Examination (MMSE)

Osteoarthritis (OA)

Observed ratio (OR)

Physical Activity (PA)

Personal Activities of Daily Living Progressive Resistance Training (PADL)

Respondents group (PG)

Pittsburgh Sleep Quality Index (PSQI)

Progressive resistance training (PRT)

United Kingdom (UK)

United States of America (USA)

Relative risk (RR)

Randomised controlled trial (RCT)

World health organization (WHO

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1.1 INTRODUCTION AND BACKGROUND

Physical activity is widely recognised as a means for the primary prevention of chronic diseases as well as in patient's treatment and rehabilitation. It has beneficial effects on an individual's health and well-being (Kruk, 2007). Numerous studies have shown that regular physical activity is widely recognized as a means of preventing the occurrence of many chronic diseases and reducing the risk of all causes of mortality (Bauman, Bellew, Vita, Brown & Owen, 2002; Cadilhac, Magnus, Cumming, Sheppard, Pearce& Carter, 2009). Research has shown that physical activity results in reduced risk of cardiovascular and heart diseases, type 2 diabetes, osteoporosis, fall-related injuries, depression and obesity (Bauman, 2004). Physical activity also improves cardiovascular function, neuromuscular function, bone density, respiratory function and cognitive function in older adults (Binhosen, Srisuphun, Sucamvang, Panathai, Chang & Cioffi, 2003).

12. BACKGROUND OF THE STUDY

Evidence confirms that engaging in moderate physical activity is very important for the primary prevention of chronic diseases, decreasing all causes of mortality and that exercise is one of the determinants for physical and psychological well-being (Kruk, 2007).

Despite the release of scientific reports that document health benefits associated with regular physical activity and exercise, the percentage of physically inactive elderly people in the world is high (Morrow, Malone, Jackson, Bungum & Fitzgerald, 2004). According to the World Health Organization (WHO, 2003) more than 63% of adults can be classified as inactive around the globe. The World Health Organisation also estimated that physical inactivity is responsible for 6% of death globally, around 3.2 million deaths per-year and it is the fourth leading risk factor for global mortality.

According to the World Health Organization (WHO,2008) 80% of heart diseases, stroke, type 2 diabetes and over a third of cancers could be prevented by eliminating certain lifestyle risk factors, including physical inactivity. Physical inactivity as a life style or behaviour is recognized as one of the major causes and risk factors that lead to multiple chronic conditions (WHO, 2003).

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In Canada, national population health surveys (...) last two decades have consistently found that older adults are the least physically active of Canadians (Canadian Community Health Survey, 2002/2003; Moore, Rosenberg& Fitzgibbon, 1999; National Advisory Council on Aging, 2006). Statistics form the Canadian Community Health Survey (2005) indicated that 62% of Canadians 65 years of age and older are physically inactive (National Advisory Council on Aging, 2006).

A study conducted in Australians has shown that, the proportion of adults Australian who exercised sufficiently to obtain benefits to their health were 37% (AIHW, 2010). It were also estimated that physical inactivity is responsible for more than 6.6% of the total burden of disease and injury in Australia alone (Begg, Barker, Stevenson, Stanley & Lopez, 2007). Globally, physical inactivity accounted for 21.5% of heart disease, 11% of stroke, 14% of diabetes, 16 % of colon cancer, and 10% of breast cancer (Bull, Armstrong, Dixon, Ham, Neiman & Pratt, 2004). Although across the whole Australian population women reported slightly higher regular physical activity participation rate than men, when compared to men, women of all ages are less likely to engage in levels of physical activity sufficient for health benefits. This is particularly so for older women (Australian Government Independent Sports Panel, 2009; AIHW, 2010; Women's Health Australia, 2010; ERRASS, 2010).

In the United Kingdom (UK) alone, the fastest growing age group in the entire population is those aged 85 years and over. With the continual growth over the last 25 years, this population group reached 1.3 million in 2007, meaning that today those aged 85 and over represent 2.1% of the total population of the UK (Falkingham, Evandrou, McGowan, Bell & Bowes, 2010). Recent statistics (British Heart Foundation Centre, 2012) indicated that the population of older adults meeting physical activity recommendations were 20% of men aged 65 - 75 years, 9% of men aged 75+; 17% 0f women aged 65 -74 years and 6% of women aged 75 years and above.

In Britain it is estimated that 37% of coronary heart disease is attributed to physical inactivity (McPhesson, Britton & Causer, 2002). The study also estimated that, if people who now have inactivity or marginally active lifestyles changed to moderate level of activity, this could achieve 10% reduction in coronary heart disease risk. The total cost of inactivity in England alone, including both direct and indirect cost of treatment for major lifestyle-related diseases, has been estimated at 8.2 billion euros a year (Department of Health Chief Medical Officer's Report, 2004).

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A study conducted in the United States of A(USA) estimated that by the year 2030, the number of individuals aged 65 years and older will reach 70 million in the United States, with persons aged 85 years and older constituting the fastest growing segment of the population (Mernitz & McDermott, 2004). This group represents the population with the highest rate of physical inactivity in the USA. Only 30% of those aged 65 and older report any regular exercise in the USA (Mernitz & McDermott, 2004). This inactivity is associated with greater disease burden and decreased functional status (Kruk, 2007). Data suggest that, despite the evidence that many Americans are aware of guidelines for physical activity and benefits associated with physical activity (Morrow, Krzewinski, Jackson, Bungum & FitzGeral, 2004), the majority of Americans and especially older adults do not engage in physical activity or exercise enough to provide health benefits (Nelson, Rejeski, Blair, Duncan, Judge & King, 2007).

According to the report from the Centre for Disease Control and Prevention (CDC, 2004), at least 80% of older Americans are living with at least one chronic condition and 50% of older Americans live with at least two chronic diseases. It were also estimated that obesity alone as a result of poor diet and physical inactivity cost America 117 billion dollars annually, including 61 billion dollars in direct medical cost for treatment of related disease, plus 56 billion dollars in indirect cost such as lost productivity (U.S. Department of Health and Human Services, 2001).

Evidence showed high levels of physical inactivity among older adults throughout Africa (April, Kolbe-Alexander & Lambert, 2005). A study conducted in Africa (Bull, Armstrong, Dixon, Ham, Neiman & Pratt, 2010) estimated that 18% of males aged 65 -79 years do not participate in any physical activity, with 44% engaging in insufficient physical activity, while 19% of females aged 65-79 years do not participate in any physical activity at all, with 46% engaging in physical activities which are not sufficient enough to produce health benefits.

In South Africa, chronic disease due to physical inactivity account for nearly 40% of older adults deaths, and the majority of South Africans have at least one modifiable risk factor for chronic disease. More specifically, conditions such as hypertension and diabetes in older South African adults are very common (Lambert & Alexander, 2005).

While in South Africa concerns have been expressed regarding high levels of physical inactivity, it has been estimated that 3.3% of the adult burden of disease may be explained by

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physical inactivity, which were ranked ninth among risk factors attributable to deaths (Joubert, Norman, Lambert, Groenewald & Schneider, 2000).

In a sample of people in a peri-urban community in the Western Cape, approximately half 49.7% did not meet the public health recommendations of 150 minutes or more of health-enhancing physical activity per week. Of those younger than 35 years, 40% were insufficiently active, compared with 66% and 77% of those aged 55-66 and 64 years respectively, showing increasing prevalence of inactivity with increasing age (Lambert & Kolbe-Alexander, 2005).

South Africa stands out as having a particularly high prevalence of physical inactivity, with 49% of adult women reportedly insufficiently active to achieve health benefits, compared to a global average of 17% or Africa's average of about 10% (Jobbers, Norman, Lambert, Groedwald, Schneider, Bull & Bradshow, 2007). Therefore the study seeks to explore the perceived health benefits of participating in physical activity among the elderly people in Vhembe District, Limpopo Province, South Africa.

1.2 PROBLEM STATEMENT

Vhembe district has a total population of 1 302 113 with 53.3% females; 46.7% males and 19.0% of people who are age 65 and above (Vhembe District profile, 2012). The concern is that very few of these elderly people (i.e. Less than 1500) participated in physical activity between 2013/2014 and 2014/2015 term (Vhembe district, 2014). In support of this claim, the department of sports, arts and culture Limpopo reported low participation on programme 4 sports and recreation (DSAC, 2014). Similarly, Lambert and Kolbe-Alexander (2005) asserts that only a minority(18% of those aged 66 years) of the South African elderly population are active enough to benefit from the positive outcomes associated with regular physical activity participation. Physical inactivity can lead to risk of coronary heart disease, stroke, diabetes, hypertension, colon cancer, breast cancer and depression (World Health Organization, 2009). The question remains 'does this population know the benefits of participating in physical activity?'

While several studies have been conducted around the world to investigate the health benefits associated with regular physical activity and the factors that hinder the participation in physical activities (Hu, Lei, Smith & Zhao,Y., 2012; Picorelli, Pereira, Pereira, Felício, & Sherrington, 2014; Lindwall, Larsman & Hagger, 2011; Bridle, Spanjers, Patel, Atherton, &

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Lamb, 2012; Win, Parakh, Eze-Nliam, Gotto, Jr, Ballantyne, Haight, Lee, Ho & Ziegelstein, 2010; Sanchez & McGough, 2014 ;British Heart Foundation, 2012; National Institute of Aging, 2011; Factora, 2013; Mesquita, Carvalho , Freire , Neto, & Zângaro, 2015; Wan & Wong, 2014), very little is known about perceptions of the elderly people in Vhembe District regarding the health benefits of participating in physical activity. Therefore, this study seeks to explore the perceived health benefits of participating in physical activity among the elderly people in Vhembe District, Limpopo Province, South Africa.

1.4 SIGNIFICANCE OF THE STUDY

The perception of the elderly people concerning the health benefits of participating in PA may help the government and communities to institute strategies on how to reduce the high levels of physical inactivity and to improve the health and well-being of elderly people. This can be achieved by eliminating inactivity as a risk factor for chronic diseases. The results will also contribute to the existing body of knowledge in the field of public health and gerontology (the study of physical, mental, and social changes in older people as they age).

1.5 GENERAL OBJECTIVE

The aim of this study was to explore the perception of the elderly people of Vhembe District regarding the health benefits of participating in physical activity.

1.6 SPECIFIC OBJECTIVES

The specific objectives of the study were:

- To describe the perception of elderly people regarding physiological benefits of physical activity in Vhembe District.
- To describe the perception of elderly people regarding physical benefits of participating in physical activity in Vhembe District
- To describe the perception of elderly people regarding the psychological benefits of physical activity in Vhembe District.

1.7 RESEARCH QUESTIONS

- What is the perception of elderly people in Vhembe District regarding physiological benefits of physical activity?

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- What is the perception of elderly people in Vhembe District regarding the physical benefits of participating in physical activity
- What is the perception of the elderly people in Vhembe District regarding the psychological benefits of physical activity?

1.9 DELIMITATION OF STUDY

The study were conducted among the elderly people in Vhembe District (aged 65 years and above). The perceptions of the elderly persons regarding the physiological, physical, psychological and social benefits of physical activity participation were described.

1.10 DEFINITION OF TERMS

- Physical activity: is defined as any bodily movement produced by skeletal muscles that require energy expenditure (WHO, 2009).
- Health benefits of physical activity include: physiological, physical, psychological and social benefits
- Health implications of physical activity: refer to both the positive effects of being physically active and the negative effects of being physically inactive.
- Elderly people refer: to the persons over the age of 65 years.

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CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews literature on the health benefits associated with regular participation in physical activity amongst elderly people. The review will include physiological, physical, psychological and social benefits.

2.2 PHYSIOLOGICAL BENEFITS OF PARTICIPATING IN PHYSICAL ACTIVITY

Physical activity is widely accepted as being beneficial to health. Research indicates that regular physical activity improves physical health, reduces the rate of premature mortality, and decreases the likelihood of numerous diseases, including coronary heart disease, hypertension, colon cancer, and diabetes mellitus (U.S. Department of Health and Human Services, 1996). Evans (1999) proposed that older adults benefit from regular exercise more than any other age group. The low functional independence and high rate of chronic disease so typical of older adults can be dramatically influenced by regular exercise. Evidence indicates that exercise can decrease the risk of developing disease and may even help to stop or reverse the progression of certain disease conditions (Blumberg, et.al., 1992).

2.2.1 CARDIOVASCULAR DISEASES

Cardiovascular diseases (CVD) include high blood pressure (hypertension), coronary heart disease (CHD), stroke, rheumatic heart disease and other forms of heart disease. The protective effect of physical activity and regular exercises on risk factors of the CVD morbidity and mortality, hypertension, blood glucose level, cholesterol and triacylglycerol's levels has been reported for different study design and population (Bauman, 2004).

In a systematic review and meta-analysis presented by Taylor et al. (2004) of 48 studies (8,940 patients from Europe, North America and Asia/Australia) on the effectiveness of exercise-based cardiac rehabilitation, a significant 26% reduction in cardiac mortality (OR=0.74) were found among cardiac rehabilitation individuals compared with usual care patients. Another systematic review that evaluated results from 81 studies with a total number

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of 2,387 patients, examined the role of exercise training in heart failure by Smart and Marwick (2004), found that exercise caused significant increment in maximal oxygen consumption (of a measure of functional capacity in patients with heart failure).

The previous published data from thirty (30) articles evaluated by Oguma and Shinoda-Tagawa (2004). The results indicate that physical activity were associated with significantly reduction of CHD and stroke among women in a dose-response relation (RR: 0.78, 0.53, 0.61, P<0.0001; 0.73, 0.68, P<0.0001, respectively). The authors also reported that walking 1 hour/week were associated with reduction of CVD risk among women. Moreover, Faff (2004) gives a detailed description of finding on association between physical activity and physical fitness and decreased mortality from CVD. The author has suggested that physical activity coincides with the reduced morbidity and mortality from coronary diseases independently on age being performed. Physical activity and fitness exert beneficial effects on the CVD risk factors, such as the level of cholesterols, triacyglycerols, elevated blood pressure, and improve insulin sensitivity and glycaemic control.

Findings from the INTERHEART study by Yusuf, Hawken and Ounpuu (2004) included 15,152 cases and 14,820 controls from 52 countries, analysed the effect of physical activity on the CHD risk factors; reporting that subjects regularly involved in moderate activities such as walking, cycling, swimming-vigorous for four (4) hours or more per week had significantly decreased multivariable ORs compared with those inactive. Also, there were a strong association of the magnitude of risk with healthy lifestyle. For example, a 14% reduction of the risk observed among physically active women were increased to 40% (OR=0.60, 99% CI=0.51- 0.71) in those who exercised regularly and consumed fruit and vegetables daily, and further to 80% among those who also avoided smoking. The authors stated that regular physical activity is inversely correlated with cardiovascular disease 'in both sexes and at all ages in all regions' though a potential limitation as selection bias were possible in the study.

Löllgen, Völker, Böckenhoff and Löllgen (2006a, 2006b) stressed the importance of physical activity in relation to all causes mortality including CVD in a meta-analysis of thirty (30) prospective cohort studies. The authors estimated that physical activity at moderate levels were associated with a significantly reduced risk in both genders, women (RR=0.653) and men (RR=0.748) versus inactive subjects.

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Earlier studies reaffirm that physical activity is associated with a reduction of the mortality from CVD. In the prospective large study, middle-aged subjects (15,853 men and 16,824 women) living in eastern and western Finland (Barengo & Lakka, 2004), CVD mortality were lower by 9-17% in men and by 11-17 % in women who were moderately or highly physically active during leisure time compared with those inactive. Also, a 23% benefit from occupational activities were found in both genders. Yet, in this study, women who reported walking or cycling to and from work daily 15-29 min had a 22% reduced risk.

A study by Knoops, de Groot and Kromhout (2004) involving 2,152 elderly individuals, aged 70-90 years, reported 371and 122 deaths due to CVD and CHD, respectively. This indicates a favourable impact of physical activity. Likewise, a high reduction of CVD-related mortality due to leisure-time physical activity were reported in a Caucasian population (24,079 dead cases and 13,054 live controls) (Lam, Ho, Hedley, Mak & Leung, 2004). The study further reported an inverse correlation between physical activity and the risk of a cardiovascular cause of death in both sexes; however, the gradient of the activity-mortality relationship were steeper in men than in women. Several studies has also confirmed a causal relation between physical activity and CVD diseases (Løkkegaard, Eplou, Köster & Garde, 2005; Noda, Iso & Toyoshima, 2005; Grace, Barry-Biandchi & Stewart, 2007).

In the Danish prospective population based study (447 respondents) by Lökkegaard et al. (2005), a borderline significant 28% reduction of CVD for exercising more than 4 hours/wk were found in active persons as compared to those inactive.

Noda et al. (2005) study examined the impact of exercise on mortality from CVD in Asian population (Japan) aged 40-79 years, involving 63265 respondents (31,023 men and 42,242 women). The authors demonstrated that both walking and sports time are inversely correlated with mortality from total stroke, ischemic stroke, CHD, and total CVD. For example, both men and women reported ≥1hour/day walking had a 16%-29% reduced risk after adjusting for multiple covariates (HR=0.71, 95% CI=0.54-0.94; p=0.02 for ischemic stroke, and hazard ratio (HR) HR=0.84, 95% CI=0.75-0.95, p=0.006 for total CVD). Increasing walking time were also inversely associated with ischemic stroke and CVD risk with significant trends (p= 0.02 & 0.006, respectively). The study also reported stronger significant inverse association between sports participation time and mortality risk from CHD and total CVD.

A study by Grace et al. (2007) examining 964 residents of Canada (355 diabetes, 144 with CVD, 75 diabetes and CVD, 390 non diabetes individuals), aged 35-74 years, demonstrated

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that non-diabetes individuals participated in a greater range of total physical activity and more frequently compared with diabetes (p=0.013, respectively). Moreover, diabetes individuals had lower exercise capacity compared with non-diabetes. It is well recognized that decreased exercise capacity is independent risk factor for cardiovascular and all-cause mortality. There were no significant decrease concerning the risk of cardiovascular disease in subjects who were physically active in the last three months compared with those who were inactive (Dylewicz, Borowicz-Bienkowska & Deskur-Smielecka, 2005).

2.2.2 DIABETES

Diabetes constitutes a widespread health problem in the world. In 2000 it were estimated that 171 million individuals had prevalent diabetes mellitus, and there is a prognosis that the number people with the disease will increase to 366 million in 2030 (Forgarty, O'Beirne & Casey, 2005).

The data of numerous studies, based on evidence from large prospective cohort trials and randomized controlled trials, have revealed that physical activity can prevent type 2 diabetes (Nakhanakhup, Moungmee, Appell & Duarte, 2006). For example Hsia, Wu and Allen (2005) identify an association between increased physical activity and lower incidence of type 2 diabetes in postmenopausal Caucasian women (74, 240 respondents).

A 26% reduction of diabetes risk were observed for the highest quintile of walking (energy expenditure 10.1-40.8 MET-hours/wk) compared with the least active women (HR=0.74, 95% CI=0.62-0.89) and 33% reduction of the risk for total physical activity (HR=0.67, 95% CI=0.56-0.82 for an energy expenditure level of 23.4-143.0 MET-hours/wk versus the lowest level (0-2.3 MET-hours/wk). Both tests of linear trend across physical activity categories were significant ($p<0.001$ and $p=0.002$, respectively), with a less clear relationship between risk for the disease and activity in African-American, Hispanic, and Asian/Pacific Islander women.

A study by Grace et al. (2007) reported a significant decrease in the risk of diabetes mellitus for physically active subjects (OR=0.645, 95% CI=0.456- 0.911). The findings from the Diabetes Prevention Programme, a 27-center RCT (n = 3234), suggest that diet and exercise can be more effective than pharmacologic therapy (metformin) in preventing or delaying the onset of type 2 diabetes in people with impaired glucose tolerance (Diabetes Care, 2002). A lifestyle intervention designed to achieve and maintain a weight reduction of at least 7% of

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initial body weight through a low-calorie, low-fat diet and moderate physical activity (such as brisk walking) for 150 min/week or more decreased diabetes incidence by 58%, while metformin reduced the incidence by only 31%. Effects were similar in men and women and in all racial and ethnic groups, with the most profound impact in the oldest subgroup (aged ≥ 60).

These results complement earlier findings and demonstrate the efficacy of diabetes prevention in high-risk subjects through diet and exercise interventions (Tuomilehto, Lindstrom and Eriksson, 2001). Exercise can decrease the risk of CHD in diabetics through improved cardiovascular fitness and lipoprotein risk profile and reduced blood pressure and central obesity.

In type 2 diabetic patients, exercise may improve glucose uptake and insulin sensitivity and return elevated blood glucose to normal levels. Animal studies indicate that effect may be mediated by increases in the GLUT-4 glucose transporter protein in muscle (Kern, Dolan & Mazzeo, 1992). Clinical studies confirm these results and suggest that older human skeletal muscle retains the ability to increase muscle GLUT-4 and improve insulin action in response to endurance training (Cox, Cortright, Dohm & Houmard, 1999).

Further, exercise can improve modifiable risk factors for the premature coronary disease associated with diabetes. Evidence for an exercise training benefit is strongest for improvements in endothelial vasodilator function and left ventricular diastolic function, with fewer studies examining improvements in arterial stiffness and systemic inflammation (Stewart, 2002). While most studies demonstrating the beneficial effects of exercise in diabetics have used an aerobic exercise intervention, Castaneda and colleagues demonstrated 16 weeks of supervised PRT (60% to 80% 1-RM, 45 min/session, 3×/week) can improve glycemic control and reverse some abnormalities associated with the metabolic syndrome in older Latino adults with type 2 diabetes (RCT; n = 62; mean age, 66) with high programme compliance (Castaneda, Layne & Munoz-Orians, 2002).

Decreased plasma glycosylated hemoglobin, systolic BP, and trunk fat mass, increased lean mass, and a reduction in prescribed diabetes medication doses were evident. Since muscle tissue represents the primary site for glucose storage and oxidation, increased lean mass results in greater capacity for glucose disposal, and thereby improved glycaemic control in type 2 diabetics. Exercise of any intensity level can be used to modify morbidity and mortality risk factors in patients with type 1 diabetes provided they have good blood glucose

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control prior to initiating the exercise program and adequate knowledge of the use of carbohydrate supplementation and insulin therapy to maintain blood glucose levels throughout each exercise session (Zinman, Williamrman & Campaigne,2004).

2.2.3 CANCER

The majority of epidemiologic studies have found an inverse association between physical activity and cancer risk. Levels of evidence on physical activity/exercise and cancer prevention are classified as follows: convincing, probable, possible and insufficient (Friedenreich & Orenstein, 2002; Hsia, Wu & Allen, 2005). Among the site-specific cancer studies consistence of scientific evidence for colon and breast cancer is strong and the most consistent and were classified as convincing (average risk reductions ranges from 40 to 50% for colon and from 30% to 40% for breast cancer), for endometrium evidence is weaker and less consistent and classified as ' probable' (average risk reductions ranges from 30% to 40%), for prostate and lung 'possible' (average risk reductions ranges from 10% to 30% for prostate and 30%-40% for lung) (Friedenreich & Orenstein, 2002). The protective effect of physical activity on cancer risk has been observed across different population and study design (Monninkhof, Elias & Vlems, 2007; Kruk & Aboul-Enein 2006b, 2007).

In Friedenreich, Norat and Steindorf (2006) study comprising of 413,044 respondents, reported a decreased in colon cancer by 22% among the most active respondents compared with inactive; as well as a negative trend in the risk of colon cancer associated with physical activity. The author found a strong risk reduction among active individuals with a BMI under 25kg/m2 (HR=0.63, 95% CI=0.39-1.01) compared with the inactive, with no association found between any type of physical activity and the rectal cancer risk. Contrastingly, Johnsen, Christensen and Thomsen's (2006) study involving Danish middle-aged population reported no association between the risk of colon cancer and occupational or recreational activity measured in energy expenditure or the time spent on six types of activity (sports, cycling, walking, gardening, house-work, do-it-yourself work) 'during summer and winter'. However, there were a borderline significant risk reductions adjusted for occupational activity (RR=0.88, 95% CI=0.78-1.00, p=0.053 for men and 0.87, 95% CI=0.76-1.00, p=0.051 for women). A population-based study by Lee, Inoue and Otani (2007) involving 65,022 Japanese men identified 154 proximal colon, 166 distal colon, 149 rectal cancer cases during six years of follow-up showed a significant inverse correlation between the level of physical activity (time spending daily on heavy physical work or strenuous exercise, walking

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and standing) and the risk of developing colorectal cancer among men. In particular, the authors observed strong risk reduction in men for colon cancer (OR=0.58, 95% CI=0.39-0.87, p=0.006) and for proximal colon cancer (OR=0.29, 95% CI=0.14-0.60, p<0.001).

A lack of association for rectal cancer corroborates findings of Friedenreich et al. (2006). Evidence for an association between physical activity and breast cancer is weaker and less consistent than that found for colon cancer. The evidence from the majority of epidemiologic studies indicates a stronger and more consistent effect for risk reduction among postmenopausal women (Friedenreich, 2004).

The maximal magnitudes in the risk decrease change from 20% to 72% (Bardia, Hartmann & Vachon, 2006; Kamarudin, Shah & Hidayach, 2006;Anderson, Matsuno & Sherman, 2007;Dallal, Sullivan-Halley & Ross,2007;Lahmann, Friedenreich & Schuit,2007; Kruk, 2007).

A higher risk reduction were discovered in a case-control study in Kuala Lumpur (Malaysia), (203 breast cancer cases, 203 controls) carried out by Kamarudin et al. (2006). The results showed that women who did not exercise regularly have a 3.5 times higher risk of getting breast cancer in comparison to those who exercised regularly. Also, the authors of a population-based case-control study of Polish women (Anderson et al., 2007) (2,386 cases, 2,502 controls, aged 25-74 years) reported increased by 35% RR for women of which average lifetime physical activity were <220 MET scores/wk for every year of life compared with those physically active (≥220 MET scores/wk).

California Teachers Study by Dallal et al. (2007) (110,599 women, 2,649 invasive and 593 in situ breast cancer cases) there were a 20% reduction of the risk of invasive breast cancer among women engaged in long-term strenuous activity (>5 hours/wk per year) and a 31% reduction of in situ cancer risk compared with those of short-term activity (≤5 hours/wk per year).

The preceding researchers observed a linear decrease in the risk of breast cancer with increasing amounts of physical activity (p=0.02 and 0.04, respectively). The following study, in the Region of Western Pomerania, found that high levels of lifetime total physical activity (>150 MET-hours/wk per year) were associated with a significant 57% risk reduction relative to that detected in the low activity group of respondents (<110 MET-hours/ wk per year) (Kruk, 2007). Also, lifetime activity for household and recreational activities revealed

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significant risk reductions: OR=0.54, 95% CI=0.29-0.94, p=0.002, and OR=0.40, 95% CI=0.22-0.70, p<0.001, respectively.

A study by Lahmann et al. (2007) examined data from nine European countries (218,169 women aged 20-80 years, 3,423 incident invasive breast cancers). The study found that higher levels of household physical activity were associated with reduction of breast cancer risk; 29% reduction in premenopausal women and a 19% reduction in postmenopausal women).

The authors also observed the protective effect of physical activity early in life in postmenopausal years and in the recent past among women without family history of the disease. Lifetime strenuous occupational activity were not associated either with invasive or in situ breast cancer. In contrast, Nkondjock, Robidoux, Paredes, Narod & Ghardirian (2006), in a study carried out on a cohort of 80 French-Canadian families with 250 members involving 89 cases-carries of mutated BRCA gene and 48 non-affected carriers, found no benefit from physical activity in women with BRCA1 and BRCA2 mutations.

Whilst research evidence is strongest for physical activity in the prevention of colonic cancer, the evidence for breast cancer is accumulating. The evidence remains mixed for the prevention of other forms of cancer (Bauman, 2004).

A cohort study conducted in Australia found that improved prognosis amongst those with colorectal cancer occurred amongst those who were physically active prior to diagnosis (Haydon, MacInnis, English, & Giles, 2006), confirming previous findings. The reduced hazard ratio 0.73 (95% CI 0.54-1.00) were significant even once adjusted for age, tumour stage and sex.

The authors noted that one limitation of their study were that they did not account for activity levels post diagnosis and did not adjust for any comorbidity, pointing out future studies on the impact of post diagnosis activity on survival and quality of life. High levels of physical activity have been associated with around 30% reduction in breast carcinoma risk (Gammon, John & Britton, 1998). A commentary review by McTiernan (2000) indicates that the association and its proposed underlying mechanisms may also pertain to women from other racial backgrounds. The on-going Women's Health Initiative in the US, which contains diverse population groups in its cohort, should illuminate this relationship further.

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2.2.4 OBESITY

Many epidemiological studies have been conducted to show the hypothesized relationship between a high body mass index (BMI) and development of several diseases, for example, cardiovascular diseases including hypertension, noninsulin-dependent diabetes mellitus, site-specific cancer such colon and prostate in men, breast cancer, endometrium, cervix, and ovarian in women (Carmichael & Bates, 2004). Zhu Caulfield and Hunter (2005) examine an association between BMI and breast cancer on African American women (304 cases, 305 controls) at the ages of 20 to 64 years. The authors reported both pre-and postmenopausal women with BMI of 25 to 29.9 and 30 kg/m2 or higher had increased breast cancer risk: 1.75 (95% CI=1.02-3.02) and 2.32 (95% CI=1.33-4.03) in comparison to women having BMI<25kg/m2.

The positive correlation between obesity and breast cancer risk were reported by Silvera, Jain, Howe, Miller and Rohan (2005) based on the National Breast Screening Study of 49,613 Canadian women (2,545 cases). The researchers found that obese postmenopausal women (BMI ≥30kg/m2) in the highest quartile of energy intake (≥2406 kcal/day) were at greater risk of breast cancer compared to women who consumed <1,630 kcal/day (HR=1.72, 95% CI=1.01-2.93) (Carmichael & Bates, 2004; Linos, Holmes & Willett, 2007).

A trial study by Burke, Beilin and Cutt (2007) demonstrated that respondents at risk of hypertension and BMI>25kg/m2 achieved greater improvements in time spent on physical activity (about 37min/wk) as compared to respondents of usual care. Decreased body weight were found in respondents suffering from hypertension and a reduction in cardiovascular risk factors.

2.2.5 OSTEOPOROSIS AND FALL-RELATED INJURIES

Osteoporosis constitutes a major health problem of ageing population, especially in postmenopausal women. The disease is associated with increased susceptibility to fractures due to decreased bone density (Renno, Granito, Driusso, Costa & Oishi, 2005). Another risk factor in the elderly is the susceptibility to falls (Brown &Jose, 2002). The incidence of osteoporosis fractures are the highest in North Europe and the USA (Roy, Pye & Lunt, 2003). Rates of the osteoporosis are higher in Scandinavia than in Southern European countries due to the climate, which limits physical activity and exposure to sunlight-important to vitamin D

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synthesis and bone formation. For women, the costs associated with osteoporosis are higher than for myocardial infraction, stroke, and breast cancer in some countries (Forgarty, O'Beirnea & Casey, 2005).

It is known from literature data that regular physical activity could influence bone strength and mineral density due, probably, to beneficial impact on bone turnover caused by skeletal muscle activity (Langberg , Skovgaard & Asp, 2000). Lindsey, Brownbill and Bohannon (2005) tested an association between physical performance measures and bone mineral density in healthy 116 elder women and found that step length, walking speed, balance and grip strength were significantly associated with bone mineral density; women with longer step lengths and faster normal and brisk gait speeds had higher bone density. Recent studies support this observation that physical exercise may play an important role in improving the range of variables evaluated in subjects with osteoporosis (Liu-Ambrose, Khan & Eng, 2005; Uusi-Rasi, Sievänen & Heinonen, 2006). A study by Uusi-Rasi et al. (2006) based on a prospective 6-year study of 107 gymnasts and 110 controls found that the long-term recreational gymnastics is beneficial in age-related functional decline and bone loss.

Another study by Liu-Ambrose et al. (2005) reported that physical exercise programmes positively influenced psychological well-being and reduced the chronic pain of osteoporosis and back pain in postmenopausal women with low bone mass. The authors state that only resistance and agility training may significantly correlate with change in health-related quality of life determined by physical, emotional and social well-being. Moreover, the authors strongly underline the important role of group based exercise programmes in improvement of health-related quality of life. Another concern is the role of exercise in health-related quality of life of patients with vertebral fractures. The interventions of exercise for preventing falls in elderly people were recently reviewed by several researchers (Rejeski & Mihalko, 2001; Gillespie, Gillespie & Robertson, 2007). For example, Gillespie et al. (2007) reviewed data of 62 controlled trials involving 21,668 subjects, published since 1966 to 2003 year. The authors concluded that interventions to prevent falls that are likely to be effective are now available; less is known about their effectiveness in preventing fall-related injuries. There is consensus from studies that examined the influence of physical exercise on bone strength that improving a meaningful quality of life for patients with fractures should encourage spending several hours/wk stretching, strength training and doing aerobics activities (Papaioannou, Kennedy & Ioannidi, 2006). The existing literature represents the view that high physical activity during childhood and early adolescence is an important factor

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for development of maximal bone mass (Kannus, Haapasalo &Sankelo, 1995; Ford, Bass & Turner, 2004; Hallal et al., 2006; Rikkonen, Tuppurainen, Kröger, Jurvelin & Honkanen, 2006; Park, Togo & Watanabe, 2007). For example, Park et al. (2007) examined the relationship between bone health and the quality and quantity of habitual physical activity among a cohort of 172 Japanese aged 65-83 years. The authors found that men and women in the lowest quartile of moderate-exercise duration (<8.5 min/day) were, respectively, 2.2 and 3.5 times more at risk of fracture in comparison to those in the highest quartile (>24.5 min/day).

In addition, women in the two lowest quartiles of step count (<5171 step count) had 4.9 and 8.3 times higher the risk than those in the highest quartile (>8,746 step count). Based on these findings the authors propose the following recommendations for bone health in older age: engage in low- and moderate-intensity habitual physical activity taking more than 7,000 steps/ day with a duration more than 15 min/day at an intensity >3 METs. A study by Bolanowski, Pluskiewicz and Skrzek (2006) showed that Tai Chi exercise, a popular low-weight bearing exercise regularly practiced by elderly Chinese population, improves the skeletal status in postmenopausal women and recommended this kind of exercise as a means in the prevention of osteoporosis in this group of high-risk women.

2.3 PHYSICAL BENEFITS OF PARTICIPATING IN PHYSICAL ACTIVITY

Aging is frequently associated with a decrease of exercise capacity, muscle mass and strength and impaired balance. In addition, the impaired physical function frequently leads to decreasing in activities of daily living and, consequently, to loss of independence and poor quality of life. Physical inactivity relates to more deconditioning which may lead to a vicious circle of declining in physical function. It is well-established that participation in regular and moderate physical activity can delay age-related functional declines (Nidia et al., 2013).

2.3.1 FUNCTIONAL FITNESS AND PHYSICAL CAPACITY

The maintenance of mobility and independent living functional capacity declines with age: strength, endurance, balance, bone density and flexibility are all lost at about 10% per decade, and muscle power is lost even faster at around 30% per decade. Gradually, this loss in physical function will impact upon an older adult's health, wellbeing and ability to maintain an independent life. Physical activity has been shown to improve everyday physical function

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and mobility including factors such as walking speed and time to stand up from a chair, even in those at an advanced age. Cardiorespiratory exercise can offset declines in endurance and reduce breathlessness and fatigue in older adults (British Heart Foundation, 2012).

Exercise or leisure time activity has been shown to affect physical functioning by improving muscle strength, joint flexibility, oxygen capacity, balance and general endurance among older adults (Smith & Gilligan, 1989). A study by Simon Sick et.al., (1993) demonstrated that moderate to high activity appeared to reduce the likelihood of developing limitation in physical functioning over 3 years, particularly in the area of walking and doing heavy housework. In addition, the study of Young et al. (1995) showed that the elderly who expended larger amounts of energy daily were more likely to have optimal function in Basic Activity Daily Living (BADL) and Instrumental Activity Daily Living (IADL). Even in individuals with chronic disease, those who expend more energy in physical activities are more likely to have optimal physical function.

Exercise also reduces pain which comes from various musculoskeletal problems and conditions such as arthritis among the elderly. Studies of arthritis patients in which exercise were included in a comprehensive intervention have reported significant reductions in pain. It could be explained that exercise acts as the potential for pain relief through the release of morphine like beta endorphins. It may also relieve pain and discomfort by improving joint flexibility and through relaxation effects (Varin Binhosen et. al., 2003)

Evidence from the Brazilian journal of physical therapy demonstrated that physically independent elderly who are respondents of community-based exercise programmes are more physically active in daily life than those elderly people who are not respondents. Moreover, the level of physical activity in daily life in physically independent elderly were largely explained by participation in exercise programmes and better maximal and functional exercise capacity. In contrast to the findings, Meijer, Westerterp and Verstappen (1999) did not find a difference in the level of PADL objectively measured with a triaxial accelerometer in healthy elderly after a 12-week exercise programme based on aerobic and strengthening exercises. In addition to the fact that the Brazilian study had a different design from Meijer's study, we could hypothesize that the conflicting results are attributed to the higher time of participation in exercise programmes in Brazilian study (12 months, in general). Very interestingly, the respondents group (PG) had higher number of steps/day even in the days when there were no participation in the exercise programme, which demonstrates that

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subjects in the (PG) assimilated a more active lifestyle and translated it into being more active every single day.

According to Tudor-Locke etal.(2005) 9, 8000 steps/day is a good estimation of 30 min of daily moderate-intensity activities is the current recommendation for one being considered physically active. Aoyagi and Shephard showed that a better overall health is seen in elderly individuals who take an average of >8000 steps/day. Thus, a considerable number of physically independent elderly in PG are achieving the minimum daily amount of physical activity necessary to promote and maintain health (Aoyagi & Shephard ,2009).

Furthermore, a higher level of physical activity is associated with a reduced risk of death (Hrobonova, Breeze & Fletcher, 2011) in a longitudinal study with 1449 community dwelling older people. Additionally, Brazilian study showed that in PG there were no difference between the median steps/day during days with or without participation in the exercise programme. This finding once again confirmed that participation in a community-based exercise programme could positively change the lifestyle of physically independent elderly's daily life. In contrast, Meijer et al.1999 found a difference in the level of PADL between exercise and non-exercise programme days of older people enrolled in exercise programmes. The different conclusions demonstrated by those authors could be attributed to some methodological issues observed in those studies such as small sample size (18 respondents21 and 15 respondents1), short-term exercise training (12 weeks1), reduced number of days of PADL assessment (3 days) and assessment of PADL occurring during only one season (October and November) 21 which is known to influencing the PADL level.

Rydwik, Frandin and Akne (2004) pointed out that targeted physical activity protocols can positively influence strength, resistance, flexibility and balance, thus protecting the individual from certain forms of disability that are strictly connected to ageing. Netz, Wu, Becker and Tenenbaum (2005) found a relationship with an increase in self-efficacy, which also seems to decrease the fear of falling. Conversely, the fear of falling and the feeling of inadequacy when performing a motor task can accelerate decline, leading the individual into depression or social isolation.

It seems likely that physical activity presents the elderly with a chance to better master small daily tasks, engendering a heightened sense of wellbeing. However, what is still lacking is an investigation of the underlying processes, and particularly of the interconnection between

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physical and psychological effects, which may be stimulated in older people by participation in physical activity.

2.3.2 POSTURAL STABILITY

Approximately 30% of older adults fall each year in Britain alone, this figure increases with age to over 40% in those 80 years and over (Department for Work & Pensions, 2012).Falls are the most common cause of nonfatal injuries and trauma-related hospital admissions (Horne, Skelton, Speed & Todd, 2010). Falls are associated with considerable morbidity, mortality, reduced functioning, and premature nursing home admissions in both men and women. Home- and community-based exercise programmes have been shown to be feasible and effective in maintaining functional status, improving balance, reducing falls, and lowering the incidence of vertebral fractures.

Campbell et al. (1997) demonstrated that moderate-intensity strengthening and balance exercises coupled with a walking plan, when administered by a physical therapist, decreased falls by 42% and decreased fall-related injuries by 13% in a group of women aged 80 and over. The same home-based exercise programme, when administered by a trained nurse, were able to reduce falls by 46% in men and women aged 75 and older (n = 450) (Day, Fildes & Gordon, 2002). Serious injuries and hospital admissions due to falls were reduced, and the program was shown to be cost-effective, especially for those aged 80 years and older.

It is predicted that by 2036 over £6 billion a year could be spent (in the UK) on treating and caring for hip fractures (Report to the Minister of State for Care Services, 2012). Evidence accumulated in recent years has identified balance impairment as one of the main risk factors for falls in older adults (The Department of Health; London, 2011). While regular physical activity of a general nature can be used to maintain balance, to illicit improvements in unstable individuals, structured physical activity sessions which focus on improving postural stability are necessary (British Heart Foundation, 2012).

Exercise programmes – particularly strength training – have been shown to be highly effective in reducing osteoporosis.. Physical activity can slow down the loss of muscle mass, but cannot halt it or reverse it. In programmes combining strength, balance and endurance training, the risk of falls were reduced by 10%; programmes with balance training alone reduced the risk by 25%; and Tai Chi reduced the risk by 47%. (Lord et al.,2005).

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Evidence indicates that physical activity preserves or even increases lower-extremity muscle strength. Wolf, Barnbart, Kutner, McNeely, Coogler and Xu (1996) showed that six months of Tai Chi training (following their primary interventions) did not improve lower-extremity muscle strength, compared to an exercise control group. However, their data did indicate that Tai Chi training preserved lower extremity strength gains developed by the intervention. In a 20-week pilot study, Christou, Yang and Rosengren (2003) showed that, compared to those in the control condition, Tai Chi respondents significantly improved knee extensor strength and force control among older adults. Tai Chi also appears to be safe and beneficial for patients with rheumatoid arthritis. In a randomized trial among older women with osteoarthritis, Song et al. (2003) showed a 12-week Tai Chi program resulted in significant improvements in pain and stiffness in joints, balance, and abdominal strength, and fewer reported perceived difficulties in physical functioning, compared to those of control subjects.

Another randomized trial, showed that a 12-week program significantly improved osteoarthritis symptoms such as fatigue, arthritis self-efficacy, feelings of tension, and satisfaction with general health status (Hartman et al. 2000). Evidence points to the potential of Tai Chi as a weight-bearing exercise for retarding bone loss in older women. In a 12-month randomized trial, Chan et al. (2004) tested the hypothesis that Tai Chi may retard bone loss in early postmenopausal women.

At the end of the trial, bone mineral density (BMD) measurements revealed a general bone loss in both Tai Chi and control subjects at all measured skeletal sites, but with a slower rate in the Tai Chi group. Although the BMD findings were equivocal, the findings lend some support for the potential of Tai Chi to retard bone loss.

Arthritis and musculoskeletal conditions were estimated to account for 4% of the disease burden in Australia in 1996, in terms of disability-adjusted life years (DALYs). The direct costs of arthritis and musculoskeletal conditions were estimated at $4.7 billion in 2000-1 (Australian Institute of Health and Welfare 2005). In Keysor and Jette's review of disability (2001), three of the five studies that found positive effects on both function and disability involved people with arthritis (Minor et al., 1989; Kovar et al., 1992; Ettinger et al., 1997). Notably, people with musculoskeletal conditions may find it difficult to do land-based aerobic physical activities because of the impact on joints. There is evidence that water-based

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exercises can be helpful for those with osteoporosis and rheumatoid arthritis. There have been four randomised controlled trials of water exercises/hydrotherapy for older people with musculoskeletal problems, with positive outcomes in terms of functional reach (Simmons & Hansen, 1996), muscle endurance, work capacity (Ruoti et al., 1994), muscle strength, cardiorespiratory fitness, body fat and total cholesterol (Takeshima et al., 2002), and muscle strength, distance walked and self-rated health (Foley et al., 2003).

An Australian implementation trial, using local aquatic facilities with an existing program reported improved balance and shoulder range of motion compared to a control group (Lord et al., 2005). An increasingly popular type of Tai Chi in Australia and internationally is 'Tai Chi for Arthritis', which is a gentle combination of forms for people with more limited mobility. Tai Chi for Arthritis has been shown to improve balance, leg strength, and function in older people with arthritis (Song et al., 2003; Verhagen et al., 2004). Two RCTs have reported the effectiveness of Tai Chi in the management of people with osteoarthritis. One reported improvements in arthritic symptoms, balance and self-perceived function (Song et al., 2003). The other found significant improvements in self-efficacy for arthritis symptoms, satisfaction with general health and trends for improved mobility and standing up from a chair (Manos et al., 2000).

2.4 PSYCHOLOGICAL BENEFITS PHYSICAL ACTIVITY/ MENTAL HEALTH

In addition to its effects on physiological variables and a variety of chronic diseases and conditions, there is now strong evidence that exercise and physical activity have a significant impact on several psychological parameters. Physical activity also promotes psychological functioning and well-being across populations (Salmon, 2000). Regular physical activity reduces symptoms of anxiety and depression (Camacho, Roberts, Lazarus, Kaplan & Cohen, 1991; Ross & Hayes, 1988; Stephens & Craig, 1990), and lowers respondents' stress levels (Berger 1994).

2.4.1 DEPRESSION STRESS AND ANXIETY REDUCTION

Research indicates that the prevalence of depression in society is increasing. In addition, projections suggest that by 2020, depression will be second only to heart disease in its contribution to the global burden of disease3 (Chapman & Perry, 2008). Physical activity,

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even at a moderate level (Health Scotland, 20[illegible] has been shown to be effective in treating depression. In addition, physically active individuals are less likely to develop depressive symptoms than those who are not active. While depression is more common amongst younger age groups, research shows that in the Republic of Ireland (ROI), 10% of people aged 50 or more reported depressive symptoms (Department of Health & Children, 2007).

In Northern Ireland 18% of the same age group reported depressive symptoms (DHSS & PS, 2006). Exploring the link between physical activity and the prevention and treatment of depression in older adults is an important challenge.

Observational and intervention studies suggest that regular physical exercise reduces symptoms of depression (McNeil, LeBlanc & Joyner, 1991). In an RCT of 156 men and women (aged $\geq$ 50) with major depressive disorder, a program of aerobic exercise (continuous walking or jogging, 70% to 85% maximal heart reserve, 30 min/session, 3×/week) were found to be as effective as antidepressant medication (sertraline) as measured by both a clinical rating scale and self-reported questionnaire (Blumenthal, Babyak & Moore, 1999).

In another observational cohort studies, results suggest that exercise-based cardiac rehabilitation may improve behavioural and quality-of life parameters in depressed patients after major cardiac events (Milani & Lavie, 1998). Although antidepressants may facilitate a more rapid initial therapeutic response, exercise appears equally effective in reducing depression in certain elderly populations.

Strength training also has been shown to modify symptoms of depression. Twenty weeks of unsupervised weight lifting were found to exert an ant depressive effect in depressed elderly patients (mean age, 71; n = 32) (Singh, Clements & Fiatarone, 1997). One third of these exercisers reported weight lifting regularly at a 26-week follow-up, suggesting that long-term changes in exercise behaviour are possible in some subjects, even without supervision. Ten weeks of supervised weight training were shown in an RCT (n = 32) to improve subjective sleep quantity and quality in subjects aged 60 to 84 with major or minor depression or dysthymia (Singh, Clements & Fiatarone, 1997).

Cross-sectional and prospective studies of healthy adult populations have shown an association between physical inactivity and depression (;Lampinen, Heikkinen &Ruoppila,2000;Kritz, Barrett &Corbeau,200) and indicate that a low prevalence of

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depressive symptomatology is related to exercise behaviour (Blumenthal 1999; Lawlor & Hopker 2001; Baldwin, Chiu, Katona, & Graham,2002), (causality can only be attained via controlled trials).

Data from the Australian Longitudinal Study on Women's Health found that depression scores decreased and mental health scores increased with increasing levels of previous, current and habitual activity (Brown & Ford, 2005). Women who were active (one hour or more of moderate intensity activity per week) at baseline were 30 to 40% less likely to have poor mental health and depression scores than those less active. Those in the lowest category at baseline who became more active were also at lower risk of poor mental health scores than those who remained inactive.

This association were independent of pre-existing physical or psychological health status. People who have chronic health problems are less likely to be physically active and depression is more common in those with illness than in the healthy (Leon &Ashton, 2003).

Evidence suggests that physical activity is preferable to no treatment or social contact alone and that it has a similar effect to standard antidepressant drug or psychological treatments for both adults (North, McCullagh& Tran, 1990; Craft & Landers, 1998; Lawlor & Hopker 2001; Brosse, Sheets, Lett& Blumenthal, 2002) and older adults (Frazer, Christensen & Griffiths, 2005; Palmer 2005). Recent meta-analytic and experimental studies show a significant antidepressant effect for physical activity in older adults with clinical depression, supporting the use of physical activity in the management of depression in older people (Taylor & Cable, 2004; Frazer, Christensen et al. 2005).

Reviewers have been critical of the quality of studies (Lawlor & Hopker 2001) particularly where physical activity failed to improve on the effectiveness of medications (Blumenthal 1999). Common methodological weaknesses include a lack of a standard diagnostic process for identifying depression in respondents and a short follow up period (Dunn, Trivedi and Al, 2001; Lawlor & Hopker 2001). Aerobic and resistance training have both produced benefits. Both moderate and vigorous levels of exercise shows efficacy in reducing depressive symptoms (Dunn, Trivedi & Al. 2001). Singh et al. (2001; 2005) have reported positive effects following progressive resistance training (PRT) in older people with depression.

Their most recent research highlights the importance of exercise intensity, with the high intensity group being significantly more likely to reduce their depressive status (61% versus

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29% in the low intensity group and 21% in the usual care group) (Singh et al. 2005). The reduction were associated with actual strength gain, suggestive of an underlying biological mechanism. There were indications that vitality and sleep quality were particularly improved in the high intensity Progressive Resistance Training (PRT) group. Research is on-going to elucidate the role of social contact in exercise programs for older people with depression. In Singh et al's study socialization did not seem to explain the impact of PRT: only the high intensity group achieved clinically significant benefits (Singh, et al. 2005).

Belief in the perceived gains from the program seemed to produce a placebo effect for the low intensity group, whereas efficacy beliefs did not predict outcome in the high intensity group. Physical activity may reduce the risk of depression relapse, but the evidence is scarce (Babyak & Blumenthal, 2000). In a trial with major depressives, aerobic exercise were found to have similar benefits to the antidepressant sertraline (Blumenthal 1999).

Given the poor adherence to antidepressant medication, it is interesting to note that at six months follow-up, relapse rates were lower in the exercise group (Babyak &Blumenthal, 2000). One study focused on people who had not responded to antidepressant treatment (Mather & Rodriguez, 2002). Aerobic exercise were of short-term benefit as an adjunct treatment. Secondary analyses in an osteoarthritis trial found improvements in depressive symptoms and disability at 18 months post aerobic, but not resistance, training (Pennin & Rejeski, 2002).

2.4.2 COGNITIVE FUNCTION

Cross-sectional studies suggest that aerobic exercise may preserve and improve cognitive functioning (van Boxtel, Paas & Houx, 1997). In a cohort of 349 healthy adults aged 55 and older, high cardiorespiratory fitness were associated with increased preservation of cognitive function over a 6-year period (Barnes, Yaffe, Satariano & Tager, 2003).

In randomized controlled trials (RCTs) (n = 36) in which older exercisers (aged 65–74) followed a 10-week program of aquatic exercise (45 min/session, 3×/week), the exercisers demonstrated substantial improvement on two measures of dual-task attention compared with age-matched controls (Hawkins , Kramer & Capaldi, 1992). Walking has been found to improve executive control functions including planning, scheduling, working memory, and inhibition in adults aged 60 to 75 (Kramer, Hahn & Cohen, 1999). Most studies indicate that

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multiple aspects of attention and mental fu[illegible] be positively affected by aerobic exercise.

While leisure time physical activity were not shown to be any more effective than cognitive leisure activities (reading, playing board games) in preventing Alzheimer's disease or dementia in a cohort of 469 adults aged over 75 (Verghese, Lipton & Katz, 2003), longitudinal studies suggest that continued physical activity remains an important protective factor against cognitive decline in the elderly (Laurin, Verreault & Lindsay, 2001).

Matthews and Williams (2008) evaluated the effects of a Tai Chi Chuan programme (three sessions per week for 10 weeks) on cognitive performance in older adults (mean age 76.5 years). Cognitive performance were assessed using the Trail Making Test, a digit-symbol substitution test, and clock drawing. Results indicated that significant positive effects of the Tai Chi Chuan programme were evident for Test B of the Trail Making Test (ES = 0.53) and for clock drawing (ES = 0.43). Given that benefits were not observed for the digit-symbol substitution task, these results suggest that Tai Chi Chuan might have benefits for executive function but not for general information-processing types of cognition.

This is consistent with the report by Colcombe and Kramer (2003) that larger effects from physical activity are expected for executive-function tasks. Similar results have been obtained by Taylor-Piliae, Newell, Cherin, Lee, King, and Haskell (2010) using an experimental design. They examined the effect of Tai Chi Chuan, a condition they call Western exercise, and an attention-control group on physical and cognitive function in healthy older adults. Both exercise groups completed sessions in classes and at their homes during an adoption phase (first 6 months) and maintenance phase (next 6 months). The Tai Chi Chuan intervention involved the Yang 24-form performed for 60 min per session and at a lower than moderate intensity. The Western-exercise group performed aerobic, resistance, and flexibility exercises in 60-min sessions. The results indicated that respondents in the Tai Chi Chuan programme experienced a significant improvement in digits-backward and semantic fluency performance from baseline to 12 months. Between-groups comparisons indicated that the Tai Chi Chuan group performed significantly better on digits backward than the other two groups at the end of both phases. Digits backward is considered modestly sensitive to executive control (Kaufman & Lichtenberger, 1999) and is related to other cognitive domains such as attention, concentration, mental tracking, and double tracking (Lezak, Howieson, Loring, Hannay & Fischer, 2004).

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The authors (Kaufman & Lichtenberger, 1999) [illegible] that because the practice of Tai Chi Chuan requires that respondents pay attention and concentrate on their body and postures, this may explain the fact that Tai Chi Chuan benefited this specific type of cognitive performance more than did Western exercise. Hall, Miszko and Wolf (2009), however, failed to support the positive effects of Tai Chi Chuan on cognitive tasks. Twenty-two older community-dwelling adults (62–85 years old) were randomly assigned to either a 12-week Tai Chi Chuan intervention or a control condition consisting of a course on healthy lifestyles. The Yang 24-style was taught, and respondents were asked to attend twice a week for 1.5 hr per session. Cognitive performance was assessed by choice reaction-time tasks. Results showed that the control group improved in the ability to avoid obstacles under dual-task conditions, but no changes were observed for the Tai Chi Chuan group.

Thus, the results of this study failed to support the claim for Tai Chi Chuan benefits specific to such task improvement. Three studies examined the effects of long-term Tai Chi Chuan practice on cognition using the Mini Mental State Examination (MMSE), and the findings of these studies were not consistent (Burgener, Yang, Gilbert & Marsh-Yant, 2008; Deschamps, Onifade, Decamps & Bourdel-Marchasson, 2009; Nowalk, Prendergast, Bayles, D'Amico & Colvin, 2001).

A repeated-measures randomized design were used by Burgener et al. (2008) to examine the effects of a multimodal intervention (including Tai Chi Chuan exercise, cognitive-behavioural therapies, and social-support treatments) on cognitive, physical, and behavioural outcomes in 43 older adults with early-stage dementia. The Tai Chi Chuan intervention was applied using the modified Chen style and was a 40-week programme meeting three times a week for 1 hr per session. Respondents were randomly assigned into the treatment group or an attentional-control group (education and delayed enrolment in the treatment). Cognitive function was assessed by the MMSE at 20 and 40 weeks. The treatment group showed improved cognitive performance on the MMSE from baseline to 20 weeks (ES = 0.48).

However, there was no significant difference in MMSE performance from 20 to 40 weeks, which indicated that 20 weeks might be sufficient for cognitive gains as a result of this intervention. Deschamps et al. (2009) compared the effects of an intervention called cognition-action (which consists of lower body muscle exercise, upper and core body exercises, and deep breathing and relaxation) with those of Tai Chi Chuan in 52 frail older

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adults' age 65–94 years. The Tai Chi Chuan consisted of the Yang style for 24 weeks, four times a week, for 30 min per class.

The intensity was light to moderate and was based on the respondents' ability. Results demonstrated that after this 24-week intervention, both the cognition-action group and the Tai Chi Chuan group improved on a variety of mental and physical measures as reported on health-related quality of life (Short Form 12, SF-12), falls self-efficacy, and exercise self-efficacy; however, there were no significant change in performance on the MMSE as a function of the interventions.Tai Chi Chuan and Cognition, Nowalk et al. (2001) used a randomized-trial design to explore the effects of three types of exercise intervention on cognitive performance. Respondents were residents of two long-term care facilities. Facility employees were provided training in team management and in providing quality-of-life programming, and these programmes were offered to all residents. Respondents in the study were randomly assigned to resistance-exercise training, Tai Chi Chuan, or a control condition. These exercise programs were held three times a week for two years. Tai Chi Chuan was taught by a professional; however, no clear style or clear description was provided. Cognitive performance and physical functioning were measured over two years in 110 elders (mean age 84 years).

The outcomes were evaluated at baseline and 6, 12, and 24 months. The authors indicated that although elders who fell during this time period had significantly lower MMSE scores, there were no differences on MMSE, time to first fall, time to death, and incidence of fall among the three programmes. To summarize, there has been only limited research addressing the effects of Tai Chi Chuan on cognition, and this literature has developed relatively recently, suggesting that examination of this research question is still in its infancy.

Furthermore, he studies that have been done suffer from important methodological limitations. In particular, few of them address exercise intensity, duration, or frequency or describe the style and associated movements completely, which are recognized as important components of exercise prescription (American College of Sports Medicine, 2010).

In addition, three of the five studies used the MMSE as the cognitive outcome. Although the MMSE is useful for testing for cognitive impairment, it might not be particularly sensitive to change as a result of an intervention (Salthouse, 2007) and might be influenced by personality factors (Roselli, Tartaglione, Federico, Lepore, Defazio & Livrea, 2009). Therefore, this has seriously limited the likelihood of observing significant results as a

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function of a Tai Chi Chuan intervention. Finally, a few of the studies administered Tai Chi Chuan as part of a combined treatment intervention (Deschamps et al., 2009; Nowalk et al., 2001), which makes the specific effects of Tai Chi Chuan on cognition indecipherable.

It is perhaps not surprising given these limitations that the findings of these studies have been mixed; however, there is some evidence that Tai Chi Chuan can benefit particular measures of cognition. In particular, significant effects were found when measures of executive function (Burgener et al., 2008; Matthews & Williams, 2008; Taylor-Piliae et al., 2010) were used, suggesting that the effects of Tai Chi Chuan on cognition might be task specific. Thus, the results from studies testing the effects of Tai Chi Chuan are consistent with the results of recent metaanalyses in showing that the effect of chronic exercise on cognition is task-specific (Angevaren, Aufdemkampe, Verhaar, Aleman& Vanhees, 2008; Colcombe & Kramer, 2003).

Dishman (1985) suggested that increased oxygenation of the brain may stimulate and protect the central nervous system. Only a handful of studies have systematically investigated the association between physical activity and cognitive function. In another study conducted in Britain by Stewart, Richards, Brayne and Mann (2001). Results indicated that physically active subjects were 50% less likely to present with cognitive impairment (OR = 0.48; 95% CI= 0.23–1.02). Schuit, Feskens, Laune and Kromhout (2001) also found that adults who exercised at least 30min/day had higher Mini-Mental Stae Examination (MMSE) scores than older adults' who did not ($p < 0.05$). This same group showed that carriers of the ε4 allele of the Apo lipoprotein E (APOE), a genetic risk factor for Alzheimer's Disease (AD), have a 13.7-fold increase in the risk of cognitive decline (95% CI: 4.2–45.5) if they perform less than one hour of physical activity per day when compared to non-ε4 carriers who are active. This finding suggests that physical activity may contribute to modify the deleterious effect on cognition of the APOE ε4 genotype.

Yaffe, Barnes, Nevitt, Lui and Covinsky (2001) stratified their subjects according to a self-report questionnaire that provided an estimate of the number of kilocalories (kcal) expended per week or city blocks (= 160 m) walked per week. Women in the highest quartile of activity had an OR of 0.66 (95% CI: 0.54–0.82) of experiencing significant cognitive decline during 6–8 years follow-up when compared to women in the lowest quartile of physical activity.

More importantly, the findings of three independent follow-up studies indicate that physical activity may reduce the risk of dementia in later life (Laurin, Verrault, Lindsay, MacPherson

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& Rockwood, 2001; Yoshitake, Kiyohara, Kawamura, Iwamoto, Nakayama, Ohmori, Nomiyama, Kawano & Ueda, 1995).

Laurin et al. (2001). showed, in nested case-control study with 4,615 community-dwellers participating in the Canadian Study of Health and Aging, that older subjects engaging in moderate to high levels of physical activity were less likely to develop cognitive impairment (OR = 0.57, CI: 0.46–0.70) or dementia (OR = 0.58, 95% CI: 0.45–0.76). Older women performing physical activity of greater intensity than walking more than 3 times a week seemed to benefit the most from the protective effect of physical activity against AD. Randomized control trials looking at the effects of physical activity on cognition are rare, but the results of two studies are of interest. Emery, Schein, Hauck and MacIntyre (1998), observed that subjects suffering from chronic airway disease who walked, as exercise, for 10weeks had significantly better word fluency than non-active controls.

Molloy, Beerschoten, Borrie and Crilly (1988), reported similar findings in an intervention trial investigating older female outpatients after three months of a 45-minute exercise programme. Most of the studies mentioned above recruited individuals who were cognitively normal at the time of entry into the study. These studies had relatively small sample sizes and the measures of cognitive function (such as the MMSE) used were rather cdf.

2.4.3 PSYCHOSOCIAL WELLBEING

Li et al. (2001a; 2001b, 2001c; 2001d; 2002a; 2002b) provided a series of reports examining the extent to which Tai Chi enhanced older adults' multidimensional psychological well-being and health-related quality of life indicators. In a 6-month randomized controlled trial, healthy older adults were randomly assigned to either a control condition or Tai Chi. Results indicated that Tai Chi respondents reported higher levels of health perceptions, life satisfaction, positive affect, and well-being, and lower levels of depression, negative affect, and psychological distress (Li et al., 2001a). Respondents also showed higher levels of both domain-specific physical self-esteem (Liet al., 2002b) and exercise self-efficacy relevant to movement confidence (Li et al., 2001c). Change in the level of movement self-efficacy were found to be significantly related to change in physical functioning (Li et al., 2001b). Similar profiles have been reported by other researchers (Kutner, Barnhart, Wolf, McNeely & Xu

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1997) in that Tai Chi practice resulted in improved well-being, increased alertness, relaxation, better mental outlook, achievement, and greater confidence.

Netz and Jacob (1994) reported that elderly adults who became involved in physical activity improved in happiness and well-being. In one study, physically fit women with a mean age of 64.5 years showed immediate improvements in global mood after a 75-minute session of aerobic dance (Pierce & Pate, 1994). Hills and Argyle (1998) asked 275 individuals to rate their happiness during four leisure tasks (sport/exercise, music, church and watching TV soaps), only sport/exercise were found to actually increase happiness levels. Therefore, physical activity has benefits beyond mere recreation, for increasing well-being and positive mood.

There is some evidence that physical activity can help in the management of people with dementia, by improving disruptive behaviour, functional health, sleep patterns and alertness. For people who require medication or physical restraint, physical activity affords a potentially safer and cheaper alternative treatment approach. In a quasi- experimental study, Holliman et al. (2001) piloted a 30 minute interactive group activity for people (n =14) with moderate to severe dementia, designed to enhance purposeful upper limb activity and social interaction. The intervention produced acute behavioural benefits, but these were not sustained beyond the sessions themselves.

Given the low cost of running such sessions (staff or volunteers could be trained to run them), it may be worth trialling such an intervention with a larger sample over a longer period than this two-week pilot, to assess the on-going impact.

According to Bonura (2007) exercise may improve self-efficacy due to its capacity to increase the individual's sense of personal control. While many older adults feel a loss of control over their independence and functional ability, older adults who exercise on a regular basis may feel greater control over their physical bodies and abilities. Older adults who exercise may also have greater control over their bodies, which can therefore help to maintain self-efficacy for activities of daily living Bonura (2007). Unger, Johnson and Marks (1997) found in a 6-year follow-up of 7,527 respondents over age 70 that physical activity had independent effects in protecting older adults from declines in functional ability, and were particularly effective in buffering the negative effects of widowhood on physical functioning.

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However, regardless of actual functioning, exercise may improve self-efficacy for movement tasks. Daltroy, Larson, Eaton, Phillips and Liang (1999) assessed 289 community-dwelling elderly (aged 65 – 97) and compared self-reports of physical functioning with objective assessments of the performance and performance ability (made by trained observers). Controlling for actual physical capacity, lack of exercise contributed to self-reports of greater disability. Mihalko (1997) reported similar results.

When older adults participated in a 12-week strength-training program, respondents showed significant increases in muscular strength, efficacy perceptions relative to strength capabilities, and improvements in measures of activities of daily living. Perceptions of control and self-efficacy were significantly related to improve self-reports of activities of daily living, independent of strength or balance changes.

2.4.4 QUALITY OF SLEEP

Sleep problems in old age are prevalent and have been known to be associated with physical and psychological factors. Depression and hypnotics use were, in particular, suggested as strong correlates with poor sleep (Chen, Chong & Tsang, 2007; Su, Huang & Chou, 2004). Conversely, various alterations of sleep architecture (e.g., decreased deep sleep, impaired sleep continuity, and duration) can be identified in patients with depression (Tsuno, Besset & Ritchie, 2005). The relationship between depression and sleep disturbance has been hypothesized to be bidirectional, with depression increasing the risk of poor sleep and poor sleep predicting depression.

Self-reported sleep complaints are common among older adults (Neubauer, 1999) and it isestimated that up to 50% of elderly persons complain about their sleep (Alessi, 2000). Li, Fisher, Harmer, Irbe, Tearse and Weimer (2004) conducted a six-month intervention trial in china to examine the impact of a simpler Tai Chi program on improving quality of sleep and reducing daytime sleepiness among older adults reporting moderate sleep complaints.

Respondents were randomly assigned to a Tai Chi group or an exercise control group. Tai Chi respondents reported significant improvements in several sleep-quality related measures in comparison to the control respondents; with reduced sleep latency (by about 18 minutes per night) and daytime sleepiness, and improved sleep duration (by about 48 minutes per night). The study provided preliminary evidence linking the benefits of Tai Chi exercise to improved quality of sleep and reduced daytime sleepiness in older adults.

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In an investigation carried out by Urponen, Vuori, Hasan and Partinen (1988) with1190 middle-aged adults in Finland, 44% of the respondents listed exercise as the most sleep-promoting activity. Dose response patterns of physical exercise for a better night of sleep compared the sleep log data of 258 athletes with 176 controls (mean age 17.2 years) and found that high level exercise were related to better sleep patterns including higher sleep quality, shortened sleep latency, and fewer awakenings during the night ((Brand, Gerber, Beck, Hatzinger, Phse & Holsboer-Trachsler, 2010).

A lack of habitual exercise is associated with more reported sleep complaints (Drew, 1996; Morgan, 2003). Randomised, controlled exercise-intervention studies in adults suffering from complaints having to do with initiating and maintaining sleep are rare but yielded promising results on subjective(Reid, Baron, Lu, Naylor, Wolfe& Zee,2010; King, ROman, Brassington, Bliwise, & Haskell, 1997) and objective (polysomnography and actigraphy) measures of sleep quality(King, Pruitt & Woo, 2008; Guilleminault, Clerk, Black, Labanowski, Pelayo & Claman, 1995).

For example, King et al. (1997) investigated the effects of moderate-intensity endurance training over 16 weeks. The 20 older sedentary adults (50 to 76 years) of the exercise group reported better overall sleep quality after the intervention as assessed by the Pittsburgh Sleep Quality Index (PSQI) when compared to a control group.

In the study of Reid et al. (2010), respondents (mean age 61.6 years) in the physical activity plus sleep hygiene group (n = 10) showed better results in subjective sleep quality (PSQI score) than the control group with only the sleep hygiene intervention (n = 7).

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CHAPTER 3

METHODOLOGY

3.1 STUDY DESIGN

This study adopted a quantitative approach, using a cross sectional descriptive design as it attempts to describe the perceptions of a sample of a population that are made at one point in time (Babbie, 2010). In this case, the perceptions of a sample of elderly population were described.

3.2 STUDY SETTINGS

This study was conducted in Vhembe district. Vhembe District Municipality is located in the Northern part of Limpopo Province; it shares boarders with Zimbabwe and Botswana in the North West, and Mozambique in the east-south through the Kruger National Park, respectively. The District has a total population of 1 302 113 with 53.3% females and 46.7% males and 19.0% of people who are age 65 and above (Limpopo Vhembe District profile, 2011).

Thulamela	**Makhado**	**Mutale**	**Musina**
Tshifulanani Hub	Bungeni Hub	Tshixwadza Hub	Musina Hub
Makonde Hub	Rabali Hub	Masisi Hub	
Tshikombani Hub			
3	**2**	**2**	**1**

Total number of Sport Hubs in Vhembe District= 8

3.3 TARGET POPULATION

The study were conducted among the elderly people age 60 years and above, registered to participate in various sports and recreational hubs in Vhembe District. It is estimated that there are a total of 93253 people aged 60 years and above in Vhembe District. The estimated population of older adults in four local municipalities within Vhembe District is as follow: Thulamela Municipality 42359; Makhado Municipality 42901; Musina Municipality 1491;

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and Mutale Municipality 6502 (Vhembe District Municipality 2012/13-2016/17 integrated development plan).The numbers of elderly people who participated in each of the four municipalities within Vhembe District are asfollows: Thulamela Municipality 166; Mutale Municipality 103; Makhado Municipality 94; Musina Municipality 59. The total numbers of respondents from the four municipalities were 422

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Thulamela Municipality		Makhado Municipality		Mutale Municipality		Musina Municipality	
Tshifulanani Hub	67	Bungeni sport Hub	38	Tshixwadza sport Hub	69	Musina sport Hub	59
Makonde sport Hub	46	Rabali sport Hub	56	Masisi port Hub	63		
Tshikombani sport Hub	53						
	166		94		103		59

Total population = 422

3.4 SAMPLING TECHNIQUE

The study used convenience sampling technique where elderly people who are available and willing to participate in the study during the data collection days were asked to complete the questionnaire.

3.5 MEASUREMENT INSTRUMENT

Questionnaires were used as an instrument for data collection. It was divided into four sections. Section A contained demographic profile of the respondents. Section B, C and D seeks to describe the perception of elderly people in Vhembe District regarding physiological, physical and psychological benefits of participating physical activity.

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3.6 VALIDITY

Validity is the ability of an instrument to measure what it purports to measure. Face validity is the physical appearance of the instrument and its legibility, face validity cannot be quantified. Thus, efforts were made by the researcher to scrutinize the questionnaire before data collection in order to ensure high degree of face validity (Creswell, 2009). Content validity refers to the extent to which the instrument covers the complete content of the particular construct that it is set out to measure. The questionnaire were designed in line with pre-existing questionnaires that have been used for similar studies; and were reviewed by the experts in the field of PA testing and health promotion for face and content validity. Adjustments were made to ambiguity and incorrect wordings or expressions.

3.7 RELIABILITY OF INSTRUMENT

Test- retest methods of reliability testing were employed to test the reliability of the study instrument. The questionnaire were administered to a sample of 43 respondents who do not formed part of the study, but residing in Thulamela Municipality on day 1 and re-administered on the same sample on day 2. The Pearson's correlation coefficient were calculated and yielded high correlation (r=0.74), indicating consistent in the responses.

3.8 DATA PROCEDURE

Questionnaires were translated to Tshivenda for more clarity. The researcher read and explained the questionnaire in local language to those who cannot read and write and capture the responses. Data collection took place in sport hub offices namely, (Tshifulanani Hub Makonde and Tshikombani hub; Rabali hub Bungeni Hub; Masisi hub; Tshixwadza hub and Lesley Manyathela Hub).

3.9 DATA ANALYSIS

Descriptive statistics (percentile, mean and standard deviation) were used to analyse data. Chi-square was applied to test the statistical significance differences between genders, age group and level of education concerning the physical, physiological and psychological benefits of participating in physical activity. The results of statistical significance were set at

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p-value of 0.05. All statistical analysis was performed using Statistical Package for Social Sciences (SPSS version 20.1).

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3.10 ETHICAL CONSIDERATIONS

3.10.1 ETHICAL CLEARANCE

The ethical clearance was obtained from the University of Venda Ethical Research Committee. Permission were sought and obtained from the Department of Sports, Arts and Culture prior to data collection.

3.10.2 INFORMED CONSENT

The nature and aim of the study were explained to the respondents. Informed consent was obtained from all the respondents before data collection. Only those who agreed to participate after the explanation were given consent forms to fill. The respondents were assured of confidentially, anonymity and privacy of the information provided. The research process and the need for the study were explained to the respondents and they were also informed that their participation in the study is voluntary. Only those who have agreed to participate after the explanation were given consent forms to fill.

3.10.3 CONFIDENTIALITY

The respondents were assured that the information provided by them will be treated confidentially and that only the researcher and the supervisors will have access to the data.

3.10.4 ANONYMITY

The respondents were not requested to indicate their names on the questionnaire, in order to maintain anonymity.

1.11 DISSEMINATION OF RESULTS

The findings from this proposed study will be published in peer-reviewed journals as well as presented in national and international conferences. Workshops will be organised to sensitise and educate the elderly in Vhembe District concerning their physical activity participation based on the findings of the study. A copy of the dissertation will be submitted to the central library of Vhembe District in order to inform the public concerning the outcomes of the study.

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RESULTS AND DISCUSSION

4.1 INTRODUCTION

This chapter presents the results of the data collected through a questionnaire, as well as the discussion of the study findings.

4.2 RESULTS

Table 4.1.1 shows the demographic characteristics of the respondents. More than half (56.4%) of the respondents were aged 60 – 65 years; 284 (67.3%) were females, 298 (70.6%) were illiterates (298; 70.6%), while 43 (10.1%) were degree holders.

Table 4.1.1: Demographic profiles of the respondents

Variables	Number	Percentage
Age (years)		
60-65	238	56.4
66-75	113	26.8
76-85	71	16.8
Gender		
Male	138	32.7
Female	284	67.3
Educational level		
None	298	70.6
Matric	42	10.0
Diploma	39	9.2
Degree	43	10.1

Table 4.1.2 shows the time spent by the respondents in physical activity, stratified by gender, age and educational level. The majority (185; 46.2%) of the respondents spent little time (10-20 minutes) engaging in physical activity. Only 57 (13.5%) spent between 41 and 50 minutes exercising. About 118 (50%) aged between 60-65years spent between 10-20 minutes exercising which is less than 30 the minutes recommended for maintaining good health, while 14 (6%) of the respondents from the same age group reported spending between 41-50 minutes in physical activity. The majority 27 (63%) of the respondents who hold a degree as

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their highest qualification spent between 41-50 minutes exercising. Another 16 (37%) spent 10-20 minutes engaging in physical activity. However, there were no significant difference between the male and female concerning the duration of time spent participating in physical activity (X^2 =44.037; p= 0.99), age groups and the duration of time spent participating in physical activity (X^2 =35.548; p= 0.000). However, a significant relationship exists between the level of education and the duration of time spent participating in physical activity (X^2 =202.136; p= 0.000).

Table 4.1.2: Time spent in PA by the elderly stratified by gender, age and educational level

	Time spent in physical activity (in minutes)				
Variables	**10-20 n(%)**	**21-30 n(%)**	**31-40 n(%)**	**41-50 n(%)**	**p-values**
Gender					
Male= (N138)	75(54)	31(22)	0(0)	32(23)	
Female=(N284)	120(42.0)	89(31.0)	50(18.0)	25(9.0)	X^2=44.037, df=4, p<0.933
Total=(N422)	195(46.2)	120(28.4)	50(11.8)	57(13.5)	
Age (years)					
60-65=(N238)	118(50)	81(34)	25(11)	14(6)	
66-75=(N113)	52(46)	19(17)	14(12)	28(25)	X^2=35.548, df=4, p<0.000
76-85=(N71)	25(35)	20(28)	11(15)	15(21)	
Total =(N422)	195(46.2)	120(28.4)	50(11.8)	57(13.5)	
Educational level					
None=(N298)	157(53)	104(35)	24(8)	13(4)	
Matric=(N42)	13(31)	0(0)	12(29)	17(40)	
Diploma=(N39)	9(23)	16(41)	14(36)	0(0)	X^2=202.136, df=4, p<0.000
Degree=(N43)	16(37)	0(0)	0(0)	27(63)	
Total=(N422)	195(46.2)	120(28.4)	50(11.8)	57(13.5)	

Table 4.1.3 present the frequency of participation in physical activity by the elderly, stratified by gender, age and educational level. The majority of the respondents (285;67.5%) engage in physical activity on a weekly basis, another 42 (10.0%) exercise on a monthly basis less for than 30 minutes of moderate intensity daily, which is the minimum

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recommended for maintaining good health. Majority (96; 70%) of the male respondents engage in physical activity on weekly basis compared to females (189; 67%). The majority (173; 73%) of the respondents aged 60-65 years reported exercising on a weekly basis. Of the 113 respondents aged 66-75 years, the majority (89; 79%) exercised on a weekly basis. Surprisingly, out of the 71 respondents aged 76-85 years, 52% reported engaging in physical activity on a daily basis. Out of the 298 illiterate respondents, (251; 84%) reported exercising on a weekly basis. None of the 43 degree holders reported exercising on a monthly basis, while the majority (33; 77%) exercised on a daily basis. There were no significant difference between male and female respondents concerning exercise frequency (X^2=2.729, df=4, p<0.214). However, a significant relationship exists between exercise frequency and respondents' age (X^2=66.591, df=4, p<0.000); and exercise frequency and the level of education (X^2=215.342, df=4, p<0.000) (Table 3).

Table 4.1.3: Time spent in PA by the elderly, stratified by gender, age and educational level

	Frequency of PA participation			
Variables	**Daily n(%)**	**Weekly n(%)**	**Monthly n(%)**	**p-values**
Gender				
Male= (N138)	33(24)	96(70)	9(7)	
Female=(N284)	62(22)	189(67)	33(12)	X^2=2.729, df=4, p<0.214
Total=(N422)	95(22.5)	285(67.5)	42(10.0)	
Age (years)				
60-65=(N238)	34(14)	173(73)	31(13)	
66-75=(N113)	24(21)	89(79)	0(0)	X^2=66.591, df=4, p<0.000
76-85=(N71)	37(52)	23(32)	11(15)	
Total =(N422)	95(22.5)	285(67.5)	42(10.0)	
Educational level				
None=(N298)	28(8)	251(84)	19(6)	
Matric=(N42)	30(71)	0(0)	12(29)	X^2=215.342, df=4, p<0.000
Diploma=(N39)	4(10)	24(62)	11(28)	
Degree=(N43)	33(77)	10(23)	0(0)	
Total=(N422)				

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Table 4.1.4 shows the perception of elderly people regarding the physiological benefits of participating in physical activity, stratified by gender. On whether physical activity reduces the risk of obesity by preventing weight gain, the majority (289; 70.6%) of the respondents disagreed, another 60 (14.2%) neither agreed nor disagreed while 64 (15.2%) agreed. About 71 (51%) of the 113 male respondents disagreed that physical activity reduces the risk of obesity by preventing weight gain; another 34(25%) agreed, while the 34 (25%) neither agreed nor disagreed. The chi-square analysis indicated that there were a significant difference between the perception of male and female respondents concerning the role of physical activity in reducing the risk of obesity and preventing weight gain (X^2=36.671, df=4, p<0.000).

When asked if regular physical activity can prevent diabetes, about half of the respondents (187; 44.3%) neither agreed nor disagreed, while 79 (18.7%) agreed that physical activity can prevent diabetes, whereas 156 (37%) disagreed. Almost half (137; 48%) of the 284 female respondents neither agreed nor disagreed on whether regular physical activity can prevent diabetes, another 109(38%) disagreed and 38(13%) agreed. There were a significant difference between the responses of males and females regarding the role of regular physical activity in the prevention of diabetes (X^2=16.720, df=4, p<0.006).

The results showed that 217 (51.4%) of the respondents neither agreed nor disagreed when asked if regular physical activity is effective in reducing the risk of colon cancer, another 166 (39.3%) disagreed with the statement, while 39 (9.2%) agreed that regular physical activity is effective in reducing the risk of colon cancer. Almost half of the respondents (70; 51%) neither agreed nor disagreed, another 59(43%) disagreed, while 9(7%) agreed that regular physical activity is effective in reducing the risk of colon cancer. However, there were no significant difference between the responses of male and female respondents concerning whether regular physical activity is effective in reducing the risk of colon cancer (X^2=2.270, df=4, p<0.163).

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Table 4.1.4: Perceptions of elderly people regarding physiological benefits of regular physical activity participation stratified by gender

	Male (N=138)			Female (N= 284)			Total (N= 422)			
	A	I	D	A	I	D	A	I	D	
Statements/Questions	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	**p-values**
Regular physical activity reduces blood pressure and hypertension	36(26)	47(34)	55(40)	24(8)	141(50)	119(42)	60(14.2)	188(44.5)	174(41.2)	X^2=25.478, df=4, p<0.006
Physical activity reduces the risk of obesity by preventing weight gain	34(25)	34(25)	71(51)	26(9)	31(11)	227(80)	60(14.2)	64(15.2)	298(70.6)	X^2=36.671,df=4, p<0.000
Physical activity prevent diabetes	41(30)	50(36)	47(34)	38(13)	137(48)	109(38)	79(18.7)	187(44.3)	156(37)	X^2=16.720,df=4, p<0.006
Regular physical activity is effective in reducing the risk of colon cancer	9(7)	70(51)	59(43)	30(11)	147(52)	107(38)	39(9.2)	217(51.4)	166(39.3)	X^2=2.270, df=4, p<0.163
Physical activity improves blood circulation and oxygen carrying capacity.	53(38)	85(62)	0(0)	50(18)	142(50)	92(32)	103(24.4)	227(53.8)	92(21.8)	X^2=63.488, df=4, p<0.000
Physical activity preserves and increases muscles strength	70(51)	42(30)	26(19)	103(36)	45(16)	136(48)	173(41)	87(26.6)	162(38.4)	X^2=34.736, df=4, p<0.000
Physical activity increase bone density.	51(37)	22(16)	65(47)	46(16)	46(16)	192(68)	97(23)	69(16.1)	257(60.9)	X^2=23.827, df=4, p<0.306

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Table 4.1.5 shows the perception of elderly people regarding the physiological benefits of participating in physical activity stratified by age. Few (60; 14.2%) respondents agreed that regular physical activity reduces blood pressure and hypertension, while just less than half (188; 44.5%) of the respondents neither agreed nor disagreed, while 104 (41.2%) disagreed. Respondents aged between 60-65 years (118; 50%) disagreed that regular physical activity reduces blood pressure and hypertension. However, there were no significant relationship between the age groups of the respondents concerning their perception on whether regular physical activity reduces blood pressure and hypertension (X^2=,30.761,df=4, p<0.066).

The majority of respondents 289 (70.6%) disagreed that physical activity reduces the risk of obesity by preventing weight gain, another 60 (14.2%) neither agreed nor disagreed, while 64 (15.2%) agreed. The results further show that there were a significant relationship between the respondents age and their perceptions concerning the role of physical activity in the reduction of the risk of obesity and preventing weight gain (X^2=32.900,df=4, p<0.013).

On whether regular physical activity can prevent diabetes, the majority (187; 44.3%) neither agreed nor disagreed, 79 another (18.7%) agreed, 156 (37%) of the respondents disagreed. The majority 127(53%) of the respondents aged between 60-65 years neither agreed nor disagreed with the statement. There were no significant difference between the perceptions of elderly people according to their age groups on whether regular physical activity can prevent diabetes (X^2=47.502, df=4, p<0.231).

Asked if regular physical activity is effective in reducing the risk of colon cancer, the majority (217 ;51.4%) of the respondents neither agreed nor disagreed, another 166 (39.3%) disagreed, while 39 (9.2%) agreed that regular physical activity is effective in reducing the risk of colon cancer. Thirty four (48%) of the respondents aged 76-85 years disagreed that regular physical activity is effective in reducing the risk of colon cancer, while 30(42%) respondents neither agreed nor disagreed; and few 7(10%) agreed. A significant relationship exists between the age groups of the respondents and their perceptions on the efficacy of regular physical activity in reducing the risk of colon cancer (X^2=51.409, df=4, p<0.006).

None of the respondents aged 66-75 years agreed that physical activity improves blood circulation and oxygen carrying capacity. The majority 93(82%) neither agreed nor disagreed while 20(18%) agreed. Out of the 72 respondents aged 76-85 years, 29 (41%) neither agreed nor disagreed. There were a significant difference between the perceptions of elderly people

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according to their age group regarding the role of physical activity in improving blood circulation and oxygen carrying capacity (X^2=[illegible]/89, df=4, p<0.004).

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Table 4.1.5: Perceptions of elderly people regarding the physiological benefits of regular physical activity participation stratified by age

	60-65 Years =(N238)			66-75 Years=(N113)			76-85 Years =(N72)			Total(N=422)			
	A	I	D	A	I	D	A	I	D	A	I	D	
Statements/Questions	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**P-values**
Regular physical activity reduces blood pressure and hypertension.	27(11)	93(39)	118(50)	28(25)	60(53)	25(22)	5(7)	35(49)	31(44)	60(14.20	188(44.5)	174(41.2)	X^2=,30.761,df=4, p<0.066
Physical activity reduces the risk of obesity by preventing weight gain.	35(15)	46(19)	157(66)	25(22)	3(3)	85(75)	0(0)	15(21)	56(79)	60(14.2)	64(15.2)	298(70.6)	X^2=32.900,df=4, p<0.013
Physical activity prevents diabetes.	33(14)	127(53)	78(33)	31(27)	20(18)	62(55)	15(21)	40(56)	16(23)	79(18.7)	187(44.3)	156(37)	X^2=47.502,df=4, p<0.231
Regular physical activity is effective in reducing the risk of colon cancer.	15(6)	104(44)	119(50)	17(15)	83(73)	13(12)	7(10)	30(42)	34(48)	39(9.2)	217(51.4)	166(39.3)	X^2=51.409, df=4, p<0.006
Physical activity improves blood circulation and oxygen carrying capacity.	83(35)	105(44)	50(21)	0(0)	93(82)	20(18)	20(28)	29(41)	22(31)	103(24.4)	227(53.8)	92(21.8)	X^2=65.7[illegible], p<0.004
Physical activity preserves and increases muscle strength.	117(49)	50(21)	71(30)	22(19)	15(13)	76(67)	34(48)	22(31)	15(21)	173(41)	87(26.6)	162(38.4)	X^2=58.722, df=4, p<0.103
Physical activity increases bone density.	55(23)	48(20)	135(57)	27(24)	9(8)	77(68)	15(21)	11(15)	45(64)	97(23)	69(16.1)	257(60.9)	X^2=8.977, df=4, p<0.306

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Table 4.1.6 shows the perception of elderly people regarding the physiological benefits of participating in physical activity stratified by level of education. None of the 298 illiterate respondents agreed that regular physical activity reduces blood pressure and hypertension, while half 150(50%) neither agreed nor disagreed. All 43(100%) of the respondents who hold a degree affirmed that regular physical activity reduces blood pressure and hypertension. This shows that level of education had a significant influence on the perceptions of the elderly regarding the role of regular physical activity in reducing blood pressure and hypertension (X^2=342.086, df=4, p<0.000).

When asked whether regular physical activity is effective in reducing the risk of colon cancer, 217 (51.4%) of the respondents neither agreed nor disagreed. Another 166 (39.3%) disagreed with the statement, while 39 (9.2%) agreed that regular physical activity is effective in reducing the risk of colon cancer.

The majority (29;67%) of elderly people who were degree holders neither agreed nor disagreed that physical activity improves blood circulation and oxygen-carrying capacity, while 14(33%) agreed. This shows that educational level of the respondents had no significant relationship on their perceptions regarding the role of physical activity in improving blood circulation and oxygen -carrying capacity (X^2=68.951, df=4, p<0.308).

When asked if physical activity increases bone density, the majority (257; 60.9%) of the respondents disagreed, while 69(16.1%) neither agreed nor disagreed, and 97(23%) agreed with the statement. Only 5(13%) of the 39 respondents who hold a diploma agreed. Another 14(36%) neither agreed nor disagreed and the majority 20(51%) disagreed. While none of the 43 respondents who were holders of a degree neither agreed nor disagreed regarding whether physical activity increases bone density, the majority 26(60%) of the respondents disagreed and only 17 (40%) agreed. There were a significant relationship between the perceptions of respondents and the level of education on whether physical activity increases bone density (X^2=43.559, df=4, p<0.018).

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Table 4.1.6: Perceptions of elderly people regarding the physiological benefits of regular physical activity participation stratified by level of education

	None =(N298)			Matric =(N42)			Diploma=(N39)			Degree(N=43)			Total(N=422)			
	A	I	D	A	I	D	A	I	D	A	I	D	A	I	D	
Statements	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**P-values**
Reduces blood pressure.	0(0)	150(50)	148(50	17(40)	13(31)	12(29)	0(0)	25(64)	14(36)	43(100)	0(0)	0(0)	60(14.20	188(44.5)	174(41.2)	X^2=342.086,df=4, p<0.000
Reduces the risk of	21(7)	9(20)	218(73)	12(29)	5(12)	25(60)	0(0)	0(0)	39(100)	27(63)	0(0)	16(37)	60(14.2)	64(15.2)	298(70.6)	X^2=123.278 ,df=4, p<0.000
Prevents diabetes.	22(7)	133(45)	143)(48)	17(40)	24(57)	1(2)	0(0)	30(70)	9(23)	40(93)	0(0)	3(7)	79(18.7)	187(44.3)	156(37)	X^2=231.02 ,df=4, p<0.000
Reduces the risk of	19(6)	152(51)	127(43)	0(0)	33(79)	9(21)	4(10)	19(49)	16(41)	16(37)	13(30)	14(33)	39(9.2)	217(51.4)	166(39.3)	X^2=57.578 . df=4. p<0.000
Improves blood circulation.	73(24)	172(58)	53(18)	0(0)	17(40)	25(60)	16(41)	9(23)	14(36	14(33)	29(67)	0(0)	103(24.4)	227(53.8)	92(21.8)	X^2=68.951 , df=4, p<0.308
Preserves muscle strength.	79(26)	74(25)	145(49)	25(60)	4(10)	13(31)	30(77)	9(23)	0(0)	39(91)	0(0)	4(9)	173(41)	87(26.6)	162(38.4)	X^2=104.255 , df=4, p<0.000
Increases bone density.	58(19)	42(14)	198(66)	17(40)	12(29)	13(31)	5(13)	14(36)	20(51)	17(40)	0(0)	26(60)	97(23)	69(16.1)	257(60.9)	X^2=43.559, df=4, p<0.018

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Table 4.1.7 shows the perception of elderly people regarding the physical benefits of participating in physical activity stratified by gender. When asked whether physical activity improves physical function and mobility, majority 334 (79.1 %) of elderly people disagreed, 73 (17%) respondents agreed while only 15 respondents neither agree nor disagree. Of the 138 male respondents, majority 113 (82%) disagreed and 25(18%) agreed. Evidence shows that there were no significant difference between the perceptions of male and female respondents on whether physical activity improves physical function and mobility (X^2=7.562, df=4, p<0.719).

On whether physical activity helps to improve balance, 56 (41%) of the 138 male respondents agreed, 42(30%) neither agree nor disagree and 40(29%) disagreed. However, majority 151(53%) of female respondents neither agree nor disagree. Gender of the respondents had no significant relationship concerning their perceptions on whether physical activity helps in improving balance (X^2=20.659, df=4, p<0.706).

Table 4.1.7 shows that majority 288(68.2%) elderly people disagreed when asked whether physical activity is effective in maintaining postural stability, whereas 89(21.1%) agreed and 45(10.7%) neither agree nor disagree. Greater number of male respondents 98(71%) disagree, 33(24%) agreed while only 7 (5%) male respondents neither agree nor disagree. Only 6 (20%) of the 284 female respondents agree, 38(13%) neither agree nor disagree while majority 190(67%) disagreed. However, there were no significant difference between the perceptions of male and female respondents on whether physical activity is effective in maintaining postural stability (X^2=7.016, df=4, p<0.992).

When asked whether physical activity helps to prevent fall-related injuries in older adults, majority 170(60%) of female respondents, 94(33%) disagreed and 20(7%) agreed. Data shows that there were significant difference between the perceptions of male and female respondents on whether physical activity helps to prevent fall-related injuries in older adults (X^2=18.361, df=4, p<0.000).

Majority (71.1%) respondents disagree when asked whether physical activity improves flexibility, 65(15.4%) neither agree nor disagree while 57(13.5 agreed. Out of the 138 male respondents, majority 109 (79%) disagreed, while 29(21%) agreed. Data also shows that majority 191(67%) of female respondents disagree with the statement, 65(23%) neither agree nor disagree and only 28(10%) agreed. There were no significant difference between the

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perceptions of male and female respondents on whether physical activity improves flexibility (X^2=41.939, df=4, p<0.938).

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Table 4.1.7: Perception of elderly people regarding physical benefits of regular physical activity participation stratified by gender

Statements	Male (N=138)			Female (N= 284)			Total (N= 422)			P-values
	A	I	D	A	I	D	A	I	D	
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	
Physical activity improves my physical function and mobility	25(18)	0(0)	113(82)	48(17)	15(5)	221(78)	73(17)	15(3.6)	334(79.1)	X^2=7.562,df=4, p<0.719
Physical activity helps me to improve my balance	56(41)	42(30)	40(29)	87(31)	151(53)	46(16)	143(33.9)	193(45.7)	86(20.4)	X^2=20.659,df=4, p<0.706
Physical activity is effective in maintaining postural stability	33(24)	7(5)	98(71)	6(20)	38(13)	190(67)	89(21.1)	45(10.7)	288(68.2)	X^2=7.016,df=4, p<0.992
Physical activity helps to prevent fall-related injuries in older adult	20(14)	65(47)	53(38)	20(7)	94(33)	170(60)	40(9.5)	159(37.7)	223(52.8)	X^2=18.361, df=4, p<0.000
Physical activity improves my strength	39(28)	0(0)	99(72)	31(11)	62(22)	191(67)	70(16.6)	62(14.7)	290(68.7)	X^2=47.244, df=4, p<0.104
Physical activity improves flexibility	29(21)	(0)	109(79)	28(10)	65(23)	191(67)	57(13.5)	65(15.4)	300(71.1)	X^2=41.939, df=4, p<0.938

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Table 4.1.8 presents the perceptions of elderly people regarding the physical benefits of participating in physical activity stratified by age. The majority 196(82%) of the respondents aged 60-65 years disagreed when asked whether physical activity improves physical function and mobility. Another 38 (16%) agreed, 4 (2%) neither agreed nor disagreed while 11 (15%) of the respondents aged between 76-85 years agreed equalled the 11(15%) who neither agreed nor disagreed. The majority 49(70%) respondents from the same age group disagreed. Age of respondents had no significant relationship concerning their perceptions on whether Physical activity improves physical function and mobility (X^2=, 37.461, df=4, p<0.160).

On whether physical activity is effective in maintaining postural stability, the majority 288(68.2%) of the respondents, (89; 21.1%) agreed and 45(10.7 neither agreed nor disagreed. Majority 159(67%) of respondents aged between 60-65 years disagreed, another 51(21%) agreed while 28(12%) neither agreed nor disagreed. Of the 238 respondents aged of 60-65 years, only 1(0%) agreed that physical activity helps to prevent fall-related injuries among older adults.

This shows that there were no significant relationship in the perceptions of elderly people and their age concerning the effectiveness of physical activity in maintaining postural stability (X^2=11.631, df=4, p<0.653), and improvement in flexibility (X^2=53.343, df=4, p<0.364). However, age has a significant influence on the perception of the elderly regarding prevention of fall-related injuries (X^2=61.747, df=4, p<0.004), and strength (X^2=26.610, df=4, p<0.05

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-Table 4.1.8: Perceptions of elderly people regarding the physical benefits of regular physical activity participation stratified by age

Statements	60-65 Years =(N238)			66-75 Years=(N113)			76-85 Years =(N72)			Total(N=422)			p-values
	A	I	D	A	I	D	A	I	D	A	I	D	
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	
Physical activity improves my physical function and mobility	38(16)	4(2)	196(82)	24(21)	0(0)	89(79)	11(15)	11(15)	49(70)	73(17)	15(3.6)	334(79.1)	X^2=,37.461,df=4, p<0.160
Physical activity helps me to improve my balance.	64(27)	119(50)	55(23)	41(36)	59(52)	13(12)	38(54)	15(21)	18(25)	143(33.9)	193(45.7)	86(20.4)	X^2=29.190,df=4, p<0.003
Physical activity is effective in maintaining postural stability.	51(21)	28(12)	159(67)	20(18)	17(15)	76(67)	18(25)	0(0)	53(75)	89(21.1)	45(10.7)	288(68.2)	X^2=11.631,df=4, p<0.653
Physical activity helps to prevent fall-related injuries in older adults.	1(0)	113(48)	124(52)	24(21)	26(23)	63(56)	15(21)	20(28)	36(51)	40(9.5)	159(37.7)	223(52.8)	X^2=61.747, df p<0.004
Physical activity improves my strength	39(16)	50(21	149(63	24(21)	1(1)	88(78)	7(10)	11(15)	53(75)	70(16.6)	62(14.7)	290(68.7)	X^2=26.610, df=4, p<0.053
Physical activity improves flexibility	39(16)	50(21)	149(63)	0(0)	4(4)	109(96)	18(25)	11(15)	42(59)	57(13.5	65(15.4)	300(71.1)	X^2=53.343, df=4, p<0.364

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Table 4.1.9 shows the perception of elderly people regarding the physical benefits of participating in physical activity stratified by level of education. Asked whether physical activity improves physical function and mobility, the majority (334; 79.1 %) of the respondents disagreed, another 73 (17%) agreed while 15 respondents neither agree nor disagreed. The majority (262; 88%) of the illiterate respondents disagreed while none of the respondents with matric certificate agreed.

None of the respondents with a diploma agreed that physical activity helps to prevent fall-related injuries in older adults, while the majority (27; 69%) neither agreed nor disagreed and 12(31%) disagreed. Out of the 298 illiterate respondents, 227(76%) disagreed when asked whether physical activity improves strength, another 35 (12%) agreed while 36 (12%) neither agreed nor disagreed. The majority (25; 64%) of the respondents with a diploma disagreed while none of the respondents with a diploma agreed. Most 30(71%) of the respondents with a matric certificate disagreed when asked whether physical activity improves flexibility, not even a single participant agreed with the statement, while 12(29) neither agreed nor disagreed.

The results indicate that there is a significant difference between the perceptions of elderly people's level of education and whether physical activity improves physical function and mobility in older adults (X^2=184.673, df=4, p<0.000), and improves strength (X^2=101.693, df=4, p<0.000). However, there were no significant difference between the perceptions of elderly people's level of education on whether physical activity helps to prevent fall-related injuries in older adults (X^2=103.222, df=4, p<0.348), and improves flexibility (X^2=46.137, df=4, p<0.221) (Table 5).

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Table 4.1.9: Perceptions of elderly people regarding the physical benefits of regular physical activity participation stratified by level of education

Statements	None =(N298)			Matric =(N42)			Diploma=(N39)			Degree(N=43)			Total(N=422)			P- value
	A	I	D	A	I	D	A	I	D	A	I	D	A	I	D	
	N (%)	N (%)	N (%)	N (%)	N (%	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	
Improves my physical function and mobility.	36(12)	0(0)	262(88)	0(0)	12(29)	30(71)	7(18)	3(8)	29(74)	30(70)	0(0)	13(30)	73(17)	15(3.6)	334(79.1)	X^2=184.673,df =4, p<0.000
Improves my balance.	84(28)	155(52)	59(20)	17(40)	14(33)	11(27)	6(15)	24(62)	9(23)	36(84)	0(0)	7(16)	143(33.9)	193(45.7)	(20.4)	X^2=65.864,df= 4, p<0.000
Maintain postural stability	28(9)	42(14)	228(77)	12(29)	0(0)	30(71)	9(23)	0(0)	30(77)	40(93)	3(7)	0(0)	89(21.1)	45(10.7)	288(68.2)	X^2=171.304,df =4, p<0.00
Prevents fall-related injuries.	14(5)	128(43)	156(52)	17(40)	0(0)	25(60)	0(0)	27(69)	12(31)	9(21)	4(9)	30(70)	40(9.5)	159(37.7)	223(52.8)	X^2=103.222,df =4, p<0.348
Improves strength.	35(12)	36(12)	227(76)	8(19)	12(29)	22(52)	0(0)	14(36)	25(64)	27(63)	0(0)	16(37)	70(16.6)	62(14.7)	290(68.7)	X^2=101.693,df =4, p<0.000
Improves flexibility	43(14)	39(13)	216(72)	0(0)	12(29)	30(71)	0(0)	14(36)	25(64)	14(33)	0(0)	29(67)	57(13.5)	65(15.4)	300(71.1)	X^2=46.137 df=4, p

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Table 4.1.10 presents the perceptions of elderly people regarding the psychological benefits of participating in physical activity stratified by gender. When asked whether physical activity helps to reduce stress, the majority (177; 41.9%) respondents disagreed. The majority 80 (58%) of male respondents agreed while few 80 (28%) of the female respondents agreed. There were a significant difference between the responses of male and female respondents on whether regular physical activity helps to reduce stress (X^2=63.059, df=4, p<0.001).

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Table 4.1.10: Perceptions of elderly people regarding the psychological benefits of regular physical activity participation stratified by gender

Statements	Male (N=138)			Female (N= 284)			Total (N= 422)			P-value
	A N (%)	I N (%)	D N (%)	A N (%)	I N (%)	D N (%)	A N (%)	I N (%)	D N (%)	
Physical activity helps me to de-stress/reduce stress.	80(58)	0(0)	58(42)	80(28)	85(30)	119(42)	160(37.9)	85(20.1)	177(41.9)	X^2=63.059,df=4, p<0.001
P.A preserves and improves my cognitive functioning.	15(11)	35(25)	88(64)	163(57)	41(14)	80(28)	178(42.2)	76(18)	168(39.8)	X^2=83.379,df=4, p<0.000
Physical activity helps me to sleep better.	79(57)	0(0)	59(43)	73(26)	49(17)	162(57)	152(36)	49(11.6)	221(52.4)	X^2=53.083,df=4, p<0.000
Physical activity improves my well-being.	79(57)	59(43)	0(0)	77(27)	145(51)	62(22)	156(37)	204(48.3)	62(14.7)	X^2=54.264,df=4, p<0.000
Physical activity improves self-efficacy.	19(14)	0(0)	119(86)	73(26)	94(33)	117(41)	92(21.8)	94(22.3)	236(55.9)	X^2=85.426,df=4, p<0.000
Physical activity helps me to relax.	44(32)	35(25)	59(43)	57(20)	69(24)	158(56)	101(23.9)	104(24.6)	217(51.4)	X^2=8.455,df=4, p<0.004
Physical activity reduces anxiety, and depression.	65(47)	37(27)	36(26)	76(27)	40(14)	168(59)	141(33.4)	77(18.2)	204(48.3)	X^2=40.753,df=4, p<0.000
Physical activity helps to improve your mood.	32(23)	22(16)	84(61)	82(29)	59(21)	143(50)	114(27)	81(19.2)	227(53.8)	X^2=4.151,df=4, p<0.069

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Table 4.1.11 shows the perceptions of elderly people regarding the psychological benefits of participating in physical activity stratified by age. The majority 52 (46%) of the respondents aged 66-75 years disagreed that physical activity helps to reduce stress. Another 20(18%) neither agreed nor disagreed, while 41(36%) respondents agreed.

Out of the 238 respondents aged of 60-65 years, 99(42%) agreed that physical activity helps elderly people to sleep better, another 38(16 %) neither agreed nor disagreed, while 101(42%) disagreed with the statement. The majority 80(71%) of the respondents aged 66-75 years disagreed while, 33(29%) agreed.

When asked whether physical activity improves a person's well-being, the majority 40(56%) of the respondents aged 76-85 years neither agreed nor disagreed, another 20(28%) agreed, while 11(15%) disagreed. While 1 (1%) participant aged 66-75 years disagreed, the majority 75(66%) respondents neither agreed nor disagreed with the statement, while 37(33%) agreed.

On whether physical activity helps to improve an individual's mood, the majority 143(60%) of the respondents aged of 60-65 years disagreed, another 46(19%) respondents neither agreed nor disagreed, while 49(21%) agreed with the statement. Half (56; 50%) of the respondents aged of 66-75 years agreed, another 24(21%) neither agreed nor disagreed, while 33(29%) disagreed with the statement. Few 11(15%) respondents between the ages of 76-85 years neither agreed nor disagreed with the statement.

There were a significant difference between the perceptions of respondents and their age groups concerning whether physical activity helps to reduce stress (X^2=6.087, df=4, p<0.019), sleep better (X^2=34.681, df=4, p<0.002), improve one's well-being (X^2=39.006, df=4, p<0.793), and improve individual's mood (X^2=39.006, df=4, p<0.793).

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Table 4.1.11: Perceptions of elderly people regarding the psychological benefits of regular physical activity participation stratified by age

Statements	60-65 Years =(N238)			66-75 Years=(N113)			76-85 Years =(N72)			Total(N=422)			P-value
	A	I	D	A	I	D	A	I	D	A	I	D	
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	
Helps me to de-stress/reduce stress.	99(42)	50(21)	89(37)	41(36)	20(18)	52(46)	20(28)	15(21)	36(51)	160(37.9)	85(20.1)	177(41.9)	X^2=6.087,df=4, p<0.019
Preserve and improve my cognitive functioning.	89(37)	50(21)	99(42)	53(47)	11(10)	49(43)	36(51)	15(21)	20(28)	178(42.2)	76(18)	168(39.8)	X^2=11.947,df=4, p<0.034
Helps me to sleep better.	99(42)	38(16)	101(42)	33(29)	0(0)	80(71)	20(28)	11(15)	40(56)	152(36)	49(11.6)	221(52.4)	X^2=34.681,df=4, p<0.002
Improves my well-being.	99(42)	89(37)	50(21)	37(33)	75(66)	1(1)	20(28)	40(56)	11(15)	156(37)	204(48.3)	62(14.7)	X^2=39.006,df=4, p<0.793
Improves self-efficacy.	63(26)	47(20)	128(54)	18(16)	32(28)	63(56)	11(15)	15(21)	45(63)	92(21.8)	94(22.3)	236(55.9)	X^2=8.942,df=4, p<0.041
Helps me to relax.	54(23)	76(32)	108(45)	29(26)	10(9)	74(65)	18(25)	18(25)	36(50)	101(23.9)	104(24.6)	217(51.4)	X^2=23.039,df=4,p<0.4
Reduces anxiety, and depression.	67(28)	55(23)	116(49)	28(25)	22(19)	63(56)	46(65)	0(0)	25(35)	141(33.4)	77(18.2)	204(48.3)	X^2=45.368,df=4,p<0.00
Helps to improve your mood.	49(21)	46(19)	143(60)	56(50)	24(21)	33(29)	9(13)	11(15)	51(72)	114(27)	81(19.2)	227(53.8)	X^2=49.802,df=4,p<0.587

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Table 4.1.12 presents the perceptions of elderly people regarding the psychological benefits of participating in physical activity stratified by level of education. Out of the 42 elderly people with a matric certificate, few 6 (14%) respondents agreed when asked whether physical activity helps to reduce stress. About half 19(45%) of the respondents neither agreed nor disagreed, while 17(40%) disagreed. The majority 27(63%) of the respondents who hold a degree agreed while 16(37%) disagreed.

There were a significant difference between the perceptions of respondents and their level of education regarding whether regular physical activity helps to reduce (X^2=45.372, df=4, p<0.014), sleep better (X^2=71.078, df=4, p<0.018), improve self-efficacy (X^2=24.010, df=4, p<0.556), and reduce anxiety and depression (X^2=63.370, df=4, p<0.001).

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Table 4.1.12: Perceptions of elderly people regarding the psychological benefits of regular physical activity participation stratified by level of education

	None =(N298)			Matric =(N42)			Diploma=(N39)			Degree(N=43)			Total(N=422)			
	A	I	D	A	I	]	A	I	D	A	I	D	A	I	D	
Statements	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	**P-value**
Helps me to de-stress/reduce stress.	111(37)	52(17)	135(45)	6(14)	19(45)	17(40)	16(41)	14(36)	9(23)	27(63)	0(0)	16(37)	160(37.9)	85(20.1)	177(41.9)	X^2=45.372,df=4, p<0.014
Preserve and improve my cognitive functioning.	114(38)	73(24)	111(37)	25(60)	3(7)	14(33)	23(59)	0(0)	16(41)	16(37)	0(0)	27(63)	178(42.2)	76(18)	168(39.8)	X^2=38.081,df=4, p<0.464
Helps me to sleep better.	111(37)	23(8)	164(55)	0(0)	12(29)	30(71)	16(41)	14(36)	9(23)	25(58)	0(0)	18(42)	152(36)	49(11.6)	221(52.4)	X^2=71.078,df=4, p<0.018
Improves my well-being.	111(37)	151(51)	36(12)	2(5)	28(67)	12(29)	16(41)	9(23)	14(36)	27(63)	16(37)	0(0)	156(37)	204(48.3)	62(14.7)	X^2=54.369,df=4, p<0.172
Improves self-efficacy.	63(21)	70(23)	165(55)	13(31)	12(29)	17(40)	2(5)	12(31)	25(64)	14(33)	0(0)	29(67)	92(21.8)	94(22.3)	236(55.9)	X^2=24.010,df=4, p<0.556
Helps me to relax.	39(13)	78(26)	181(61)	17(40)	12(29)	13(31)	9(23)	14(36)	16(41)	36(84)	0(0)	7(16)	101(23.9)	104(24.6)	217(51.4)	116.430 0.000
Reduces anxiety, and depression.	79(27)	63(21)	156(52)	29(69)	0(0)	13(31)	6(15)	14(36)	19(49)	27(63)	0(0)	16(37)	141(33.4)	77(18.2)	204(48.3)	X^2=63.370,df=4, p<0.001
Helps to improve your mood.	69(23)	53(18)	176(59)	17(40)	12(29)	13(31)	0(0)	14(36)	25(64)	28(65)	2(7)	13(30)	114(27)	81(19.2)	227(53.8)	X^2=61.563,df=4, p<0.000

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4.2 DISCUSSION

The majority of the respondents were illiterate. During the apartheid era, black people lived in poverty and they were not allowed or given equal opportunity to education. This may explain the high number of illiterates among elderly people in this study. Other studies conducted in Austria, Italy and Brazil (Eichinger, Titze, Haditsch3, Dorne ,& Stronegger, 2015; Ttribess, virtuoso & de Oliveira, 2012; Liubicich, Candela, Magistro, Rabaglietti & Ortega, 2012) also reported that the majority of the elderly people had just a primary school education, while a smaller proportion achieved a higher level of education.

The study also showed that the majority (46.2%) of the respondents spent little time (10-20 minutes) engaging in physical activity. It might be that the elderly are ignorant or they simply lack the knowledge of the recommendations made by WHO concerning the time which elderly people should spend engaging in physical activity to attain and maintain good health. The majority of the respondents (67.5%) engage in physical activity on a weekly basis, with exercise duration of less than 30 minutes. This is in contrast with the WHO minimum recommendation for maintaining good health. These results are in line with the WHO findings which estimated that at least 60% of the world's population is failing to achieve physical activity for 30 minutes of moderate activity daily-the minimum recommendation for maintaining good health (WHO, 2002). However, this result differs with the cross-sectional observational study findings which clearly demonstrate that the majority of Irish elderly people are achieving recommended levels of physical activity with only 26% failing to reach health-enhancing physical activity levels of 30 minutes moderate activity daily (Sherlock, O'donnelL, White & Blake, 2010).

The study also showed that respondents aged 60-65 years spent between 10-20 minutes exercising, which is less than the 30 minutes recommended for maintaining good health, while few (6%) of the participate in physical activity lasting between 41-50 minutes. This is surprising because one would expect respondents aged of 60-65 years to be more active compared to those aged of 66-75 and 76-85 years, respectively. The finding in the current study differs with the results of the study conducted in Romania (Elenaaa, Georgetab, Ceciliac, & Elenad, 2011); in which the highest proportion of both women and men in the age range 65-70 years walk for 20-40 minutes. There were a significant difference between age

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groups concerning the duration of time spent participating in physical activity (X^2 =35.548; p= 0.000).

The present study indicated that the majority (63%) of the elderly with degree as their highest qualification spent longer time (41-50 minutes) exercising. It is likely that respondents who are better educated are more knowledgeable about the health benefits of regular physical activity participation; hence they spend longer time engaging in physical activity. Perhaps, this finding suggests the need to make more efforts to educate elderly people about the health benefits of physical activity, rather than just encouraging them to engage in physical activity. The results further revealed a significant relationship between level of education and the duration of time spent participating in physical activity (X^2 =202.136; p= 0.000).

Whilst research evidence supports physical activity in the prevention of colonic cancer, the perceptions of elderly people in the current study failed to complement existing evidence. More than half (51.4%) of the respondents were indifferent when asked if regular physical activity is effective in reducing the risk of colon cancer. A study conducted in South Africa by Herbst (2015) listed physical activity among other factors playing an important role in reducing the risk for colon cancer. This finding is in disagreement with Chan and Giovannucci's (2010) study which reported that high levels of physical activity decrease the risk of colon cancer among men and women, possibly, by as much as 50%.

Obesity is a public health problem worldwide. It is no doubt that obesity is a significant health problem in South Africa, too. Although genetics can play a role in the likelihood that a person will become obese, regular exercise and healthy diet has been shown to reduce body fat as well as protect against chronic diseases associated with obesity (Schmidt,2012; Olson, 2014; Hills, Andersen & Byrne , 2011; Chan & Woo, 2010; Han, Tajar & Lean , 2011). Surprisingly, the majority of respondents in this study (70.6%) disagreed that physical activity reduces the risk of obesity by preventing weight gain. The results further show that there is a significant relationship between the age and perceptions concerning the role of physical activity in the reduction of the risk of obesity and preventing weight gain (X^2=32.900,df=4, p<0.013). Given this negative perception, effective measures should be instituted to address poor knowledge regarding health benefits associated with regular physical activity participation among the ageing population.

Contrary to the findings of several studies, which showed that regular physical activity is key element in the prevention and management of type 2 diabetes (Boateng,D.A.D.,2015;

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Colberg, Sigal,R.J.,Fernhall,B., Regenstein, J.G., Blissmer, B.J., etal, 2010; American Diabetes Association,2015), the present study showed that the majority (44.3%) of the respondents were indifferent regarding the fact that regular physical activity is of crucial importance in both prevention and management of diabetes. However, results show that there is no significant difference between the perceptions of elderly people in relation to age regarding the role of regular physical activity in preventing diabetes (X^2=47.502,df=4, p<0.231).

Although Rakumakoe's (2011) study reported that 77% of the elderly people in South Africa believed that exercise lowers blood pressure, the result of the present study indicated that few (14.2%) respondents believed that regular physical activity reduces blood pressure and hypertension. However, Mkhonto , Labadarios and Mabaso's (2011) study showed no relationship between physical activity and high blood pressure.

Aging is frequently associated with a decrease of exercise capacity, muscle mass and strength and impaired balance. In addition, the impaired physical function frequently leads to decreasing in activities of daily living and, consequently, to loss of independence and poor quality of life. Although physical activity has been shown to improve everyday physical function and mobility, including factors such as walking speed and time to stand up from a chair, even in those at an advanced age (British Heart Foundation, 2012), the majority (79.1 %) of elderly people in the present study did not believe that physical activity improves physical function and mobility. However, a similar study conducted amongst the Czech and Slovak elderly people showed that only one third of the respondents (32.10%) did not believe that regular physical activity participation positively influences their health (Kisvetrova & Vaskova, 2014). This Brazilian study confirmed that participation in a community-based exercise programme could positively change the lifestyle of a physically independent elderly's daily life (Hernandes Probst , Da Silva Jr., Januário , Pitta , & Teixeira, 2013). In contrast, Meijer et al. found a difference in the elderly's level of physical activity in daily life [PADL] between exercise and non-exercise programme days of older people enrolled in exercise programmes. The different conclusions reached by those authors could be attributed to some methodological issues observed in those studies, such as small sample size (18 respondents and 15 respondents), short-term exercise training (12 weeks), reduced number of days of PADL assessment (3 days) and assessment of PADL occurring during only season (October and November) which is known to influence the PADL level. Data indicate that there were a significant difference between the perceptions of respondents and level of

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education on whether physical activity improves physical function and mobility in older adults (X^2=184.673, df=4, p<0.000).

The evidence accumulated in recent years has identified balance impairment as one of the main risk factors for falls in older adults (The Department of Health; London, 2011). While studies have shown that regular physical activity of a general nature can be used to maintain balance (British Heart Foundation, 2012; National Institute of Aging, 2011; Factora, 2013; Mesquita, Carvalho , Freire , Neto, & Zângaro, 2015; Wan & Wong, 2014). The current study showed that elderly people did not believe that physical activity helps to improve balance. The findings of the current study also failed to support the outcome of the Spanish study which concluded that Pilates Method offers a beneficial tool to improve the abilities to maintain body balance (Isabela, Appell, Pérez1, Nascimento, Coriolano, 2012).

Although exercise programmes, particularly strength training, have been shown to be highly effective in maintaining postural stability (Ministry of Health, 2013; British Heart Foundation, 2012; Factora, 2013; Wan & Wong, 2014; Morey, Schmader & Sokol, 2014),the majority (68.2%) of the respondents disagreed with the statement that physical activity is effective in maintaining postural stability. It remains a mystery whether these respondents know that there are different types of physical activity which can be performed to attain specific health benefits. It is possible that elderly people are choosing the wrong mode of exercise. For example, if one wants to reduce belly fat, an appropriate type of exercise that targets the upper body or specifically the belly should be identified. While it has been shown that regular physical activity of a general nature can be used to maintain balance, to illicit improvements in unstable individuals, structured physical activity sessions which focus on improving postural stability are necessary (British Heart Foundation, 2012).

Approximately 30% of older adults fall each year in Britain alone. This figure increases with age to over 40% in those 80 years and above (Department for Work & Pensions, 2012). Falls are the most common cause of nonfatal injuries and trauma-related hospital admissions (Horne, Skelton, Speed & Todd, 2010). However, the current study failed to support previous findings, as few (9.5%) respondents believed that physical activity helps to prevent fall-related injuries in older adults.

Perceptions of elderly people were low regarding the fact that physical activity improves flexibility, as the majority (71.1%) of the respondents disagreed with the statement. Also, there were no significant difference between the perceptions of male and female respondents

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on whether physical activity improves flexibility (X^2=41.939, df=4, p<0.938). Surprisingly, the results of a clinical study conducted by Stathokostas, McDonald, Little and Paterson, (2013) showed that physical activity level did not explain a significant amount of the variance in flexibility measures, and flexibility were not associated with functional ability. However, other studies have proven that exercise or leisure time activity has been shown to affect physical functioning by improving muscle strength, joint flexibility (National Institute of Aging, 2011; Ministry of Health, 2013; Roma Busse, Betoni , Melo , Kong , Santarem & Filho ,2013; Seco, Abecia, Echevarrı , l Barbero, Unda, Rodriguez, , & Calvo, 2014; Liubicich, Magistro, Candela, Rabaglietti, & Ciairano, 2012).

The elderly in this present study were ignorant of the fact that physical activity preserves and improves cognitive functioning, a finding which is worrying and warrants intervention. Given the growing body of evidence, with many studies and clinical trials demonstrating benefits of physical activity in the elderly, which includes improved mood, reducing symptoms of stress, anger and depression (Hu, Lei, Smith & Zhao,Y., 2012; Picorelli, Pereira, Pereira, Felício, & Sherrington, 2014; Lindwall, Larsman & Hagger, 2011; Bridle, Spanjers, Patel, Atherton, & Lamb, 2012; Win, Parakh, Eze-Nliam, Gottdiener, Kop & Ziegelstein, 2010; Kempermannetal, 2010; Sanchez & McGough, 2014), there is a need to educate the elderly on the beneficial health outcomes of participating in physical activity.

Generally, the perception of elderly regarding regular physical activity in reducing stress were low (41.9%). The present study failed to support the results of other studies which showed that participation in physical activity were associated with decreased risk of depression in the elderly (Roh, Hong, Lee, Oh, Lee, Chang, Kang, Kim, Lee, Chung, Lim, Noh, Kim, Sang & Son, 2015; Mura & Carta, 2014; Picorelli, Pereira, Pereira, Felício, & Sherrington, 2014; Lindwall, Larsman & Hagger, 2011; Bridle, Spanjers, Patel, Atherton & Lamb, 2012; Win, Parakh, Eze-Nliam, Gottdiener, Kop & Ziegelstein, 2010; Kempermannetal, 2010). Furthermore, a study conducted on the older Irish adult population over 50 years of age showed that physical activity had a 50-56% reduction in the odds of having elevated depressive symptoms.

About half of the respondents (52.4%) said they do not believe that physical activity helps elderly people to sleep better. In contrast, several other studies (Kitano, Tsunoda, Tsuji, Osuka, Jindo, Tanaka & Okura, 2014; Hung, 2013; Monteiro, Neri & Coelim, 2014;

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Taylor,2013; Hendrick, 2010) have suggested that a combination of physical activity with dairy consumption may effectively improve sleeping problem.

Stratified by level of education, the majority 164 (55%) of illiterate respondents responded that they do not believe that physical activity helps elderly people to sleep better. This finding is comparable to the results of other studies conducted in Europe and South America (Eichinger, Titze, Haditsch, Dorne & Stronegger, 2015; Ttribess, virtuoso & de Oliveira, 2012; Liubicich, Candela, Magistro, & Rabaglietti, 2012). Perhaps, the lack of knowledge on the psychological effect of physical activity on sleep exhibited by the elderly in this present study is expected when one considers their educational level, in which majority are not educated. There were a significant difference between the perceptions of respondents and their level of education concerning whether physical activity helps elderly people to sleep better (X^2=71.078, df=4, p<0.018). The findings of the present study failed to support other studies (Mura & Carta, 2014; Picorelli, Pereira, Pereira, Felício, & Sherrington, 2014; Lindwall, Larsman & Hagger, 2011; Bridle, Spanjers, Patel, Atherton, & Lamb, 2012; Win, Parakh, Eze-Nliam, Gottdiener, Kop & Ziegelstein, 2010; Kempermannetal, 2010;Win, Parakh, Eze-Nliam, Gottdiener, Kop & Ziegelstein, 2010; Kempermannetal, 2010; Sanchez & McGough, 2014), demonstrating higher levels of health perceptions, life satisfaction, positive affect, and well-being, and lower levels of depression, negative affect, and psychological distress among the elderly in physical activity participation.

Regarding whether physical activity helps to improve an individual's mood, the perceptions were low. However, other studies have confirmed that physical activity can improve the mood and quality of life of older people (Dow, Moore, Russel, Ames, Cyarto, Haines, Hill, Lautenschlager, Mackenzie & Williams ,S., 2013; Ngaire, Hayman, Dowell, etal 2010; Chen, & Li , 2014 ; Stone, Meisner & Baker, 2012). Again, this could be linked to the low level of education of the respondents. There is therefore a need to create awareness to the elderly on the importance and the need to participate in physical activity, given the psychological benefits accruable on one's individuals' health.

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CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. SUMMARY

The primary objective of this study was to describe the perceptions of the elderly people in Vhembe District regarding the health benefits of participating in physical activity. Older adults are important from a public health standpoint and with the continuing growth of elderly populations in modern societies, it has become a matter of increasing urgency to look for ways to maintain and improve the functional abilities of ageing people, to help them cope independently in the community and ultimately, to raise the quality of their lives specifically, the study aimed to:

- To describe the perceptions of elderly people regarding physiological benefits of physical activity in Vhembe District.
- To describe the perceptions of elderly people regarding physical benefits of participating in physical activity in Vhembe District
- To investigate the knowledge of elderly people regarding the psychological benefits of physical activity in Vhembe District.

This quantitative descriptive cross-sectional study involved a total population of 422 elderly persons registered to participate in eight sports and recreational hubs in Vhembe District, Limpopo Province. Questionnaires were administered by both the researcher and respondents. Data were analysed using descriptive and inferential statistics.

5.1.1The major findings of the study are highlighted as follows:

The majority of the respondents spend little time engaging in physical activity, less than 30 minutes, in contrast with the WHO minimum recommendation for maintaining good health.

Elderly people who are educated showed positive perceptions regarding the physiological benefits associated with regular physical activity participation.

The majority of the elderly people in this study were indifferent or did not believe at all that regular physical activity participation is associated with psychological, physical and physiological health benefits.

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5.1.2. Limitations of the Study

The findings of this study should be interpreted within the limitations of non-representative sampling. Only elderly people in Vhembe District (aged 65 years and above) were recruited. Therefore, the results of the present study do not necessarily apply to all South African elderly people. The perceptions of respondents might be different from some areas with different living conditions. Large-scale surveys that cover all areas of South Africa might be necessary for future research.

5.2 CONLCUSSION

Elderly people of Vhembe District have negative perceptions regarding the health benefits associated with regular physical activity participation, Therefore , it has become a matter of increasing urgency to look for ways to eradicate these negative perceptions in order to reduce loss of physical function which impact upon older adults' health, wellbeing and ability to maintain an independent life. Intervention strategies should be instituted to educate and inform elderly people about the health benefits of participating in physical activity.

5.3 RECOMMENDATIONS

Based on the findings of the study, the researcher makes the following recommendations:

- The Department of Health together with Sports and Recreation should educate and inform elderly people about the health benefits of participating in physical activity.

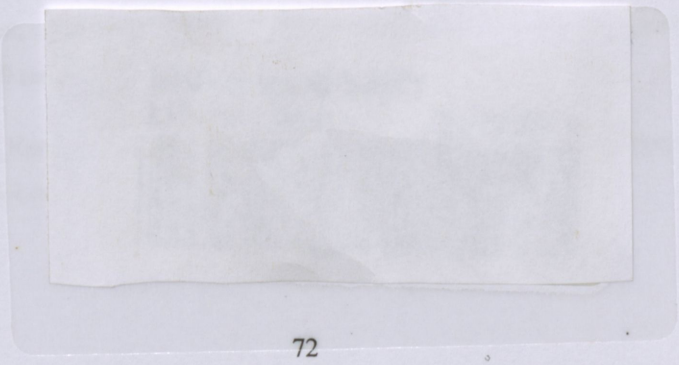
It is also recommended that efforts should be made by the above mentioned government departments to encourage elderly people to:

- Do at least 150 minutes of moderate-intensity aerobic physical activity per week or do at least 75 minutes of vigorous-intensity aerobic physical activity per week or an equivalent combination of moderate- and vigorous-intensity activity.
- Older adults, with poor mobility, should perform physical activity to enhance balance and prevent falls for three (3) or more days per week
- When older adults cannot do the recommended amounts of physical activity due to health conditions, they should be as physically active as their abilities and conditions allow.

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- Encouraging any type or amount of physical activity in leisure time can also provide important health benefits, compared to a sedentary lifestyle.
- Elderly people should be provided with opportunities to ensure that physical activity and fitness become part of regular healthy behavioural patterns.
- Further studies should be conducted to investigate why participation in physical activity is lower among male elderly people.



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APPENDIX 1

INFORMATION SHEET

My name is Ndadza M student no: 11563812. I am a post-graduate student in the Department of Public Health, School of Health Sciences at University of Venda.

I am conducting a study on the perception of the elderly people of Vhembe District regarding the health benefits of participating in physical activity.

I humbly request you to participate in this research project. There will be no direct benefits to you for your participation in this study. I assure you that any information obtained from you will be treated as confidential. Your participation in this study is voluntary and your decision to take part in this study will have no negative impact on your life or health and you are free to withdraw from the study should you feel uncomfortable with the way the study is being conducted.

ETHICAL CLEARANCE

The Higher Degrees Committee of the School of Health Sciences will assess the proposal and give recommendations to the ethics committee of the University of Venda for approval before the researcher can interact with respondents.

The researcher also request permission from the Department of Sports, Arts and Culture to collect data.

INFORMED CONSENT

The research process and the need for the study were explained to the respondents and they were also informed that their participation in the study is voluntary. Only those who have agreed to participate after the explanation were given consent forms to fill.

CONFIDENTIALITY

The respondents were assured that the information provided by them will be treated confidentially and that only the researcher and the supervisors will have access to the data.

ANONYMITY

The respondents were not being required to indicate their names on the questionnaire, in order to maintain anonymity.

CONSENT FORM

Participant

I_____ have read through the content of this form and hereby voluntarily consent to participate in this study.

Respondents' signature _____ date_____

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RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:
Mr M Ndadza

Student No:
11563812

PROJECT TITLE: **Perceived health benefits of participating in physical activity amongst elderly people in Vhembe District, Limpopo Province South Africa.**

PROJECT NO: SHS/15/PH/02/1903

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Dr TG Tshitangano	University of Venda	Supervisor
Prof TD Goon	University of Venda	Co-Supervisor
Mr M Ndadza	University of Venda	Investigator - Student

ISSUED BY:
UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE

Date Considered: March 2015
Decision by Ethical Clearance Committee Granted
Signature of Chairperson of the Committee: .....
Name of the Chairperson of the Committee: Prof. G.E. Ekosse

University of Venda
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APPINDIX 2

MR.NDADZA MADZHIE

House no: 463, Thohoyandou Unit E
P.O. Box 2178, Thohoyandou 0950
Limpopo
Cell: 0721065644
E- Mail Ndadzawm@gmail.com

Department Of Sports, Arts and Culture

Limpopo Province

Private Bag x 9549
Polokwane
0700

The Head of Department

RE: Application for Data Collection

My name is **Ndadza Madzhie**, and I am a full time student in the Department of Public Health at the University of Venda (UNIVEN). I hereby apply for permission/approval to collect data from the sports and recreation hubs in Vhembe District. I am conducting research under the supervision of **Prof. T.D Goon and Dr. T.G.Tshitangano**. The title of my mini-dissertation is **Perceived health benefits of participating in physical activity amongst elderly people in Vhembe district, Limpopo province South Africa.**

The purpose of the study is first to complete my master's degree but also to explore the perception of elderly people regarding the health benefits of participating in physical activity This might be necessary or help to combat the high levels of physical inactivity amongst elderly people in South Africa, high levels of chronic diseases and high deaths rates due to chronic diseases related to physical inactivity.

Yours sincerely: Ndadza M

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LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF SPORT, ARTS & CULTURE HEAD OFFICE

Ref : 2/9/9/2

Eng : Masemola P.K

Date : 20 April 2015

To : Mr Ndadza Madzhie
House No: 463
Thohoyandou Unit E

SUBJECT: APPLICATION FOR DATA COLLECTION

1. The above matter refers
2. It is with great pleasure to inform you that the Limpopo Department of Sport, Arts and Culture have approved your application for data collection from the sport and recreation hubs in Vhembe District.
3. The department would like to take this opportunity to wishes you all the best in your mini-dissertation.

MANGENA MABAKANE
ACTING HEAD OF DEPARTMENT

21/04/2015
DATE

21 BICCARD ST, POLOKWANE, 0699, Private Bag X9549 POLOKWANE, 0700
Tel: (015) 248 4000. Fax: (015) 248 4508
Website; http/www.limpopo.gov.za

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SECTION C. PHYSICAL BENEFITS

1 Agree. 2 Neither agrees nor disagrees. 3 Disagree. Put a cross x on your choice of answer

Statement	1	2	3
Physical activity improves my physical function and mobility			
Physical activity helps me to improve my balance			
Physical activity is effective in maintaining postural stability			
Physical activity helps to prevent fall-related injuries in older adults			
Physical activity improves my strength			
Physical activity improves flexibility			

SECTION D PSYCHOLOGICAL BENEFITS

1 Agree. 2 Neither agrees nor disagrees. 3 Disagree. Put a cross x on your choice of answer

Statement	1	2	3
Physical activity helps me to de-stress/reduce stress			
Physical activity preserve and improve my cognitive functioning			
Physical activity helps me to sleep better			
Physical activity improves my well-being			
Physical activity improves self-efficacy due to its capacity to increase the individual's sense of personal control.			
Physical activity helps me to relax			
Physical activity reduces anxiety, and depression			
Physical activity helps to improve your mood			

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