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DISSERTATION



PERCEIVED BENEFITS AND BARRIERS TO EXERCISE AND LEVELS OF PHYSICAL ACTIVITY OF UNDERGRADUATE PHYSIOTHERAPY STUDENTS IN THE WESTERN CAPE

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LIST OF ABBREVIATIONS

ACSM:	American College of Sports Medicine
BBAQ:	Barriers to Being Active Quiz
EBBS:	Exercise Barriers and Benefits Scale
BMI:	Body Mass Index
CANRISK:	Canadian Diabetes Risk Questionnaire
COPD:	Chronic Obstructive Pulmonary Disease
DQ:	Demographic Questionnaire
EMI-2:	Exercise Motivation Inventory-2
EPP:	Exercise Promotion and Prescription
FGD:	Focus Group Discussions
GPAQ:	Global Physical Activity Questionnaire
HOD:	Head of Department
HP:	Health Promotion
HRPF:	Health Related Physical Fitness
HREC:	Health Sciences Human Research Ethics Committee, University of Cape Town
HICs:	High Income Countries
ICF:	International Classification of Function
IPAQ-Short:	International Physical Activity Questionnaire-Short
ILD:	Interstitial Lung Disease
MI:	Myocardial Infarction
NMDs:	Neuromuscular Diseases
NCDs:	Non-Communicable Diseases
PA:	Physical Activity
PE:	Physical Education
PR:	Pulmonary Rehabilitation
RCTs:	Randomised Controlled Trials
SCT:	Social Cognitive Theory
SA:	South Africa

Perceived benefits and barriers to exercise and levels of physical activity of undergraduate physiotherapy students in the Western Cape

SASP:	South African Society of Physiotherapy
TPB:	Theory of Planned Behaviour
SUN:	University of Stellenbosch
UCT:	University of Cape Town
UWC:	University of the Western Cape
WCPT:	World Confederation of Physical Therapists
WHO:	World Health Organization

LIST OF DEFINITIONS

Behaviour: anything a person does in response to internal or external stimuli (Davis, Campbell, Hildon, Hobbs, & Michie, 2015).

Exercise: a category of physical activity that is planned, structured, repetitive and has a final or intermediate objective i.e. the improvement or maintenance of physical fitness (Caspersen, Powell, & Christenson, 1985).

Health: is not merely the absence of disease but complete wholeness of the mind, body and soul aspects of the individual (WHO, 1946).

Health focused physiotherapy: physical therapy that maximises a patient's/client's health in the broad sense of the WHO definition of health and ICF (Dean, Dornelas de Andrade, et al., 2014).

International Classification of Functioning: a unified and standard framework for describing and organising information on health, functioning and disability (World Health Organization, 2001).

Non-communicable diseases: diseases that progress slowly and tend to last for an extended duration of time, increasingly affecting the health of the population (Reiner, Niermann, Jekauc, & Woll, 2013).

Perceived benefits: are positive perceptions about the resulting joy of a behaviour (Pippin, 2013).

Perceived barriers: obstacles that make it more difficult to engage in exercise (Kulavic, Hultquist, & McLester, 2013).

Physical Activity: Any movement of the body produced by skeletal muscles that requires the use of energy WHO (2017).

ABSTRACT

Background: Physiotherapists have been identified as key role players in health promotion (HP) as well as in the prevention and treatment of non-communicable diseases (NCDs). As key role players engaged in physical activity (PA) HP who society observe as role models, it is valuable to investigate the health behaviours of physiotherapists and physiotherapy students alike. There is a paucity of evidence on the levels of PA of physiotherapists and physiotherapy students, making it difficult to predict their effectiveness as role models and the effectiveness of HP strategies they use.

Aim: The aim of this study is to describe the perceived benefits and barriers to exercise and their association with levels of PA in physiotherapy students (first to fourth year) attending university in the Western Cape province of South Africa.

Method: This study follows a quantitative, cross-sectional, survey design. Two hundred and ninety-six participants (median age = 22 years) were recruited from the three universities in the Western Cape (University of Cape Town, University of the Western Cape and University of Stellenbosch). Participants completed a demographic questionnaire (DQ), 43 item exercise benefits and barriers scale (EBBS) and the international physical activity questionnaire short form (IPAQ-short).

Results: Female students accounted for 83% of the sample. From the 296 participants, 58% lived off campus and 65% were involved in sporting activities six hours per week. The median score on the EBBS was 136 (54-167) for all years. Responses with the highest agreement for perceived benefits were: (1) Exercise increases my level of physical fitness, (2) Exercise improves functioning of my cardiovascular system and (3) exercise improves the way my body looks. Alternatively, the top three responses for perceived barriers were: (1) exercise tires me, (2) I am fatigued by exercise and (3) Exercise is hard work for me. The IPAQ scores revealed that the majority of students had low PA. Only 37.5% students engaged in high PA. Scores on the EBBS categorised by level of physical activity (low, moderate and high) showed that students with high PA had significantly higher scores on the EBBS than those with moderate and low PA. There were no significant differences between the EBBS scores of students with high, moderate and low PA levels in the first year of study [$H(2, N=41) = 3.01, p=0.22$].

However, students in the second (n=61), third (n=111) and fourth years of study with high PA had significantly better scores on the EBBS than those with low and moderate PA.

Conclusion: Undergraduate physiotherapy students in the WC across all three universities do not engage in adequate PA. In this group of students, benefits associated with high PA related to physical performance and barriers associated with low levels of PA related to physical exertion.

Clinical relevance: Physiotherapists who do not practice what they preach are not effective role models and may not be effective in obtaining behavior change through PA HP. Global mortality by NCDs is on the rise and physiotherapists need to respond by taking a leadership role. Physiotherapy students should be encouraged to participate in PA as part of their undergraduate training. Methods of promoting PA in this population should take into account the perceived barriers and benefits of this group of students.

Keywords: *Physical activity, benefits, barriers, physiotherapy students.*

CHAPTER ONE: INTRODUCTION AND SCOPE

Physical activity (PA) cannot be separated from the practice of physiotherapy (Cup et al., 2007). For decades physiotherapists have been using physical activity and exercise to treat a range of conditions which include neuromuscular diseases (NMDs), respiratory, orthopaedic, paediatric, non-communicable diseases (NCDs) and others (Cup et al., 2007; DeTurk & Scott, 2008; Higgs & Ellis, 2001; Meisingset, Stensdotter, Woodhouse, & Vasseljen, 2016). In today's world, non-communicable diseases have been noted as the leading cause of death globally, reported to reach epidemic proportions and resulting in more deaths than all other causes combined (WHO, 2009a). Therefore, there is a high demand for physiotherapists to provide rehabilitative, preventive and education therapies, particularly in the prevention and management of non-communicable diseases (Bury & Moffat, 2014; Dean, 2009a, 2009b; Dean et al., 2011; Dean, Dornelas de Andrade, et al., 2014; Skinner, 1980).

The ever-growing body of literature continues to support the use of physical activity by physiotherapists to successfully prevent and treat non-communicable diseases such as diabetes, cardiovascular disease, cancer, chronic lung disease, arthritis, liver disease, stroke, Alzheimer's disease and others (Bury & Moffat, 2014; Dean et al., 2016). Of course, the epidemiological literature has not only affected the practice of physiotherapy, but has also influenced the physiotherapy curriculum and the competencies that are needed to effectively address these 21st century health challenges (Dean et al., 2011; Dean et al., 2016). However, the extent of the impact of evidence based training on physiotherapy students' health behaviours is a matter of speculation. For instance, although physiotherapy curricula worldwide emphasise the role of exercise and physical activity to optimize health, prevent illness and their use as a treatment technique; whether students are expected to engage in PA outside of the learning hours as part of their undergraduate training is unclear (Bodner, Rhodes, Miller, & Dean, 2013).

While theoretical knowledge about the benefits of physical activity and the methods of prescribing are fundamental during undergraduate training (Plotnikoff et al., 2015), engaging in physical activity and exercise itself is beneficial for students to embed knowledge and facilitate learning while developing insight into the future challenges that they will face in implementing strategic health promotion strategies in practice (Dabrowska-Galas, Plinta, Dabrowska, & Skrzypulec-Plinta, 2013; Shirley, Van der Ploeg, & Bauman, 2016).

One of the components crucial for success in achieving behavior change, is for the prescriber to be engaged in the target behavior i.e. physical activity (Dabrowska-Galas et al., 2013). The majority of patients will not start to engage in physical activity simply because it is advised (Keating, Guan, Piñero, & Bridges, 2005). Achieving a change in behavior requires the physiotherapist to engage with the patient's beliefs and barriers to PA while also successfully modelling the behavior change (Dean, 2009b). Essentially, physiotherapists who lead by example are more likely to be successful in prescribing behavior change (Dabrowska-Galas et al., 2013; Dean, 2009a, 2009b; Dean et al., 2011; Dean, Dornelas de Andrade, et al., 2014; Dean et al., 2016).

Physiotherapist have been identified as key role players in health promotion (HP), improving the health and wellbeing of communities both as role models and by facilitating behavior change consistent with public health priorities (Chevan & Haskvitz, 2010; Frerichs, Kaltenbacher, van de Leur, & Dean, 2012; Taukobong, Myezwa, Pengpid, & Van Geertruyden, 2014). As key role players engaged in physical activity promotion, it is valuable to investigate the health behaviors of physiotherapists and physiotherapy students alike. There is a paucity of information on the levels of physical activity of physiotherapists and physiotherapy students, making it difficult to predict their effectiveness as role models and the effectiveness of the health promotion strategies they use. Therefore, this study aims to describe the levels of physical activity and benefits and barriers to exercise of undergraduate physiotherapy students in the Western Cape.

1.1. AIM AND OBJECTIVES

1.1.1. Aim

The aim of the study is to describe the perceived benefits and barriers to exercise and their association with levels of PA in undergraduate physiotherapy students (first to fourth year) attending university in the Western Cape province of South Africa.

1.1.2. Objectives

In physiotherapy students attending university in the Western Cape Province:

- i. Determine the perceived benefits and barriers to PA using the Exercise Barriers and Benefits Scale (EBBS)
- ii. Determine the levels of PA using the International Physical Activity Questionnaire (IPAQ-Short)
- iii. Evaluate the association between EBBS, PA, and year of study

1.2. SIGNIFICANCE OF STUDY

Over two thirds of South African Adults do not meet the World Health Organisation (WHO) physical activity guidelines for health benefits (Fourie et al., 2006). We know that physical inactivity is the fourth leading risk factor for global mortality causing to 6% of deaths globally (WHO, 2018). The guidelines for ages 18-64 are: at least 150 minutes of moderate-intensity aerobic physical activity throughout the week (2017). We know that physical inactivity is the fourth leading risk factor for global mortality causing 6% of deaths globally which further contributes to the burden of non-communicable diseases in South Africa (WHO, 2018). Physiotherapists have used physical activity in the rehabilitation of diseases for many decades (Cup et al., 2007; DeTurk & Scott, 2008; Higgs & Ellis, 2001; Meisingset et al., 2016). Also, physiotherapists are identified as key players in person centered health promotion that aim to promote health and well being of the population, prevent disease and maintain health of individuals living with non-communicable diseases (Chevan & Haskvitz, 2010; Frerichs et al., 2012; Taukobong et al., 2014). Research shows that habitual physical activity patterns in communities are influenced by perceived benefits and barriers to physical activity (El Ansari & Lovell, 2009). However, there is limited research on the health behaviour of physiotherapists and their individual views on their potential role in PA promotion.

CHAPTER TWO: LITERATURE REVIEW

2.1. INTRODUCTION

Insufficient PA is identified by the World Health Organization (WHO) as one of the leading risk factors for non-communicable diseases (NCDs) or chronic diseases of lifestyle (Warburton, Nicol, & Bredin, 2006). Insufficient PA, along with tobacco use, unhealthy diet and harmful use of alcohol are identified as the top four modifiable risk factors for NCDs accounting for 16.2 million deaths annually (Dean, de Andrade, O'Donoghue, Skinner, Umereh, Beenen, . . . Footer, 2014). According to WHO (2017), one in four adults presents with insufficient PA. Additionally, physical inactivity is the fourth leading risk factor for global mortality contributing to 6% of deaths globally (WHO, 2018). Over 20 years ago, moderate levels of aerobic activity were shown to delay mortality and lower the risks associated with NCDs (Plotnikoff et al., 2015; Skinner, 1980; Warburton & Bredin, 2016). However, 20 years later, the world's population still has insufficient levels of PA (WHO, 2017).

The global report on PA indicates that around 23% of adults aged over 18 had insufficient levels of PA in 2010 (WHO, 2017). When comparing high-income and low-income countries, 26% of men and 35% of women versus 12% of men and 24% of women were insufficiently active respectively (WHO, 2017). Further, 81% of adolescents aged 11-17 also presented with low levels of PA (WHO, 2017). The rapid increase in physical inactivity over time in both adults and children has been described as alarming and has resulted in calls for immediate resolution (Vanhala, Korpelainen, Tapanainen, Kaikkonen, Kaikkonen, Saukkonen, & Keinänen-Kiukaanniemi, 2009).

The global action plan, as set out by the WHO, to prevent and control NCDs includes increasing levels of PA across the population (Skinner, 1980). Physiotherapists have used PA in the prevention and rehabilitation of NCDs for many decades (DeTurk & Scott, 2008). With the increase in NCDs, the demand for physiotherapists to use PA in the provision of physical rehabilitation, education and preventative therapies is also on the rise (Skinner, 1980).

Physiotherapists are uniquely equipped to be the link that connects patients to the pursuit of a healthy lifestyle through person centered health promotion (HP) (Chevan & Haskvitz, 2010; Taukobong et al., 2014). To develop the skills of health promotion relevant to PA, undergraduate physiotherapy programmes provide training in exercise prescription and promotion (Plotnikoff et al., 2015). However, it may be that providing physiotherapy students with knowledge about physical activity without exploring their behaviours will have limited benefit once they are qualified.

Physiotherapists who engage in PA that is necessary to maintain health benefits lead by example and those that provide advice about PA but do not implement this are less effective in health promotion strategies (Dabrowska-Galas et al., 2013). Consequently, regular exercise is recommended for all health professionals to strengthen credibility and avoid the argument that can arise about health professionals not practicing what they preach (Dabrowska-Galas et al., 2013; Shirley et al., 2016). However, there is limited research on the health behaviours of physiotherapists and physiotherapy students (Black, Marcoux, Stiller, Qu, & Gellish, 2012; Shirley et al., 2016). Therefore, it is relevant to explore whether physiotherapy students are engaging in PA and their attitudes and beliefs towards PA to inform education and training for this group of health care professionals.

2.2. IMPORTANCE OF PHYSICAL ACTIVITY

The United Nations, in partnership with the WHO, prioritise NCDs (Dean, Dornelas de Andrade, et al., 2014). Primary health epidemics that the world faces are no longer attributed to viruses without cure but to chronic diseases (NCDs) which are associated with lifestyle choices (Skinner, 1980). The top four NCDs i.e. cardiovascular disease, cancer, chronic lung disease and diabetes kill three in five people worldwide (Skinner, 1980). The good news is, these diseases of lifestyle are largely preventable and the evidence to suggest this is unequivocal (Arzu, Tuzun, & Eker, 2006; Dean, Dornelas de Andrade, et al., 2014; Dean, Moffat, et al., 2014). A great number of NCDs primarily occur as a result of unhealthy living which includes increased consumption of unhealthy food, excessive drinking and smoking, combined with physical inactivity (Dean et al., 2011;

Fourie, Steyn, Temple, & South African Medical Research, 2006). NCDs usually progress slowly and tend to last for an extended duration of time and increasingly affect the health of the population (Reiner, Niermann, Jekauc, & Woll, 2013).

Health is not merely the absence of disease but complete wholeness of the mind, body and soul aspects of the individual (WHO, 1946). The WHO (2017) describes PA as any movement of the body produced by skeletal muscles that requires the use of energy. PA of moderate amounts, when done regularly, has significant benefits for health. Additionally, exercise is a category of physical activity that is planned, structured, repetitive and has a final of intermediate objective i.e. the improvement or maintenance of physical fitness (Caspersen, Powell, & Christenson, 1985). The health benefits of engaging in regular PA are well established for the adult population (Plotnikoff et al., 2015). Recommendations from the WHO (2017) for adults aged 18-64 are: at least 150 minutes of moderate-intensity aerobic PA throughout the week. Alternatively, the ACSM recommends 30 minutes or more of moderate intensity PA on most or preferably all days of the week for health benefits (Irwin, 2004).

PA has been found to reduce the risk factors associated with NCDs (Cecchini et al., 2010 & WHO, 2009a). Further, PA reduces all cause (30-40%), cancer and cardiovascular deaths among both healthy and chronically ill patients (Abubakari et al., 2009). Given the above, there is a need for national policies and programmes to follow the guidelines for PA recommendations in order to inform, motivate and support members of the population (WHO, 2017). In addition, national policies to ascertain that PA is both accessible and safe are needed to promote PA (WHO, 2017). Further, the WHO (2009a) adds that the physical environment contributes to PA levels in a community, therefore, it is important to ensure that activities like walking and cycling are safe for all (WHO, 2017). School based PA strategies should be taught by trained individuals and have parental involvement to ensure successful results (WHO, 2017) and finally, in the workplace, PA promotion programs should be inclusive, specific, measurable, realistic and attainable (WHO, 2017).

As the fourth leading cause of global mortality, physical inactivity has reached pandemic proportions and there can no longer be any delay in addressing this issue (Kohl et al., 2012). Other leading causes of global mortality are; high blood pressure (13%), tobacco use (9%), high blood glucose (6%), overweight and obesity (5%) (WHO, 2009b). Of concern is the rapid increase in physical inactivity and obesity in both adults and children which will further contribute to the growing burden of NCDs in South Africa (SA) (Vanhala et al., 2009). In light of this, physical inactivity should be given the same amount of attention as other leading risk factors for global mortality such as obesity, alcohol and tobacco use (Kohl et al., 2012). For instance, up to 5.7 million deaths worldwide from NCDs could have been prevented if persons who were insufficiently active had engaged in PA that is necessary for health benefits as described and recommended by WHO (Kohl et al., 2012). Additionally, it is reported that up to 30% of all deaths from ischaemic heart disease can be attributed to physical inactivity (Kohl et al., 2012). Unfortunately, the detrimental effects of physical inactivity worsen when middle to low income countries are considered (Kohl et al., 2012).

Approximately 10 million of the 250 million people who suffer from diabetes live in Sub-Saharan Africa (Abubakari et al., 2009). The most comprehensive data are available for West Africa. In a review of 36 studies to determine the prevalence and distribution of physical inactivity and diabetes in West African countries, the prevalence of diabetes had increased by 33% in West Africa, with 4% of urban West African adults having diabetes (Abubakari et al., 2009). Urban West Africans were over five times more at risk of developing diabetes as opposed to rural West Africans, older West Africans were three times more at risk of getting diabetes than their young counterparts and in Nigeria, the prevalence of diabetes multiplied 300% between 1985 and 2000 (Abubakari et al., 2009).

Concerning physical inactivity; 13% of the West African population had low PA levels, two thirds of urban West Africans were involved in sedentary work and 50% of public sector workers did not participate in any form of PA (Abubakari et al., 2009). While this review has limitations, namely; it did not study all West African countries, the studies that were included were mostly heterogeneous making it difficult to effectively compare

studies and the ages varied greatly across studies (Abubakari et al., 2009). The study does stress the urgent need for experts such as physiotherapists who are capable of encouraging healthy living through PA to reduce the expected growth and spread of diabetes in West African countries specifically and in African countries more broadly (Abubakari et al., 2009).

In South Africa, the burden from NCDs is estimated to be two to three times more than in developed countries, consistent with the data from West African countries discussed above (Mayosi et al., 2009). The prevalence of NCDs is prominent in poor people living in urban settings (Mayosi et al., 2009). In 2004, it was estimated that NCDs contributed 28% of the total burden of disease, including cardiovascular diseases, diabetes mellitus, respiratory diseases, cancers and neuropsychiatric disorders (Mayosi et al., 2009). A South African study looking at mortality related to NCDs between the years 1992 and 1994 revealed 209 (men) and 172 (women) deaths per 100 000 (Mayosi et al., 2009). Additionally, the numbers increased to 270 and 180 deaths per 100 000 for men and women respectively in the years 2002-2005, a significant increase for men ($p=0.01$) (Mayosi et al., 2009). In Cape Town, age standardized mortality rates caused by NCDs were found to differ according to socioeconomic status (Mayosi et al., 2009). In Khayelitsha (poor sub district) 856.4 deaths per 100 000 were recorded compared to Northern and Southern (wealthy sub districts) where 450-500 deaths per 100 000 were reported (Mayosi et al., 2009). The leading cause of death in men and women aged 50 years and older in South Africa is theorized to be vascular disease with mortality caused by cardiovascular disease projected to have doubled by 2040 (Mayosi et al., 2009).

As in other populations, the risk factors for NCDs in South Africa are tobacco use, physical inactivity and poor diet and these risk factors have been found to consistently affect people younger than 25 years (Mayosi et al., 2009). Data from statistics South Africa reported that by the year 2003, premature deaths increased for the following NCDs: Stroke (28%), ischaemic disease (17%), diabetes (38%), hypertension (20%), ill-defined heart disease (23%), COPD (24%), Asthma (31%) and kidney disease (67%). Further, about 40 000 deaths of 58 000 cases of cancer occur every year in South Africa (Mayosi et al., 2009). In light of this growing burden of NCDs in South Africa, attempts

by the government to put policies in place to counteract the effects these killer diseases have been less than fruitful (Mayosi et al., 2009). Additionally, one of the risk factors mentioned for this population is physical inactivity, again, as health professionals who have been using PA to treat diseases for over 100 years, physiotherapists not only have the experience but are best suited to take a leadership role in preventing deaths attributed to NCDs.

2.3. LEVELS OF PA IN SOCIETY

The WHO estimates that about 41% of the global population does not engage in sufficient PA (Abubakari et al., 2009). Further, of the population that engages in PA, up to 60% fall short of the WHO global PA recommendations for health benefits (Abubakari et al., 2009). In Africa, the prevalence of adequate PA decreases by over 50% as people move from rural to urban areas (Kohl et al., 2012). It is estimated that, in just under two decades from now, about 60% of West Africans will have migrated to urban areas, two thirds of which will do so into poverty (Kohl et al., 2012). The urbanization of populations and low levels of PA globally are a concern. These same considerations apply to young adults at university. When considering PA and university students, there is a paucity of research and room for further research and learning.

Levels of PA decline between the ages of 18 and 24 with fewer people achieving the recommended levels of PA to achieve health benefits in this age group and this is around the same time many young people undertake tertiary education (Mihailova, Kaminska, & Bernane, 2014; Plotnikoff et al., 2015). This is reflected by almost half of all university students in the United States of America falling short of the recommended PA levels (Kulavic, Hultquist, & McLester, 2013; Plotnikoff et al., 2015). In addition, there is also considerable weight gain among the population studying at university (Plotnikoff et al., 2015). Analysing and understanding why individuals present with insufficient PA is complex and multifaceted and involves personal, social, cognitive and environmental determinants (El Ansari & Lovell, 2009). Keating et al., (2005) clearly states that researchers have noted that individuals will not simply change their PA behaviors merely upon request. Significant mediators for engagement in PA are the perceived benefits and barriers to exercise of the individual (El Ansari & Lovell, 2009). In university students, these determinants may be different from the general population with changes in social setting, independence and financial circumstances.

University students are a group worthy of research focus and promoting healthy lifestyles for many reasons (Mihailova et al., 2014). Firstly, a positive history exists between PA history and PA maintenance in the later years of life (Kulavic et al., 2013;

Mihailova et al., 2014). Secondly, there are a rising number of individuals participating in higher education (Plotnikoff et al., 2015). Thirdly, universities are regarded as institutions with empirical soundness and high standards of practice which can pave the way for neighbouring communities to follow (Plotnikoff et al., 2015). Lastly, university presents an opportunity for future health care professionals to engage in PA initiatives as part of their training programmes (Plotnikoff et al., 2015). Exposure to PA during training is particularly critical for health care professionals because, as mentioned previously, these professionals are recognised as powerful influencers of public behaviour, e.g. a health care professional who is observed by members of the community doing regular PA acts as a role model and their advice to do PA is more readily received (Dabrowska-Galas et al., 2013).

In South Africa, insufficient PA is recorded in over one-third of children (Fourie et al., 2006). In adults, a national survey representative of the population reported that less than a third met the American College of Sports Medicine PA recommendations for health benefits and nearly 50% presented with low PA (Fourie et al., 2006).

Furthermore, persons over the age of 55 years have the lowest self-reported moderate and vigorous PA with NCDs accounting for nearly 40% of adult deaths, and overweight and obesity affecting more than 55% of women (Fourie et al., 2006). South Africans have at least one modifiable risk factor for NCDs – physical activity.

The South African government embraces the WHO Global Strategy on Diet and PA for health. Included in the 10 year retrospective review of research priorities for PA in South African health are: determining the benefits of PA for preventing NCDs in specific target groups and identifying habitual patterns of PA in various communities (Fourie et al., 2006). Therefore, identifying the patterns of PA in physiotherapy students is a research priority and forms part of the solution in addressing global and national health concerns.

2.4. PHYSIOTHERAPISTS AS KEY ROLE PLAYERS AND THEIR ROLE AS PRESCRIBERS OF PA

Physiotherapists and their role in rehabilitation therapy grew during the poliomyelitis epidemic in the 1890's and after World War I (Moffat, 2012; Skinner, 1980). For over 100 years, the methods used by physiotherapists have been considered the gold standard in noninvasive and non-drug treatment approaches (Dean et al., 2011; Frerichs et al., 2012). The physiotherapy treatment approaches of education and exercise are consistent with the Hippocratic oath which dates to over 2500 years ago: "first, do no harm", this oath continues to be a cornerstone in ethical healthcare practice to date ('Chinere', 2006). Today, physiotherapy ranks as the third largest healthcare profession in the world (Frerichs et al., 2012) with a wide sphere of influence.

Physiotherapists are key role players in health. The World Confederation of Physical Therapists (WCPT) has adopted both the WHO definition of health established 69 years ago and the International Classification of Functioning (ICF) as a primary model underlying contemporary physiotherapy practice (Dean et al., 2011). The ICF model offers a more nuanced and comprehensive approach (i.e. body function, body structure, activity, participation, environmental and personal factors) to understanding and explaining an individual's health, disability and disease which in turn enables holistic treatment (Dean et al., 2011). Therefore, physiotherapists worldwide no longer restrict their understanding of health to the biomedical model (Dean et al., 2011), rather there is an understanding that behaviour plays a critical role in a biopsychosocial model of health.

Behaviour is defined as anything an individual does in response to internal and external stimuli (Davis, Campbell, Hildon, Hobbs, & Michie, 2015). Health behavior change is multifaceted, involving psychosocial and economic factors (Dean, 2009b). Achieving health behavior change warrants being a 21st century evidence-based physiotherapist applying the principles of the ICF (Dean et al., 2011). Positive health behavior change is advocated through social cognitive theory (SCT) which largely suggests that, modeling positive behavior such as PA is superior to just encouraging behavior change (Dean,

2009b; Marmo, 2013; Sriramatr, Silalertdeskul, & Wachirathanin, 2016; Young, Plotnikoff, Collins, Callister, & Morgan, 2014). Bandura's SCT provides a model for behavioural functioning with the two primary constructs of self-efficacy and outcome expectation (Marmo, 2013; Sriramatr et al., 2016; Young et al., 2014). Self-efficacy can be defined as the ability to perform behaviour and overcome obstacles and "outcome expectation" is defined as predictions one makes regarding the outcome of a particular behaviour (Marmo, 2013; Sriramatr et al., 2016; Young et al., 2014). Bandura's theory teaches that people learn from observing others. Therefore, knowing and studying the health behaviors of physiotherapy students and physiotherapists alike who are considered key role players in health promotion targeted at positive behavior change who will be observed by their community, should be a priority.

Frerichs et al., (2012) reported that physiotherapists were confident and effective in health promotion using patient counselling as a fundamental skill taught early during training. However, the effects of health promotion through counselling are limited as they last a short period of time (Dean et al., 2011; Frerichs et al., 2012). In recent years, the profession of physiotherapy has adopted a health-focused practice with health as a primary value of care (Dean et al., 2016). To compliment this, physiotherapy education has been aligned with research, clinical practice and the health needs of society (Dean, 2009b; Dean et al., 2016). With these changes, physiotherapy practice and training has shifted from using patient counselling alone as a tool to achieve health promotion behavior change to include leading by example with active engagement in positive health behavior (Dean, 2009b; Dean et al., 2016). Physiotherapists with positive PA behaviour, and a clear understanding of their own health behaviour (including knowledge about perceived benefits and barriers that underpin this behavior) is valuable. The practice of positive health behaviour and dismantling of negative behaviours need to first start with the physiotherapists themselves.

The role of physiotherapists as leading healthcare professionals in health promotion strategies that enhance health and well-being has been a central issue since the founding of the WCPT (Dean et al., 2016). Dean et al., (2016) adds that the non-invasive nature of physiotherapy treatment is considered superior in the prevention and

treatment of NCDs and there is a plethora of research proving the effectiveness of treatment strategies such as PA and education. Physiotherapists recognize that negative lifestyle choices such as physical inactivity, or smoking are rooted in behavior and therefore physiotherapists should focus on health behavior change strategies in health promotion which include addressing facilitators and barriers (Dean, 2009b). These health promotion strategies and noninvasive treatment approaches should be channeled towards the four leading NCDs i.e. cardiovascular disease, cancer, COPD and diabetes.

2.4.1. Cardiovascular disease

Cardiovascular disease causes a third of deaths in the population globally, of those deaths, 7.22 million are attributed to coronary heart disease (CHD) (Heran et al., 2011). The body of evidence for cardiovascular disease prevention is worth taking note of. It suggests that, lifestyle intervention, risk factor management and cardio protective-drugs can reduce both the incidence and death rate for high risk patients and those with confirmed atherosclerosis (Wood et al., 2008). Further, exercise has been shown to have direct benefits on the coronary vasculature and the heart, myocardial demand, endothelial function, autonomic tone, development of collateral vessels and more (Heran et al., 2011; Mihailova et al., 2014; Taylor et al., 2004). As current routine practice in cardiovascular disease prevention has fallen short, a more specific cardiac rehabilitation programme has been designed (Heran et al., 2011; Taylor et al., 2004; Wood et al., 2008). In this cardiac rehabilitation programme, physiotherapists play a key and important role in improving and encouraging positive health behavior through planning and supervising exercise interventions for patients (Heran et al., 2011; Taylor et al., 2004; Wood et al., 2008). The evidence for the positive effects of cardiac rehabilitation are compelling.

A systematic review compared the effects of cardiac rehabilitation programmes with usual care in 47 randomised controlled trials (RCTs) of 10794 participants with 6-months or more of follow up (Heran et al., 2011). Participants included men and women in both hospital and community based settings with myocardial infarction (MI), angina

pectoris, coronary artery disease or undergone revascularization surgery (Heran et al., 2011). This study followed a robust Cochrane design with two reviewers independently assessing risk of bias and heterogeneity in the included studies was addressed with the random effects model (Heran et al., 2011).

The review found that there was a decrease in overall and cardiovascular mortality with long-term follow-up (i.e. greater than 12 months) exercise based rehabilitation [RR 0.87 (95% CI 0.75, 0.99) and 0.74 (95% CI 0.63, 0.87)] and hospital admission in the short term follow-up i.e. less than 12 months [RR 0.69 (95% CI 0.51, 0.99)] with no heterogeneity found across all trials, however, all these findings were not significant (Heran et al., 2011). Further, a non-significant reduction in hospitalization was reported for exercise based rehabilitation (Heran et al., 2011). Lastly, quality of life increased significantly in seven trials for exercise based programmes compared to usual care groups (Heran et al., 2011). While these results are compelling, it is also important to consider the limitations.

The reviewers reported several limitations; bias, poor methodology, poor reporting of data and others (Heran et al., 2011). An earlier but similar review conducted with 48 RCTs (8940 patients) had similar findings (Taylor et al., 2004). Despite the limitations, the results of these two reviews further cement the crucial role of physiotherapists in the treatment and management of NCDs. Physiotherapists should be aware of the burden caused by cardiovascular disease to be well equipped to assist these patients with evidence-based lifestyle changes.

2.4.2. Cancer

Exercise prescription by physiotherapists also plays a significant role in the management of cancer (Lacomba et al., 2010). Secondary lymphedema which can potentially lead to disfigurement, physical discomfort and functional impairment is the most common chronic complication after breast cancer surgery (Lacomba et al., 2010). A randomized, single blinded, clinical trial demonstrated the key role of

physiotherapists in minimizing the risk of secondary lymphedema post breast cancer surgery using early physiotherapy and education. The intervention group had significantly fewer cases of secondary lymphedema (4 cases, 7%) compared to the control group (14 cases i.e. 25%) after 12 months ($p=0.01$) (Lacomba et al., 2010). This study shows that early physiotherapy treatment has a positive effect in the prevention of secondary lymphedema. Current standard physiotherapy treatment for lymphedema is complex decongestive physiotherapy, which includes exercise (Liao, 2016). The 21st century burden of disease profile requires contemporary physiotherapists to be competent in practices such as CDP which includes exercise prescription.

2.4.3. Chronic Obstructive Pulmonary Disease

Pulmonary rehabilitation (PR), an intervention that is prescribed for patients with chronic respiratory disease who present with manifestation of symptoms and a decline in participation and activity, includes exercise training as a cornerstone (Nellessen, Hernandez, & Pitta, 2013). A literature review considered studies that used pulmonary rehabilitation in the treatment of chronic obstructive pulmonary disease (COPD), asthma, bronchiectasis and Interstitial Lung Disease (ILD) (Nellessen et al., 2013). Overall, pulmonary rehabilitation was found effective in improving exercise capacity, quality of life and reducing symptoms in patients with COPD, ILD, asthma and bronchiectasis (Nellessen et al., 2013). Exercise, the gold standard for physiotherapy management for over 100 years is argued to be the best treatment regime for patients with chronic respiratory disease. This would suggest that, physiotherapy as a profession is central to pulmonary rehabilitation.

2.4.4. Diabetes

Diabetes is the most common cause of non-traumatic amputations, a leading cause of blindness and also largely associated with end stage kidney failure (Bradshaw, Pieterse, Norman, & Levitt, 2007). In South Africa, approximately 1.5 million people were diagnosed with diabetes in the year 2000 (Bradshaw et al., 2007). A prospective study was conducted to investigate the clinical outcomes at the beginning, completion and three months follow-up of a 12 week lifestyle programme in 36 (mean age= 62 years)

adult patients with diabetes (Higgs, Skinner, & Hale, 2016). Participants received bi-weekly education and exercise (i.e. 45 min education and 45 min exercise respectively) conducted by physiotherapists and physiotherapy students with the support of other allied professionals (Higgs et al., 2016). Outcome measures included the six minute walk test, waist circumference and Stanford Self-Efficacy for Managing Chronic Disease 6-item Scale (Higgs et al., 2016). In the results, the 6-minute walk test indicated a clinically and statistically significant improvement at week 12 (+87m) and 3 months (+60m) and waist circumference significantly improved at 12 weeks and 3 months. Finally, self-efficacy increased at week 12 (+0.7) and 3 months (+0.8) (Higgs et al., 2016). Despite the limitations of a small sample size and the absence of a control group, the results indicate that a physiotherapy led exercise programme for adult diabetic patients is associated with positive health outcomes.

The above sections demonstrate the critical role of physiotherapists using exercise and physical activity in the promotion of health, prevention of disease and treatment of diseases. There is a wealth of literature demonstrating the positive effects of exercise as a treatment and the role of physiotherapists in its delivery. As mentioned previously, physiotherapists are key role players in health promotion for physical activity. The question remains, are they effective role models to positively influence the communities in which they work?

2.5. PA BEHAVIOURS OF PHYSIOTHERAPY STUDENTS

In the United States, PA promotion is the most common health behaviour practice by physiotherapists with their patients (Rea, Marshak, Neish, & Davis, 2004). However, there is limited research on the health behaviour of physiotherapists and their individual views on their potential role in PA promotion (Black et al., 2012; Shirley et al., 2016). It has been found that self-efficacy is the best predictor of a physiotherapist's perception of practice patterns (Rea et al., 2004). That is, a physiotherapist who is confident in PA behaviour is more likely to prescribe and promote positive PA behaviour as part of treatment for their patients. Therefore, there is a need to study and

know the PA patterns of physiotherapists, particularly, physiotherapists in South Africa where the burden of NCDs is overwhelming .

A Polish study aimed to evaluate the PA levels of 300 health sciences students with a focus on physiotherapy students and health promotion (Dabrowska-Galas et al., 2013). This particular study used the short form of the IPAQ to evaluate levels of PA. They found that physiotherapy students had the highest levels of PA with 54% and 46% reporting moderate and high PA levels respectively (Dabrowska-Galas et al., 2013). The majority of students from other health fields were classified as having moderate PA levels and while none of the physiotherapy students used the university sports facilities, they did consider PA important for their daily life while only 2% did not feel the need for regular PA (Dabrowska-Galas et al., 2013). Lastly, the school of medicine, training doctors, presented with the lowest level of PA overall (Dabrowska-Galas et al., 2013). This Polish study shows an interesting difference in the PA behaviour of future health professionals, while the effects of self-report biases, the cross-sectional nature of the study as well as the small sample size have to be considered, the high levels of PA in the physiotherapy students potentially places them at an advantage and strengthens their credibility in health promotion.

A similar study exploring the prevalence of PA in physiotherapy students based in a Spanish university administered the IPAQ with 145 students (Toloza, Conesa, & Montesinos, 2008). Their PA levels were: high (31.3%), moderate (47.6 %) and low (19.7%) (Toloza et al., 2008). Toloza and colleagues report a lower percentage of students who engage in high PA compared to those who had low PA. Additionally, a high percentage of physiotherapy students were moderately active. Physiotherapy students who engage in low PA may find it challenging to take on a leading role in promoting PA in the fight against NCDs.

A recent study evaluated PA levels of undergraduate physiotherapy students as well as their motives and barriers to PA in Sri Lanka (University of Colombo) (Ranasinghe et al., 2016). All undergraduate physiotherapy students at the university were invited to

participate and 115 (98% response rate) responded (Ranasinghe et al., 2016). The IPAQ was used to determine PA levels, with Focus Group Discussions (FGDs) to explore motives and barriers to PA (Ranasinghe et al., 2016). A significant number of students engaged in “low” PA and only 15.9% were participating in “high” PA (Ranasinghe et al., 2016). Results from the FGDs revealed that students had developed a significant negative attitude toward PA that was traced back to earlier life due to lack of support and motivation for PA participation during primary and secondary schooling (Ranasinghe et al., 2016). It appears that the negative attitudes towards PA could not be overcome despite their education. In this Sri Lankan study, the majority of physiotherapy students had low PA, suggesting that this group of students may not be effective in health promotion strategies for PA.

The aim of another study was to evaluate PA in relation to health related physical fitness (HRPF) in physiotherapy and Physical Education (PE) students attending university in Latvia (Northern Europe) (Mihailova et al., 2014). 67 students were recruited (46 females) with a mean age of 21.61 years (Mihailova et al., 2014). The outcome measure for PA was the IPAQ-long and HRPF tests included: body composition, abdominal muscle strength tests, dynamometry, hamstring and quadratus lumborum muscles flexibility tests and bicycle ergometer tests (Mihailova et al., 2014). Firstly, 46.26% students had moderate PA while 44.78% had high PA. Secondly, 66% of the physiotherapy students presented with moderate PA compared with 95% of the PE students who had high PA levels. Lastly, physiotherapy students had lower cardiorespiratory fitness and handgrip strength and the upper abdominal muscle strength was significantly higher in those with high PA levels (Mihailova et al., 2014). This European study shows that majority of physiotherapy students engaged in moderate PA. No studies could be found reporting on levels of PA or attitudes and beliefs of South Africa physiotherapy students.

2.6. ARE PHYSIOTHERAPY STUDENTS BEING TAUGHT TO ENGAGE IN PHYSICAL ACTIVITY?

As health professionals, physiotherapists claim to be committed to improving global health and wellbeing through promoting best standards of practice, education and research (Skinner, 2015). Interestingly, although NCDs have reached pandemic proportions and have become WHO global health priorities, the area of orthopaedics/musculoskeletal therapy still accounts for the majority of the physiotherapy curriculum (31.1%) (Dean et al., 2011; Frerichs et al., 2012). Although lifestyle behavior influences musculoskeletal health (Dean, 2009a) a central focus on orthopedics/musculoskeletal conditions instead of the WHO global health priorities raises concerns of whether 21st century physiotherapy has sufficiently responded to global health priorities both in theory and practice (Dean et al., 2011).

Health focused physiotherapy is defined as physical therapy that maximises a patient's/client's health in the broad sense of the WHO definition of health and ICF (Dean, Dornelas de Andrade, et al., 2014). It is argued that contemporary physiotherapists have the priority and responsibility to maximize health and wellbeing as a goal through effective health promotion (HP) and to reduce risk factors as well as the occurrence of NCDs in society (Dean, Dornelas de Andrade, et al., 2014). Additionally, to be sufficiently equipped to address these 21st century health issues, physiotherapists need to learn and exercise relevant clinical competencies (Dean, 2009a). Currently, physiotherapists worldwide do not have the standardised competency to systematically and consistently effect positive health behaviour change due to poor self-efficacy in these skills (Dean, Dornelas de Andrade, et al., 2014).

A systematic review on the degree to which HP has been included in physiotherapy literature was conducted exploring two domains specifically i.e. practice and entry-level education (Taukobong et al., 2014). The literature search produced 29 articles from five different databases (i.e. PubMed, Science Direct, CINHAL, Amed and Pedro) and all literature was reviewed and analysed under the headings: acceptability of the HP role to physiotherapists and physiotherapy students; integration of HP into physiotherapy

practice and HP in physiotherapy education and training (Taukobong et al., 2014). It was found that 48% of the articles covered the topic of HP interventions in physiotherapy whereas HP in Physiotherapy education had the least coverage at only 6.8% (Taukobong et al., 2014).

Taukobong et al., (2014) reported the following: firstly, physiotherapists and physiotherapy students alike are convinced that they have acceptable knowledge and skills to engage in HP activities even though they faced challenges. The challenges that were mentioned included lack of time, lack of reimbursement from health insurance, limited counselling skills, poor motivation from the patient and lack of HP emphasis by most countries. Secondly, two South African studies in the review reported that young South Africans with physical disabilities expressed unmet HP needs as none were included in their physiotherapy management. Moreover, physiotherapist self-efficacy was found to influence pattern of HP practice. Thirdly, in High Income Countries physiotherapists are engaging in strategic HP programs, however, they have been mostly ineffective and non-sustainable. Lastly, one of the 29 studies covered physiotherapy education and found a number of loopholes in the curriculum relating to PA and HP (Taukobong et al., 2014). From this review, it is clear that PA related HP for physiotherapists is a struggle both in theory and practise, with the PA behaviour of the physiotherapist also reflecting strongly on the HP practice.

Looking ahead, for physiotherapists to deliver evidence based HP, entry level curricula needs to have a standard and consistent process for assessment and intervention across physiotherapy practise (Dean, Dornelas de Andrade, et al., 2014; Dean, Moffat, et al., 2014). This is especially so for health behaviours related to NCDs and their risk factors (e.g. PA, diet, tobacco use, alcohol abuse etc.) as well as evidence-based behaviour change interventions such as evaluating readiness to change (Dean, Dornelas de Andrade, et al., 2014; Dean, Moffat, et al., 2014). According to the literature, physiotherapist are being taught about PA and HP, however, these areas are not a priority and have not yet found a strong voice in the profession. Fortunately, there are valid and reliable tools that have already been formulated; e.g. the short (12 questions) diabetes type II risk factor assessment form also known as CANRISK (Canadian Diabetes

Risk Questionnaire) which is comprehensive and can be used as a general tool for NCDs in practice (Dean, Moffat, et al., 2014). Transforming the physiotherapy curriculum to fit world priorities will not happen overnight but it is a step in the right direction.

2.7. BARRIERS AND FACILITATORS TO PA IN STUDENTS

Exercise and its health benefits appear to be an issue of little concern among university students (Keating et al., 2005). Habitual PA patterns which are critical to optimise health are influenced by perceived benefits and barriers to PA within communities (El Ansari & Lovell, 2009). University time is considered a pivotal time in one's life (Mihailova et al., 2014). It is reported that PA decreases during and after ages 15-24 years, however, this is not true for individuals who engage in regular PA (Mihailova et al., 2014; Plotnikoff et al., 2015). Therefore, evaluating physiotherapy students' perceived benefits and barriers to PA is worthwhile. This knowledge will inform HP strategies directed at improving their level of PA and help solidify their professional role in PA promotion.

A study of 746 students attending a large South-Eastern University in the United States of America compared the motivational factors and perceived barriers to exercise in traditional (full-time) vs non-traditional (part-time) students (Kulavic et al., 2013). These students completed 3 questionnaires: the Exercise Motivation Inventory-2 (EMI-2), Barriers to Being Active Quiz (BBAQ) and a Demographic Questionnaire (DQ)(Kulavic et al., 2013). The top three barriers for both traditional and non-traditional students were identical, namely: lack of time, lack of effort and lack of willpower (Kulavic et al., 2013). Further, some of the motivational factors reported for traditional students were: appearance, competition, challenge and for non-traditional students: health pressure and ill health avoidance respectively (Kulavic et al., 2013). These results appear to be cross-cultural as a study of learners in public schools in South Africa identified similar barriers to participation.

In the first ever youth risk behavior survey conducted across public schools in all nine South African provinces, learners in grades 8-11 attending public schools were investigated (Amosun, Reddy, Kambaran, & Omardien, 2007). Through a random selection process, the study analyzed 10699 students (54% females & 46% males; ages 13-18 years). Over a third (37.5%) of the learners did not participate in PA sufficient for health benefits, with significantly more females than males participating in insufficient PA or no PA with no significant variation by grade (Amosun et al., 2007). Further, barriers to taking part in PA included: no apparent reason, unwillingness, no access to PA equipment and questionable safety in their surroundings (Amosun et al., 2007).

Physiotherapy students may have a different profile to that of other students. In a study to determine the HP behaviour of both qualified physiotherapists and student physiotherapists, self-reported data from a sample of 321 qualified physiotherapists and 279 students was collected (Shirley et al., 2016). Both groups perceived themselves to be more physically active than their peers, they recognised HP as part of their role and the majority agreed that incorporating education into their treatment sessions with patients is most effective for PA health promotion (Shirley et al., 2016). However, there is a risk of selection bias with physiotherapists who were already PA and had a keen interest in PA HP responding to the survey (Shirley et al., 2016). Important to note about this Australian study is the positive HP behaviour expressed by both physiotherapists and physiotherapy students and the willingness to recognise and embrace the key role of HP.

The links between PA and HP have been explored with studies suggesting that PA and exercise promotion and prescription (EPP) should be included as part of HP curricula (O'Donoghue, Doody, & Cusack, 2011). Further, a physiotherapist's confidence in prescribing PA programmes has been found to be the best predictor for their PA prescription behaviour (Shirley et al., 2016). Therefore, equipping physiotherapists with the necessary competencies for PA and EPP HP in the curricula can potentially build confidence and further strengthen their role in HP for positive health behaviour

change. Additionally, physiotherapists need to engage in PA to further strengthen their credibility.

Habits and behaviours are strongly influenced by perceived benefits and barriers (El Ansari & Lovell, 2009). In light of this, knowledge about perceived benefits and barriers to PA in physiotherapy students will assist in the successful application of HP and behaviour modification strategies in practice. Therefore, in order to increase PA among university students generally and physiotherapy students specifically, the key focus may be to determine the barriers to PA to facilitate addressing these (Kulavic et al., 2013). If for instance, if physiotherapy students in South Africa have barriers to PA similar to those mentioned by Kulavic et al. (2013), physiotherapy undergraduate programmes could specifically target these barriers through experiential learning approaches and curricula modification. Unfortunately, the barriers and facilitators to PA for PT students in South Africa specifically are presently unknown.

2.8. MEASURING BENEFITS AND BARRIERS TO EXERCISE

Habitual patterns of PA in communities are influenced by perceived benefits and barriers to PA (Arzu et al., 2006; El Ansari & Lovell, 2009). As expected, the higher the perceived benefits, the more active the individual and conversely the higher the perceived barriers to exercise the less active the individual (El Ansari & Lovell, 2009). Perceived barriers to exercise are defined as obstacles that make it more difficult to engage in exercise (Kulavic et al., 2013) and perceived benefits are positive perceptions about the resulting joy of a behaviour (Pippin, 2013). There are instruments available that either assess barriers and benefits together or separately.

Perceived barriers have been shown to correlate negatively with perceived benefits of exercise among university students (Kulavic et al., 2013) and appear to be key in predicting health behaviour (Lovell, El Ansari, & Parker, 2010). Moreover, both internal and external factors cause perceived benefits and barriers to PA (Muzindutsi, Nishimwe-Niyimbanira, & Sekhampu, 2014). Some of the internal and external perceived barriers that have been found in university students include: lack of time,

laziness, physical exertion, exercise environment and family discouragement (Kulavic et al., 2013; Lovell et al., 2010; Martínez-Lemos, Puig Ribera, & García-García, 2014).

Alternatively, students perceive the following benefits: physical performance, preventive health, life enhancement, psychological outlook and social interaction (Kulavic et al., 2013; Lovell et al., 2010). It appears valuable to assess both internal and external benefits and barriers to PA.

In their study, (Kulavic et al., 2013) used the BBAQ, a 21-item self-reported questionnaire which measures barriers to being physically active in seven different areas (i.e. lack of time, social influences, lack of energy, lack of willpower, fear of injury, lack of skill and lack of resources). The BBAQ uses a four-point Likert type scale ranging from zero (very unlikely) to three (very likely) (Kulavic et al., 2013). All items on the scale were found to have good distributions, overall internal consistency and reliability for university students (Kulavic et al., 2013). Unfortunately, the BBAQ did not meet all criteria for the present study objectives as it only considers barriers and not benefits to exercise.

Other studies chose not to use previously validated questionnaires to evaluate benefits and barriers to exercise, but rather design and use their own questionnaire (Poobalan, Aucott, Clarke, & Smith, 2012; Robbins, Pender, & Kazanis, 2003). A United Kingdom study undertook to explore attitudes and PA behaviour of university students aged between 18-25 (Poobalan et al., 2012). Researchers designed a questionnaire based on Social Cognitive Theory (SCT) and Theory of Planned Behaviour (TPB) with the questionnaire including 11 items and 12 items for facilitators and barriers respectively with yes/no response options (Poobalan et al., 2012). Alternatively, a study of the perceived barriers to PA in middle school aged female pupils used a 23-item barriers questionnaire with a five-item Likert scale (Robbins et al., 2003). This questionnaire was reviewed and revised by PA experts and a Cronbach's alpha of 0.86 was calculated (Robbins et al., 2003).

The EBBS is a 43-item questionnaire which measures both perceived benefits and barriers to exercise (Lovell et al., 2010; Muzindutsi et al., 2014; Sechrist, Walker & Pender, 1987). This instrument can be used in its entirety to measure benefits and barriers to exercise or alternatively, it can be separated to measure either one or the other (Lovell et al., 2010; Sechrist et al., 1987). This scale has a four-response, forced-choice Likert-type format with responses ranging from four (strongly agree) to one (strongly disagree) (Muzindutsi et al., 2014; Sechrist et al., 1987). This questionnaire has been widely used in research studying perceived benefits and barriers to PA (Kamrani, Sani, Fathire-Zaie, Bashiri, & Ahmadi, 2014).

A study of 200 “non-exercising” females who were selected randomly from two different universities in the UK examined the perceived benefits and barriers of these “non-exercising” female participants using the EBBS (Lovell et al., 2010). Perceived benefit items with the highest agreement were reported under the “physical performance” and “psychological outlook” subscales, in decreasing order i.e. exercise increases my level of physical fitness, exercise improves the way my body looks and exercise gives me a sense of personal accomplishment (Lovell et al., 2010). Again, the top three barriers fell under the “physical exertion” subscale: exercise tires me, I am fatigued by exercise and exercise is hard work for me (Lovell et al., 2010). This study demonstrates the successful use of the EBBS within the university context.

The Self-percieved Barriers for Physical Activity questionnaire was used by Martínez-Lemos et al., (2014) to determine perceived barriers to PA among Spanish university students and related factors (i.e. sociodemographic characteristics, lifestyle variables, physical activity status and stages of change for PA). This study included a randomly selected group of 772 males and females from a north-west regional university in Spain. The students’ top three barriers to PA included: too much work, lack of time to engage in PA and laziness (Martínez-Lemos et al., 2014). Concerning gender, females were associated with having more perceived barriers and lower physical activity status ($p < 0.05$) compared to males (Martínez-Lemos et al., 2014). Stages of change for PA (i.e. passive stages) were identified with having significantly higher scores for both internal and external PA barriers, in addition, the barriers significantly decreased as people

indicated that they were more active (Martínez-Lemos et al., 2014). Moreover, students who reported regular/worse self-perceived health presented with more perceived barriers as compared to students with good/excellent self-perceived health (Martínez-Lemos et al., 2014). These results do not determine causality, however, they can be added to the quest of developing effective PA intervention programs at university level.

The EBBS has acceptable reliability and validity in varying contexts (Muzindutsi et al., 2014). According to Sechrist et al., (1987), Cronbach's alpha coefficients were 0.95, 0.95 and 0.86 for the whole scale, and the benefits and barriers subscales respectively in a convenient sample of white Midwestern adults in the United States of America. Further, test re-test reliability was assessed over a two-week period with correlation coefficients of 0.889, 0.893, 0.772 for the 43-item questionnaire, 29-item benefits and 14-item barriers subscales respectively (Sechrist et al., 1987). While initial factor analysis yielded a 10-factor solution with an explained variance of 62.4%, second-order factor analysis extracted two factors, benefits and barriers (Sechrist et al., 1987). Hence, this questionnaire measures the two variables; perceived benefits of exercise and perceived barriers to exercise with acceptable reliability (Sechrist et al., 1987). This questionnaire has been found to be both valid and reliable, has been widely used, including in research that involves university students. Therefore, the EBBS was selected as the questionnaire of choice for this study.

2.9. MEASURING PHYSICAL ACTIVITY

There is a plethora of questionnaires available to measure PA (van Poppel, Chinapaw, Mokkink, Van Mechelen, & Terwee, 2010; Washburn, Jacobsen, Sonko, Hill, & Donnelly, 2003). The Global Physical Activity Questionnaire (GPAQ) was developed by WHO in 2002 as part of a surveillance study (Bull, Maslin, & Armstrong, 2009). The GPAQ is 19-item questionnaire designed to capture PA occurring in the work, transport and recreational domains (Bull et al., 2009). The questionnaire was tested for reliability and validity in nine different countries including South Africa (total N=2697). For concurrent validity the GPAQ was measured against the previously validated IPAQ showing a positive to strong relationship (Bull et al., 2009). The GPAQ presented with

moderate reliability, however, validation of the tool was poor and warrants more study (Bull et al., 2009). In contrast, this study identified the IPAQ as a well-developed and pretested questionnaire, fit to be used to ascertain concurrent validity in developing the GPAQ.

Another study set out to validate the Seven-Day Physical Activity Recall in Young Adults instrument (7D-PAR) (Washburn et al., 2003). A small sample of 46 males and females from the University of Kansas in the United States was used (Washburn et al., 2003). The 7D-PAR is not recommended for use in studies that compare PA levels in cross-sectional studies nor monitor individual changes in PA due to poor validity (Washburn et al., 2003).

In a systematic review, the measurement properties of self-administered questionnaires for assessing PA in adults were evaluated (van Poppel et al., 2010). A total of 85 questionnaires were included, 18 of which were reliable and valid, including the IPAQ (van Poppel et al., 2010). Further, only the IPAQ met sufficient criteria for construct validity and is reportedly the most widely used and most widely validated questionnaire (van Poppel et al., 2010).

The IPAQ-short is a seven-item self-completion questionnaire that is designed to assess the types of physical activity people engage in as part of their everyday lives (Dinger, Behrens, & Han, 2006). This questionnaire is a short version of the 31-item IPAQ and the questions focus on the time spent being physically active in the last seven days in adults aged 18-65 (Craig et al., 2003). It measures PA (lasting 10minutes duration) such as walking, moderate intensity and vigorous intensity taken in each of the four domains i.e. leisure-time PA, domestic activities, work-related PA and transport related PA (Dinger et al., 2006; Rangul, Holmen, Kurtze, Cuypers, & Midthjell, 2008; Roberts et al., 2016).

Craig et al., (2003) undertook to determine the measurement properties (i.e. reliability and validity) of the IPAQ in 12 countries, including South Africa. This study tested both the long and short version of the IPAQ for rural and urban residents. Reliability was measured over a 3- to 7-day period where participants completed the same IPAQ version(s). For validity, participants completed the same assessments for 1-week between two visits and also wore a Computer Science and Application (CSA) motion detector with weight and height recorded (Craig et al., 2003). Overall, the IPAQ questionnaires were found to have acceptable reliability and validity (Barwais, Cuddihy, & Tomson, 2014; Craig et al., 2003; Martínez-Lemos et al., 2014). In addition, the instrument produces both repeatable and comparable data which is consistent with other self-report validation studies (Craig et al., 2003). The IPAQ is valid and reliable (Barwais et al., 2014), has acceptable measurement properties and is useful in various settings as well as in different languages (Abubakari et al., 2009; Roberts et al., 2016). Therefore, the IPAQ questionnaire would be an appropriate tool to use in university students.

2.10. SUMMARY

In summary, the NCDs pandemic is on the rise, claiming millions of lives worldwide each year. PA has been found to reduce all-cause mortality associated with NCDs.

Physiotherapists have used PA in the treatment of disease for decades and are well equipped to take the lead in promoting PA and encouraging positive behaviour change in the population. However, positive behaviour change is modelled and not merely encouraged. Therefore, physiotherapist are challenged to model PA to their patients in order to achieve successful HP. Further, physiotherapy undergraduate students need to be taught about HP and PA in both theory and practice. Studies report that habitual PA patterns are greatly affected by perceived benefits and barriers. As it stands, we have no knowledge of the PA practises of physiotherapy students nor their perceived benefits and barriers to PA. These need to be explored so as to inform effective HP training and skill development in students.

CHAPTER THREE: METHODS

INTRODUCTION

The aim of this study was to describe the perceived benefits and barriers to exercise and their association with levels of physical activity (PA) in physiotherapy students (first to fourth year) attending university in the Western Cape province of South Africa. The three objectives of this study included: (1) to determine the perceived benefits and barriers to PA using the Exercise Barriers and Benefits Scale (EBBS), (2) to determine the levels of PA using the International Physical Activity Questionnaire (IPAQ-Short) and lastly, (3) to evaluate the association between EBBS, levels of PA and year of study.

3.1. Study design

This study followed a quantitative, cross-sectional, survey design.

3.2. Participants

Two hundred and ninety-six participants were recruited from the three universities in the Western Cape i.e. University of Cape Town (UCT), University of the Western Cape (UWC) and University of Stellenbosch (SUN).

3.1.1. Sample size calculation

As this was a cross-sectional survey of physiotherapy students in the Western Cape, the population was all undergraduates physiotherapy students. Each University has approximately 240 registered students, therefore, adding all three gives a total of 720 students in the population. Based on previous studies, using a population size of 720 (Kulavic et al., 2013) and a hypothesised 50% frequency of a “high number of barriers to participation” and 5% confidence limits, a minimum sample size of 251 was required for 95% confidence. Therefore, a minimum of 251 participants was the goal, fortunately, the study managed to recruit 296 participants.

3.1.2. Inclusion criteria

Male and female physiotherapy students over the age of 18 attending university in the Western Cape (UCT, UWC and SUN). Students were completing their undergraduate programme i.e. first to fourth year. Students of all races and socio-demographic background were included.

3.1.3. Exclusion criteria

Students who did not sign the consent form were excluded from the study. No exclusion criteria applied. Incomplete questionnaires were excluded from the study.

3.1.4. Recruitment

Participants were recruited from the three universities in the Western Cape which offer the BSc(Physiotherapy degree), namely; UCT, SUN and UWC. The researcher visited each university and after obtaining permission from the Head of Department and the year conveners, addressed the respective classes. Good communication was maintained with all the class representatives throughout. Further, where the researcher was unable to find a convenient time to speak to the class, the class representative was able to relay information to the students. For data collection, students who were interested in being part of the study were requested to stay behind for no more than 15 minutes after a scheduled lecture.

3.3. Measurement Instruments

This study made use of three measurement tools. Firstly, a demographic questionnaire was used to obtain the characteristics of the participants from the three universities (*Appendix IV*). Secondly, the 43-item EBBS questionnaire which measures the perceived benefits and barriers to exercise was used (*Appendix IV*). The EBBS is a 43-item questionnaire scale has a four-response, forced-choice Likert-type format with responses ranging from four (strongly agree) to one (strongly disagree) (Lovell et al., 2010; Muzindutsi et al., 2014; Sechrist et al., 1987). Further, when using the entire instrument, scores can range from 43-172, the lower the score, the more negatively the person perceives exercise and vice versa (Sechrist et al., 1987). Finally, The IPAQ-short form which measures the kinds of physical activities people do as part of their everyday lives was included (*Appendix IV*). The IPAQ-short provides analysis algorithms for both the total volume and number of days to assess PA. The categorical score classifies PA into three levels (i.e. low, moderate and high) (IPAQ Research committee, 2005).

3.4. Procedure

The procedure was as follows: following departmental and Faculty of Health Sciences Research Ethics Committee approval, the Head of Department (HOD) for each institution was contacted to request permission to conduct the study on their premises (*Appendix V*). Upon acceptance, a designated time was set to visit each of the three universities. After explaining the aim and objectives of this study to each year group of students, students had the option to either give consent or decline participation in the study. Participants were requested to complete the informed consent form after reading the information sheet (*Appendix III*). Both the information sheet and informed consent form explained the details of the study, addressed possible questions, explained that there were no risks involved, mentioned benefits, explained the procedure concerning confidentiality and most importantly the freedom each participant had to withdraw at any point in the study without incurring any prejudice. All students were provided with separate consent forms and questionnaires. Students who did not wish to participate in the study did not incur any penalty. Completed consent forms and questionnaires were collected from the respective class representatives separately.

3.5. Statistical analyses

The raw data was entered into Microsoft excel, data was labelled consistently and cleaned for missing values as well as non-plausible responses. The questionnaires included in this study provided ordinal and nominal data. “Statistica” software was used for data analyses and the statistical significance value was accepted at $p \leq 0.05$.

Descriptive statistics were used to compare different categories of data such as males and females, universities and year of study. Non-parametric analysis was used because the results did not assume a normal distribution. Non-parametric measures of central tendency (i.e. median and range) are reported throughout. The sociodemographic information of the participants and results for the international physical activity questionnaire are reported by use of graphs. Correlations were performed to explore associations between variables. The Pearson’s Chi-squared test was used determine correlation in scores between students in different years due to the categorical nature of the data. Further, the Kruskal-Wallis test was used to explore association between scores on the Exercise Benefits and Barriers Scale and categorise of physical activity (low, moderate and high).

3.6. Ethical consideration

The written proposal for this study was submitted to the UCT Faculty of Health Sciences HREC for approval. The study was approved by the Faculty of Health Sciences Human Research Ethics Committee, University of Cape Town (HREC REF: 712/2016) (*Appendix I*). No one was coerced to participate in this study; only participants who completed the informed consent form were included in the sample. The informed consent form covered aims and objectives, risk and benefits, voluntary participation, issues of confidentiality and freedom not to participate without negative consequences (*Appendix II*). Confidentiality was held as a high priority ensuring that the personal information of the participants was not compromised. The results of this study will add to the body of literature but the rights of all participants will be protected.

(i) Risks to participants

Participants did not incur any risk by participating in this study. There were no negative consequences for students who did not consent to this study.

Perceived benefits and barriers to exercise and levels of physical activity of undergraduate physiotherapy students in the Western Cape

(ii) Benefits to participants

-Direct Benefits

A handout (infographic) on common barriers to PA was given to the students to assist them in overcoming these challenges when prescribing exercise to patients.

-Indirect benefits

The results of this study will be invaluable to the South African population. The knowledge will add to the body of literature on improving physical activity behavior in physiotherapists and contribute to combating the growing burden of disease through developing physiotherapists who practice health promotion and lead by example. The authors intend to submit the results for publication to the South African Journal of Physiotherapy and the results will be shared with UCT, UWC and SU physiotherapy departments.

CHAPTER FOUR: RESULTS

In the results, to maintain confidentiality, the universities will be identified as university one, university two and university three. Results about the sociodemographic profile of the students will be reported in the form of bar graphs, followed by scores per item for the exercise benefits and barriers scale (EBBS). Next, the time as percentage spent engaging in different types of physical activity (international physical activity questionnaire- IPAQ) is presented. Lastly, Box and Whisker plots are used to report the association between EBBS and IPAQ scores. To conclude this section, a summary of the results is presented.

Students from all three universities (296 students) participated in the study with just over half of the students coming from University One. Data was collected between February 2017 and May 2017 before the mid-year examinations. However, all first year students from university three did not participate in the study. Lastly, only one student was excluded due to missing data on the EBBS, the participant had only responded to 21 out of 43 items on the scale. (Figure 1).

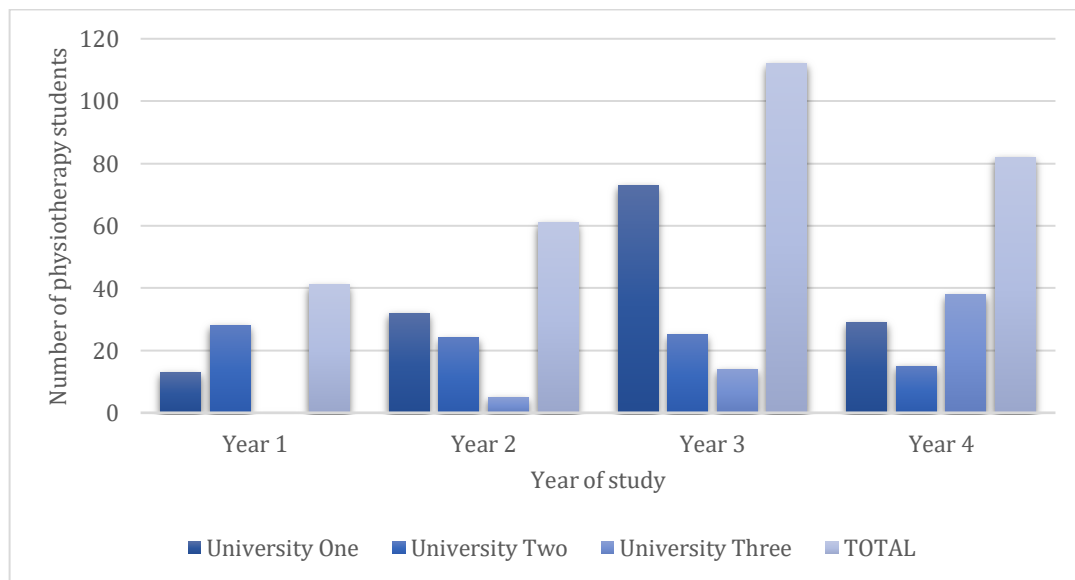


Figure 1: Number of physiotherapy students per year of study by university (n=296)

4.1. SOCIODEMOGRAPHIC PROFILE OF PARTICIPANTS

The median age of the students was 22y (18-29). As expected, students in the final year of study were older than students in years one to three (Table 1). Females were in the majority in all four years of study, making up 83% of sample (Table 2).

Table 1: Median age of physiotherapy students in each year of study

Year of study	Age (y) Median (Range)
ALL YEARS	22 (18-29)
Year 1	18 (18-22)
Year 2	19 (18-23)
Year 3	21 (19-27)
Year 4	22 (19-29)

Table 2: Gender distribution of participants per year of study

Year of study	Females N (%)	Males N (%)
ALL YEARS	246 (83)	50 (17)
Year 1	34 (83)	7 (17)
Year 2	52 (85)	9 (15)
Year 3	96 (86)	16 (14)
Year 4	64 (78)	18 (22)

The majority of the students (172; 58%) especially in year three and year four were living off campus (Figure 2), and were not working (Figure 3). Those who were working, spent a median of 8 hours (1-40) per week at work. The majority of students (196; 65%) were participating in sporting activities (Figure 4). The median number of hours per week spent doing sport was 6 hours (4-8).

Perceived benefits and barriers to exercise and levels of physical activity of undergraduate physiotherapy students in the Western Cape

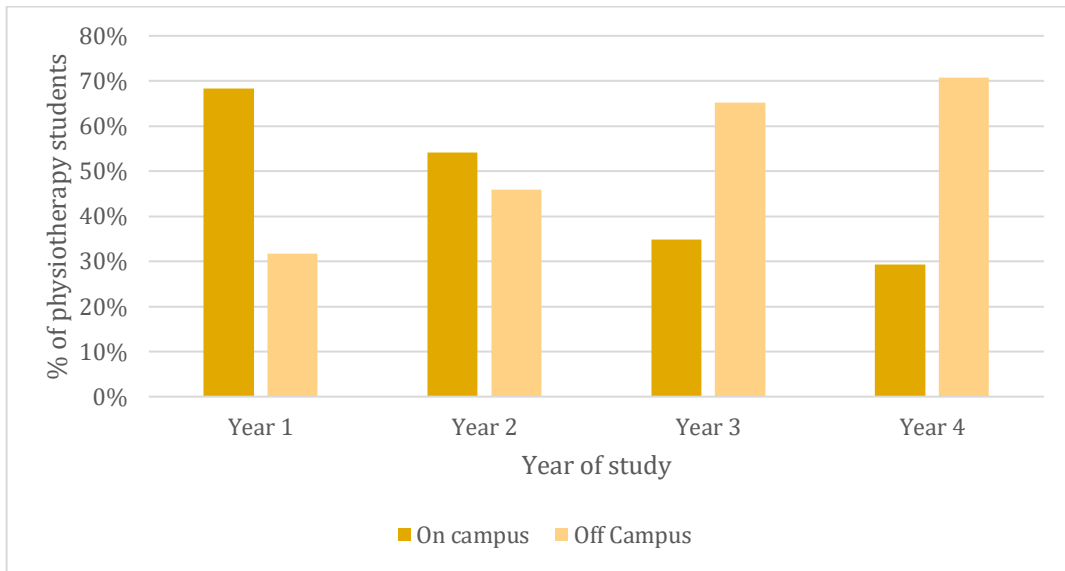


Figure 2: Percentage of students living on campus or off campus by year (n=296)

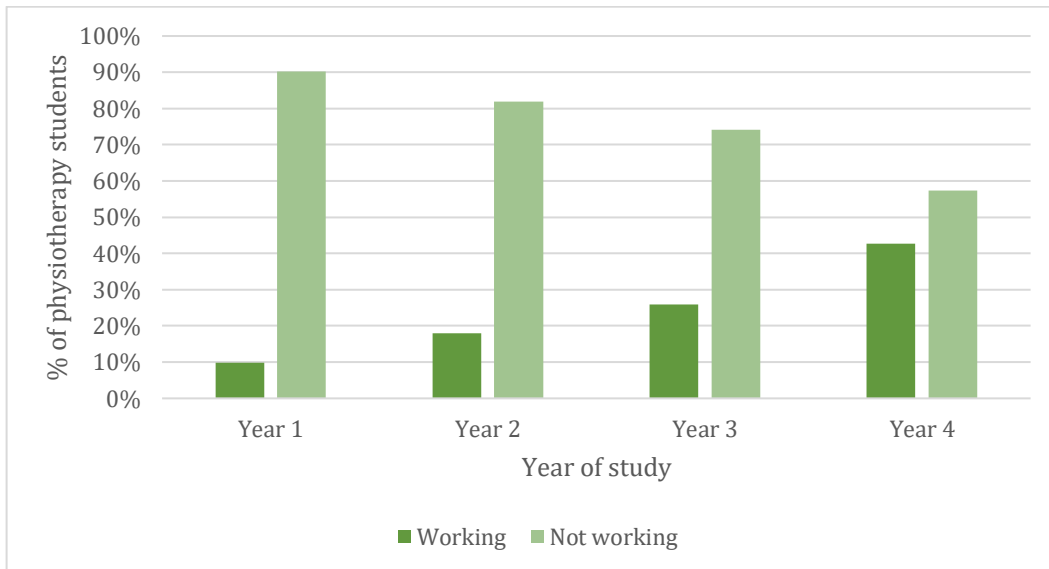


Figure 3: Percentage of students working by year (n=296)

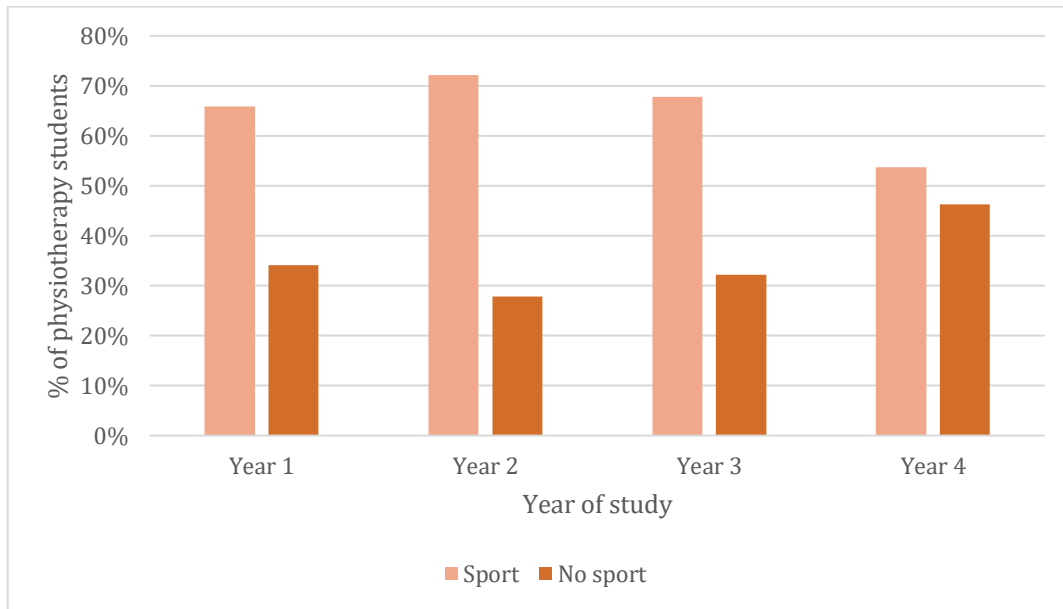


Figure 4: Percentage of students participating in sporting activities by year (n=296)

4.2. BENEFITS AND BARRIERS TO PA

The participants' median score for the Benefits and Barriers to exercise was 136 out of a possible 172 (Table 3) with no significant differences in scores between students in different years of study ($\chi^2=1.31$; $df=3$; $p=0.73$).

Table 3: Student scores on the Exercise Benefits and Barriers Scale

Year	EBBS Barriers Score	EBBS Benefits Score	EBBS Total Score	EBBS Median (Range)
All Years	42	97	139	136 (54-167)
Year 1	44	94	138	136 (113-160)
Year 2	41	95	136	134 (54-159)
Year 3	43	101	144	137 (66-167)
Year 4	40	97.5	137.5	135 (103-165)

Perceived benefits and barriers to exercise and levels of physical activity of undergraduate physiotherapy students in the Western Cape

Year	EBBS Score Median (Range)
ALL YEARS	136 (54-167)
Year 1	136 (113-160)
Year 2	134 (54-159)
Year 3	137 (66-167)
Year 4	135 (103-165)

Table 4 presents the participants' medians and ranges for each item of the benefits sub-scales. Results for the three universities show that participants either "agreed" (score of 3) or "strongly agreed" (score of 4) with most of the benefits under examination. Participants agreed the most with items under the "physical performance" and "psychological outlook" sub-scales and agreed with at least one item under the "social interaction" sub-scale i.e. exercise is good entertainment for me. These results reflect that the students agreed with many of the statements on the benefits of regular exercising.

Table 5 depicts the sample's medians and ranges for each item of the barriers sub-scales. Barrier items are reverse scored, i.e. a score of 1 indicates "strongly agree" and a score of 2 indicates "agree". Participants agreed the most with items under the "physical exertion" sub-scale and agreed the least with items under the "family discouragement" sub-scale.

Table 4: The exercise benefits scale: median and range of each questionnaire item

Perceived benefit items	Median (range)
Life enhancement sub-scale	
25: My disposition is improved by exercise	3 (1-4)
26: Exercise helps me sleep better at night	3 (1-4)
29: Exercise helps me decrease fatigue	3 (1-4)
32: Exercising improves my self-concept	3 (1-4)
34: Exercising increases my mental alertness	3 (1-4)
35: Exercise allows me to carry out normal activities without becoming tired	3 (1-4)
36: Exercise improves the quality of my work	3 (1-4)
41: Exercise improves overall body functioning for me	3 (2-4)
Physical performance sub-scale	
7: Exercise increases my muscle strength	4 (2-4)
15: Exercise increases my level of physical fitness	4 (1-4)
17: Muscle tone is improved with exercise	4 (1-4)
18: Exercising improves functioning of my cardiovascular system	4 (2-4)
22: Exercise increases my stamina	4 (2-4)
23: Exercise improves my flexibility	3 (1-4)
31: My physical endurance is improved by exercising	4 (2-4)
43: Exercise improves the way my body looks	4 (1-4)
Psychological outlook sub-scale	
1: I enjoy exercise	3 (1-4)
2: Exercise decreases feelings of stress and tension for me	4 (1-4)
3: Exercise improves my mental health	4 (2-4)
8: Exercise gives me a sense of personal accomplishment	4 (2-4)
10: Exercising makes me feel relaxed	3 (1-4)
20: I have improved feelings of wellbeing from exercise	4 (1-4)
Social interaction subscale	
11: Exercising lets me have contact with friends and persons I enjoy	3 (1-4)
30: Exercising is a good way for me to meet new people	3 (1-4)
38: Exercise is good entertainment for me	3 (1-4)
39: Exercising increases my acceptance by others	2 (1-4)
Preventative health sub-scale	
5: I will prevent heart attacks by exercising	3 (1-4)
13: Exercising will keep me from having high blood pressure	3 (1-4)
27: I will live longer if I exercise	3 (1-4)

Table 5: The exercise barriers scale: median and range of each questionnaire item

Perceived barriers items	Median(range)
Exercise Environment sub-scale	
9: Places for me to exercise are too far away	3 (1-4)
12: I am too embarrassed to exercise	3 (1-4)
14: It costs too much money to exercise	3 (1-4)
16: Exercise facilities do not have convenient schedules for me	3 (1-4)
28: I think people in exercise clothes look funny	4 (1-4)
42: there are too few places for me to exercise	3 (1-4)
Time expenditure sub-scale	
4: Exercising takes too much of my time	3 (1-4)
24: Exercise takes too much time from family relationships	3 (1-4)
37: Exercise takes too much time from my family responsibilities	3 (1-4)
Physical exertion sub-scale	
6: Exercise tires me	2 (1-4)
19: I am fatigued by exercise	2 (1-4)
40: Exercise is hard work for me	2 (1-4)
Family discouragement subscale	
21: My spouse (or significant other) does not encourage exercising	4 (1-4)
33: My family members do not encourage me to exercise	4 (1-4)

4.3. PHYSICAL ACTIVITY (IPAQ SCORES)

On the IPAQ, 111 students (37.5%) reported high physical activity levels while 61 students (20.6%) were classified with low physical activity (Figure 5). There were no significant differences in levels of physical activity by year ($\chi^2=4.02$; $p=0.67$).

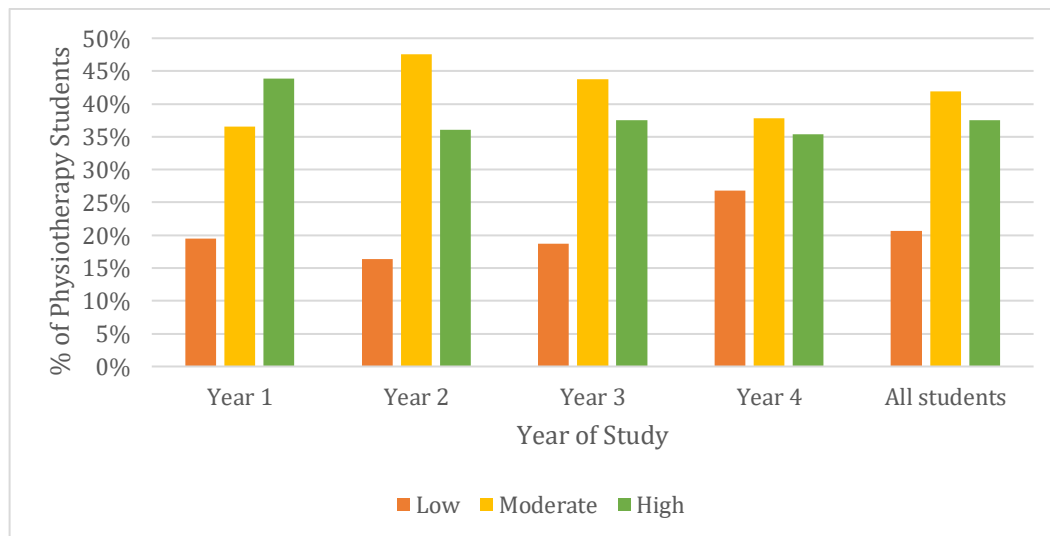


Figure 5: Percentage of students classified in each level of Physical Activity by year (n=296)

4.4. TIME SPENT IN DIFFERENT TYPES OF PA

There were no differences between students in different years of study and the percentage of time spent walking ($\chi^2=4.55$; $p=0.6$), doing moderate physical activity ($\chi^2=7.88$; $p=0.98$) or doing vigorous physical activity ($\chi^2=9.66$; $p=0.94$) (Figure 6).

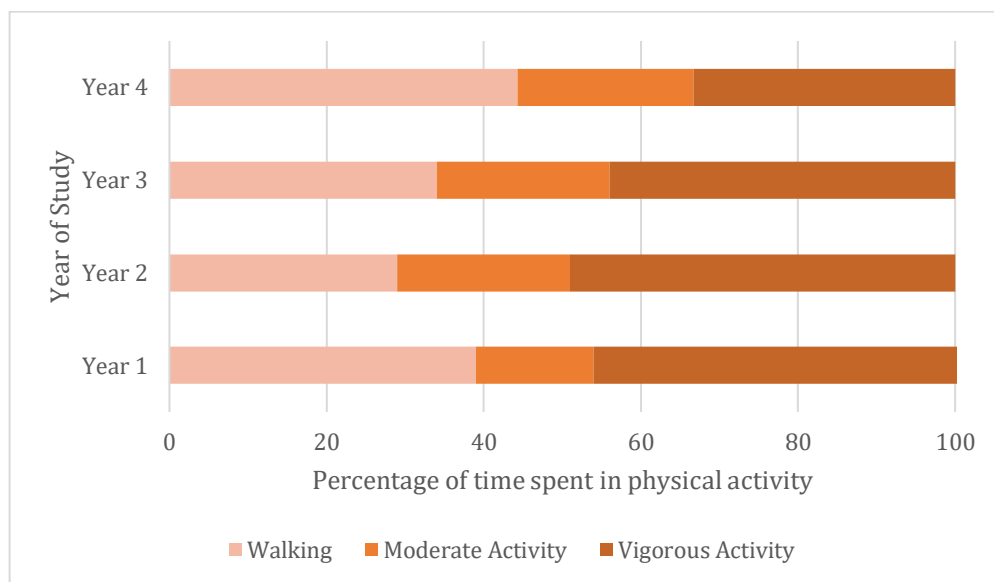


Figure 6: Percentage of time spent walking, doing moderate or vigorous activity by year (n=296)

4.5. IS THERE AN ASSOCIATION BETWEEN EBBS AND IPAQ?

When we explored scores on the Exercise Benefits and Barriers scale categorised by level of physical activity (low, moderate, high) we found that students who had high PA had significantly higher scores on the EBBS than those with moderate and low PA [H (2, $n=296$) = 34.4 $p<0.01$] (Figure 7).

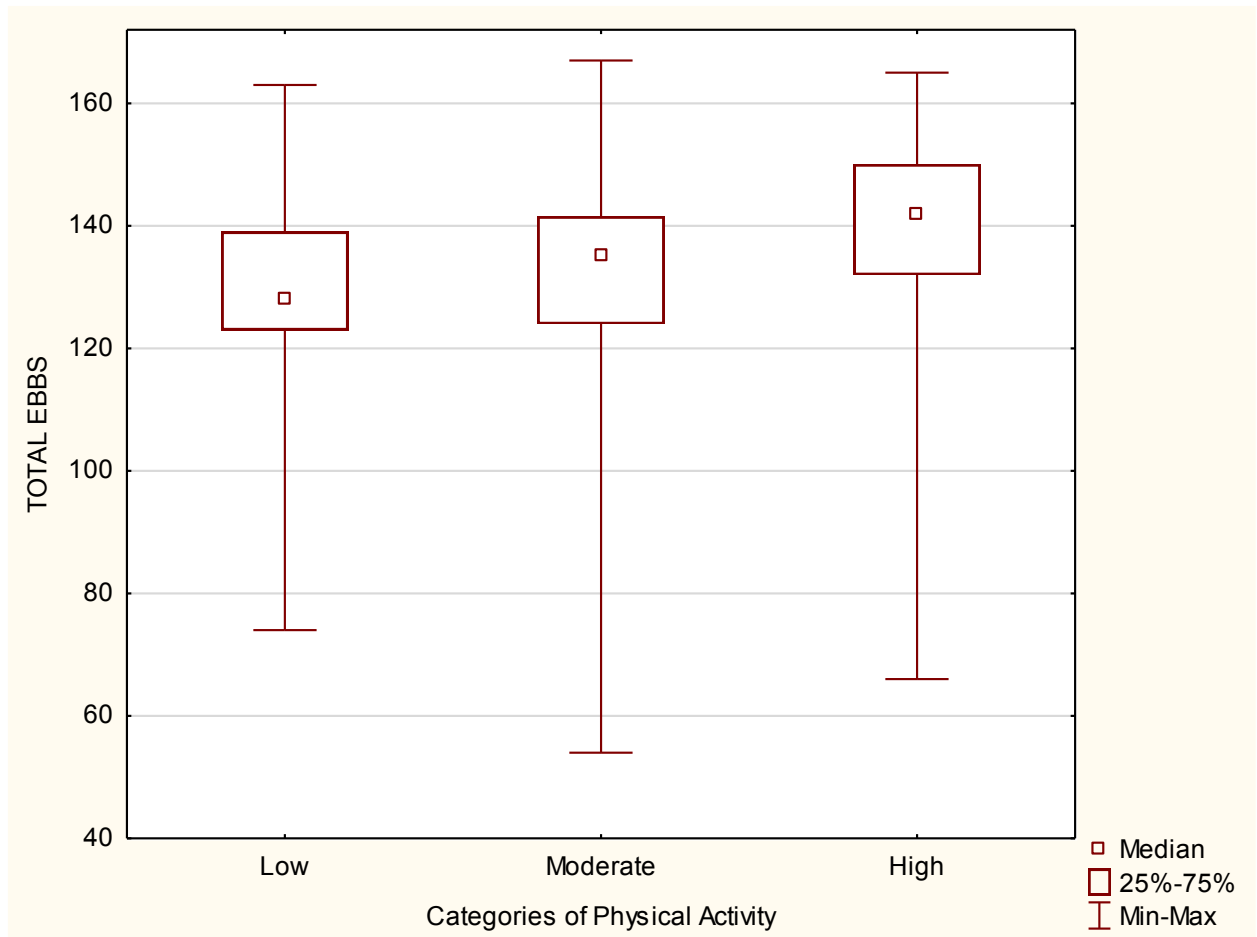


Figure 7: Box and whisker plot of scores on the EBBS for all students classified as low, moderate or high (n=295)

There were no significant differences between the EBBS scores of students who had low, moderate and high PA levels in the first year of study [H (2, N=41) =3.01 p=0.22]. However, students in the second (n=61), third (n=111) and fourth (n=82) years of study with high PA levels had significantly better scores on the EBBS than those with low and moderate PA [H (2, n=61) =14.93; p<0.001; H (2, n=112)=13.66; p=0.001; H(2,n=82)=7.77; p=0.02] (Figures 8-10).

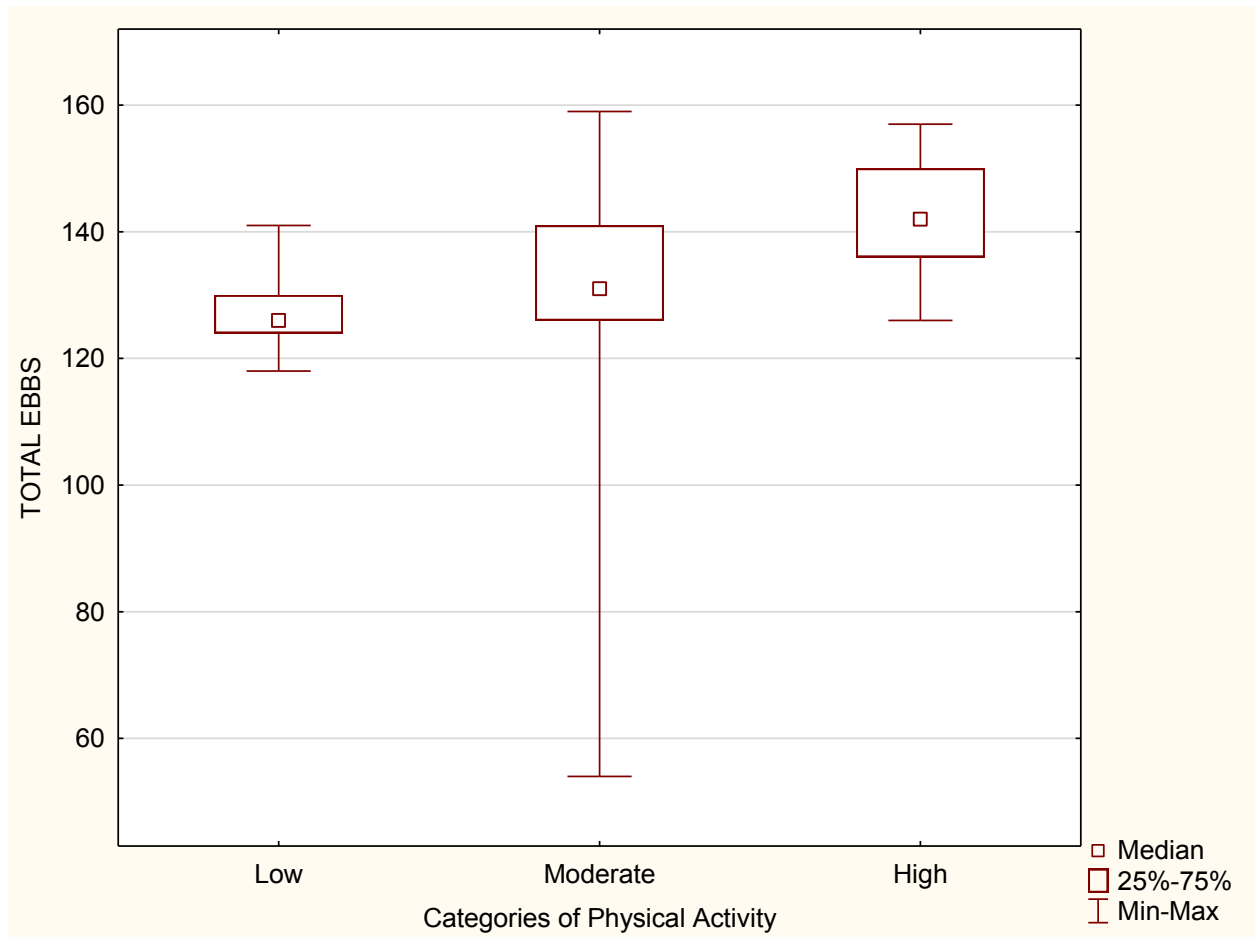


Figure 8: Box and whisker plot of scores on the EBBS for Second Year students classified as low, moderate or high (n=61)

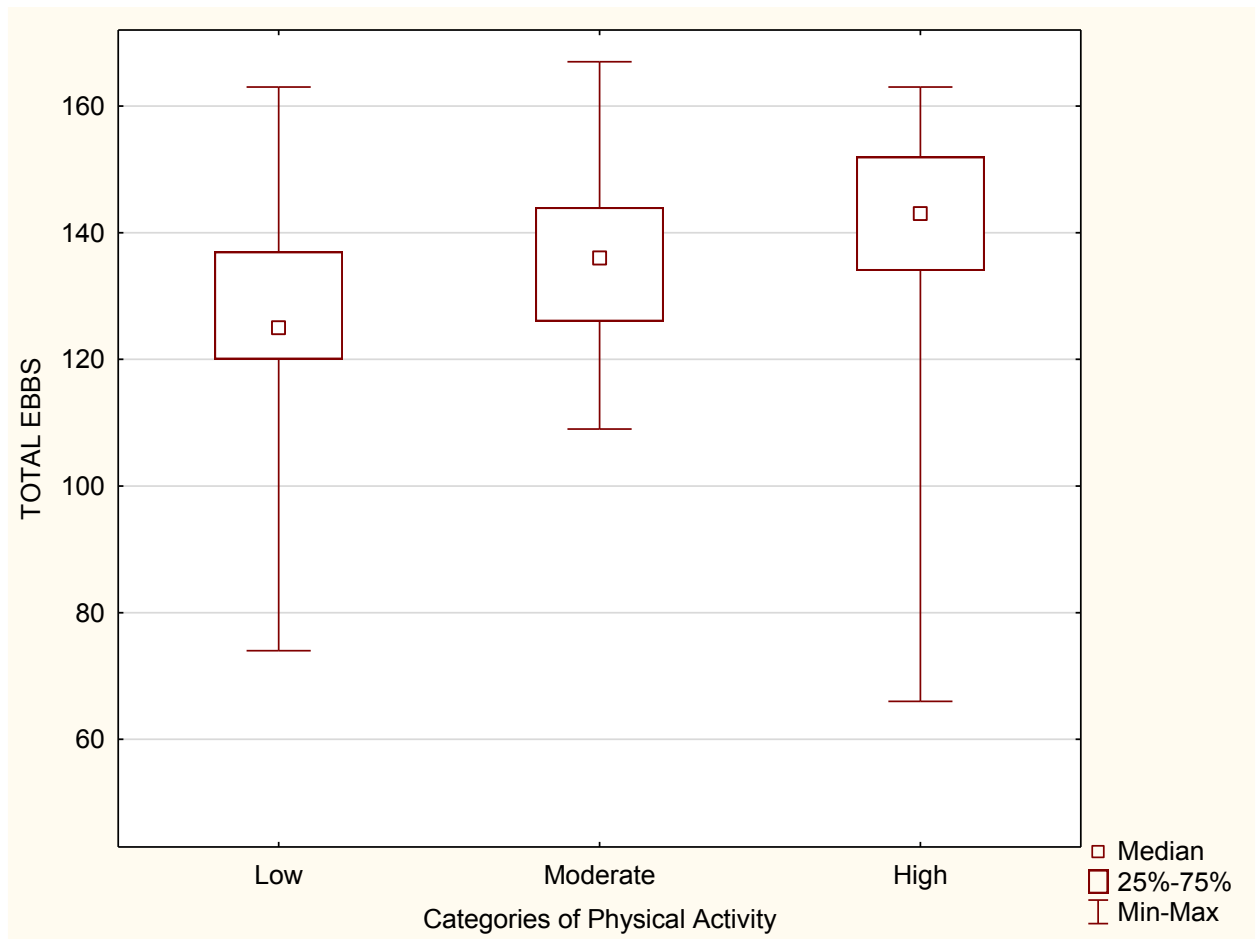


Figure 9: Box and whisker plot of scores on the EBBs for Third Year students classified as low, moderate or high (n=111)

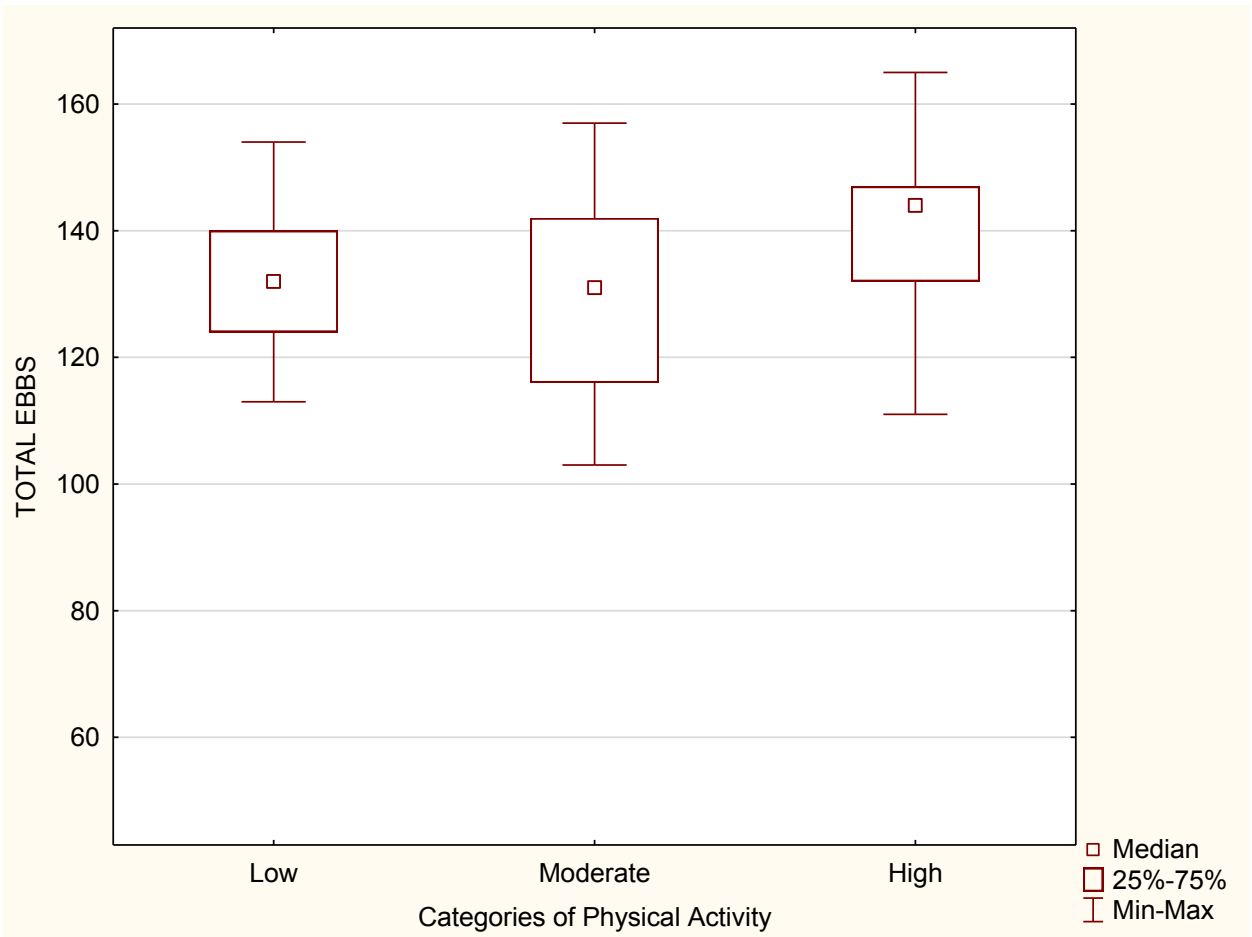


Figure 10: Box and whisker plot of scores on the EBS for Fourth Year students classified as low, moderate or high (n=82)

4.6. SUMMARY OF RESULTS

The sample included 296 students with a median age of 22y (18-29). The median score for the EBS was 136 out of a possible 172 with no significant differences in scores between students in different years of study. Moreover, there was strong agreement in the EBS under benefits for “physical exertion” as well as barriers for “physical exertion”. IPAQ scores revealed that only 37.5% of the students managed to obtain high PA. Lastly, students with high PA had significantly higher scores on the EBS than those with low and moderate PA.

CHAPTER FIVE: DISCUSSION

5.1. INTRODUCTION

Physiotherapists have been identified as key role players in the health promotion (HP) of physical activity (PA). As discussed in the literature review, in order to be effective in HP, health care professionals should be practicing the healthy behaviours they are advising, i.e. they should be participating in healthy PA themselves. However, in South Africa there is a paucity of evidence regarding the PA behaviour patterns of physiotherapists and physiotherapy students. This study undertook to describe the perceived benefits and barriers to exercise and their association with levels of physical activity in physiotherapy students (first to fourth year) attending university in the Western Cape Province of South Africa. Participants in the present study included first to fourth year undergraduate students in all three universities in the Western Cape Province of South Africa. To our knowledge, there is no other study in South Africa that has studied this construct.

5.1.1. Characteristics of the sample

The profile of participants in this study was similar to that reported previously. A total of 296 students, median age 22 years participated in this study with 83% of the sample being female. In Spain, 101 of 145 students were female and the mean age was 20.84 years (Tolozza et al., 2008). Similarly, in a Sri Lankan study of 111 participants, the mean age was 23.4 (range 20-25 years) and 62% were female (Ranasinghe et al., 2016). Several other studies from varying countries have similar data (Dabrowska-Galas et al., 2013; Lovell et al., 2010; Mihailova et al., 2014; Plotnikoff et al., 2015; Poobalan et al., 2012; Shirley et al., 2016). These studies suggest that physiotherapy is a female dominated field, and that undergraduate students appear to be in their late teens to early twenties. This is expected because individuals generally complete high school at age 17-18 years and then move on to higher education. Physiotherapy has been appealing to the female population since its origin, little has changed over the years as more females than males continue to enter the profession.

In the present study, 58% of the participants lived off campus, meaning that a majority had to commute. This could be due to limited accommodation space being available in the universities as well as the high costs incurred with living on campus. Therefore, students opt to either stay at home or find alternative accommodation which may be more affordable. The lack of capacity and financial pressures faced by students are supported by the following. In 2010, South Africa's universities only had the capacity to cater for 20.1% of the total number of registered students in residences (Universities & Rensburg, 2011). Moreover, total student residence debt in the universities indicates a rise from R67 million in 2006 to R87 million in 2009 (Universities & Rensburg, 2011). Further, the three universities in this study presented with high residence fee increases between the years of 2008-2010 (average increases of 10.5%- 19.4%) (Universities & Rensburg, 2011).

Additionally, physiotherapy study in South Africa (SA) is a four year programme, and tuition fees in SA, where university education is expensive, are a priority. Recently in SA, a rise in University fees has seen students respond in mass protest action across various universities and the birth of the "#feesmustfall" movement forcing institution and government involvement (Pillay, 2016). The movement was a cry against financial exclusion and debt traps for economically disadvantaged students (Pillay, 2016). The financial challenges faced by students may not only have an impact on residence choice but also the ability to participate in extra-curricular activities such as sport as this study has shown that 58% of students commute to university each day.

This current study found that 65% of the students participated in sporting activities, a median of 6 hours per week across all years of study. These results contradict the IPAQ-short results where the majority of students were either classified with "low" or "moderate" PA. It is important to remember that the IPAQ is a validated tool and questions on the IPAQ are more specific as opposed to the two questions about sport participation included in the demographic questionnaire. The IPAQ tool has been found to be valid and reliable in different languages as well as different settings (Abubakari et al., 2009; Barwais et al., 2014; Craig et al., 2003; Martínez-Lemos et al., 2014; Roberts et

al., 2016) Therefore, it is possible that students overestimated their responses on the demographic questionnaire resulting in a reporting bias.

5.1.2. Exercise Benefits and Barriers Scale

Scores on the total EBBS can range from 43 to 172, the higher the score the more positively the participant perceives exercise. The median score on the EBBS was 136 (54-167) for all years. This suggests that a significant number of students have a positive view of exercise. Additionally, students presented with high median scores even when considered according to the respective years. The results for EBBS indicate that undergraduate physiotherapy students in the WC province of SA have a positive perception to PA. This is expected due to their unique PA knowledge and skill which is a core part of their training. Additionally, through experiential learning they are involved in PA regardless of how moderately active they are.

Twenty nine out of 43 questions on the EBBS target perceived benefits to exercise. The majority (i.e. six out of 10) of the responses with the highest median scores (i.e. agreement) for perceived benefits were related to “physical performance” (Table 4). The results for the sub-sections of the EBBS, specifically for the statements: “exercise increases my level of fitness” and “exercise improves the way my body looks”, are consistent with a previous study where 147 undergraduate university students also reported the highest mean scores for the sections on physical performance and appearance (Grubbs & Carter, 2002).

Conversely, 14 of the 43 questions on the EBBS target perceived barriers to exercise. Responses with the highest agreement for perceived barriers were all related to “physical exertion”. Interestingly, these results are similar to results found in previous studies of university students (Grubbs & Carter, 2002) and consistent with the results of Lovell et al., (2010) for both perceived benefits and barriers. Despite the participants in Lovell et al., (2010) being non-exercising female students, the results suggest that barriers and beliefs towards exercise may be similar across continents, universities, sexes and students.

Despite their knowledge and expertise in PA, Physiotherapy students in the WC of SA appear to have similar perceived benefits and barriers to exercise as non-physiotherapy students elsewhere. Although there appears to be a common desire among university students to improve one's physical performance, overcoming the physical exertion appears to be more of a challenge and it would seem that overcoming this challenge requires more than just "knowledge" about exercise to achieve this positive behaviour change. General knowledge about exercise and its benefits appears to be accessible across the board as the positive attitudes are not restricted to students with enhanced knowledge based on curricula. However, when this knowledge does not translate into positive behaviour it becomes redundant. Specifically, physiotherapists who know all there is to know about exercise but fail to achieve recommended levels of physical activity put themselves at risk of NCDs and in turn cannot effect positive behaviour change in their patients.

5.1.3. Levels of PA

The IPAQ scores revealed that the majority of students across all years had low PA levels. Only 37.5% of the students engaged in high PA. The prevalence and levels of PA found in this current study are very low compared to the WHO estimates for the global population. However, the results in this current study reflect the levels of PA previously reported for South African adults, where less than a third engage in PA levels recommended for health benefits (Fourie et al., 2006). According to the WHO, 41% of the population have low PA levels (Abubakari et al., 2009), similar to the 41.9% in this current study. The PA behaviour of the physiotherapy students in the current study appears to be no different to the PA behavior of the general South African population. This reinforces the discussion above, that despite this group of people being prospective promoters of PA in the population with sound knowledge about PA and its benefits, they do not have healthy PA behaviours. Therefore, it is difficult to imagine how this group of students are going to model positive behaviour change.

These results appear to be consistent with previous research that reports a decline in the levels of PA in the years where young people undertake university studies (Mihailova et al., 2014; Plotnikoff et al., 2015). The low percentage of students with high PA levels (37.5%) is similar to the 31.3% of Spanish physiotherapy (Toloza et al., 2008). Although these results are disappointing and concerning, the figures are more encouraging than the mere 15.9% of Sri Lankan physiotherapy students who reported high PA levels (Ranasinghe et al., 2016). Given that 46% of Polish physiotherapy students reported high PA, Dabrowska-Galas et al., (2013), suggests that being physically active may be related to culture and environment as well as knowledge. It appears that the positive perception to PA shown by the students as per the EBBS scores does not necessarily translate into practice for the majority. Therefore, this group of students who will be practicing physiotherapists in diverse countries in a few years' time are not participating in sufficient physical activity despite having positive attitudes and beliefs.

For students that engaged in PA, all but the 4th year students spent over 40% of the time engaging in vigorous activity as compared to walking and moderate PA. Students in their fourth or final year of study in physiotherapy face higher academic pressures compared to other years (Ranasinghe et al., 2016). This is reflected by students in one study being unable to participate in physical activity due to schedules (Ranasinghe et al., 2016). There is evidence that stress in physiotherapy students is on the rise, this stress is attributed to academic load, personality traits, illness and emotional problems among others (Davis et al., 2015). Therefore, these fourth-year students who face an overwhelming academic load are at risk of increased levels of stress which may limit the prioritisation of PA. Consequently, this group of students may be fatigued and exhausted, and most probably lack sufficient energy to engage in sufficient vigorous PA to promote health.

5.1.4. Associations between EBBS and PA.

Scores on the EBBS categorised by level of physical activity (low, moderate and high) showed that students with high PA had significantly higher scores on the EBBS than those with moderate and low PA. This could suggest that these students expressed a

positive attitude towards exercise which in turn resulted in positive health behaviour (i.e. exercise). These results are consistent with the previous statement that the greater the perceived benefits to exercise the more active the individual (El Ansari & Lovell, 2009). In addition, according to social cognitive theory, individuals tend to act in ways that they perceive will lead to positive outcomes but avoid behaviour that they expect to result in negative outcomes (Young et al., 2014). However, it may be that physiotherapy students who are physically active have resulting improved EBBS scores. In other words, the relationship between the two may be bidirectional. The students who exercise may have good attitudes towards PA because they regularly participate in high PA and have experienced the benefits themselves. This concept of experiential learning is key in behaviour change.

The smallest changes in Physical activity behaviour can result in substantial improvement in population health outcomes (Davis et al., 2015). Therefore, it is essential to have a sound theoretical understanding of behaviour change because correct use of theoretical based interventions has been found to be successful (Davis et al., 2015). Bandura's Social Cognitive Theory has been widely used in PA behaviour change (Davis et al., 2015). Consistent with Bandura's theory, there is a positive relationship between self-efficacy and PA (Sriramatr et al., 2016; Young et al., 2014). Self-efficacy is necessary in the contemplation, initiation and maintenance of behaviour change (Marmo, 2013). That is, individuals with high self-efficacy in PA are more likely to commit and remain consistent with PA and vice versa (Marmo, 2013). Therefore, for physiotherapy students, educating them about PA alone may not be enough to achieve high PA levels. In order to instill PA behaviour in students it may be necessary to incorporate PA participation into their training programme in an experiential module which will in turn improve self-efficacy. Furthermore, this may result in an increase in perceived benefits to exercise and a decrease in perceived barriers to exercise as well as encourage lifelong commitment PA.

There were no significant differences between the EBBS scores of students with low, moderate and high PA in the first year of study [$H(2, N=41) = 3.01$ $p=0.22$]. However, students in the second ($n=61$), third ($n=111$) and fourth ($n=82$) years of study with high

PA had significantly better scores on the EBBS than those with moderate and low PA. During the four-year long physiotherapy undergraduate education, supervised clinical education usually commences during the second and third year of study (Skinner, 2007). Therefore, it can be hypothesized that first year students have the least knowledge and clinical practice about PA and positive health behaviour compared to all the other years. Furthermore, this may lead to low self-efficacy and decreased levels of PA.

5.2. STRENGTHS AND LIMITATIONS

Limitations of the current study include the study design, data collection methods, recruitment bias and limited generalizability. The cross-sectional survey design means causality cannot be established. Thus, benefits and barriers to PA can only be studied as constructs. Secondly, data collection was through self-report questionnaires i.e. IPAQ and EBBS. Although, both the IPAQ and EBBS questionnaires have been previously validated and are reliable tools, self-report instruments are still vulnerable to bias. This potential for bias was most noticeable in the lack of agreement between the amount of PA reported by the students in the demographic questionnaire and in the validated IPAQ. Thirdly, first year students from one of the universities were unable to participate due to logistical issues, introducing a recruitment bias. Lastly, the results of this study are limited to universities in the Western Cape province of South Africa and cannot be generalized further.

Although this study has these limitations, one of the strengths of the study is the 95% confidence level which was achieved with a sample of $n=296$. Therefore, these results can be generalized to physiotherapy students attending university in the Western Cape. Finally, to our knowledge, this is the first study in South Africa to describe the perceived benefits and barriers to exercise and their association with levels of PA in physiotherapy students. Therefore, this study is breaking new ground for physiotherapists and their training in the South African context.

5.3. IMPLICATIONS

5.3.1. Clinical implications

Results of this current study are compelling and suggest implications for the training of physiotherapists for clinical practice. Insufficient physical activity (PA) is one of the leading risk factors for non-communicable diseases (NCDs) or chronic diseases of lifestyle. PA has been found to reduce the risk of all-cause mortality. Undergraduate physiotherapy students in the Western Cape across all three universities do not appear to engage in adequate PA for health benefits. This means that they are at increased risk for NCDs. In addition, physiotherapists who do not practice what they preach, i.e. do not participate in sufficient physical activity to promote good health, are not role models to the communities in which they work and may not be effective in promoting PA for health.

Global mortality from NCDs is on the rise and physiotherapists need to respond by taking a leadership role. Physiotherapy students should be encouraged, and perhaps required to participate in PA as part of their undergraduate training. In addition, methods of promoting PA in this population should target an increase in self-efficacy and take into account the perceived barriers and benefits identified. Physiotherapy students need to model positive health behaviour in practice to enable application of social cognitive theory to achieve behaviour change.

5.3.2. Research implications

More research needs to be done in this area, particularly in the South African context. The levels of PA in physiotherapy students across the country need to be established and optimal PA promotion strategies for this population while they are studying need to be developed and tested.

CHAPTER SIX: SUMMARY AND CONCLUSION

The health benefits of physical activity have been well documented (Arzu et al., 2006; Dean, Dornelas de Andrade, et al., 2014; Dean, Moffat, et al., 2014; Sriramatr et al., 2016; Young et al., 2014). Despite this, there is a decline in levels of PA internationally in both young people and adults (Young et al., 2014). Particularly, levels of PA decline between the ages 18 and 24 during the time when young people undertake tertiary education (Mihailova et al., 2014; Plotnikoff et al., 2015). While PA in the population declines, non-communicable diseases which can be prevented and managed by PA are on the rise causing more deaths than all other causes combined (Heeren et al., 2017).

Physiotherapist have used PA in the treatment of disease for decades (Cup et al., 2007; DeTurk & Scott, 2008; Higgs, Elizabeth Ellis, Joy, 2001; Meisingset et al., 2016) and are well equipped to take the lead in PA promotion (Chevan & Haskvitz, 2010; Frerichs et al., 2012; Taukobong et al., 2014). The social cognitive theory teaches that positive behaviour change is modelled and not just encouraged, and, individuals learn by observing others (Young et al., 2014). Additionally, habitual PA patterns are critical to optimise health and influence others and are affected by perceived benefits and barriers to PA (El Ansari & Lovell, 2009). Therefore, physiotherapists in the 21st century are challenged to model positive PA behaviour in order to optimise their own health and achieve successful health promotion in practise. However, there is limited research about PA practice of physiotherapy students nor their perceived benefits and barriers to PA.

Therefore, the aim of this current study was to describe the perceived benefits and barriers to exercise and their association with levels of PA in undergraduate physiotherapy students (first to fourth year) attending university in the Western Cape Province of South Africa.

Objective 1:

To determine the perceived benefits and barriers to PA using the Exercise Barriers and Benefits Scale (EBBS)

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In a sample of 296 students with a median age of 22y (18-29), the median score on the EBBS was 136 (54-167) for all years with no significant differences in scores between students in different years of study ($\chi^2=1.31$; $df=3$; $p=0.73$). For perceived benefits, students agreed the most with items under the “physical performance” and “psychological outlook” sub-scales and agreed the least with one item under the “social interaction” sub-scale i.e. exercise is good entertainment for me. Moreover, for perceived barriers, students agreed the most with items under the “physical exertion” sub-scale and agreed the least with items under the “family discouragement” sub-scale. Overall, the students appeared to have positive attitudes and beliefs towards physical activity.

Objective 2:

To determine the levels of PA using the International Physical Activity Questionnaire (IPAQ-Short)

IPAQ scores revealed that 111 students (37.5%) reported physical activity levels classified as high while 61 students (20.6%) were classified as low. There were no significant differences in levels of physical activity by year ($\chi^2=4.02$; $p=0.67$).

Objective 3:

To evaluate the association between EBBS, levels of PA and year of study

Students with high PA had significantly higher scores on the EBBS than those with moderate and low PA [$H(2, n=296) = 34.4$ $p<0.01$].

Based on the results of the current study, the majority of physiotherapy students in the universities of the Western Cape of South Africa across all years of study engage in moderate physical activity and do not achieve recommended physical activity levels despite having positive beliefs regarding exercise. At present, despite having knowledge about PA and positive beliefs, the majority of physiotherapy students are not engaging in high PA. It is recommended that specific physical activity (PA) promotion based on social cognitive theory be integrated into the physiotherapy curriculum to emphasize

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PA participation as part of training. Additionally, physiotherapy students should be trained in all the necessary competencies to be well equipped to handle the challenges of behavior change in clinical practice as they journey towards being key role players taking a leading role in the fight against non-communicable diseases through the implementation of health promoting physical activity.

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APPENDIX I: LETTER OF ETHICS APPROVAL



UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee



Room E53-46 Old Main Building
Grootte Schuur Hospital
Observatory 7925
Telephone [021] 406 6492
Email: sumayah.arielidien@uct.ac.za
Website: www.health.uct.ac.za/fhs/research/humanethics/forms

02 December 2016

HREC REF: 712/2016

A/Prof R Parker
Division of Health & Rehab Sciences
F-Floor
OMB

Dear A/Prof Parker

PROJECT TITLE: PHYSIOTHERAPY STUDENTS' PERCEIVED BENEFITS AND BARRIERS TO EXERCISE IN THE WESTERN CAPE (MPHIL CANDIDATE - MS D KGOKONG)

Thank you for your response letter, addressing the issues raised by the Human Research Ethics Committee (HREC).

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

Approval is granted for one year until the 30 JANUARY 2018.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.

(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

We acknowledge that the student, D Kgokong will also be Involved in this study.

Please quote the HREC REF in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval before the research may occur.

Yours sincerely


PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN RESEARCH ETHICS COMMITTEE

Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB00001938

HREC 712/2016

APPENDIX II: PARTICIPANT INFORMATION SHEET

❖ **Why is this study being done?**

Over two thirds of South African adults fail to meet the “World Health Organization” physical activity guidelines for health benefits. The guidelines for ages 18-64 are: at least 150 minutes of moderate-intensity aerobic physical activity throughout the week. We know that physical inactivity is the fourth leading risk factor for global mortality causing 6% of deaths globally which further contributes to the burden of non-communicable diseases in South Africa. Physiotherapists have used physical activity in the rehabilitation of diseases for many decades. Also, physiotherapists are identified as key players in person centered health promotion that aim to promote health and well being of the population, prevent disease and maintain health of individuals living with non-communicable diseases. Research shows that habitual physical activity patterns in communities are influenced by perceived benefits and barriers to physical activity. However, there is limited research on the health behaviour of physiotherapists and their individual views on their potential role in PA promotion.

❖ **Why are you being asked to take part?**

You are being asked to take part in this study because you are a physiotherapy student attending university in the Western Cape and you meet the study inclusion criteria.

❖ **How many people will take part in this study?**

We hope that all undergraduate physiotherapy students in the Western Cape will take part in the study, this is about 720 students.

❖ **How long will the study last?**

It will take 10-15 min to complete the two questionnaires.

❖ **What do we do to decide if you are eligible?**

You are eligible according to the aim and purpose of the study.

❖ **What will happen if you decide to take part in the study?**

You will be asked to complete three separate questionnaires.

❖ **What are the risks and discomforts of this study?**

None.

❖ **Are there any benefits to you for being part of this study?**

There are no direct benefits to you for participating in this study. However, with your help this study will add to the body of literature on improving physical activity behavior in physiotherapists and combat the growing burden of disease through physiotherapists who practice health promotion and lead by example. The authors intend to submit to South African Society of Physiotherapy (SASP) journal for publication and results shared with UCT, UWC and SU physiotherapy departments. You will receive an infographic describing common barriers to physical activity upon completion of this study.

❖ **What other choices do I have?**

You have the choice not to take part in the study, you have the right to withdraw at any point during the study without penalty.

❖ **What will happen when the study is over?**

The researchers will compile the data, analyse it and submit to the university. You will not be individually identified in the data.

❖ **Will your tests results be shared with you?**

Yes, they will be available at the HOD's office and sent to you through the departmental communication network.

❖ **Who will see the information which is collected about you during the study?**

The researchers involved in the study as well as the university will see the information which is collected but at no point will your data be identifiable as your consent form will be separated from your questionnaires.

❖ **Who do I speak to (or contact) if I have any questions about the study?**

You are most welcome to contact any of the persons listed with their contact details at the end of the form.

APPENDIX III: INFORMED CONSENT FORM

Dear participant,

I am an MPhil (Masters in sports and exercise physiotherapy) student at the University of Cape Town. I will be conducting a research study that will describe the perceived benefits and barriers to exercise and their association with the levels of physical activity in Physiotherapy students. Perceived barriers to exercise are defined as obstacles that make it more difficult to engage in exercise. Current research has found that, the higher the perceived benefits to exercise, the more active the individual and conversely the higher the perceived barriers to exercise, the less active the individual. As a physiotherapy student we are sure that you know that physical activity has been identified by the World Health Organization as one of the two main risk factors for Non-Communicable Diseases.

You will be requested to fill in three questionnaires that will be used to answer the research question. The perceived benefits and barriers to exercise will be measured using the Exercise Benefits and Barriers Scale (EBBS), a 43 item Likert-type questionnaire and a Demographic Questionnaire (DQ). The short version of the International Physical Activity Questionnaire (IPAQ-short) will be used to measure the level of physical activity. Completing both questionnaires will take no longer than 10 minutes.

RISKS

You will not incur any risk should you consent to this study. There will be no consequence to you should you choose not to participate or withdraw from this study. Your personal information will be protected and kept confidential.

BENEFITS

The results of this study will be invaluable to the South African population. You will stand a chance to take part in the search and development of new knowledge. Furthermore, this knowledge will add to the body of literature on improving physical activity behavior in physiotherapists and combat the growing burden of disease through physiotherapists who practice health

Perceived benefits and barriers to exercise and levels of physical activity of undergraduate physiotherapy students in the Western Cape

promotion and lead by example. The authors intend to submit to South African Society of Physiotherapy (SASP) journal for publication and results shared with UCT, UWC and SU physiotherapy departments. Additionally, an infographic describing common barriers to PA upon completion of this study.

This study will be conducted under the supervision of Associate Professor Romy Parker.

Should there be any uncertainty or need for clarity on any of the above mentioned information, please feel free to contact us.

Please take you time to read the information on this document before you sign. You have the right to withdraw your participation from the study at any point without any penalty.

Your participation will be greatly appreciated.

SIGN

Kind Regards,

Supervisor:

Assoc/Prof. Romy Parker

Tel: (Work) 021-4066314

E-mail: romy.parker@uct.ac.za

Physical address:

Division of Physiotherapy

Department of Health and Rehabilitation Sciences

Faculty of Health Sciences

University of Cape Town

Anzio Road

Observatory 7925

Perceived benefits and barriers to exercise and levels of physical activity of undergraduate physiotherapy students in the Western Cape

Cape Town

Research student:

Diana Kgokong

Tel: 021-5551090

Fax: 021-4066401

E-mail: kgkdin001@uct.ac.za

Physical address:

Unit 57 Dennekamp 361

Main Road

Kenilworth

7708

Human Research Ethics Committee (HREC)

Tel: 021 650 1236

Physical address

Room E53.46

Old Main Building, GS

All participants may contact the HREC for questions or concerns about their rights or welfare associated with taking part in this study.

APPENDIX IV: QUESTIONNAIRES

Demographic Questionnaire

Please answer the following questions to the best of your ability

1. What is your sex/gender? Please tick

Male Female

2. What is your age?

Answer:

3. What is the name of your institution/University? Please tick

University of Stellenbosch

University of the Western Cape

University of Cape Town

4. What is your year of study? Please tick

First year

Second year

Third year

Fourth year

5. Do you stay on campus/residence? (YES/NO)

Answer:

6. Do you work part-time? (YES/NO)

Answer:

7. If yes to "question 6" how many hours a week do you work part-time?

Answer:

8. Are you involved in any sport/recreational activity? (YES/NO)

Answer:

9. If yes to "question 8" how many hours a week?

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Answer:

International Physical Activity Questionnaire

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**.

Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

___ **days per week**

No vigorous physical activities ~~→~~ **Skip to question 3**

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

___ **hours per day**

___ **minutes per day**

Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**.

Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

___ **days per week**



No moderate physical activities **Skip to question 5**

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

___ **hours per day**
___ **minutes per day**

Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

___ **days per week**

No walking → **Skip to question 7**

6. How much time did you usually spend **walking** on one of those days?

___ **hours per day**
___ **minutes per day**

Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

___ **hours per day**
___ **minutes per day**

Don't know/Not sure

Exercise Benefits and Barrier Scale

DIRECTIONS: Below are statements that relate to ideas about exercise. Please indicate the degree to which you agree or disagree with the statements by circling SA for strongly agree, A for agree, D for disagree, or SD for strongly disagree.

1. I enjoy exercise.	SA	A	D	SD
2. Exercise decreases feelings of stress and tension for me.	SA	A	D	SD
3. Exercise improves my mental health.	SA	A	D	SD
4. Exercising takes too much of my time.	SA	A	D	SD
5. I will prevent heart attacks by exercising.	SA	A	D	SD
6. Exercise tires me.	SA	A	D	SD
7. Exercise increases my muscle strength.	SA	A	D	SD
8. Exercise gives me a sense of personal accomplishment.	SA	A	D	SD
9. Places for me to exercise are too far away.	SA	A	D	SD
10. Exercising makes me feel relaxed.	SA	A	D	SD
11. Exercising lets me have contact with friends and persons I enjoy	SA	A	D	SD
12. I am too embarrassed to exercise.	SA	A	D	SD
13. Exercising will keep me from having high blood pressure.	SA	A	D	SD
14. It costs too much to exercise.	SA	A	D	SD
15. Exercising increases my level of physical fitness.	SA	A	D	SD
16. Exercise facilities do not have convenient schedules for me.	SA	A	D	SD
17. My muscle tone is improved with exercise.	SA	A	D	SD
18. Exercising improves functioning of my cardiovascular system.	SA	A	D	SD
19. I am fatigued by exercise.	SA	A	D	SD
20. I have improved feelings of wellbeing from exercise.	SA	A	D	SD
21. My spouse (or significant other) does not encourage exercising.	SA	A	D	SD

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22. Exercise increases my stamina.	SA	A	D	SD
23. Exercise improves my flexibility.	SA	A	D	SD
24. Exercise takes too much time from family relationships.	SA	A	D	SD

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25. My disposition is improved with exercise.	SA	A	D	SD
26. Exercising helps me sleep better at night.	SA	A	D	SD
27. I will live longer if I exercise.	SA	A	D	SD
28. I think people in exercise clothes look funny.	SA	A	D	SD
29. Exercise helps me decrease fatigue.	SA	A	D	SD
30. Exercising is a good way for me to meet new people.	SA	A	D	SD
31. My physical endurance is improved by exercising.	SA	A	D	SD
32. Exercising improves my self-concept.	SA	A	D	SD
33. My family members do not encourage me to exercise.	SA	A	D	SD
34. Exercising increases my mental alertness.	SA	A	D	SD
35. Exercise allows me to carry out normal activities without becoming tired.	SA	A	D	SD
36. Exercise improves the quality of my work.	SA	A	D	SD
37. Exercise takes too much time from my family responsibilities.	SA	A	D	SD
38. Exercise is good entertainment for me.	SA	A	D	SD
39. Exercising increases my acceptance by others.	SA	A	D	SD
40. Exercise is hard work for me.	SA	A	D	SD
41. Exercise improves overall body functioning for me.	SA	A	D	SD
42. There are too few places for me to exercise.	SA	A	D	SD
43. Exercise improves the way my body looks.	SA	A	D	SD

APPENDIX V: LETTER TO THE HEAD OF DEPARTMENT



Division of Physiotherapy
Department of Health and Rehabilitation
Sciences
Faculty of Health Sciences
University of Cape Town
Anzio Road
Observatory 7925
Cape Town

The Head of Department
Division of Physiotherapy
University of the Western Cape/UCT/SUN

REQUEST FOR PERMISSION TO CONDUCT STUDY IN YOUR DEPARTMENT

Dear Sir/Madam

I am an MPhil (Masters in sports and exercise physiotherapy) student at the University of Cape Town. I am conducting a research study which has been approved by the Faculty of Health Sciences Human Research Ethics Committee [HREC REF:712/2016] at the University of Cape Town. I would like to request your support and permission to conduct my study titled: ***Physiotherapy students' perceived benefits and barriers to exercise in the Western Cape.***

The aim of the study is to describe the perceived benefits and barriers to exercise and their association with the levels of physical activity in Physiotherapy students. Previous research has shown that the levels of physical activity in university students is low and does not come close to meeting the recommended levels by the World Health Organization for health benefits. At university there is the opportunity for future health care professionals and physiotherapy students in particular to engage in PA initiatives as part of their training programmes. This exposure to PA during training is critical given that physiotherapists are recognised as powerful influencers of public behaviour, e.g. a physiotherapist who is observed by members of the community engaging in regular physical activity acts as a role model and their advise to do physical activity is more

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readily received. Analysing and understanding why physiotherapy students do, or do not participate in PA is complex and multifaceted and involves personal, social, cognitive and environmental determinants (El Ansari and Lovell, 2009). The results of this study will be invaluable to the training of physiotherapy students in South Africa and more broadly to the South African population.

I would like to invite first to fourth year undergraduate physiotherapy students from your department to participate in this study. Should permission be granted, I will visit your department at a time convenient to you and present the aims and objectives of this study. Furthermore, participants who have signed the informed consent form will be recruited immediately. Participants will be required to fill in a total of three questionnaires namely; Demographic Questionnaire (DQ), Exercises Benefits and Barriers Scale (EBBS) and the International Physical Activity Questionnaire (IPAQ-short form). Questionnaires will be collected once students have completed filling in the required information. The whole procedure will take no longer than 10-15 minutes from each class.

It is preferable to conduct the study at a time where the majority of students are available on campus and in class. This will be a once off procedure and the students will not incur any harm or unfavourable consequences.

This study will be conducted under the supervision of Associate Professor Romy Parker.

Should there be any uncertainty or need for clarity on any of the above mentioned information, please feel free to contact us.

Your permission will be greatly appreciated.

Kind Regards,

Supervisor:

Prof. Romy Parker

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Perceived benefits and barriers to exercise and levels of physical activity of undergraduate physiotherapy students in the Western Cape

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