

Physical inactivity among adolescents with physical disabilities attending high schools in Kenya

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degree of

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Declaration

I declare that “**Physical inactivity among adolescents with physical disabilities attending high schools in Kenya**” is my own work, and that it has not been submitted for any other degree or examination in any other university and that complete referencing have been made and acknowledged for all sources used and or quoted.

Signed.....



This dayofyear

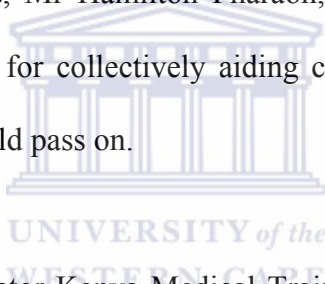
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Dedication

This work could not be complete without the love of my wife who had to keep awake through the nights that I wrote this work. Our two daughters, Esther Njeri and Mercy Mwhiki and son Daniel Matheri, encouraged me to hang on the thread to the finish. They conducted themselves well and kept our dignity. Esther Njeri Matheri, my dear widowed mother, who cared, educated, cultured and whispered wise words that keep my spirit alive; and my sisters and brothers. The reverend, Pastor Kamau Gicigi, Mr Kimani Matheri, Dr Waihenya, Mr Benard Mugambi, Uncles: Frank Nguku, John Kariuki and wife Nyambura, Niece Wangeeci Thairu , Cllr Njehia, PC Mugambi, Mr Mureithi Kinyungu and their families and many friends who encouraged and supported my studying.



Keywords

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Barriers, facilitators,

Behaviour problems,

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Fear avoidance

Leisure time activity,

Obesity,

Physical activity promotion,

Physical disabilities,

Physical inactivity,



Abstract

Physical inactivity together with overweight and obesity has emerged as a major health risk factor for chronic diseases of lifestyle such as coronary heart disease, diabetes type 2, and hypertension affecting adolescents with physical disabilities in developed countries. This has contributed to the increase of social and economic costs healthcare and social services in these countries. Review of literature has revealed that little has been documented about the status of adolescents with physical disabilities in developing countries. Given the social and economic benefits of a physically active healthy population, including those with physical disabilities, there is need for studies to analyze and document the status of activity or inactivity of this sub-population in developing countries. This study, therefore, aimed at establishing the degree of physical inactivity among high school adolescents with physical disabilities in Kenya. Using a quantitative method, a cross-sectional study was carried out on a purposively selected sample of adolescents with physical disabilities drawn from high school settings in Kenya. Data was collected by means of pre-piloted and valid self-administered questionnaire comprising of outcome measures for physical activity levels, barriers, and facilitators to physical activity participation. Data analysis was done using SPSS (Statistical Package for the Social Sciences) software. Descriptive and inferential statistical analyses using Chi-square and correlation tests were calculated on the data.

It demonstrated that almost 1 out of 2 (48.3%) adolescents with physical disabilities are inactive. The results show that physical activity decline with advance in age and females are less active than males. It also showed that adolescents with disabilities in residential high schools in the Kenya engage for fewer days in moderate and vigorous

physical activities than is recommended. The study shows barriers are perceived from the interaction between the learner's personal attributes, physical (lack of transport to exercise spaces, uneven play grounds, lack of suitable facilities, and lack of clothes/equipment) and social factors (lack of time and the need to rest). In particular, fear is perceived as a major barrier to participation in physical activities. Factors that emerged as facilitators for participation in physical activities include: making new friends, to strengthen body, to learn and gain experience, acceptance by peers, self-confidence and self-satisfaction, and the ability to move without assistance. Based on the results of this study, and in the context of the overwhelming evidence of the role of physical activity in preventing many chronic diseases, it is apparent that there is a need to increase physical activity participation and to create awareness among adolescents with physical disabilities. Further, there is a need to provide social and local barrier-free environments that promote participation. Therefore, this study recommended that various stakeholders should be included in recommending and designing physical activity programmes for the adolescents with disabilities in their schools.

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Chapter One

Introduction

1.1 Introduction

This chapter introduces the background of the research problem, the statement of the problem, and the aim and objectives of this research. The chapter also includes sections on the definition of terms used and the significance of this study. The organizational structure of the research is later presented.

1.2 Background

Physical inactivity has emerged as a major health risk habit that is more prevalent among adolescents with physical disabilities (Pan, Frey, Bar-Or & Longmuir, 2005). Researchers have shown that the habit of physical inactivity worsens as adolescents approach adulthood (Norman, Schmid, Sallis, Calfas, & Patrick, 2005; *National Center for Health Statistics*, 2005). Further, research has associated the habit of inactivity with overweight and obesity among persons with disabilities (Boyle & Coldero, 2005). Evidence has also shown that inactivity, overweight, and obesity are risk factors of coronary heart disease, diabetes type 2, hypertension, insulin resistance, and colon cancer affecting both adolescents and adults in developed countries (*Public Health Agency of Canada*, 2003; *World Health Organization*, 2002, 2003). By the time they are adults, people with disabilities have 2 to 3 times higher prevalence of having developed the above listed secondary conditions than those without disabilities (Kinne, Patrick, & Doyle, 2004). Kinne et al. (2004) found that 87% of adults aged between 18-59 years with disabilities reported at least one secondary condition they attributed to their disability status compared to only 49% of participants without

disabilities who reported at least one condition. According to Okoro et al. (2005), disabled persons with diabetes are more likely to have more risk factors for heart disease and stroke, such as obesity, hypercholesterolemia, and hypertension, than those without disability. The increasing incidence of these conditions among those with physical disabilities has led to an increase in the social and economic costs of healthcare and social services in developed countries (McDougall et al., 2004).

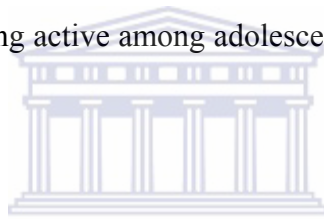
Reports of studies on inactivity among adolescents are available for developed countries but very few have been carried out in developing countries. Examples of such studies include Boyle and Coldero (2005) and Norman et al. (2005), for America, and McDougall et al. (2004) and Pan et al. (2005) for Canada. Such reports range from the prevalence of disability, level of inactivity, to risk factors associated with inactivity among adolescents. Heah, Case, McGuire and Law (2007) reported that 7.7% of all Canadian children and youths, and approximately 6.5% of all American children have a disability. This could be compared to the case in Kenya where Lund-Nielsen and Ameeroh (2006), relying on the Kenya Population Census of 1989, revealed that out of 21.4 million Kenyans aged between 0-59 years, 0.7% had disabilities. On the issue of inactivity, Pan et al. (2005) reported that a large proportion of Canadian children and adolescents with physical disabilities (37-40%) are inactive. In addition, a majority of the youth (55%) in San Diego county, aged 11-15 years, participation in physical activity is below the set guidelines, with girls being more inactive than boys (Sanchez et al., 2007).

As revealed in the beginning of this section, very little is documented of physical activity levels among adolescents with physical disabilities in developing countries,

especially those in Sub-Saharan Africa where most people live in poverty. Therefore, this study aims at reducing this void by investigating the status of physical inactivity among adolescents with physical disabilities in Kenya.

1.3 Problem Statement

General investigation reveals a lack of literature on the levels of physical activity among adolescents with physical disabilities, specifically in sub-Saharan African countries. To my knowledge, none has been published about the levels of physical activity among adolescents with physical disabilities in Kenya. Therefore, this study aims at reducing this gap by investigating the levels of physical inactivity, including facilitators and barriers to being active among adolescents with physical disabilities in Kenya.



1.4 Aim of the research

The aim of this study was to determine the degree of physical inactivity among adolescents with physical disabilities in selected high schools in Kenya.

1.5 Specific objectives

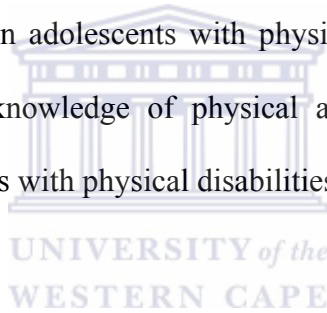
This study was guided by the following specific objectives:

- 1.5.1 To establish the levels of physical activity among adolescents with physical disabilities.
- 1.5.2 To identify barriers to engaging in physical activity experienced by adolescents with physical disabilities.
- 1.5.3 To identify facilitators to engaging in physical activity as perceived by adolescents with physical disabilities.

- 1.5.4 To identify types of activities in which adolescents with physical disabilities participate.
- 1.5.5 To identify associations between independent variables (age and gender) and physical activity, barriers or facilitators.

1.6 Significance of the research

Acknowledging the scarcity of researches done on levels of physical activity among adolescents with physical disabilities in developing countries, and appreciating the need to establish the status of this ‘forgotten’ sub-population, the results of this study would contribute to the knowledge of physical inactivity levels, facilitators, and barriers to physical activity in adolescents with physical disabilities in Kenya. The study would also increase knowledge of physical activity promotion and health education needs of adolescents with physical disabilities in Kenya.



It is envisaged, as Rimmer, Rubin and Braddock (2000) also indicate, that future designs of physiotherapy treatments and physical education programmes will use this kind of new knowledge to provide interventions and exercises with a higher rate of improving physical activity participation. This would be through equalization of opportunities for participation in physical activities and use of adaptive environments. It is also envisaged that health education will be used by physiotherapists and physical educators as a core strategy to prevent disease and help promote the quality of life and independence among adolescents with physical disabilities.

1.7 Definition of terms used in this study

- 1 **Physical inactivity:** Refers to doing a total of more than 10 minutes per week of moderate or vigorous-intensity lifestyle activities (i.e., household, transportation, or leisure-time activity), but less than the recommended level of 30 minutes (or ½ hour) of moderate physical activity, 5 or more days per week (Centres for Disease Control & Prevention, 2006). For this research the recommended level of 2½ hours to 3 ½ hours in the past week was used.
- 2 **Physical activity:** This refers to any bodily movement, produced by skeletal muscles that result in increased energy expenditure (Hussey, 2005, p. 4).
- 3 **Lifestyle physical activity:** is defined as “the daily accumulation of at least 30 minutes of self-selected activities, which includes all leisure, occupational, or household activities that are at least moderate to vigorous in their intensity and could be planned or unplanned activities that are part of everyday life” (Dunn, Andersen & Jakicic, 1998). Critical to this definition is that the adolescent selects and executes the daily life activity without expert influence. These may or may not be planned but occur as a result of manipulation of the environment (Dunn et al., 1998).
- 4 **Disability:** “Is defined as the outcome of the interaction between a person with impairment and the environmental and attitudinal barriers he/she may face” (Mulcahy, 2005).
- 5 **Adolescence:** “This is the transitional period of human life between the onset of sexual maturity that marks the end of childhood and full adulthood, usually from 12 to 21 years” (Gall, Beins & Feldman, 1996, p. 9-10).

- 6 **Leisure time:** is defined as time spent as one chooses and can be an important opportunity for socialization, to reduce stress, express one's self, and to maintain or improve physical fitness.
- 7 **Sedentary:** is defined as “an inactive state in which physical activity is not done or being done; those who engage in no leisure-time physical activity” (Amisola & Jacobson, 2003).
- 8 **Performance:** refers to what a person “does do” in daily life. *Capability* is “what a person “can do” when environmental conditions are controlled (Palisano, Copeland & Galuppi, 2007; Young, Williams, Yoshida, Bombardier & Wright, 1996).

1.8 Outline of the chapters in this study

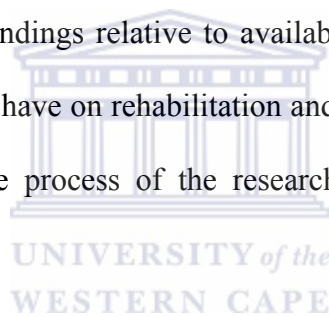
Chapter one describes the background of the study. In this chapter, the lack of information on levels of physical activity of adolescent learners with disabilities in Kenya is highlighted. Also described is the general picture of the health implications of inactivity in this sub-population as a global public health concern. The purpose, problem statement, the aim, objectives of the research, and the significance of the study are included.

Chapter two presents a review of literature that is pertinent to the current study. It discusses the prevalence of physical inactivity in adolescents and associated comorbidities, barriers and facilitators of physical activity participation, and lifestyle patterns and behaviors of adolescents, specifically those with physical disabilities. It also describes physical activity and health promotion needs for adolescents with disabilities. The theoretical framework that illuminates the study is also presented in this chapter.

Chapter three describes the methodology applied to the study, including a description of the study setting, population sample, and the sampling method used. In addition the data collection instrument, and the procedure used to collect data are presented. The chapter further describes the statistical data analysis package used to analyze the data. The ethical statement is included in this chapter.

Chapter four describes the results of the study. The results comprise both descriptive findings and associations, which illustrate the general picture of the study.

Chapter five discusses key findings relative to available literature, findings, and the implications that the findings have on rehabilitation and public health. The limitations that were encountered in the process of the research are also highlighted in this chapter.



Chapter six includes a summary of the key issues emerging from this study, and a conclusion about the findings. Also recommendations relative to the findings of this study have been presented in this chapter.

Chapter Two

Literature Review

2.1 Introduction

This chapter reviews literature on: the impact of physical inactivity on quality of life in adolescence; barriers and facilitators of physical activity participation; lifestyle patterns and behaviors of adolescents, specifically those with physical disabilities. Literature on physical activity and health promotion needs for adolescents with disabilities is also reviewed. The theoretical framework that illuminates the research is described at the end of the review. This follows an extensive search of databases; EBSCOhost, PubMed MEDLINE, Gateway, Health Technology Assessment, CINAHL, TRIP African Healthline, Science direct. The search was limited to publications between 1980 and 2007. A combination of terms used in all databases included: physical activity, exercise, children, adolescents, youth, disabilities, physical disabilities, barriers, facilitators, physical education, mobility, and physical function. Manual search was also done in library textbooks and published papers in peer reviewed journals as well as by examining reference lists of all retrieved articles to identify additional relevant studies.

2.2 Prevalence of physical inactivity in persons with disabilities

Available literature from both developed and developing countries reveal that physical inactivity among adolescents is rising, especially among those with physical disabilities (Waldrop & Stern, 2003; McDougall et al., 2004; Pan et al., 2005). One such research from a developed country, Canada, by Pan et al. (2005) reports that 37-

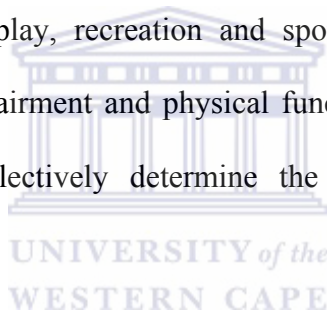
40% of a sample of 342 Canadian children and adolescents with physical disabilities aged 6-18 years were inactive. According to Kahn et al. (2002) and the Task Force on Community Preventive Services (2002), only 27% of learners (grades 9 to 12) and 38% of those aged 18–21 years (Centers for Disease Control and Prevention [CDC], 1997) engage in the recommended amounts of moderate-intensity physical activity of 30 minutes, 5 or more days per week. In a cross-sectional study on 878 adolescents attending outpatient clinics aged 11-15 years, it was found that 55% of the participants participated in physical activity below the recommended guideline, with girls being more inactive than boys, while 30% spent over 2 hours daily viewing television (Sanchez et al., 2007). Additionally, Sanchez et al. (2007) found that physical inactivity is associated with being older among adolescents. This implies that the decrease in the level of physical activity in adolescents with disabilities might be a function of the transition from childhood to adulthood. This is reflected in the high prevalence of inactivity among adults with disabilities as nearly a half of them do not achieve the activity levels recommended by the Centers for Disease Control (CDC) of moderate physical activity (Boslaugh & Andresen, 2006).

This review reveals that a high proportion of adolescents, specifically those with disabilities, are inactive. The increased prevalence of inactivity in adolescents implies that this age group is more vulnerable to the vice, especially those with disabilities.

2.2.1 Factors contributing to inactivity in adolescents with disabilities

For adolescents with disabilities, vulnerability to being inactive is high partly because of their biological impairments and functional limitations, which contribute to their varying restriction of access and participation in physical activities (Howard, Russoniello & Rogers, 2004). Their vulnerability is reflected in research evidence of

their participation in physical activity. One such research, Law et al. (2006), found that participation of children with physical disabilities in structured school activities was lower than that of their peers without disabilities and less vigorous. The International Classification of Functioning, Disability and Health (ICF) defines ‘participation’ as involvement in life situations, and proposes that the ‘context’ in which those with health impairments live, significantly influences the extent of their participation” (Hemmingsson & Borell, 2003). Another reason for their being more vulnerable to physical inactivity is the delayed development of major life skills for independence compared to the able-bodied peers (Anderson & Clarke, 1982). Developed major life skills enable those with physical disabilities to participate in life activities such as walking, play, recreation and sports activities unassisted. This implies that, the type of impairment and physical functioning, context and, level of skills for independence collectively determine the individual’s participation in physical activities.



As a consequence to low or non-participation in physical activities, it has been shown that older adolescents and persons with disabilities spend their leisure time in sedentary activities such as playing video games or cards, viewing television, or listening to the radio (Pentland, Harvey, Smith & Walker, 1999). Research evidence has also shown that persons with disabilities are more likely to smoke tobacco, drink alcohol, engage in less physical activity and be overweight or obese (Boyle & Coldero, 2005; Schydlower, 2001).

2.2.2 Performance versus capability in persons with disabilities

Another dimension that determines the level of participation in physical activities is the individuals own performance of the chosen activities which is not always related

to ones own ability. In a study on children aged 5-15 years with physical disabilities, Young et al. (1996) found that, despite an individual being capable of performing 95% of their selected activities: their actual performance did not amount to 95% on a daily basis. This may be particularly because of variations in an individual adolescent's disability and environments. For example, in a study on 148 children, aged 6-9 years, with cerebral palsy attending inclusive education, Schenker, Coster and Parush (2005) found that participation and the performance of physical activities improved with decrease of physical impairments. These findings imply that performance of physical tasks cannot be reflected in the measurement of capability. The implication for this research therefore is that, the evaluation of physical activity among the adolescents should be based on the assessment of their participation in physical activities and not whether they are capable. According to Young et al. (1996), the evaluation of physical activity participation among adolescent with disabilities should measure their performance and not their capability. This is the focus of the objective in this study that aims to assess, the level of physical activity using the activities the individuals engaged in the previous week.

2.2.3 Benefits of an active lifestyle

According to Howard et al. (2004), involvement in physically and socially active recreation may promote physical activity and improve mental health, which are key health indicators. Research evidence also consistently relates physical activity among adolescents to higher levels of self-esteem and self-concept, and to lower levels of anxiety and stress (CDC, 1997). Evidence also exist that weight-bearing exercise increases bone mass density among adolescents (Vuori, 2004; CDC, 1997). Further, research has shown that children who engage in regular physical activity develop greater motor, strength, and cardiovascular fitness than those who are physically

inactive (Bauman, 2006). This implies that health benefits accrue when adolescents with disabilities participate in health promoting behaviours.

The foregoing review has revealed that there is a distressingly high prevalence of physical inactivity among those with disabilities, which is of public health concern because of its cumulatively negative health and economic impact. The literature further implies that the interaction between individuals with disabilities, their personal attributes (disability), and the social, structural, and physical environmental factors, may often result in them remaining physically inactive. Hence, the literature reviewed implies that there is need to investigate the issues affecting physical activity participation among adolescents with physical disabilities. This is the focus of the current study.

2.3 Co-morbidities associated with physical inactivity

The negative impacts of inactivity are to a large extent multidimensional in that they affect a person's physical, emotional, and psychological health, as well as a person's social wellbeing. For example, physical inactivity results in increased incidence of overweight and obesity among persons with disabilities (Boyle & Coldero, 2005; Boslaugh & Andresen, 2006). Evidence has shown that being overweight and obesity are risk factors of coronary heart disease, diabetes type 2, hypertension, and colon cancer. These risk factors are now seen among adolescents in developed countries (*Public Health Agency of Canada, 2003; World Health Organization, 2002; 2003*). The prevalence of these co-morbidities increases as the adolescents move into adulthood. For example, Kinne et al. (2004) found that 87% of adults aged 18-59 years with disabilities reported at least one chronic condition, compared to only 49%

of those without disability. According to Kinne et al. (2004), the most common conditions affecting adults with disabilities include: pain, overweight, tiredness, difficulty in accessing community settings, falls, sleep disorders, muscle spasms and incontinence. In another study, Okoro et al. (2005) reported that disabled persons with diabetes were more likely to have more risk factors for heart disease and stroke than those without disabilities. These include: sedentary behaviour, inadequate physical activity, obesity, high levels of low-density cholesterol and high blood pressure.

According to Carmona (2005), the risk of developing pressure sores, infections, and fatigue in physically inactive adolescents with physical disabilities is high, which could increase their activity limitations further. This could result in the loss of independence in performing life activities such as walking unassisted. In addition, McDougall et al. (2004) stated that children with activity limitation also experience social isolation, psychiatric disorders, low competence in recreational activities, school difficulties, and increased use of social and healthcare services. For example, it was estimated that the gross direct cost of disability on the United States of America exchequer is at 260 billion dollars per year (Anderson & Knickman, 2001). Boyle and Cordero (2005) estimated that persons with disabilities spent sixteen times more than those without and were less likely to be in school. These costs could be lowered by providing effective interventions (McDougall et al., 2004). Thus, the impact of physical inactivity is the sustained increase of risk factors of heart disease and stroke, as well as disability and the costs of healthcare, which is a public health concern that needs collective effort.

It is apparent from the literature review that adolescents with disabilities may be constantly exposed to multiple health risks and are more likely to develop multiple health disorders that are costly to manage compared to their able bodied peers. It is also apparent that, they could suffer loss of opportunities for physical activities that are necessary for the prevention of the above mentioned conditions and social as well as physical competences. Therefore, it is important to understand how adolescents with disabilities environments influence their participation in physical activities.

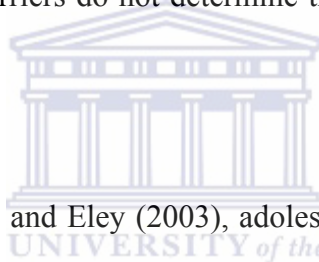
2.4 Factors influencing participation of adolescents' with disabilities in physical activity

The WHO International Classification of Functioning, Disability and Health model (ICF) provides a conceptual framework for understanding the interaction between adolescents and their environment (e.g., physical environment, attitudes of others, or policies) as a barrier or facilitator in their daily activities (CDC, December 8, 2006). This is a key element in the strategies to addressing activity and social participation of adolescents with disabilities to achieve health and wellbeing, and to fulfill objective 6-12 of chapter 6 of Healthy People 2010 (HP2010) that aims: “To reduce the proportion of people with disabilities reporting environmental barriers to participation at home, school, work, and or community activities” (Howard et al., 2004, 123). According to Rosenstock (2005), knowledge of the causal processes is pre-requisite to the design of interventions to correct health risk behaviours that have a chance of success. It is also important to understand the individual’s view of environmental barriers (Howard et al., 2004). This is the focus of the objectives in this study: to identify factors perceived as barriers and facilitators to participation in physical

activities. The following sections will discuss literature on barriers and facilitators adolescents with disabilities experience while engaging in activities.

2.4.1 Barriers to physical activity

Studies show that family income, and the number of parents significantly influences the diversity of physical activities in which a child with disabilities engage in, and their participation intensity (Law et al., 2006). In a study among persons with disabilities aged 17 to 69 years Kinne, Patrick and Maher (1999) found that, exercise self-efficacy, lack of motivation and lack of appropriate exercise advice, were key barriers to exercise participation experienced by persons with disabilities. Kinne et al. (1999) noted that extrinsic barriers do not determine the continuation of the exercise habit.



According to MacPhail, Kirk, and Eley (2003), adolescents with physical disabilities do not participate in physical activities because they lack enjoyment, parents control their decisions, lack time or friends to play with, have limited access to physical activity opportunities, lack preferred choice, and need more encouragement. In contrast, adults with disabilities perceive the cost of an exercise program in recreational facilities, lack of energy, transportation problems and not being aware of suitable exercise facilities, and ignorance of the benefits of exercises as the major barriers to exercise participation (Rimmer, Rubin & Braddock, 2000). In other studies, Rimmer, Riley, Wang and Rauworth (2005) and Rimmer, Riley, Wang, Rauworth, and Jurkowski (2004) found that barriers to recreational facilities arose from the way the buildings were designed, types of equipments in use, unavailability of information, lack of policy on clients with disabilities and the poor attitude of the staff towards persons with disabilities. Rimmer et al. (2000), as well as Boslaugh and

Andresen (2006), recommended that further research should investigate barriers limited to specific groups of persons with disabilities in order to generate findings that are cohort specific.

In a study on environmental issues in school settings involving 34 learners with physical disabilities aged between 10-19 years, Hemmingson and Borell (2001) found that 2 out of 3 learners experienced barriers to engaging in physical activity in both the physical and the social environment. These authors also found that older learners experienced significantly more barriers in the school environment than did younger ones. According to Hemmingson and Borell (2001), majority of the barriers emanated from the schedule of school programmes and the way scheduled activities are carried out in schools. Research has also shown that the explicit or implicit rules pertaining to the performance of a task (occupational form), including the place, speed, and time limits, are often unsuitable for learners with disabilities (Hemmingson & Borell, 2001).

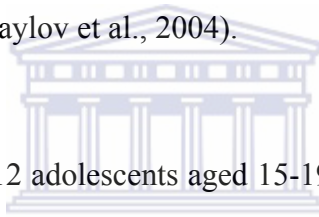
In a separate study with specialists, parents, and children with disabilities, Mihaylov, Jarvis, Colver and Beresford (2004) and Pivik, McComas and LaFlamme (2002) reported that, the mobility of children with disabilities was barred by uneven surfaces, unsuitable footwear, taking medication, poor balance, bullying, physical inaccessibility and the lack of time. In a cross-sectional survey investigating environmental barriers reported by people with spinal cord injury (SCI), Whiteneck et al. (2004) found that people with SCI reported they experienced barriers moving in and around their living areas and in transportation but very minimally in getting assistance at home, health care, information, attitudes of family members,

discrimination, and attitudes at workplace or school. In contrast, adolescent learners with disabilities perceive their barriers as coming from the architectural design of school buildings and the schools' community who have poor knowledge of adolescents with disabilities and lack of awareness about disability (Paul, 1999).

Adolescents with disabilities might have fewer opportunities to show their abilities and experience social isolation because of limited mobility (Blomquist, Brown, Peersen & Presler, 1998). These lead to the loss of opportunity to interact with peers, which prevents them from developing an age appropriate identity (Blomquist et al., 1998) and engaging in habitual physical activity behaviour. Physical activity behaviour is described as “the interaction between the person, the task and the environment” (Hemmingsson & Borell, 2000, p.163). Therefore, Physical activity participation is a function of the individual's experience of their local environment. Arising out of the adolescent-task-environment interdependence, none of these three elements can be held as an independent entity in behaviour change models and interventions. Mihaylov et al. (2004) stated that the environment should be viewed from; (1) the way the individual perceives it as influencing participation in physical and social activities with minimal or no assistance and, (2) the attitudes of persons without disabilities towards those with disabilities, (3) including the way local authorities where they live recognize their right to (implement national disability policy guidelines) barrier-free physical and social environments (including transport, health, employment) that promote participation.

Environments within a school that are not accessible prevent adolescents with disabilities from participating in the use of spaces, resources/facilities, and

educational activities provided in that school (Hemmingsson & Borell, 2000; Pivik et al., 2002), thus, increasing the need for physical help. In a study on how assistants influence participation in adolescents with physical disabilities, it was found that inaccessible environment and lack of assistive devices increased students' need for manual assistance and decreased their influence on the type of help provided, including when and how help is given (Hemmingsson, Borell & Gustavsson, 2003). These researchers also found that if assistance was perceived to increase opportunities for social participation, it was appreciated, and vice versa (Hemmingsson et al., 2003). Physical activity programming, therefore, should set a criterion that integrates objective assessments of the disability-friendliness or conduciveness to participation of the local environment (Mihaylov et al., 2004).

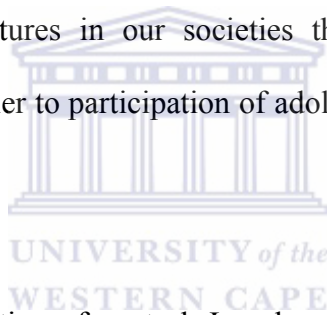


In a qualitative study among 12 adolescents aged 15-19 years with restricted mobility from northern Sweden, it was found that physical environments such as inaccessible school playgrounds made adolescents with disabilities feel unequal to their peers without disabilities and perceive themselves as different (Skär, 2003). Such inaccessible places and facilities make even the social environments (e.g. peer groups) become inaccessible – that is, isolating. An example is when trying to reach settings where other peers spend time. Skär (2003) also found that adolescents with a disability do not cope with physical activities done with other non-disabled peers due to physical pain or lack of stamina, making some to withdraw when it hurts.

Another barrier to participation in peer activities is bad attitudes manifested in the unpleasant utterances that those without disability express towards the adolescents with disabilities (Taub & Greer 2000). For instance, it was noted that able bodied

peers used such expressions as “lame duck” or “wooden-leg” (Skär, 2003, p.641). In a qualitative study, Taub and Greer (2000) also found that able bodied peers made fun against those with disabilities.

According to literature, adolescents with disabilities are, to a large extent, excluded from their peer group and have fewer experiences of peer contact outside regular school (Skär, 2003; Taub & Greer, 2000; Stevens et al, 1996). Boyce (2001) noted that, participation in health promoting activities may be hindered by life situations of disadvantaged groups, such as social isolation of adolescents with disabilities, physical inaccessibility of services, and lack of economic resources. In addition, social-cultural lifestyle structures in our societies that restrict the movement of women are an additional barrier to participation of adolescent girls with disabilities in social activities.



Another barrier is the perception of control. In a longitudinal study of pupil’s aged between 8-13 years, Skinner, Zimmer-Gembeck, and Connell (1998) found that engagement in school activities of children varied as a function of changes in their perceptions of control. When the perceived control decreased, engagement decreased as well, and vice versa. Additionally, Stevens et al. (1996) found that more than 60% of adolescents with physical disabilities experienced parental control over their decisions on what they wanted to do, which was a barrier to the autonomy of engaging in physical activities.

Therefore, barriers to physical activity are experienced in various forms, which imply that there is a need to study barriers to physical activity in adolescents with physical

disabilities to know why they are not engaging in habitual physical activity. The current research will guide future development of interventions underpinned by the new knowledge of barriers of physical activity.

2.4.2 Facilitators of physical activity

According to MacPhail et al. (2003), young people want to have more time for physical education (PE) and sport in school, and a wider choice of activities. MacPhail et al. (2003) also noted that adolescents want to participate in activities that cater for diverse competences and disability. Kristen, Patriksson, and Frilund (2002), and Taub and Greer (2000), found that children and adolescents participate in sports to get emotional and social benefits, including making new friends and learning, to achieve improvement in functional impairment (strengthening one's physique), for body perception (becoming someone), to experience nature, and to have fun. Adolescents with disabilities report to get most of their physical activity by playing with other children during school sports than from parents and family members (Pan et al., 2005).

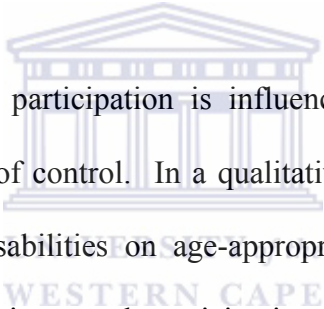
In a phenomenological study involving eight children and their parents, Heah et al. (2007) found that children with physical and neurological disabilities participated in the physical activities that they enjoyed and perceived successful in performing. In view of research evidence, the adolescent with a physical disability participates in activities that provide opportunity for independence and that give the company of others. Above all, adolescents with physical disabilities give high premium to social participation in the meaning of being accepted and also being included in peer group (Hemminsson, Borell & Gustavsson, 2003). In school, adolescents with physical disabilities enjoy the company of their classmates more significantly than that of other

children (Stevens et al., 1996). Heah et al. (2007) found that those activities that provided children the opportunity to experience enjoyment had the best chance of ensuring their participation. Paul (1999) also showed that students with disabilities derive much emotional support and physical assistance such as carrying books, wheeling the wheelchair, personal care, and other school related activities from their personal support system made of friends and other social support networks.

A greater insight of adolescent activity behavior and factors that determine participation in physical activity can only be found by carrying out surveys to get their views about physical activity. Kristen et al. (2002) argues that adolescent conceptions determine the starting and maintenance of physical activity. In a study among 472 pupils with disabilities, Almqvist and Granlund (2005, p.306) found that for an adolescent with disabilities to participate, there has to be an experience of “being a part of”, “an ability to act in a situation or a context”, and “availability to activities in the designated context.” Above all, an adolescent’s perception of control determines participation in physical activities.

When adolescents with disabilities are provided with opportunities to engage in the activities they prefer, their perception of competence increases, and they positively reinforce themselves to become more independent (Almqvist & Granlund, 2005). Almqvist and Granlund (2005) stated that an individual does not interact with all aspects of the environment except when the person perceives the availability of an opportunity to actively interact with the environment continuously. The more adolescents perceive opportunities are available to them, the more they engage in physical activity. In a cross-sectional study with 11 female athletes with physical

disabilities aged 20-38 years, Ruddell and Shinenew (2006) found that the participants had significantly been socialized into the sport by significant others, including friends with disabilities, parents, siblings, therapists or coaches, in their introduction into the sport. Almqvist and Granlund (2005) found that positive interactions of pupils with teachers and peers influenced their participation in school activities. According to Ruddell and Shinenew (2006), those proximal to adolescents with physical disabilities are important socializing agents to physical activity and sports participation of this group, in and outside school settings. In a cross-sectional study on 85 young people with disabilities, a significant correlation was found to exist between perceptions of social support from close friends and global self-worth (Antle (2004).



Adolescents with disabilities participation is influenced more by their individual autonomy and internal locus of control. In a qualitative study among 22 parents of adolescents with physical disabilities on age-appropriate activities, Luther (2001) found that parents reported improved participation after planning independence promoting activities with the adolescent. Health professionals and those around the family have been shown to increase independence in the performance of activities by adolescents with physical disabilities. Adolescents with chronic disease and physical disabilities should, therefore, be encouraged and appropriately matched to the physical activities they feel competent to participate in (Greydanus, Patel, Luckstead & Pratt, 2004).

Therefore, literature in this section has shown that factors perceived to facilitate physical activity participation among adolescents with disabilities vary as do those that are perceived as barriers. This implies that identifying the factors facilitating

physical activity participation is an important and a pre-requisite step to understanding the lifestyle patterns and the dynamics of the behaviour among adolescents with disabilities.

2.5 Lifestyle patterns and behaviours of adolescents with disabilities

The period of adolescence is of particular importance in the life of human beings in that it encompasses a period of rapid physical and psychological growth and development, and the acquisition of major skills for independence (Simeonsson, Carlsonoe, Huntington, Mcmillen & Brent, 2001). This period in life is the stage for the acquisition of future social roles associated with adults and for expressing what they aspire to be; their goals and future plans (Palisano et al., 2007). Adolescents with physical disabilities develop these skills in a much slower pace compared to the able bodied persons (Anderson & Clarke, 1982). It is also the period that they form adult value systems (Anderson & Clarke, 1982). According to Simeonsson et al. (2001), this is the most appropriate period when life long habits may be formed, such as being physically active and preventing chronic diseases. The transition of adolescents with disabilities is thought to be challenging due to their physical limitations and the barriers they experience from their interactions within their personal, living, and social environments that restrict their participation in life activities.

Adolescents, in general, suffer physical, biological and psychological problems such as lack of self confidence (Anderson & Clarke, 1982). In addition, those with disabilities become over-conscious of their disability, feel lonely and frustrated, and worry about how others view them (Anderson & Clarke, 1982). In contrast, in a study

conducted in Canada among 104 students with physical disabilities aged between 11-16 years, Stevens et al. (1996) found that over 80 % of the adolescents with physical disabilities perceived themselves positively, and over 70% had confidence in themselves. In a meta-analysis of 87 studies of the adjustment to physical disorders in children aged 3–19 years, Geist, Grdisa, and Otley (2003) found that those children with physical disorders were at risk of developing psychological adjustment problems including anxiety, depression, and social withdrawal. In a depressive symptoms survey on 72 children and adolescents with spina bifida aged 8 to 18 years old, Appleton et al. (1997) found that the youth were at risk of depression, low self-worth and contemplating suicide. Howard et al. (2004) cited a 1997 CDC report that up to 31% of children with disabilities experienced sadness or depression compared to 17 % able bodied children. Adolescents with disabilities also experience social exclusion, although the degree of this is entirely determined by where the adolescent live, and not influenced by type of disability (Hammal, Jarvis & Colver, 2004). These factors have been closely associated with behaviour problems such as drug and alcohol abuse, and anorexia in adolescent girls. However, in a study on a convenient sample, Steele et al. (2004) found that adolescents with physical disabilities had lower levels of substance abuse compared to those without disability and were unlikely to engage in regular physical activity during their leisure time. Similar behaviors persist in adulthood (Boyle & Coldero, 2005).

Despite having to manage their impairments, adolescents with disabilities have to cope with the preoccupation of physical appearance, sexual awareness, identifying with a peer group, and development of higher cognitive skills and independence (Geist et al., 2003). Therefore, the health of adolescents with disabilities is, to a large

extent, influenced by factors they experience during their transition from childhood, such as physical growth, family adjustments, social relationships, sexuality and emotional adjustments, and the need for independence in mobility (Zajicek-Farber, 1998).

2.6 Physical activity and health promotion needs for adolescents with disabilities

The physical activity promotion needs for adolescents with disabilities may be viewed from the perspective of health and well-being, as lack of required social strengths such as independence in self-care and mobility, participation in physical activities, and socialization (Zajicek-Farber, 1998). Research evidence has shown that persons with disabilities develop secondary conditions such as osteoporosis, osteoarthritis, decreased balance, bodily strength, reduced exercise endurance, decreased fitness, flexibility, over-weight, and depression (Rimmer, 1999). Adolescents with physical disabilities have been found to develop chronic diseases of lifestyle, pressure sores, underdevelopment of body structure, decline in mental health, and delay in developing physical and social skills needed for independent living (Carmona, 2005). Rimmer (1999) noted that by virtue of having a disability, any injury or illness will significantly compromise the individual's physical functioning, which could lead to an increase of dependence on assistance from family members, schoolmate's teachers, support staff, and peer and community members. Dependence on physical assistance is a function of lack of strength, disability, internal locus of control and autonomy in decision making. Stevens et al. (1996) found that over 60% of 104 learners with physical disabilities aged 11-16 years experienced parental control over their decisions on what they wanted to do because they wanted to protect them. This infringes on their right as children with disabilities as contained in article 30 of the

convention on the rights of persons with disabilities. Article 30 section 5; *d* seeks, “To ensure that children with disabilities have equal access with other children to participation in play, recreation and leisure and sporting activities, including those activities in the school system” (United Nations, 2007). Lack of opportunity to use potential in life skills such as, mobility, play, and other health enhancing behaviours, affects their health in terms of secondary chronic conditions.

In the United States of America, there is a lack of sufficient engagement in physical activities in school and extra curricula activities with enrolment in physical education in school adolescents declining from 74% for ninth-graders to 31% for 12th-graders (Sturm, 2005). Less than two thirds of adolescents enrol in these classes (Hayman et al., 2004). Being older has been shown to be associated with decline in participation in physical activity from 67% in grade 9 to 45% in grade 12, especially in girls, while it is at this time that chronic diseases, overweight, obesity develop (Hayman et al., 2004). Evidence shows that 59% of secondary schools allow exemption of students with physical disabilities from physical education (PE) classes (Centers for Disease Control and Prevention, 1997). Exemptions from PE by school agents contradicts the HP 2010 objective 22-6 that aims at increasing “ the proportion of adolescents who engage in moderate physical activity for at least 30 minutes on 5 or more days of the previous week” (Howard et al. (2004). However, increased access to PE, health education, other structured physical activities and sports in school and at community settings by this group is needed to meet their needs and interests (CDC, 1997). Above all, participation in exercises has a chance of improving and sustaining the *good health* status in adolescents with disabilities (Sturm, 2005). Zajicek-Farber (1998, p.204) describes “*good health*” as “associated with a sense of well-being derived from

a satisfaction in personal relationships, health, education, work, standard of living, community interaction and creative expression and future prospects of growth and development and the absence of stress.”

Practices in sports, fitness, and recreational activities programmes at schools exclude and discriminate adolescents from activities because of their disabilities, weakness, and motivation (Amisola & Jacobson, 2003). Also, lack of stamina has been found to prevent adolescents with disabilities from keeping up with play with their non-disabled peers in school, and some withdraw when it becomes unbearable (Skar, 2003). There is need to eliminate these disparate exclusion factors and promote participation of adolescents with disabilities by creating a role or opportunity for all of those who are interested to meet their needs and motivation to participate, even at the highest level (Kozub & Ozturk 2003). This should include improving individuals' abilities by giving them a variety of activities to choose from and are likely to increase participation (Amisola & Jacobson, 2003). In examining participation for individuals with disabilities in sports programs, Kozub and Ozturk (2003) stated that participation criteria in physical education would have to be inclusive with respect to team selection for an increase of participation to be met.

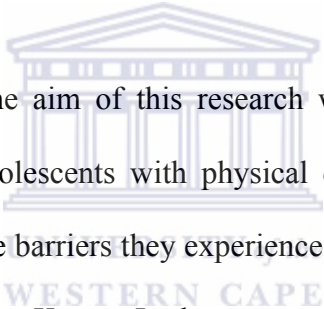
Another area of unmet need is lack of access to physical education and physical activity opportunities. It has been shown that restrictive environments and tasks (rules, time required to complete, equipment, force, or speed) decrease the adolescents' with disabilities perception of safety (need for safety) and their partaking of physical activity become less likely (Menear & Davis, 2007). According to Sturm (2005) and CDC (1997), almost half of U.S. high school students do not receive

regular physical education in school and those who do, receive low quality compared to ideal physical education instruction. In view of the foregoing discussion, this research intends to inform the designing of programmes to decrease physical inactivity by increasing access of physical education, physical activities, and increasing access to places and facilities where adolescents with a disability can be physically active in line with Healthy People Objective 6-12 (Howard et al., 2004). Objective 6-12 aims at reducing the proportion of people with disabilities reporting environmental barriers, participation in home, school, or community activities.

Other reports show that adolescents with disabilities become sad and depressed (Howard et al., 2004; McDougall et al., 2004). With increased physical activity, their state of mental health will improve (Howard et al., 2004) as well as their physical and social skills (CDC, 1997). There is need to promote positive values in youth with disabilities in order to reverse the trend and the culture of inactivity that permeate the adolescent social fabric. Physical activity promotion strategies have potential to change the culture and increase the likelihood to achieving the HP 2010 objective 6-2 - to reduce the proportion of children and adolescents who are reported to be sad, unhappy, or depressed (Howard et al., 2004). Studies have shown that physical activities (exercise) and lifestyle changes can maintain their beneficial effects on weight decrease for 10 years (Amisola & Jacobson, 2003).

Adolescents with disabilities like their peers without disabilities need opportunities to develop skills for building social group cohesiveness, friendships, and to attract social support which are derived from participation in school-based physical education and individually-adapted health behavior change programs (Task Force on Community

Preventive Services, 2002). Studies evaluating school-based physical education found that there was ample evidence that supports its effectiveness in increasing physical activity level (Kahn et al., 2002). Increasing physical activity has the potential to postpone the development of Type 2 diabetes at pre-diabetes and undiagnosed diabetes stages in adolescents, specifically those with physical disabilities (Colagiuri, Colagiuri, Yach & Pramming, 2006). Other known factors that impact on adolescent health during their transition from childhood, such as physical growth, family adjustments, social relationships, sexuality and emotional adjustments, and the need for independence in mobility, require attention to mitigate their effects on health outcome (Zajicek-Farber, 1998).



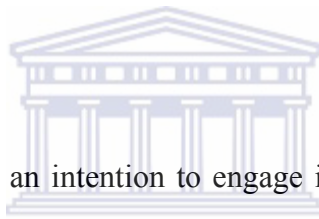
As stated in Chapter One, the aim of this research was to establish the levels of physical inactivity among adolescents with physical disabilities and to learn what facilitates participation and the barriers they experience when engaging in activities in an African context, in this case, Kenya. In the process of review, it has emerged that very few studies have identified barriers to engaging in physical activity among adolescents with physical disabilities, in particular of the age group 14-21 years. Most of the studies reviewed combined children and adolescents in their samples. Majority of them were cross-sectional studies on small convenient samples and therefore their findings could not be generalized. The present study was similar to the former studies and used the strengths of those studies. However, the present surveyed only adolescents with physical disabilities aged 14–21 years concerning, their level of physical activity participation, barriers and facilitators they experienced during physical activity.

2.7 The theoretical framework

This study investigates the levels of physical inactivity among adolescents with physical disabilities based on the Theory of Planned Behaviour's (henceforth, TPB) concept of behavioural control and self-efficacy. TPB explicates behaviour as a function of behavioural intentions and perceived behavioural intentions (Conner & Armitage, 1998). This is similar to the social-cognitive approach to personality and behaviour premise that human behavior is rational and intentional (Bermúdez, 2006). According to Conner and Armitage (1998), TPB suggests that individuals are inclined to perform only those activities they have control over, but none of those they are restricted or have no control over. Ajzen (2002) argued that a state of "perceived behavioral control reflects the actual control a person can exercise in the situation and is a direct predictor of behaviour. The perceived behavioural control an adolescent with physical disabilities has is thought to influence their experience of conditions as barriers or facilitating behaviour (Ajzen, 2002).

Behaviour in TPB is seen as a dynamic process that is influenced by the person's belief in own ability to perform certain actions, and is dependent on personality, context, environment, availability of opportunities, and resources (Conner & Armitage, 1998). According to Bermúdez (2006), personality variables predispose individuals to behaviours that could be harmful or protective to their health. However, according to the social-cognitive approach, for individuals to engage in physical activity, they have to develop a set of cognitive, affective, and motivational processes that facilitate them in taking a decisions course in which actions follow and are maintained (Bermúdez, 2006).

The second concept that informs this study is the concept of self efficacy and perceived self-efficacy. Bandura (1998,p.624) defined self-efficacy as “one’s capability to organize and execute the courses of action required to produce given levels of attainments, and theorized that it operationally influences one’s motivation, thought processes, incentives and outcome expectations”. Perceived self-efficacy refers to “people’s beliefs about their capabilities to exercise control over their own level of functioning and over events that affect their lives” (Ajzen, 2002, p. 667). Ajzen (2002) showed that behavioural beliefs produce a favourable or unfavourable attitude toward the behaviour. Such beliefs may result in perceived social pressure from peers or family for the adolescent to exhibit behaviour appropriate to age, peers, or social group.



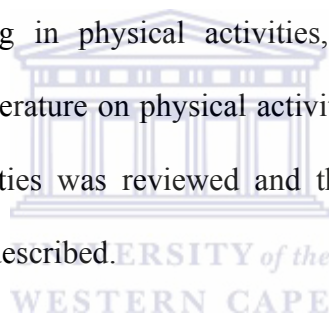
It is common knowledge that an intention to engage in certain behaviour which has strong motivations may never be implemented because of process factors such as the cost, social acceptability of the behaviour, perceived or inherent risks such as dangerous sports, substance usage, and high-risk sexual behaviour. Identification of those variables that make an individual vulnerable makes it easier for therapists and physical education teachers to target the variables to improve the individual’s prospects of health.

2.8 Summary of the chapter

The review showed a high proportion of children and adolescents with disabilities in developed countries are inactive. This group experience barriers in the personal, physical and social environments in the home, school or community settings. These include inaccessibility of physical environments, strict rules, and lack of preferred

activities, difficulties in social interactions with peers, parents and teachers and to lesser extent culture. Key facilitators were: having a companion; gaining emotional support and acceptance by peers and identifying with a group as well as the influence of important others (friends, parents and teachers). It was also found that the individuals have lower physical functioning and are at a higher risk for developing chronic health problems compared to those without disabilities. This is the concern of the present study.

In summary, in this chapter the evidence on the prevalence of physical inactivity among adolescents with physical disabilities, the barriers and facilitators they encounter while participating in physical activities, their lifestyle patterns, and behaviors was discussed. Literature on physical activity and health promotion needs for adolescents with disabilities was reviewed and the theoretical framework that illuminates the research was described.



Chapter Three

Methodology

3.1 Introduction

This chapter outlines the methodology used in the research. A quantitative approach was used for the research. The research setting, sampling and the questionnaire used for data collection, together with the inclusion and exclusion criteria, are described. A description of the pilot study, data analysis procedure and a statement of ethical considerations are also included.

3.2 Research design

This is a cross-sectional study that used a quantitative design. The study design was chosen because the targeted sample was expected to be large and the adolescents could be recruited from secondary schools in three different provinces. Domholdt (2000, p.103) stated that learners' special characteristics such as disability, demographic, geographical and duration for the study, are important considerations for selecting this research design.

3.3 Research setting

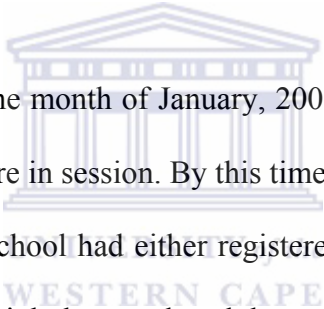
The adolescents were drawn from all the three high schools for the physically disabled in Kenya. They included: the Salvation Army Joytown Secondary School in Thika, Central Province; the Joyland Secondary School in Kisumu, Nyanza Province; and Mombasa High School for the physically disabled in Mombasa, Coast Province. The three schools are national high schools that are jointly sponsored by the government of Kenya and the Salvation Army church. All the three schools formerly

offered high school education only to learners with physical disabilities until 2005/2006, but now offer inclusive education curricula, specifically to adolescent learners with and without physical disabilities. No visually or hearing impaired learners are admitted to these schools. The schools admit learners after passing the Kenya National Certificate of Primary Education offered on completion of class 8. Each of the three schools has a resident physiotherapist seconded from the Ministry of health.

3.4 Study population and sampling

The targeted population included all adolescents with physical disabilities attending the three high schools in Kenya. A purposive sampling of adolescents was used in all the three high schools to achieve the diversity of the sample and retrieved information. Neuman (2006) stated that purposive sampling is suitable for the difficult-to-reach special target population. So this approach was used to select adolescents with physical disabilities in secondary schools. However, in this form of sampling, the researcher is not certain whether the selected adolescents represent the target population (Neuman, 2006, p. 223). The researcher had anticipated that there would be a total of 360 adolescent learners with physical disabilities in all the three schools. In the 2006 academic year Mombasa High School for the disabled had 200 adolescent learners and only 60 adolescent learners had disabilities, Joyland Secondary School in Kisumu had 120 adolescent learners of whom only 44 had disabilities, and the Salvation Army Joytown Secondary School in Thika had 226 adolescent learners with 158 adolescents with disability among them. All 262 adolescent learners with physical disabilities in the three schools were contacted and requested to participate in the study voluntarily. They were sent letters outlining the

purpose of the research and a requesting consent assuring them of confidentiality of information and safety, and stating the right of the adolescents to withdraw without loss of benefits. A consent form was attached for adolescents aged 18 years and above to sign. Guardians of those adolescents below 18 years signed on their behalf in accordance with the requirements of the ethical review boards of the Ministry of Science and Technology in Kenya, and that of the Higher Degrees Committee of the University of the Western Cape in South Africa. Two hundred and thirty seven (n=237) eligible adolescents consented to participate in the study and were given questionnaires written in English. All consenting adolescents returned filled questionnaires.



Data collection was done in the month of January, 2007. During this time, only form two, three and four classes were in session. By this time of the year, those intending to join form one from primary school had either registered, were registering or had not reported to the schools. This might have reduced the anticipated sample size.

3.5 Inclusion and exclusion criteria


Because the study was purposive, targeting adolescent learners with physical disabilities in high schools, only those between the ages of 14 to 21 years and who had physical disabilities were included in this research. Those above or below this age bracket or had intellectual disabilities or were blind or deaf were excluded. Both male and females were represented. Since the setting was in high schools, almost all of the learners were within the age bracket. All those eligible were able to read, write, and speak fluent English.

3.6 Data collection method

A self-administered questionnaire was used to collect the relevant information from the adolescent with physical disabilities. This method of data collection is used by physiotherapists, mostly to document information on facts, knowledge, and behaviour (Domholdt, 2006, p. 206).

In this study, care had been taken in the selection of measures to include in the research questionnaire, which had four parts – Sections A to D. Section A for demographic data, Section B for measurements for physical activity, Section C for measurements of barriers to physical activity, and Section D which measured facilitators to physical activity participation.

3.6.1 The instrument



The adolescents completed a modified physical activity scale for individuals with physical disabilities (PASIPD) (Washburn, Zhu, McAuley, Frogley & Figoni, 2002). This was adapted to the Kenyan context which involved replacement of physical activities with the familiar ones to learners with disabilities and were appropriate to the Kenyan context. Two activities, 11 and 13 on the questionnaire in particular, which did not suit learners at school, were omitted. The modified scale comprised categories assessing leisure including the light, moderate, and vigorous sport, among others, and school activity. The adolescents were asked to remember the number of days they engaged in these activities and the average time they had spent in each activity. The PASIPD score was calculated by multiplying the average hours per day for each activity by a metabolic equivalent (MET) value associated with the intensity

of the activity then summed up (Washburn et al, 2002). The mathematically maximum possible score for the modified scale was 156 METS hr/d.

The adolescents also completed the barriers to physical activity scale based on the Craig Hospital Inventory of Environmental Factors Short Form (CHIEF-SF) (Whiteneck et al., 2004) plus perceived barriers to physical activity from research evidence. In addition, they completed the facilitators of physical activity scale comprising six self-rated abilities (self-efficacy) for health practices dimension, and a section on environmental facilitators comprising of 19 variables.

3.6.1.1 Compilation of the instrument

Following a review of literature utilizing various outcomes measures, the author in consultation with an expert in the area found no one measure could respond to all the objectives of this study. For this reason and through consensus, (1) the physical activity scale for individuals with physical disabilities (PASIPD) (Washburn et al, 2002) was identified as the outcome measure for the level of physical activity. (2) The CHIEF-SF (Whiteneck et al., 2004) was also identified as a source of questions on environmental barriers. Seven questions were paraphrased and adapted whilst six were omitted. The other questions included in the barriers questionnaire were constructed from research findings of barriers perceived by children and adolescents with disabilities (MacPhail et al., 2003; Rimmer et al., 2000 & Kinne et al., 1999). Also made out of previous research findings was (3) the facilitators' questionnaire. Seven self-efficacy questions for facilitators scale were adapted from the Self-rated abilities scale received via email in 2006 from one author, Heather Becker (Becker,

Stuifbergen & Oh, 1993). Other questions for the facilitators scale were constructed from the findings by Kristen et al 2002.

3.6.2 Validity and reliability of the instrument

In this research, the Cronbach's alpha and Intraclass correlation coefficient (ICC) were used to test for reliability. Cronbach's alpha is a widely used psychometric measure for estimating the internal consistency of scales with multiple items (McGraw & Wong, 1996). In social science, a Cronbach's alpha of >0.70 is acceptable and good at >0.80 (Gliem & Gliem 2003). Intraclass correlation coefficient (ICC) is defined as a measure of the proportion of a variance that is attributable to objects of measurement (McGraw & Wong, 1996).

3.6.2.1 Validity and reliability of the physical activity scale

The developers found PASIPD scale correlations between each survey item and the total PASIPD score all statistically significant ($P < 0.05$) and ≥ 0.20 (range, 0.20 – 0.67). A Cronbach α for each of the 5 factors ranged from 0.37 to 0.65, and a low-to-moderate internal consistency was observed. The PASIPD has a good content and construct validity despite having a low internal consistency and was therefore used in this study.

3.6.2.2 Validity and reliability of the barriers to physical activity scale

According to the developers the CHIEF, total score has high test-retest reliability (intraclass correlation coefficient [ICC] = 0.93) and high internal consistency (Cronbach α = 0.93) but lower participant-proxy agreement (ICC = 0.62) (Whiteneck et al., 2004). The CHIEF-SF discriminates between people with different disability levels and disability types.

3.6.2.2 Validity and reliability of the facilitators of physical activity scale

The self-rated exercise efficacy subscale reproducibility was found to be 0.69 (non-disabled adults) with internal consistency (Cronbach's α) of 0.90 for adults with disabilities (Kinne et al., 1999, p.17). According to Ajzen (2002), self-efficacy is measured by rating confidence to overcome common physical activity barriers when used in the trans-theoretical model. The variables on self efficacy were combined with the 19 environmental facilitator variables. Retest of the reliability was good (Cronbach's α 0.807 [ICC= 0.807]) of the modified measure of 25 variables after pilot study. This measure has good construct and content validity.

3.7 Pilot study

Although the questionnaires had been used in different contexts and had excellent test-retest reliability, such as the CHIEF-SF component of the barriers scale (Whiteneck et al., 2004), its subsequent modification for this study could have had implications on this reliability. In addition, because the contexts were different in culture and the demography of the sample, it was necessary to re-test the validity and reliability of the modified version.

An expert in the area of the study (physical activity, exercise, sports and recreation among youth) from the University of the Western Cape examined the questionnaire for content validity at different times during and after it was fully developed. The construct and criterion validity was met by the fact that its scales were in concordance with what other researchers in the area of the study recognized as valuable constructs to measure environmental factors, both psycho-social and physical (self-efficacy,

psycho-social and physical factors) for their perceived influence on physical activity participation (Mulcahy, 2005; Dunn et al., 1998).

A pilot study was then conducted to pre-test the research questionnaire in Kenya among fifteen (n=15) adolescents with physical disabilities who were not included in the main study. According to Domholdt (2000, p. 211), piloting is used to determine the duration taken to complete the questionnaire and assess its clarity, rate of return, and presence of extraneous responses provided for individual questions. The study found clarity of all the questions except Section B, questions 11 and 13 which read: *what were these activities? Home... school... community...* All the adolescents in the pilot study finished filling in the questionnaire within 30 minutes and had no difficulty, except for responding divergently in the questions 11 and 13. In these two, 53% (n=8) of the adolescents gave the type of activities they engaged in while 47% (n=7) of adolescents in the study filled the place (home, school or community) without specifying the activity they engaged in. The section B was therefore altered to read as follows: *what were these activities?done at home, school or community?* This made the questionnaire understandable and specific in order to gain similar responses.

Data from the questionnaires filled by the fifteen adolescents in the pilot study was entered into SPSS version 14.0 and used to test the reliability of the scales in the questionnaire. The barriers scale test yielded a Cronbach's α of 0.666 (ICC=0.666). This reliability attenuated to Cronbach's α 0.506 (ICC=0.506) when physical factors were omitted in a subsequent test, which showed that the twenty items were more reliable when used as a single scale. The physical factors included lack of suitable

facilities, clothes/equipment, time, and transport, and problems with uneven playgrounds. This scale was used in the research, based on its relative strengths and accepted face validity. Test of all 26 physical activity scale items yielded a Cronbach's α of 0.663 (ICC= 0.643). The reliability of the seven items meant to measure self-efficacy as a sub-scale was tested, which was very low (Cronbach's α 0.242 [ICC=0.242]). Test of the other 19 items in the scale showed a high reliability (Cronbach's α 0.847 [ICC=0.836]). Given the low reliability in the whole scale (Cronbach's α of 0.663), further reliability tests were carried out. When only two items were omitted ("fitting exercise into routine" and "finding accessible places") from the original 26 items, the 24 remaining items yielded higher reliability (Cronbach's α of 0.830 [ICC= 0.811]) of the scale. Further tests for the effects of the two items were done. When only 1 variable ("find accessible places") was omitted the reliability in the remaining 25 variables in the scale increased (Cronbach's α 0.807 [ICC= 0.807]) compared to that of the initial 26 variables. When only "fit exercise into my regular routine" was omitted, the reliability attenuated to Cronbach's α 0.739 (ICC= 0.739). Based on these findings, it was concluded that the item "find accessible places to exercise in the community" had a strong attenuating effect on the correlation co-efficiency of the scale items and, therefore, found to be inappropriate to include in this scale.

3.8 Data analysis

The SAS and SPSS soft-wares were used to analyze the data collected from the survey. The physical activity scores were computed using the SAS. Detailed analyses were done using SPSS version 14.0 because it provides the most comprehensive way of analyzing categorical variables (Neuman, 2006, p.372). Descriptive statistics for

the variables: level of physical activity, barriers and facilitators to activity participation for both male and female adolescents were tabulated.

The sum of scores for lifestyle activities classified as *moderate* and *vigorous*-intensity (Appendix 1 Section B, question: 14, 15, 16 &18) were used to assess the levels of physical activity (Kurpad, Swaminathan, & Bhat, 2004). A bench-mark physical activity score equal to ≥ 7.5 METS hr/week (3 METs x $\frac{1}{2}$ hr x 5 days) was calculated at the relative energy expenditure value of 3 METS for engaging in moderate physical activity, based on the recommended half an hour per day of moderate physical activity on 5 days of the week as the lowest energy expenditure necessary for one to be declared as active. This was used as the bench-mark to differentiate between those inactive from the active. “1 MET is defined as a metabolic expenditure at rest corresponding to an oxygen uptake of 3.5 ml O₂/kg” (Laaksonen et al., 2005) while moderate activities are those activities that expend 3-6 METS (Levin, Ainsworth, Kwok, Addy, & Popkin, 1999).

Variables perceived as barriers to physical activity were compared with the levels of physical activity in both sexes using association analysis. Association analysis to compare variables facilitating physical activity with the levels of physical activity was also used. Further, Chi-square test of association was done between independent variables and individual variables in both barriers and facilitators scales. Exploratory factor analysis was performed on barriers and physical activity scales.

3.8.1 Exploratory factor analysis (EFA)

Exploratory factor analysis was used to identify a small number of latent dimensions (factors) which can be used to explain the interrelatedness in the data given by the

variables in each scale (the barrier and facilitator scales). The two groups of variables were examined by subjecting them to Principal Components Factor analyses with varimax rotation, first for the barrier scale, and then the facilitator scale. Factor solutions were extracted using the eigenvalue greater-than-one (≥ 1) criteria. The classification of variables to specific factors was based on the largest correlation (factor loading) between a variable and the specific factor (Appendix 2b & 3b).

EFA of the 22 variables constituting the Barrier to Physical Activity scale resulted into 6 factors (See Table 3.1). These accounted for 54.328% of the total variance in the data (Appendix 2a). The factors were correlated with age.

EFA of the 25 variables constituting the Facilitators to Physical Activity scale were analyzed separately as 6 self-efficacy variables (Table 3.2) and 19 psycho-social and physical variables (Table 3.3). Analysis of the self-efficacy variables resulted in one factor. The 19 psycho-social and physical variables resulted in 5 factors that accounted for 60.39% of the total variation in the data given by the variables (Appendix 3a). The factors were correlated with age.

Table 3. 1: Barriers to physical activity scale variables grouped by factors

Barrier factors	
1	<ul style="list-style-type: none">• People at school do not assist me to become active.• Negative attitude towards me from my family has been problem.• Negative attitude towards me from schoolmates has been problem.• People discriminate or avoid being associated with me.• Lack of advice about exercise or physical education at school.
2	<ul style="list-style-type: none">• Lack of transport has been a problem for me.• Uneven play grounds and compounds make it difficult to do exercise.• There are no suitable facilities nearby.• I have an injury or disability that stops me.• I need to rest and relax in my spare time.
3	<ul style="list-style-type: none">• I haven't got time.• I haven't got the right clothes or equipment.• People at home do not assist me to become active.• I'm too lazy/not motivated/can't get started.
4	<ul style="list-style-type: none">• My health is not good enough.• I'm too shy and feel embarrassed.• There's no one to do it with.• I haven't got the energy.
5	<ul style="list-style-type: none">• I fear getting injured or damage to my health.• I'm not the sporty type.• I don't enjoy physical exercises.
6	<ul style="list-style-type: none">• I'm too fat.

Table 3. 2: Self-efficacy variables grouped as a factor

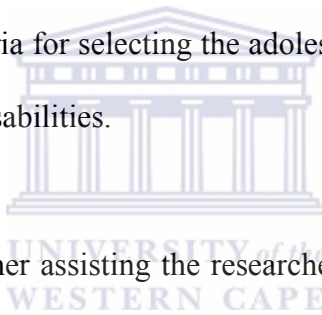
Self-efficacy factor	
	<ul style="list-style-type: none">• Keep from getting hurt when I exercise• Know when to quit exercising• Do exercises that are good for me• Fit exercise into my regular routine• Do stretching exercises• Find ways to exercise that I enjoy

Table 3. 3: Psycho-social and physical facilitator variables grouped by factors

Psycho-social and physical facilitator factors	
1	<ul style="list-style-type: none">• Making new friends.• Strengthening my body to look good.• Learning and gain experience.• Having a friend to exercise with.• Gaining acceptance in my group.• Gaining more self-confidence in doing exercises I like.• Gaining self-satisfaction.• Improving my ability to move without assistance from others.
2	<ul style="list-style-type: none">• Positive attitude towards me from schoolmates and teachers.• Positive attitude towards me from other people.• Positive attitude towards me from family members.
3	<ul style="list-style-type: none">• Enjoying and having fun.• Maintaining a healthy body.• Having the right clothes or equipment.
4	<ul style="list-style-type: none">• Encouragement from friends to be active.• Encouragement from family to be active.
5	<ul style="list-style-type: none">• Physical education classes and exercise advice at school.• Having access to suitable facilities.• Reducing my body weight.

3.9 Procedure

A letter requesting for permission and copies of clearance letters from the Ministry of Science and Technology Kenya, the Higher Degrees Committee of the University of the Western Cape, South Africa, and the research proposal, were given to the administrators of the selected high schools. In the three high schools the administrators gave written permission (Appendix 9; a, b, & c). After permission was granted the researcher was assigned a teacher - either the teacher in charge of guidance and counselling or the one on duty in all the three settings - to assist with accessing the adolescent learners with physical disabilities. In each school, the researcher held a meeting with the teacher assigned to assist him. In his meeting the researcher explained the criteria for selecting the adolescents for the research pointing to only those with physical disabilities.



In Nyanza province, the teacher assisting the researcher asked those with disabilities to meet in the assembly hall from where the researcher was introduced to them. In Coast province, the teacher assisting introduced the researcher to the learners with disabilities in the school's dining hall after they had had their lunch. In Central province the introduction was done in their class rooms between lessons.

In all schools, the purpose of the research was explained to the learners and a request made for them to participate voluntarily. Each adolescent learner was given a letter explaining the purpose of the research and another requesting for participation plus a consent form. The adolescent learners were given the evening of the first day to familiarise themselves with the letters and request their parents or guardians' consent. It was arranged for the researcher to begin data collection the following day. In the

second day, those who consented were handed the questionnaires to fill during break time. The researcher spent ample time with all the learners in each school and responded to all questions asked relating to the questionnaire until it was clear that all learners were fully familiar with the question style. The researcher then sat conveniently outside to avoid influencing the process while the teacher supervised the learners as they completed the questionnaires. Most of them were able to hand in the completed questionnaires before returning to class in the afternoon while some handed in their completed questionnaires at 4:00 p.m. The class representatives assisted to collect the questionnaires which were completed late and handed them in to the researcher who waited in a rest room in each of the schools.

3.10 Data capturing

The data was captured utilizing the SPSS, introduced earlier as the Statistical Package for the Social Sciences software, for the analysis. The responses were converted from nominal to numerical format. The 'not at all, a little, somewhat, mostly, and completely' options in Barriers and Facilitators scales (Appendix 4) were assigned 1,2,3,4 and 5 respectively. The demographic data were also assigned numerical codes. Finally the Physical Activity scale had questions 11 to 21 which had four options for days and hours (time) respectively. Question 11 had been included to familiarize participating adolescents to the questionnaire style and therefore was omitted during analysis. For the purpose of analysing the level of physical activity, the scores of activities defined as moderate and vigorous intensity were combined and recoded into a different variables as options 1 inactive (<7.5 METs hr/week) and 2 for active (≥ 7.5 METs hr/week). This is consistent with Kurpad et al. (2004) table of activities adapted from Ainsworth, Haskell, and Leon et al. (1993). Following the adapted table of activities, questions 14 and 18 constitute moderate activities and questions 15 and

16 vigorous activities (for more details on activities categories, see the questionnaire, Section B in Appendix 4).

3.11 Ethical considerations

The researcher obtained permission from the Higher Degrees Ethics Committee of the University of the Western Cape in South Africa before conducting the study. He also obtained ethical approval from the Ministry of Science and Technology in Kenya and the respective schools' administrators in Kenya (appendices 7,8,9,10,11 &12). The purpose and importance of the research was explained to the adolescents and guardians in a letter. After agreeing to participate, the adolescents who were 18 years and above were requested to sign the consent form. Adolescents less than 18 years brought signed consent forms from their guardians before they were allowed to participate in the study. Contact telephone numbers were provided. Participation was voluntary and it was made known to the adolescents they had a right to withdraw at any stage with no harm. The adolescents were assured of safety and that information gathered would be kept confidential and used for research purposes only. Results will be made available to the respective ministries, participating schools, sponsor, and the University of the Western Cape.

3.12 Summary of the chapter

In this chapter the methodology used in the study, its design, research setting, and sampling, including the inclusion and exclusion criteria, were described. Also described was the data collection questionnaire and the procedure used in data collection. A motivation of the pilot study and data analysis was discussed and supported with references. The procedure to ensure the study was conducted in an ethical manner was explained.

Chapter Four

Results

4.1 Introduction

This chapter presents the results of the analysis of the survey data. The descriptive characteristics of the sample of adolescents and their level of physical activity are reported. Also presented in this chapter are the results for the analyses of barriers and facilitators of physical activity scales. Chi-square tests of association results are also reported.

4.2 Descriptive characteristics of the sample

Two hundred and sixty six eligible adolescents were contacted in the three schools. Two hundred and thirty seven (89.1%) consented to participate in the study and returned their questionnaires. Of the 237 who returned filled questionnaires, three questionnaires were poorly filled and were discarded. Of the total sample, 140 learners (59.8%) were aged between 14-17 years while 94 (40.2%) were aged 18-21 years. The mean age was 17.09 ± 1.90 years with a range of 7 years and a median of 17 years. Fifty eight adolescents were in Form I (first year in high school), 79 in Form II (second year), 54 in Form III (third year), and only forty three 43 were in Form IV (fourth year). The majority ($n=108$) of both males and females reported that their family monthly income was between 5,000 and 10,000 Kenya shillings. Twenty one had problems with eyesight, five suffered epileptic fits, two had asthma, and two had urinary incontinence. Only one learner had a hearing problem. A hundred and fifty

four adolescents reported using special equipment. Of these 89 (69.0%) were males and 65 (62.5%) were females (Table 4.1).

Table 4. 1: Descriptive characteristics by gender

Variable	Males (n=129)	(%)	Females (n=105)	(%)
Age				
14 to 17 years	68	(52.7%)	72	(68.6%)
18 to 21 years	61	(47.3%)	33	(31.4)
School level				
Form I	29	(22.5%)	29	(27.6%)
Form II	38	(29.5%)	41	(39.0%)
Form III	35	(27.1%)	19	(18.1%)
Form IV	27	(20.9%)	16	(15.2%)
Family monthly income	n=92		n= 85	
5000 - 10000	54	(58.7%)	54	(63.5%)
10000 - 15000	10	10.9%)	10	(11.8%)
15000 - 20000	12	(13.0%)	6	(7.1%)
20000 - 25000	9	(9.8%)	7	(8.2%)
25000 - 30000	3	(3.3%)	4	(4.7%)
30000 - 35000	4	(4.3%)	4	(4.7%)
Presence of other health problem e.g. eyes spectacles, hearing				
Yes	29	(22.7%)	23	(21.9%)
No	99	(77.3%)	82	(78.1%)
Use special equipment: cane/ crutches/ wheelchair				
Yes	89	(69.0%)	65	(62.5%)
No	40	(31.0%)	39	(37.5%)

4.2.2 Gender distribution by reported physical impairments

Two hundred and two adolescents (86.3%) indicated their physical impairments which were grouped into eight subtypes (Table 4.2). These included paralysis of limbs (37.6%), congenital malformations (15.4%), and spinal injuries and deformities (14.1%). Other subtypes included amputated and congenital absence of limbs (9.0%), acquired deformities (4.7%), osteogenic problems (3.4%), muscle dystrophy (1.7%), and stroke and poor health status (0.4%), which will not be discussed any further. Thirty two adolescents (13.7%) did not indicate their impairment (Table 4.2 and Appendix 1).

Table 4. 2: Gender distribution by physical impairments in decreasing order (n=234)

Gender by physical impairment			
Variable	Males (n=129)	Females (n=105)	Total Frequency (n=234)
Paralysis of limbs	54	34	88 (37.6%)
Congenital malformations	13	23	36 (15.4%)
Spinal injuries and deformities	20	13	33 (14.1%)
Amputated and congenital absence of limbs	15	6	21 (9.0%)
Acquired deformities: contractures	6	5	11 (4.7%)
Osteogenic problems e.g. brittle bones	4	4	8 (3.4%)
Muscle dystrophy	1	3	4 (1.7%)
Stroke and poor health status	0	1	1 (.4%)
Missing	-	-	32 (13.7%)

The paralysis of limbs subtype included paralysis of either one or both legs and arms due to polio and paraplegia. The congenital malformations subtype included all forms of birth defects such as club feet, arms, legs and trunk deformities, achondroplasia, and arthrogyrosis. Spinal injuries and deformities subtype included spina bifida, spinal cord injury, and spine deformity following tuberculosis episode or of

congenital origin. In three cases, the questionnaires were discarded because the adolescents filled their copies poorly.

4.3 Physical activity participation

4.3.1 Types of activities analysed as indicated by the adolescent learners

In this section, we present a summary of the various activities the adolescents indicated they participated in as illustrated in Table 4.3. The stationary activities adolescents reported most were: reading (42%), other school activities (21%), playing cards (18%), watching television (9%), and computer games (3%), among others. The light activities the adolescents reported most were: school related activities (3%), physiotherapy exercises (11.4%), stretching (6.9%), walking (4%), and standing on frame. The moderate activities the adolescents reported most were: being wheeled on a wheelchair (38%), dancing (12%), games and sports (2.3%), football (6%), and softball (8%). The most popular vigorous activities the adolescents reported were: wheelchair racing (25%), walking with crutches (15.6%), physical education (10.2%), running (9.6%), jogging (7.2%), football (3%), and basketball (3%). The adolescents also did push-ups and press-ups.

4.3.1.1 Pattern of adolescents' participation the activities

Table 4.4 presents the pattern of adolescents' activity participation in the week for each activity category. Of the 224 adolescents who participated in stationary activities, the majority reported they had engaged in stationary activities (34.8%) in at least 5 to 7 days of the week. Of the 232 who engaged in light activities, the majority participated in light activities (62.9%) for 3-4 days and 29% for 5-7 days during the week. Of the 230 adolescents doing Moderate activities, 49% engaged in moderate activities for 1-2 days and 9% did not engage. Only 8% participated in moderate

activities for 5 or more days in the week. Among the 226 adolescents who reported Vigorous activities, the majority (42%) engaged in vigorous activities for 1-2 days and 8% did not engage. However, only 50% of the 226 adolescents engaged in vigorous activities for 3 days or more. Of 230 adolescents, 9% never participated in moderate activities as did 8% of 226 adolescents in vigorous activities (Table 4.4).

Table 4. 3: Summary of types of activities

Summary of Types of Activities	
Category of Activity	Activities
Stationary activities	Playing billiards, computer games, watching soccer and games, scrabble, draughts, play cards, singing, reading, attending lesson, Chatting, handicrafts [weaving], indoor games, Listening to music on radio, watching TV, sitting, writing
Light activities	Walking or wheel wheelchair to and from classroom, Playing pool, cards, handicrafts, stroking ball game, occupational therapy & physiotherapy exercises, walking, walking with crutches, standing on frame, stretching and physical exercise, throwing ball, swimming, acrobatic, dance and others. Dusting, sweep classroom/dormitory floors polish shoes. collect litter in school compound and care for fellow learner
Moderate activities	Moderate sport and recreation (Hide and seek, swimming, school games, general exercise, gym exercises, Physical education, Wheeling wheelchair and pushing wheelchair, walking competition, dancing, table tennis, softball, playing, , riding bicycle) and heavy school activities (scrubbing dormitory floors, washing windows)
Vigorous activities	Strenuous sport & recreation (basket ball, netball, soccer, aerobic dance, hand cycling [tricycle], running, jogging, wheelchair racing, running, Physical education, singles tennis, walk with crutches, swimming, school sports [shot-put & javelin]) netball, playing soccer, volleyball, and endurance exercises (carrying weights, lifting weights, dips, push-ups, pull-ups, wheel-chair push-ups,

Table 4. 4: Days per week of activity participation for all adolescents (%)

Category of Activity	n	never	1-2days	3-4 days	5-7 days
Stationary activities	224	2.2	33.5	29.5	34.8
Light activities	232	0	8.2	62.9	28.9
Moderate activities	230	9.1	49.1	33.5	8.3
Vigorous activities	226	8.4	42.0	35.4	14.2

4.3.1.2 Pattern of adolescents' participation in the activities according to age

Table 4.5 presents the pattern of adolescents' activity participation in the week according to age for each activity category. Of the 224 adolescents, the majority of the adolescents in both age groups reported they engaged in stationary activities (34.8%) for 3 or more days. The proportion of adolescents aged 14-17 years (67 %) who engaged in sedentary activities for 3 or more days was more than for those aged 18-21 years (60 %) who engaged in similar activities in the week. Of the 232 adolescents, a higher proportion of those aged 18-21 years (67%) than those aged 14-17 years (60%) reported they participated in light intensity activities for 1-2 days in the week. The proportion of the older adolescents who reported they engaged in moderate activities for 1-4 days was marginally higher (85%) than the younger group (81%). Of the 230 adolescents, fewer of the younger group (7%) than of the older group (10%) reported they engaged in moderate activities for 5 days or more. A higher proportion of younger adolescents (12%) than older adolescents (5%) did not engage in moderate activity. A marginally higher proportion of younger adolescents (43%) than that of the older ones (40%) reported they engaged in vigorous activities for 1- 2 days. Of the 226 adolescents, majority (53%) of those aged 18-21 years engaged in vigorous activities for 3 days or more compared to those aged 14-17 (47%).

Table 4. 5: Days per week of activity participation by age group (%)

Category of Activity	Age Group		N	never	1-2 days	3-4 days	5-7 days
	(years)						
Stationary	14 - 17	132	0.8	31.8	32.6	34.8	
	18 - 21	92	4.3	35.9	25.0	34.8	
Light activities	14 - 17	139	0	9.4	60.4	30.2	
	18 - 21	93	0	6.5	66.7	26.9	
Moderate activities	14 - 17	138	11.6	50.0	31.2	7.2	
	18 - 21	92	5.4	47.8	37.0	9.8	
Vigorous activities	14 - 17	137	9.5	43.1	37.2	10.2	
	18 - 21	89	6.7	40.4	32.6	20.2	

Note: This analysis excludes the duration adolescents reported they spent in the activities.

4.3.1.3 Pattern of adolescents' participation in the activities according to gender

Table 4.6 presents the pattern of adolescents' activity participation in the week according to age for each activity category. Of the 224 adolescents, less female (56%) than male adolescents (68%) reported they participated in light activities for 3-4 days. More female (51%) than male adolescents (48%) reported they participated in moderate activities for 1-2 days. More female (12%) than male adolescents (5%) reported they engaged in moderate activities for at least 5 or more days in the week. Of the 226 adolescents, the prevalence of engaging in vigorous activities for less than recommended days (1-2 days) in the week was higher among female (43%) than among male adolescents (41%). Of the 226 adolescents, more males (54%) than females (43%) reported to engage in vigorous activities for the 3 days or more.

Table 4. 6: Days per week of activity participation by gender (%)

Category of Activity	Gender	N	never	1-2 days	3-4 days	5-7 days
	Male					
Stationary		127	1.6	33.1	29.9	35.4
Light activities		129	-	7.8	68.2	24.0
Moderate activities		129	9.3	48.1	37.2	5.4
Vigorous activities		127	4.7	40.9	40.2	14.2
	Female					
Stationary		97	3.1	34.0	28.9	34.0
Light activities		103	-	8.7	56.3	35.0
Moderate activities		101	8.9	50.5	28.7	11.9
Vigorous activities		99	13.1	43.4	29.3	14.1

4.3.2. Analysis of all adolescents physical activity

Of the 234 adolescents' physical activity score for all categories of physical activities (leisure-including the light, moderate, vigorous sport, among others, and school activity), 5 cases were extreme outliers (scores ranged between 102.3 and 126.5) and were omitted. These were due to over-reporting by some participants. The other 229 cases had a mean score of 24.70 ± 16.784 METs hr/week, a median score of 19.930 METs hr/wk. The score ranged from 0.0 to 83.900 METs hr/week. Note that 0.0 means no scores were statistically calculable, because some questionnaires had part of the data necessary to calculate METs missing.

4.3.2.1 Levels of Physical Activity for all the learners

The score of >7.5 MET.hrs/week of engaging in moderate to vigorous intensity physical activity was set as an appropriate *bench mark* of being physically active for

cardiovascular and physical fitness for all adolescents in this study. Of the 234 adolescents, only 51.7% (121) were active at and above 7.5 MET.hrs/week, while 48.3% (n=113) did not attain the benchmark score (Figure 4.1).

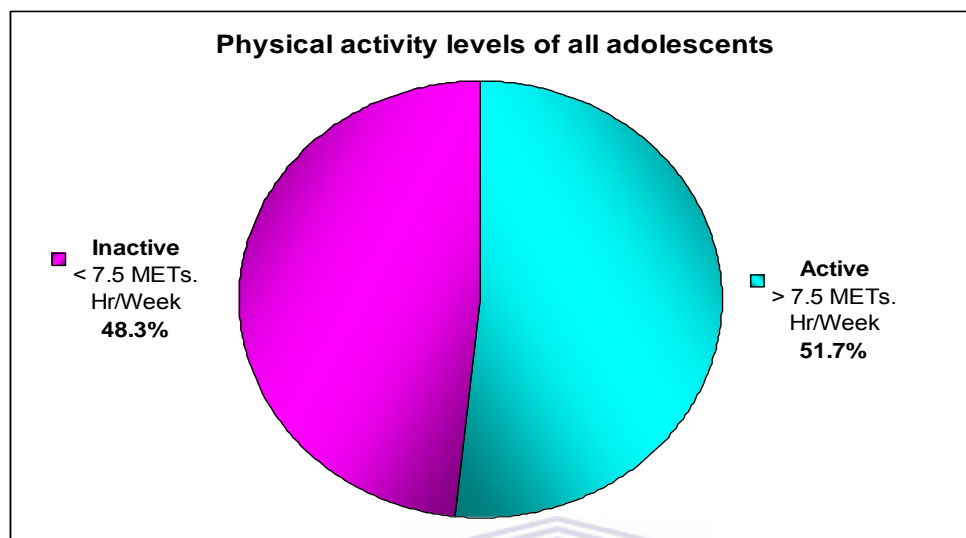


Figure 4. 1: Physical activity levels of all adolescents

4.3.3 Analysis of all adolescents physical activity by age group

Analysis of the 229 adolescents physical activity across all categories showed that those aged between 14-17 years (n=136) had a mean score of 25.426 ± 17.193 METs hr/week, a median of 21.608 METs hr/week and a mode of 0.0 METs. Those aged between 18-21 years (n= 93) had a mean score of 23.629 ± 16.199 METs hr/week, a median of 19.370 METs hr/week and mode of 12.500 METs hr/week.

4.3.3.1 Levels of physical activity by age group

Of the 234 adolescents, those aged between 14-17 years (n=140) had a mean of 14.00 METs hr/week and a standard deviation of 15.107 METs hr/week of moderate-vigorous physical activity. The median was 8.60 METs hr/week, the mode was 0, and a maximum of 92 METs hr/week. For the 18–21 years (n=94) age group, the mean and standard deviation for moderate-vigorous physical activity were 11.30 METs hr/week and 12.280 METs hr/week respectively. The median was 7.620 METs

hr/week, the mode was 0.0 METs, and a maximum of 61 METs hr/week. A significant negative correlation at 5 % level ($P=0.048$) was found between age and moderate-vigorous activity (total MET hrs/wk).

Of the 140 adolescents aged between 14-17 years, 53% ($n=74$) were active and 47% ($n= 66$) inactive (Figure 4.2). Of the 94 adolescents aged between 18-21 years 50% ($n= 47$) were active and 50% ($n= 47$) inactive. Adolescents aged 14-17 years (53%) were more active compared to those aged 18-21 years (50%). The prevalence of inactivity was higher among the older adolescents (50%) than the younger group (47%). Independent sample T-test showed that there was no difference in mean physical activity level between the two age groups ($T=1.443$, $df. =232$, $P=0.150$).

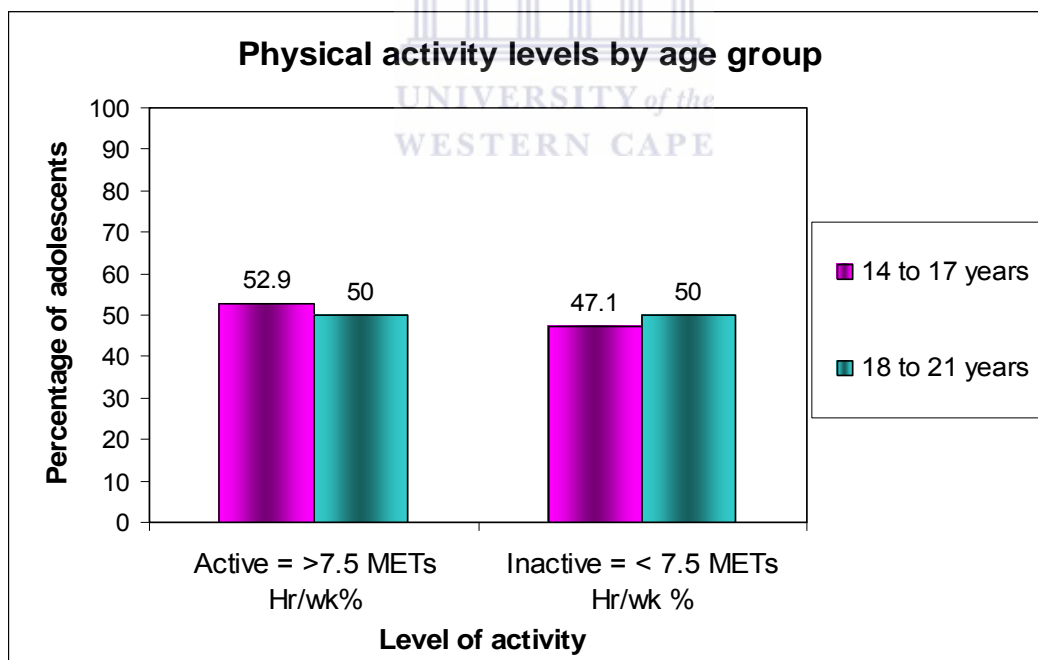


Figure 4. 2: Physical activity levels by age group

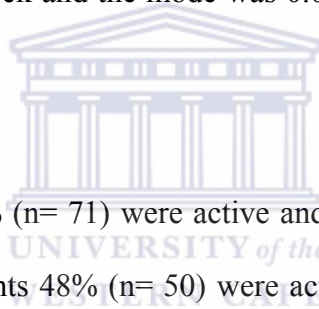
4.3.4 Analysis of all adolescents physical activity by gender

Analysis of the 234 adolescents physical activity across all categories showed that males ($n=129$) had a mean score of 26.089 ± 17.605 METs hr/week, a median of

21.585 METs hr/week, and a mode of 12.500 METs hr/week. Females (n= 100) had a mean score of 22.900±15.563 METs hr/week, a median of 18.853 METs hr/week, and mode of 0.0 METs.

4.3.4.1 Levels of physical activity by gender

Of the 234 adolescents, males (n=129 were) had a mean of 13.06 METs hr/week and a standard deviation of 14.388 METs hr/week of moderate to vigorous physical activity. The median was 8.380 METs hr/week, the mode was 0, and a maximum of 92 METs hr/week. The females (n=105) had a mean of 12.72 METs hr/week and a standard deviation of 13.746 METs hr/week of moderate to vigorous physical activity. The median was 7.45 METs hr/week and the mode was 0.0 METs, and a maximum of 74 METs hr/week



Of 129 male adolescents 55% (n= 71) were active and 45% (n= 81) inactive (Figure 4.3). Of 105 female adolescents 48% (n= 50) were active and 52% (n= 55) inactive. There were more active males (55%) than females (48%). A higher proportion of females (52%) than that of males (45%) were inactive. There was no significant association between gender and physical activity level.

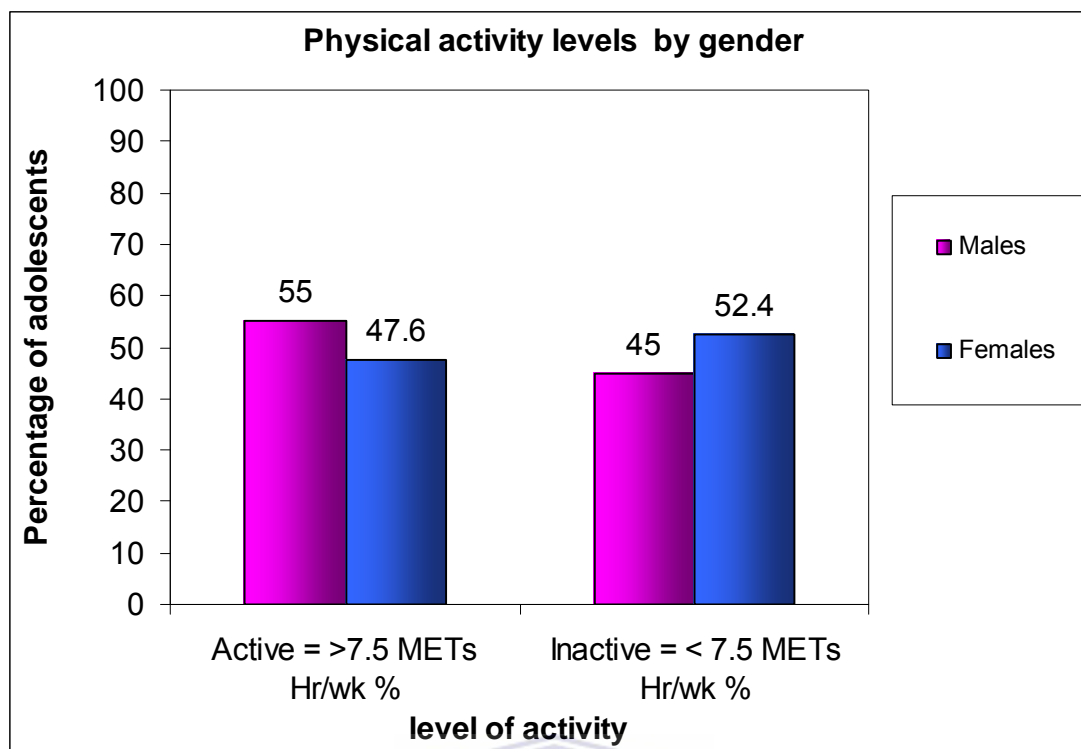


Figure 4. 3: Physical activity levels by gender

4.4 Analysis of barriers to engaging in physical activity (PA)

This section analyzes single variables in factors grouped by construct framework. “A construct is the product of informed scientific imagination or an idea developed to permit categorization of observed behaviour” (Washburn et al, 2002, p.194). The construct, perceived barriers to physical activity comprised the: (1) Physical and social, and (2) Psycho-social related factors. These included the 6 distinct factors of the barriers scale described in factor analysis (See section 3.8.1). In this research, since the mean response for most variables was below 2.50, only variables which were rated cumulatively negatively (*somewhat, mostly & completely*) by $\geq 30\%$ adolescents are regarded as important perceived barriers to physical activity

4.4.1 Rating the psycho-social factors variables on the barriers scale

Most of the adolescents perceived fear as the only key barrier to their engaging in physical activity. Of the 221 adolescents, 52.9 % (n= 117) reported they perceived fear as a barrier and 30.8% (n=68) rated it as a barrier *completely*, making it the single most important perceived barrier to physical activity participation (Table 4.7). We also found that ‘I’m too fat’ was the least likely perceived barrier for not engaging in physical activity. Data was missing for between 14 and 19 adolescents.

4.4.2 Rating the physical and social factors variables on the barriers scale

Most variables in the physical and social factors were perceived as barriers to engaging in physical activity. Of the 219 adolescents, 43.4% (n=95) indicated ‘lack of transport’ and 41.4% (n=91) ‘uneven play grounds’ as barriers to physical activity. Indeed, both were rated as complete barriers by 18.7% (n=41) and 18.2% (n=40) adolescents respectively. Other variables found to be important barriers adolescents perceived to activity participation were: ‘I have a disability that stops me’, ‘Haven't got time’, ‘Lack of clothes/equipment’, ‘I need to rest and relax in my spare time’ and ‘There are no suitable facilities’, in decreasing percentage of adolescents respectively. We found that ‘lack of motivation’ or ‘lack of assistance from family members’ were unlikely perceived barriers to activity participation.

Table 4. 7: Psycho-social factors variables rating according to adolescents’ experience.

Psycho-social factors									
				Positive response		Negative response			
Factor	Variable	N	Mean response	Not at all %	A little %	Somewhat %	Mostly %	Completely %	Total negative Resp %

1	People at school do not assist me to become active.	215	1.57	74.4	7.0	8.8	7.0	2.8	18.6
	Negative attitude towards me from my family has been problem.	218	1.77	63.8	14.2	10.1	5.5	6.4	22
	Negative attitude towards me from schoolmates has been problem.	220	1.70	65.9	15.5	6.8	6.8	5.0	18.6
	People discriminate or avoid being associated with me	219	1.72	62.6	15.5	13.2	5.0	3.7	21.9
	Lack of advice about exercise or physical education at school	215	1.94	58.6	13.0	12.1	7.9	8.4	28.4
4	My health is not good enough.	224	1.97	44.2	32.6	9.8	8.5	4.9	23.2
	I'm too shy and feel embarrassed.	223	1.82	56.5	22.9	9.4	4.5	6.7	20.6
	There's no one to do it with.	221	2.01	51.6	17.2	16.7	7.2	7.2	31.2
	I haven't got the energy.	220	1.87	54.5	20.9	11.8	8.6	4.1	24.5
5	I fear getting injured or damage to my health.	221	2.90	34.8	12.2	11.3	10.9	30.8	52.9
	I'm not the sporty type.	218	2.08	50.5	19.3	11.0	10.6	8.7	30.3
	I don't enjoy physical exercises.	217	1.70	64.1	13.8	13.4	5.5	3.2	22.1
6	I'm too fat.	219	1.51	69.4	18.7	6.4	2.7	2.7	11.9

Table 4. 8: Physical and social variables rating according to adolescents' experience

Physical & social factors									
				Positive response		Negative response			
Factor	Variable	N	Mean response	Not at all %	A little %	Somewhat %	Mostly %	Completely %	Total negative Resp %

2	Lack of transport has been a problem for me	219	2.49	40.6	16.0	16.0	8.7	18.7	43.4
	Uneven play grounds and compounds makes it difficult to do exercise	220	2.50	39.5	19.1	10.9	12.3	18.2	41.4
	There are no suitable facilities nearby.	223	2.17	45.3	21.1	13.9	10.8	9.0	33.6
	I have an injury or disability that stops me.	223	2.16	43.9	20.6	18.4	9.9	7.2	35.4
	I need to rest and relax in my spare time.	222	2.32	33.3	32.4	12.2	13.1	9.0	34.2
3	I haven't got time.	220	2.19	46.8	16.8	15.9	11.8	8.6	36.4
	I haven't got the right clothes or equipment.	222	2.21	46.8	18.0	13.5	10.8	10.8	35.1
	People at home do not assist me to become active.	218	1.78	64.2	14.2	9.6	3.7	8.3	21.6
	I'm too lazy/not motivated/can't get started.	220	1.60	70.5	12.7	8.6	2.3	5.9	16.8

4.5 Analysis of facilitators to engaging in physical activity

This section analyses single items in factors grouped by construct framework. The facilitators to physical activity construct comprised the: (1) Self-Efficacy, (2) Psycho-social related, and (3) Physical and social dimensions groupings (See section: 3.8.1). In this research, since the mean response for most variables was above 2.50, only variables which were cumulatively indicated positively (*somewhat, mostly & completely*) by $\geq 50\%$ of adolescents are regarded as important facilitators to physical activity.

4.5.1 Rating the, 'exercise self-efficacy' factors variables on the facilitators scale

Most variables in the self-efficacy factor were perceived as facilitators to engaging in physical activity. Of 218 adolescents, the majority (37.6%) highly rated (*completely*) 'Do exercises that are good for me' and 28% (n=58) of 207 'Keep from getting hurt when I exercise' as perceived facilitators. Other variables rated *mostly* as perceived

facilitators were; ‘Find ways to exercise that I enjoy’, ‘Do stretching exercises’, and ‘Fit exercise into my regular routine’ by 34.1%, 30.4% and 30.1% respectively. Of 213 adolescents, only 24.9% rated ‘Know when to quit exercising’ *mostly* (Table 4.9). Of the 234 adolescents participating in the study, between 16 and 27 of them did not respond in all the 6 variables on self-efficacy.

Table 4. 9 : Self-efficacy variables rating according to adolescents’ experience

Self-efficacy factor								
			Negative response		Positive response			
Variables	N	Mean response	Not at all %	A little %	Somewhat %	Mostly %	Completely %	Total positive Resp %
Keep from getting hurt when I exercise	207	3.38	15.0	12.6	19.8	24.6	28.0	72.5
Know when to quit exercising	213	3.08	17.4	17.4	23.0	24.9	17.4	65.3
Do exercises that are good for me	218	3.71	8.7	14.7	11.5	27.5	37.6	76.6
Fit exercise into my regular routine	216	3.26	15.3	17.6	14.8	30.1	22.2	67.1
Do stretching exercises	207	3.27	10.6	21.7	17.4	30.4	19.8	67.6
Find ways to exercise that I enjoy	211	3.57	10.9	10.9	16.1	34.1	28.0	78.2

4.5.2 Rating the psycho-social variables on the facilitators scale

Most variables in the psycho-social factors were perceived as facilitators (*mostly*) to engaging in physical activity. These variables were and not limited to: ‘Making new friends’ (43.2%), ‘Strengthening my body to look good’ (39%) and ‘Learning and gain experience’ (37.2%) of 218 adolescents among other variables. Only ‘Improving ability to move without assistance’ was rated highly (*completely*) as a perceived facilitator by majority (34.3 %) of 216 adolescents (Table 4.10). Overall, all the items were found important perceived facilitators of physical activity.

Table 4. 10: Psycho-social variables rating according to adolescents' experience

Psycho-social factors									
				Negative response		Positive response			
Factor	Variables	N	Mean response	Not at all %	A little %	Somewhat %	Mostly %	Completely %	Total Positive Resp %
1	Making new friends,	220	3.74	7.3	11.8	9.1	43.2	28.6	80.9
	Strengthening my body to look good	213	3.70	8.0	10.8	13.1	39.0	29.1	81.2
	Learning and gain experience	218	3.71	7.3	9.2	17.4	37.2	28.9	83.5
	Having a friend to exercise with	217	3.41	12.4	14.7	14.3	35.9	22.6	72.8
	Gaining acceptance in my group	213	3.48	8.5	13.1	21.6	35.7	21.1	78.4
	Gaining more self-confidence in doing exercises I like	213	3.65	7.5	9.4	21.1	34.7	27.2	83.1
	Gaining self-satisfaction.	211	3.53	9.5	13.7	18.5	31.3	27.0	76.8
	Improving my ability to move without assistance from others	216	3.64	9.7	11.6	18.1	26.4	34.3	78.7
2	Positive attitude towards me from schoolmates and teachers	212	3.45	12.7	12.7	16.5	33.0	25.0	74.5
	Positive attitude towards me from other people	210	3.34	11.9	19.0	14.3	32.9	21.9	69
	Positive attitude towards me from family members	211	3.51	13.7	8.5	18.5	31.8	27.5	77.7

4.5.3 Rating physical and social variables on the facilitators scale

Most variables in the physical and social factors were perceived as facilitators (*mostly*) to engaging in physical activity. These were and not limited to; ‘Enjoying and having fun’ (42.2 %), ‘Encouragement from friends’ (36.8%) and ‘-from family to be active’ (34.9%) (Table 4.11). ‘Physical education classes and exercise advice at school’ and ‘Maintaining a healthy body’ were rated highly (*completely*) as perceived

facilitators by 36.7% (n=77) of 210 and 35% (n=77) of 220 adolescents respectively.

All the variables were found important perceived facilitators of physical activity.

Table 4. 11: Physical and social variables rating according to adolescents' experience

Physical and social factors									
Factor	Variable	N	Mean response	Negative response		Positive response			
				Not at all %	A little %	Somewhat %	Mostly %	Completely %	Total positive Resp %
3	Enjoying and having fun	218	3.75	6.0	10.6	13.8	42.2	27.5	83.5
	Maintaining a healthy body	220	3.85	5.5	7.7	18.2	33.6	35.0	86.8
	Having the right clothes or equipment.	216	3.10	15.7	20.4	19.4	27.3	17.1	63.9
4	Encouragement from friends to be active	212	3.51	10.8	12.3	16.0	36.8	24.1	76.9
	Encouragement from family to be active	209	3.62	11.0	9.6	15.3	34.9	29.2	79.4
5	Physical education classes and exercise advice at school	210	3.70	10.5	9.5	16.2	27.1	36.7	80
	Having access to suitable facilities	217	3.43	8.8	14.7	22.6	32.7	21.2	76.5
	Reducing my body weight.	214	2.75	26.6	19.6	17.3	24.8	11.7	53.7

4.6 Analysis of tests of association

4.6.1. Tests of association between level of physical activity (dependent) and other independent variables

No association was found between levels of physical activity variable and gender ($X^2= 0.364$, $df. =1$, $P = .546$). Cross-tabulation of the levels of physical activity variable, as the dependent, and barrier variables showed there was a significant association at 5% level between the former and 'lack of transport' ($P < .030$).

Cross-tabulation of the levels of physical activity variable as the dependent and facilitating factors also showed there was a significant association at 5% level between the former and ‘fit exercise into my regular routine’ ($P < .022$). Also, a significant association at 1% level between levels of physical activity and ‘positive attitude towards me from schoolmates and teachers’ ($P < .009$) was found.

4.6.2. Tests of association between Facilitators (dependent) and other independent variables

Cross-tabulation of self-efficacy variables as dependent variables by other independent variables was done. We found a significant association at 5% level ($P < .031$) between gender and ‘Find ways to exercise that I enjoy’ (Table 4.12). Cross-tabulation of other facilitator variables as dependent variables by other independent variables was also done. Of these, a significant association at 5% level was found ($P < .040$) between, age group and ‘Gaining acceptance in my group’. A significant association was also found ($P < .032$) between age and ‘Encouragement from family to be active’ (Table 4.13).

Cross-tabulation between gender and facilitator variables showed that there was a significant association, at 5% level ($P < .041$), between gender and ‘Enjoying and having fun’ (Table 4.14).

Table 4. 12: Cross tabulation of self –efficacy and demographic variables

Cross tabulation of self –efficacy and demographic variables				
Variable	Sample (n)	X^2	P value	Level of Significance
Find ways to exercise that I enjoy by gender	211	10.667	.031*	S
Find ways to exercise that I enjoy by age group	211	1.873	.759	NS

Do exercises that are good for me by gender	218	3.582	.465	NS
Do exercises that are good for me by age group	218	2.212	.697	NS
Fit exercise into my regular routine by age group	216	1.558	.816	NS
Fit exercise into my regular routine by gender	216	2.071	.723	NS
Know when to quit exercising by age group	213	4.500	.343	NS
Know when to quit exercising by gender	213	7.100	.131	NS
Do stretching exercises age group	207	1.189	.880	NS
Do stretching exercises gender	207	5.285	.259	NS
Know when to quit exercising and use of special equipment, such as a cane, crutches or a wheelchair?	212	7.607	.107	NS
Do stretching exercises and use of special equipment, such as a cane, crutches or a wheelchair?	207	.883	.927	NS
Keep from getting hurt when I exercise by age group	207	2.255	.689	NS
Keep from getting hurt when I exercise by gender	207	4.123	.390	NS
Keep from getting hurt when I exercise and use of special equipment, such as a cane, crutches or a wheelchair?	207	4.561	.335	NS

Degrees of freedom=4

* Chi-square value is significant at the 0. .05 levels

S = Significant

NS = Not significant

Table 4. 13: Cross tabulations of facilitator variables by age group

Cross tabulations of facilitator variables by age group				
Variable	Sample (n)	X^2	P value	Level of Significance
Making new friends	220	1.898	.755	NS
Having a friend to exercise with	217	3.230	.520	NS
Learning and gain experience	218	5.090	.278	NS
Strengthening my body to look good	213	2.252	.689	NS
Gaining more self-confidence in doing exercises I like	213	6.253	.181	NS
Gaining acceptance in my group	213	10.032	.040*	S
Gaining self-satisfaction	211	8.123	.087	NS
Improving my ability to move without assistance from others	216	1.382	.847	NS

Enjoying and having fun	218	2.136	.711	NS
Maintaining a healthy body	220	9.267	.055	NS
Having access to suitable facilities	217	1.506	.832	NS
Having the right clothes or equipment	216	5.457	.244	NS
Reducing my body weight.	214	3.178	.528	NS
Encouragement from friends to be active	212	6.517	.164	NS
Encouragement from family to be active	209	10.523	.032*	S
Positive attitude towards me from family members	211	2.482	.648	NS
Positive attitude towards me from schoolmates and teachers	212	1.258	.868	NS
Positive attitude towards me from other people	210	1.058	.901	NS
Physical education classes and exercise advice at school	210	7.042	.134	NS



Degrees of freedom=4

** Chi-square value is significant at the 0. .05 levels*

S = Significant

NS = Not significant

Table 4. 14: Cross tabulations of facilitator variables by gender

Cross tabulations of facilitator variables by gender				
Variable	Sample (n)	X^2	<i>P</i> value	Level of Significance
Making new friends	220	3.685	.450	NS
Having a friend to exercise with	217	2.916	.572	NS
Learning and gain experience	218	3.012	.556	NS
Strengthening my body to look good	213	3.255	.516	NS
Gaining more self-confidence in doing exercises I like	213	.978	.913	NS
Gaining acceptance in my group	213	7.177	.127	NS
Gaining self-satisfaction	211	4.272	.370	NS
Improving my ability to move without assistance from others	216	6.594	.159	NS
Enjoying and having fun	218	9.990	.041*	S
Maintaining a healthy body	220	4.569	.334	NS
Having access to suitable facilities	217	8.706	.069	NS
Having the right clothes or equipment	216	1.653	.799	NS
Reducing my body weight.	214	1.459	.834	NS
Encouragement from friends to be active	212	5.657	.226	NS
Encouragement from family to be active	209	8.807	.066	NS
Positive attitude towards me from family members	211	5.825	.213	NS
Positive attitude towards me from schoolmates and teachers	212	6.838	.145	NS
Positive attitude towards me from other people	210	8.561	.073	NS
Physical education classes and exercise advice at school	210	4.136	.388	NS

Degrees of freedom=4

* *Chi-square value is significant at the 0. .05 levels*

S = Significant

NS = Not significant

4.6.3. Tests of association between barriers (dependent) and other independent variables

Cross-tabulation of barriers variables as a dependent variable and other independent variables was also done. A significant association at 5% level was found between age group and ‘I have an injury or disability that stops me’ ($P < .018$), gender and ‘My health is not good enough’ ($P < .036$), and ‘Use special equipment’, and ‘I haven't got the right clothes or equipment’ ($P < .045$), (Table 4.15).

Table 4. 15: Cross tabulations of barrier variables by demographic variables

Cross tabulations of barrier variables by age and gender				
Variable	Sample (n)	X^2	<i>P</i> value	Level of Significance
Age				
My health is not good enough by age group	224	6.151	.188	NS
I'm not the sporty type by age	218	8.933	.063	NS
I need to rest and relax in my spare time by age	222	8.368	.079	NS
I fear getting injured or damage to my health by age group	221	4.614	.329	NS
There's no one to do it with by age group	221	7.167	.127	NS
I have an injury or disability that stops me by age group	223	11.889	.018*	S
There are no suitable facilities nearby by age group	223	5.682	.224	NS
I haven't got the right clothes or equipment by age group	222	4.191	.381	NS
Lack of transport has been a problem for me by age group	219	3.326	.505	NS
Uneven play grounds and compounds makes it difficult to do exercise by age group	220	4.991	.288	NS
Lack of advice about exercise or physical education at school by age group	215	2.155	.707	NS
Gender				
My health is not good enough by gender	224	10.264	.036*	S
I fear getting injured or damage to my health by gender	221	6.725	.151	NS
There's no one to do it with by gender	221	1.202	.878	NS
I have an injury or disability that stops me by gender	223	5.284	.259	NS
There are no suitable facilities nearby by gender	223	1.692	.792	NS
I haven't got the right clothes or equipment by gender	222	1.502	.826	NS
I haven't got time by gender	220	2.300	.681	NS
Lack of transport has been a problem for me by gender	219	7.622	.106	NS
Uneven play grounds and compounds makes it difficult to do exercise by gender	220	4.809	.307	NS
Negative attitude towards me from my family has been problem by gender	218	6.571	.160	NS
Lack of advice about exercise or physical education at school by gender	215	5.990	.200	NS
I haven't got the right clothes or equipment by use special equipment.	222	9.720	.045*	S

Degrees of freedom=4

** Chi-square value is significant at the 0. .05 levels*

S = Significant

NS = Not significant

4.6.4 Correlation analyses

Correlation analysis between age and barrier and facilitator factors were done and presented in tables in the following sections

4.6.4.1 Correlation analysis between age and barrier factors

Correlation between age and factors extracted from the barriers scale was done. We found there was a significant but weak positive correlation at 1% level ($P < .007$) between age and factor 2 (Table 4.16).

Table 4. 16: Correlations between barrier factors and age

Correlations: Barrier factors linear relationship by age			
Factor	N	Pearson Correlation	Sig. (2-tailed)
1	193	-.122	.091
2	193	.195(**)	.007**
3	193	.036	.615
4	193	-.116	.109
5	193	-.121	.094
6	193	-.023	.750

Key:

** Correlation is significant at the 0.01 level (2-tailed).

For details on factors see section 3.8.1

4.6.4.2 Correlation analysis between age and facilitator variables

Correlation between age and factors extracted from the facilitators scale was done. No correlation was found between age and self-efficacy factor. A significant positive correlation at 1% level ($P < .003$) was found between age and factor 1 of Physical and social variables (Table 4.17).

Table 4. 17: Correlations between facilitator factors and age

Facilitator factors (Self –efficacy and physical-social 1-5) linear relationship by age			
Factor ^(a)	N	Pearson Correlation	Sig. (2-tailed)
Self –efficacy factor	196	.026	.719
Physical and social Factors			
1	183	.218(**)	.003**
2	183	.028	.706
3	183	-.034	.649
4	183	.136	.067
5	183	-.028	.706

Key: ** Correlation is significant at the 0.01 level (2-tailed)
(a) For details on factors see 3.8.1

4.7 Summary of the chapter

In this chapter the results were presented with regard to the objectives for the study. The types of activities the adolescents engaged in were summarized. Important barriers and facilitators to engaging in physical activity were identified. Cross tabulations were done between moderate-vigorous physical activity category and demographic and other independent variables. Similarly, this was done between barriers and demographic variables. Results indicated almost 1 out of 2 adolescents with disabilities were inactive (See 4.3.2.1) and majority had fear of injury among other barriers and do not want to reduce body weight. Correlation tests were done between age and factors identified in the barriers and facilitator scales. The results indicated that barrier factor 2 and facilitator factor 1 were positively correlated with age.

Chapter Five

Discussion

5.1 Introduction

The purpose of this cross-sectional study was to determine the degree of physical inactivity among adolescents with physical disabilities attending high schools in Kenya. To realize the objectives of the study, 234 (129 males and 105 females) adolescent learners with physical disabilities were surveyed on the levels of physical and type of activities they engaged in the previous week using a self-administered questionnaire. They were also surveyed on the factors they experienced were barriers and facilitators while engaging in the activities. Associations between independent variables (age and gender) and physical activity, barriers or facilitators was also calculated. The following section discusses the results on each of these variables separately.

5.2 Physical activity

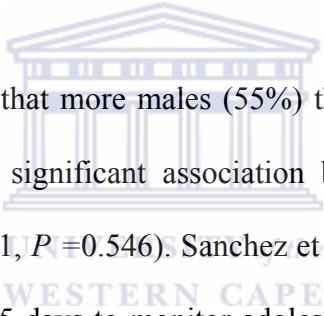
Physical inactivity has become a major public health problem, contributing to the chronic, non-communicable disease epidemic. Physical activity is vital for maintenance of good emotional and physical health as well as the prevention of disease. Individual learners behaviors which characterize recommended levels of physical activity, especially if practiced from childhood, can improve mental health (Howard, et al. 2004), protect against certain cancers and osteoporosis (Crespo, Smit, Andersen, Carter-Pokras, & Ainsworth, 2000) and reduce the risk of overweight and obesity. The latter contributes to the increase in morbidity and inactivity especially among persons with disabilities (Okoro et al., 2005). Research has consistently

shown an increased prevalence of inactivity among adolescents with or without disabilities, raising public health concern (Packer, Briffa, Downs, Ciccarelli & Passmore, 2006). Consistent with these findings, the findings in the present study demonstrate a moderately high prevalence of physical inactivity (48.3%) among the sample of adolescents with physical disabilities. This is similar to previous research findings that showed a high proportion of adolescents do not attain the recommended levels of physical activity (Jones, 2003).

5.2.1 Levels of physical activity among adolescents with physical disabilities

The Centre for Disease Control and Prevention (CDC) recommends that adolescents should participate in 30 minutes (or ½ hour) of moderate physical activity 5 or more days per week (Centres for Disease Control & Prevention, 2006), or 3 days vigorous activity to accrue health benefits (Task Force on Community Preventive Services, 2002; Kahn et al., 2002). In this study, the results from the physical activity questionnaire showed that slightly over 1 out of 2 (51.7%) adolescents with physical disabilities attending high schools in Kenya were active and 48.3% were inactive (Figure 4.1). However, inactivity was higher among older adolescents (50%) than the younger group (47%). Packer et al. (2006), using a self-report questionnaire, found similar levels (50%) of sufficient physical activity (meeting the Australian physical activity guidelines) among children and adolescents with disabilities in Western Australia. Our results differ from those of Pan et al. (2005), who, using a different survey tool to quantify physical activity (the modified version of the Canada Fitness Survey) found that 37 to 40% of children and adolescents with physical disabilities were inactive.

According to available evidence, inactivity among adolescents in transition is associated with being older (Norman et al., 2007). Consistent with the research evidence, the current study found a significant negative correlation at 5 % level ($P<.048$) between age and total moderate-vigorous physical activity (total METs hr/day). An indication that physical activity declined as age increased in this sample. Similar results were found among children with disabilities by King et al. (2006), that physical activity participation declines with the increase in age and, that older children with disabilities participate less intensely in recreational activities. It may be reasonable to say that an increase in age is associated to a decrease in the level of participation in physical activities that benefit health.



The current study also found that more males (55%) than female adolescents (48%) were active. There was no significant association between gender and physical activity level ($X^2=0.364$, $df. =1$, $P =0.546$). Sanchez et al. (2007), using an Actigraph Accelerometer for more than 5 days to monitor adolescents' physical activity, found that similar much lower proportions of girls (33.6%) than boys (59%) met national physical activity guidelines in California, United States of America. The gender differences were also similar, with more girls than boys engaging in insufficient physical activity. Research has shown that the differences in physical activity participation between genders emerge in adolescence, with more girls than boys being inactive (Jones, 2003). When compared with other research findings, it may be reasonable to conclude that the differences between genders are similar in both developed and emerging countries.

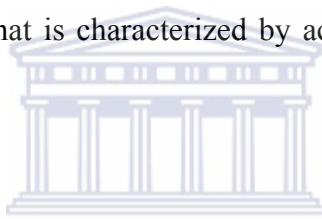
The high prevalence of inactivity among adolescents with disabilities in the current study is discouraging. However, any number of inactive adolescents with disabilities should be a public health concern, because the numbers are unlikely to decrease, especially among girls (Sanchez et al., 2007), and the associated health risks are well documented. Above all, minimizing the risk of morbidity and premature mortality associated with heart disease in adulthood should begin in childhood and adolescence (Howard et al., 2004). It is important to note that the adolescents in this study were resident in their respective schools. This had effectively eliminated active transport by walking or wheeling to and from school as a source of the adolescents' physical activity. The adolescents only walked or wheeled themselves within the schools' blocks all which were conveniently located in the respective schools' compounds.

Therefore, the findings of this study corroborate with other studies done in developed countries. Adolescents with physical disabilities attending high schools in Kenya (1 out of 2) just like the children with disabilities in Western Australia do not meet set physical activity guidelines. Inactivity is higher among older adolescents than the younger group and in females, similar to the differences seen in other research on similar samples. The high prevalence of inactivity is a public health concern and requires prompt attention - more so for females. Due consideration is needed based on the fact that active transport is minimally available in residential school settings as a source of adolescent learners' physical activity.

5.2.2 Types of activities and pattern of participation of adolescents with physical disabilities

A clear knowledge of the types of activities adolescents with disabilities engage in is a prerequisite to determining the gravity of exposure to risk or the conferment of health

benefits on the individual learner. Law et al. (2006), using Children's Assessment of Participation and Enjoyment (CAPE) to assess participation of children with disabilities (229 males, 198 females) found they participated in a variety of informal, rather than formal, activities. In agreement with Law et al.'s (2006) findings, the results of the current study showed that adolescents with disabilities engaged in all four types of activities (stationary, light, moderate, and vigorous activities) besides structured school physical activities. For example, 18% played card games, 12% dancing, 38% reported wheeling wheelchair, 25% wheelchair racing, and 15.6% walking with crutches compared to only 10.2 % who reported that they participated in vigorous physical education. The variability of participation reflects adolescent behavior (physical activity) that is characterized by activities of different intensities that are diverse.

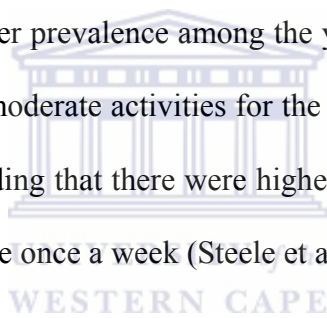


As noted earlier in the literature, research has shown that a preoccupation with sedentary activities is a risk factor for chronic disease (World Health Organization, 2003; Packer et al., 2006). The present study showed that 64% of all adolescents engaged in stationary activities for 3 days or more and 34.8 % spent 5 or more days of the week in stationary activities, while 2% reported to be completely sedentary. This is similar to the physical activity pattern found among 878 adolescents aged 11-15 years which showed that 30% adolescents spent more than 2 hours *daily* viewing TV (Sanchez et al., 2007). A similar study done in South Australia found that adolescents with cerebral palsy spent many hours daily (3.46 to 5.97 hours per day) in sedentary recreational activities (Maher et al., 2007).

In a study among 11- 17 years old adolescents (n=112) with cerebral palsy attending inclusive education settings, it was shown that adolescents with disability participated in less intensive activities compared to those without disability (Maher et al., 2007). Consistent with these findings, results from the present study revealed that more than 1 out of 3 females (35%) engaged in light activities for most days (5 or more) of the week compared to only 1 out of 4 male adolescents (24%). We found that most male adolescents (68%) reported they engaged in light activities for fewer days (3-4) in the week compared to female adolescents (56 %). This gender pattern is consistent with the literature suggesting that girls with disabilities, generally, prefer light activities than boys (Law et al., 2006) and that this trend continues as they grow older (Packer et al., 2006). The current study also found that 67% of adolescents aged 18-21 years participated in light intensity activities for 3-4 days in the week as opposed to only 60% of those aged 14-17 years. This demonstrates that majority of adolescents participate in light activities 3-4 days in the week. These types of activities are insufficient and have no documented health benefits. According to Branca (1999), children with disabilities who are unable to engage in weight bearing exercise have a reduced cross-sectional area of bone. The author also found that the time children spend in weight bearing activities is correlated to bone mineral content (Branca, 1999). According to Vuori (2004), children participating in weight bearing sports gain more bone mass.

In a study on assessing knowledge and beliefs of osteoporosis risk factors among female adolescents without disabilities in Canada, Anderson, Chad, and Spink (2005) found that half (52%) of the respondents participated in low to moderate levels of physical activity. In a survey of 427 children with disabilities in Canada, King et al.

(2006) found that boys participated in significantly higher intensity activities than girls. The latter participated more in low intensity activities such as social activities. They further found that older children were less active during recreational activities. The results of the current study found that more females (12%) than male adolescents (5%) reported they engaged in moderate activities for at least 5 or more days in the week. Although most adolescents engaged in activities of moderate intensity, only 8% engaged for the recommended 5 or more days while a high proportion (49%) did so for only 1-2 days of the week. These findings are similar to those among Canadian adolescents with physical disabilities that showed that they were more likely not to engage in regular physical activity (Steele et al., 2004). Consistent with this finding, the present study found a lower prevalence among the younger group (7%) than older group (10%) of engaging in moderate activities for the recommended 5 days or more. This is also similar to the finding that there were higher (4.5) chances for adolescents with disabilities not to exercise once a week (Steele et al., 2004).



The present study also found that more males (54%) than females (43%) engage in vigorous activities for 3 days or more. Overall, a half (50%) of all adolescents engaged in vigorous activities for 3 days or more. We found that more adolescents aged 18-21 years (53%) than those aged 14-17 years (47%) engaged in vigorous activities for 3 days or more. Consistent with the findings of the current study, King et al. (2006) found that older children with disabilities had a higher mean participation score than the younger group, for social activities.

Sit, McManus, McKenzie and Lian (2007), using the System for Observing Fitness Instruction Time (SOFIT) to monitor physical activity in children with disabilities

found that children with physical disabilities rarely engaged in moderate to vigorous activities and instead spent most of the time sitting. Consistent with this finding, the present study found that a higher proportion of the younger group (10% and 12%) than the older group (5% and 7%) did not engage in moderate or vigorous activities in the week. The current study analysis found no age or gender differences in participation in sedentary activities among the adolescents.

Therefore, as has been found elsewhere, this study showed that: adolescents with disabilities engaged in all 4 forms of activities outside formal school activities; have a high likelihood of being sedentary; or, on occasion, engage in light activities. The most popular pastime activities include playing cards, watching television, computer games and light activities, physiotherapy exercises, stretching, walking, and standing on frame. Physical education seemed popular to only 10% of the adolescents and may need to be investigated further in future research. The participation of adolescents with disabilities in this study in all four types of activities implies that, reported participation alone may not be sufficient to measure physical activity. This is why the present study chose to also use the duration of participation and to quantify energy expenditure to reflect the degree of participation. However, there is need to encourage the adolescents to engage in moderate intensity activities such as physical education and free style sports available at the schools to gain health benefits.

5.3 Barriers to adolescents with disabilities participation in physical activity

Investigations to identify barriers to engaging in physical activity has been variously researched to inform the design of strategies that might increase access to opportunities and the environments that promote physical activity and health in

children and adolescents with disabilities (Pivik, McComas & LaFlamme, 2002). This is because barriers are thought to undermine the choice of activity and maintenance of an active behavior. The continued experience of barriers is a fundamental public health concern as these diminish the likelihood of participation and time spent in health promoting physical activities. The spontaneity of these experiences during adolescence may promote sedentary behaviour (Boyle & Coldero, 2005) and depression (Howard et al., 2004). This might increase morbidity and early development of multiple risk factors such as being overweight, diabetes and diabetes complications (Acton et al., 2002) that could lead to premature death.

Earlier in the literature review, it was noted that the readiness to engage in physical activity is a function of the severity of perceived personal risk or susceptibility to a particular health condition or the threat value on the person and the serious consequences in his case (Rosenstock, 2005). According to Vlaeyen, Kole-Snijders, Boeren, and van Eek (1995), the individuals' response to fear determines their participation in physical activities. If they assume a confrontational response, fear is reduced over time, while an avoidance response may lead to the maintenance or increases of fear and "might lead to a phobic state". The latter response results in "reduced participation in both social and physical activities that, in turn, lead to physiological changes (loss of bone mineral content, muscle strength, shortened tendons) and augmenting disability" (Crombez, Vlaeyen, Heuts & Lysens, 1999, p.330). Pivik et al. (2002) found that fear of being trapped in the school in the event of a fire was a major barrier among learners with disabilities attending schools in Canada.

Consistent with this finding, the present study found that fear was the most reported barrier to engaging in physical activities experienced by the adolescents. More than half (53%) of the adolescents in this study reported fear as the main reason they did not engage in physical activities. It has been shown that subjects with low self-efficacy have fear of movement / (re)injury, and catastrophizing and therefore avoid movement (Denison, Asenlof, Sandborgh & Lindberg, 2007). Injuries are antecedent factors of disablement and vice versa and might be responsible of the perpetuation of fear among adolescents. From the available evidence, it may be reasonable to say that participation in physical activities is a function of the adolescents with disabilities predisposition or response to fear.

5.3.1 Psycho-social aspect of fear

Most adolescents participate in activities in which they have competence and are scared to venture into unknown activities for fear of injury. In a survey involving 11 nations among university students on phobic anxiety, it was found that there were gender differences concerning fear, with females having significantly more of bodily harm, illness, and death than males (Arrindell et al., 2003). The implication of fear in the course of adolescents' daily interactions with their surroundings is the potential to not engage in high intensity activities and, instead, to often engage in the less intensive activities that have no proven health benefits, and are socially isolating (McDougall et al., 2004; Skar, 2003; Boyce, 2001; Blomquist et al., 1998).

5.3.2 Physical and social factors

In a critical review, Mihaylov et al. (2004) found that the mobility of children with disabilities was impeded by uneven surfaces or steps, inappropriate footwear, pressure

of time, difficulties with physical access and the dependence on assistance. Consistent with this findings, the results of the current study show that the most important physical and social barriers that the adolescents reported were: lack of transport (43.4%), uneven play grounds (41.4%), having a disability (35.4%), lack of time (36.4%), lack of clothes/equipment (35.1%), the need to rest during spare time (34.2%), and, to a lesser extent, lack of suitable facilities nearby (33.6%). The study found that there was a significant association between the levels of physical activity and “lack of transport” (X^2 10.700, df. = 4, $P < .030$). This is consistent with the findings by Whiteneck et al. (2004) that transportation is one of the most challenging barriers experienced by persons with spinal cord injuries, earlier noted in literature. In another study among pupils with disabilities in Sweden, Almqvist and Granlund (2005) found that there was no relationship between the level of participation in school activities and the form of disability. However, having physical disabilities can have serious implications on the development of a child with disability because they too, like their peers without disability, should participate in similar activities unhindered for the development of life skills such as physical coordination and communication (Cooper et al., 1999) and strong bones (Branca, 1999).

Research evidence concerning schools as sources of barriers to physical activity is overwhelming. It has been shown that as many as 59% of American secondary schools exempt adolescents with disabilities from physical education classes (Centers for Disease Control and Prevention, 1997). In Swedish and Canadian mainstream schools, barriers to participation of children with disabilities have been found in the physical environments, the attitudes of other children and schools' staff as well as the organization of the school programs (Pivik et al., 2002; Hemmingson & Borell, 2001).

The study by Pivik et al. (2002) showed that lack of personal assistants to assist with mobility inside schools was a barrier in Canadian schools.

Contrary to these findings, the present study found that ‘assistance in school’ was not perceived as a barrier by majority of the adolescents (81%). In addition, this study found that ‘lack of assistance from family members’ and ‘lack of motivation’ as well as being fat were the least likely barriers to activity participation in school. Contrary to the present study’s findings, Zajicek-Farber (1998) found that motivation and lack of perseverance in performing tasks is lower in youth with disabilities. Perhaps, this is because in the latter’s study, it was found that the ever present assistants assist in every activity and “in turn deny the individuals the opportunity to face challenges and perform to gain the needed experiences thus augmenting barriers” (Zajicek-Farber, 1998, p.205). A study assessing the difference between capabilities to perform and the performance of activities among children with disabilities aged 5-15 years found that, fewer than 17% children “performed” than they were “capable to do” (Young et al., 1996). However, the current study’s results are different from those of Kinne et al (1999) who found that, lack of motivation and lack of confidence in personal ability were barriers to exercise participation in adolescents with disabilities. The differences in the findings may be due to the sampling criteria used in the two studies and cultural differences and the availability of social support networks.

Therefore, overall, despite shortage of literature on researches done in Africa and other developing countries (see Chapter Two), this study is consistent with other research findings outside Africa that found that barriers to activity participation are found in the many contexts and are of diverse forms. As in those other researches, the

results of the present study found that barriers emanate from interaction between the learners and their personal attributes (an avoidance predisposition to fear and having a disability), the physical (lack of transport to exercise spaces, uneven play grounds, lack of suitable facilities and lack of clothes/equipment), and social (lack of time and the need to rest during spare time) factors. Of particular importance is the finding that, fear is the leading factor. This further supports the theoretical framework concerning self-efficacy and perceived behavioral control.

5.4 Facilitators to engaging in physical activity perceived by the adolescents with physical disabilities

Physical activity is believed to be mediated by certain aspects of the individual's predisposition, social skill, and structural abilities, which are integrated to facilitate the individual's interaction with the environments (physical or social), the outcome of which is regarded to as facilitated if successfully executed as intended by the doer. Many successful actions for everyday life are thought to be facilitated by internal or external factors that the adolescent has power over or has voluntary control, although are present in the social or physical environments. Manipulation of available factors, it is thought, could result in higher outcomes. Although theorized, knowledge of factors that could be manipulated to facilitate or promote physical activity is worthwhile.

5.4.1 Self-efficacy factor

Self-efficacy refers to “beliefs in one's capabilities to organize and execute the courses of action required to produce given levels of attainments” (Ajzen, 2002, p.667; Bandura, 1998, p. 624). This deals with the ease or difficulty of performing an activity and may reflect existing internal and external factors (Ajzen, 2002). As

indicated in the literature review, evidence consistently relates physical activity among adolescents to higher levels of self-concept and self-esteem and to lower levels of anxiety and stress (CDC, 1997).

In the current study, it was found that the self-efficacy factor variables reported as the most important facilitators by adolescents with physical disabilities were: doing preferred exercises (37.6%), avoiding getting hurt (28%), enjoyment (34.1%) stretching (30.4%), and fitting exercise to routine (30.1%). This study found that the knowledge of when to quit exercising was perceived as the least important (24.9%) facilitator that influenced activity participation of the adolescents. The present study also showed that 'Fit exercise into my regular routine' was significantly associated at 5% level to the levels of physical activity ($X^2 = 11.469$, $df. = 4$, $P < .022$). This is similar to the findings of King et al. (2006) and MacPhail et al. (2003) that children with disabilities like to participate in preferred activities and to enjoy in the company of friends.

5.4.2 Psycho-social factors

In a qualitative study, Taub & Greer (2000) showed that children with physical disabilities perceive physical activity as the context for demonstrating their competence in activities done by children without disabilities and spending time with friends.

Consistent with these findings, the current study found that the most important psycho-social facilitators adolescents with physical disabilities reported were: making friends (43%), strengthening one's body (39%), learning to gain experience (37.2%), improve ability to move unassisted (34 %), among other facilitators. Similar to the

findings of the present study, Kasser, Collier & Solava, (1997) also found that adolescents perceive physical activity participation provides them the opportunity to create friends. The present study also found that positive attitude towards the individual adolescents from schoolmates and teachers were significantly associated at 1% level, to the levels of physical activity ($X^2=13.508$, $df. = 4$, $P< .009$). Similar to the present study, it was stated earlier in the review of literature, that positive interactions of the adolescents with teachers and peers influenced their participation in school activities (Almqvist & Granlund, 2005).

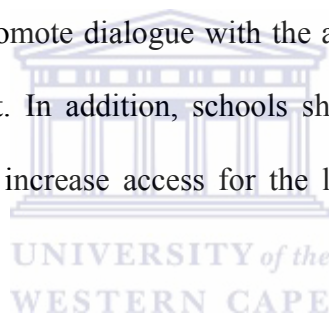
5.4.3 Physical and social factors

Pan et al. (2005) found that in Canada, adolescents with disabilities (aged 6-18 years) played more with other children at school sports than with family members. Consistent with this finding, the present study found that the most important physical and social facilitators to adolescents with physical disabilities were: physical education classes and exercise advice at school' (37%) including 'maintaining a healthy body' (35%). Pivik et al. (2002), using focus group interview to assess barriers and facilitators, found that adolescents with disabilities described physical education experience as helping "to set up ball and keeping score". Research has also shown that adolescents like to spend more time in physical education at school and in sports (MacPhail et al., 2003).

In a cross-sectional study among 11 female athletes with physical disabilities aged 20-38 years that were members of the 2003 USA Wheelchair Basketball Team, it was found that significant others (friends with disabilities, parents, siblings, therapist) played an influential role of introducing the athletes to Wheelchair Basketball

(Ruddell & Shiness, 2006). Consistent with this findings, the present study found that the physical and social facilitators adolescents rated as being on average important, were: enjoying and have fun (42 %), encouragement from friends (37%), and the encouragement from the family to be active (34.9%).

Therefore, this study finding, as in other research evidence, supports the centrality of self-efficacy in determining participation in physical activity among adolescents with disabilities. In addition, the adolescent with disabilities like to enjoy, be with friends, improve individual competences in activities they like, and to gain independence in mobility. Future strategies to minimize inactivity and to promote activity uptake among this sample should promote dialogue with the adolescents and their family to marshal wider social support. In addition, schools should create socially attractive barrier free environments to increase access for the learners to engage in physical activities.

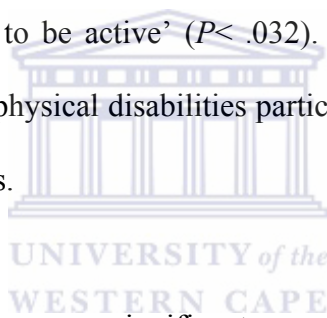


5.5 Associations between age, gender, barriers or facilitators and physical activity

Mihaylov et al. (2004) found that the pressure of time influenced the degree of engagement in physical activity of children with disabilities. Consistent with this finding, the results of the current study show that there was a significant association at 5% level between the adolescents' levels of physical activity and lack of time' ($P < .044$). This indicates that the lack of time significantly influenced the participation of the adolescents with disabilities in physical activities. This study found that 'encouragement from friends to be active' and the level of physical activity were significantly associated at 5% level ($P < .021$). It may be reasonable to say that social support, or being with friends, influences physical activity. King et al. (2006) found

that girls had significantly higher enjoyment of social and self improvement activities than boys. Consistent with King et al.'s (2006) finding, this study found that gender was significantly associated at 5% level with 'find ways to exercise that I enjoy' ($P < .031$) and also gender and 'enjoying and having fun' ($P < .041$). It may be reasonable to state that participation in activities is a function of having pleasurable climates and moments (enjoyment and having fun).

Stevens et al. (1996) showed that 6 out of 10 adolescents with physical disabilities experienced parental control and lacked the autonomy of engaging in physical activities. This study found a significant association at 5% level between age and 'encouragement from family to be active' ($P < .032$). This indicates that relative to their age, an adolescent with physical disabilities participation in physical activities is influenced by family members.



The present study found there was a significant association between age group and 'Having an injury or disability' ($P < .018$). This might indicate that there is a causal relationship between age and having an injury/disability. The current study also found that there was significant association at 5% level between gender and 'not being in good health' ($P < .036$). This may indicate that gender influences the feeling of not being healthy enough to participate in physical activities. This study found a significant association between 'using a special equipment' and 'not having the right equipment' ($P < .045$). This may indicate that using special equipment influences the selection of the suitability of the equipment for use to facilitate a physical activity outcome. For example, Mihaylov et al. (2004) found that lack of space within infrastructures, including school buildings, was a major barrier because it hinders the

adolescents with disabilities movements within the environments and occasion difficulties on where to place the equipments they use.

5.5.1 Correlation

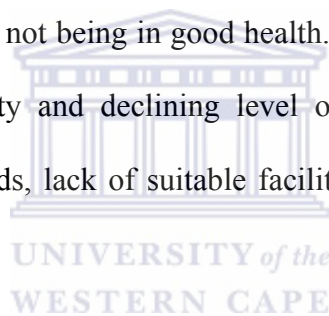
Research has shown that age is inversely related to physical level of adolescents with disability (Maher et al, 2007). Consistent with this finding, this study found a significant negative correlation at 5 % level ($P < .048$) between age and moderate-vigorous activity. This indicates that participation in activities declines with increasing age (See paragraph 1 of 4.3.3.1).

Antle (2004) stated that young adolescents with disabilities often experience barriers to friendships, such as lack of transport to visit friends and spontaneously engage in activities with peers. Consistent with this finding, the present study found that there was a significant positive, although weak, correlation at 1% level ($P < .007$) between age and barriers factor 2 (lack of transport, uneven play grounds, lack of suitable facilities, having a disability, and the need to rest) Table 4.8. This could indicate that the experience of these barriers to physical activity (factor 2) increased as age increased. This demonstrates that although it is expected that, over time, children should develop the means for coping with their environments, this may not lead to the increase of participation.

The present study found a positive significant correlation at 1% level ($P < .003$) between age and facilitator factor 1 (making new friends, 'strengthening body, learning and gain experience, having a friend to exercise with, 'gaining acceptance by peers, gaining self-confidence, gaining self-satisfaction, and improving ability to move without assistance) Table 4.10. This might indicate that the importance of these

facilitator variables to physical activity increase with increasing age. This implies that older adolescents with disabilities like to participate in physical activities because of psycho-social reasons. In support of this view, it has been found that older adolescents with disabilities participate more in social and less intense activities than young children with disabilities (King et al., 2006).

The results of the current study also suggest that the time constraint may be a cause of inactivity in both male and female learners with disabilities while encouragement from friends is associated with the maintenance of an active behaviour. They further show that gender is significantly associated with a tendency to engage in activities that an adolescent enjoys and not being in good health. However, age is associated to having an injury or disability and declining level of activity as well as lack of transport, uneven play grounds, lack of suitable facilities, having a disability, and a need to rest.



Therefore, there is need for exercise education and counseling on all facets (including explaining fear and perceived poor health) to the whole sample, irrespective of gender, to increase compliance and physical activity. In addition, resources need to be pulled together - in terms of manpower, physical and financial resources - to meet the identified physical activity needs. These include having the right clothes/equipments, building accessible physical environments, providing efficient transport to and from exercise areas and spaces for different exercises. All these must be addressed to successfully reduce inactivity in this sample.

5.6 Limitations

One of the limitations of the study was the sampling method which was purposive. The result of such a sample is only limited to the sample surveyed and cannot be representative. The age bracket was also too narrow which affected the sample size and hence the quantity of information collected. Another limitation was the subjective nature of data collection tool which was on self-report only. There was no objective observation that would have tested for performance of physical activity. According to Young et al. (1996), research on physical activity among adolescents with disabilities should evaluate performance and not capability. *Performance* is what a person “does do” in the usual circumstances of their everyday life, and *capability* is what a person “can do” in a defined situation apart from real life (Young et al., 1996). The overall walking or wheelchair racing was not assessed, including access and time spent in doing specific physical activities such as walking a known distance. Also not assessed include the effect of activity on the cardio-respiratory system and cardiovascular systems. Lastly, another limitation for this study was the possibility of adolescents over-reporting or under-reporting on activities.

Chapter Six

Summary, conclusion and recommendations

6.1 Introduction

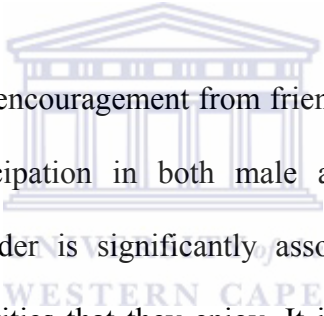
This chapter emphasizes the key findings of the study. Therefore the summary and conclusions as well as the recommendations are highlighted.

6.2 Summary

Overall, 1 out of 2 of adolescents with disabilities attending high schools in Central, Nyanza and Coast provinces in Kenya are inactive. This is a serious public health concern because the levels are lower than those reported in those without disability globally, and also because this inactivity will increase as these adolescents transit to adulthood accompanied by chronic disease and disability.

Active transport is minimally available in residential school settings as adolescents stroll or wheel to and from classrooms or to and from the dining hall to their halls of residence within the school compounds. As expected, almost all adolescents with disabilities engage in all forms of activities outside formal school schedule and are more likely to engage in sedentary (playing cards, watching television, computer games) or occasionally light activities (physiotherapy exercises, stretching, walking and standing on frame). It is apparent that only 10% indicated physical education (PE) as a source of physical activity, which may need to be investigated further in future. However, adolescents do engage formally and informally in moderate and vigorous physical activities, although the frequency is below the recommended number of days; with females engaging more often in moderate and less in vigorous activity compared to male adolescents.

Most of the barriers to activity participation are found in the many contexts of daily life and are of diverse forms. These are found in the adolescent's personality (self-efficacy with regard fear of physical activity or disability), the physical (lack of transport to exercise spaces, uneven play grounds, lack of suitable facilities and lack of clothes/equipment), and the social (lack of time and the need for to rest during spare time) environments. Self efficacy is significantly associated with engaging in physical activity in adolescents with disabilities. Adolescents with disabilities like; to enjoy, to be with friends, to improve own competences/skills in activities they like, and to be independent in mobility.



Both, the time constraint and encouragement from friends are significantly associated with physical activity participation in both male and female adolescents with disabilities. In addition, gender is significantly associated with the adolescents' participation in physical activities that they enjoy. It is also significantly associated with having a poor health status. However, age is significantly associated with an adolescent having an injury or disability and the decrease in the level of activity, as well as the likelihood to experience barriers such as; lack of transport, uneven play grounds, lack of suitable facilities, having a disability, and wanting to rest.

There is an overarching need to provide physical activity education and counseling in schools (including explaining fear and perceived poor health) to all adolescents, irrespective of gender, in order to increase compliance and physical activity. There is also need to pull available resources together (manpower, physical and financial resources) to meet the identified physical activity needs such as the provision of the

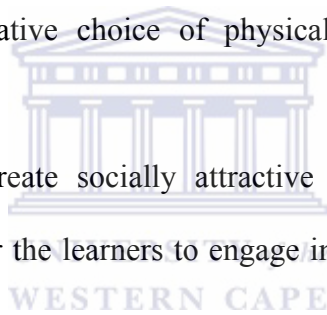
right clothes/equipments, building accessible physical environments, providing efficient transport to and from exercise areas, and creation of spaces for different exercises. All these must be addressed to successfully reduce inactivity among adolescents with physical disabilities who participated in this study, and may be others nationally, to meet the Healthy People 2010 objective 22-6 and objective 6-2 of chapter 6 of HP2010.

Therefore, future strategies to minimize inactivity and to promote activity uptake in this population should hold dialogue with the adolescents and their family to attract wider social support, in addition to creating socially attractive barrier free environments that could increase access for the learners to engage in physical activities. Further research should be conducted nationally in institutions hosting adolescents with disabilities to investigate the impact of physical activity on the health and fitness of the older learners. This is especially needed due to the high level of inactivity among this group, which is known to be linked to overweight, obesity and other cardio-vascular diseases in adolescents, especially those with disabilities.

6.3 Recommendations

1. The findings suggest that physical education can contribute significantly to the availability of appropriate physical activity which confers health benefits. Learners with physical disabilities should, therefore, be encouraged to participate for at least 20 to 30 minutes at moderate to vigorous intensity.
2. Efforts should also be made to dissuade learners with physical disabilities from pursuing stationary activities.

3. An increase in time spent in physical education (PE), relative to sedentary activities, can also significantly reduce the prevalence of inactivity. Therefore, schools (trained physical education teachers and physiotherapists and other activity specialists) should increase PE supervision and frequency to five days a week
4. It is recommended that all learners should receive physical activity and exercise education, including counseling to alleviate fear and perceived poor health, irrespective of gender, to increase physical activity compliance.
5. Schools should also promote dialogue with the learners and their family to encourage cooperative choice of physical activities and attract social support.
6. Schools should create socially attractive barrier free environments to increase access for the learners to engage in physical activities. Examples include;
 - a. Rules for games and sports should be 'relaxed' to encourage more adolescents to participate.
 - b. Competition in sports should be discouraged
 - c. Individual adolescents should be allowed to participate in the activity they like.
7. The findings in this study suggest that inactivity among the adolescents with physical disabilities is promoted by modifiable barriers. Therefore, it is strongly recommended that schools should make activity-promoting changes in their environments to increase participation, such as providing an efficient transport system to exercise spaces, level play grounds, and



designate, build new, or renovate old facilities to make them suitable for physical activities.

8. It is also recommended that school policies should make provision of suitable clothes/equipment for physical activities a priority.
9. The results suggest that time constraints significantly contribute to the level of physical activity. Therefore, learners should be encouraged to include exercises in their time plan.

6.4 Conclusion

This cross-sectional study succeeded in providing knowledge of physical inactivity levels, facilitators and barriers to physical activity among adolescents with physical disabilities attending high schools in Kenya. It demonstrated that almost 1 out of 2 (48.3%) adolescents with physical disabilities are inactive. The results show that physical activity decline with advance in age and females are less active than males. It also showed that adolescents with disabilities in residential high schools in the country engage for fewer days in moderate and vigorous physical activities than is recommended. The study shows barriers and facilitators are perceived from the interaction between the learner's personal attributes, physical and social factors. In particular, fear is perceived as a major barrier to participation in physical activities. These results would undoubtedly inform the schools' physical education policies and sports development. Physiotherapists, occupational therapists, physical education teachers, and other stakeholders will use the results of this study in recommending and designing physical activities for the adolescents with disabilities in these schools. Much emphasis is put here on the schools to work on the recommendations to increase the proportion of adolescents who meet the CDC recommendations of being physically active, and reduce barriers to participation in physical activity.

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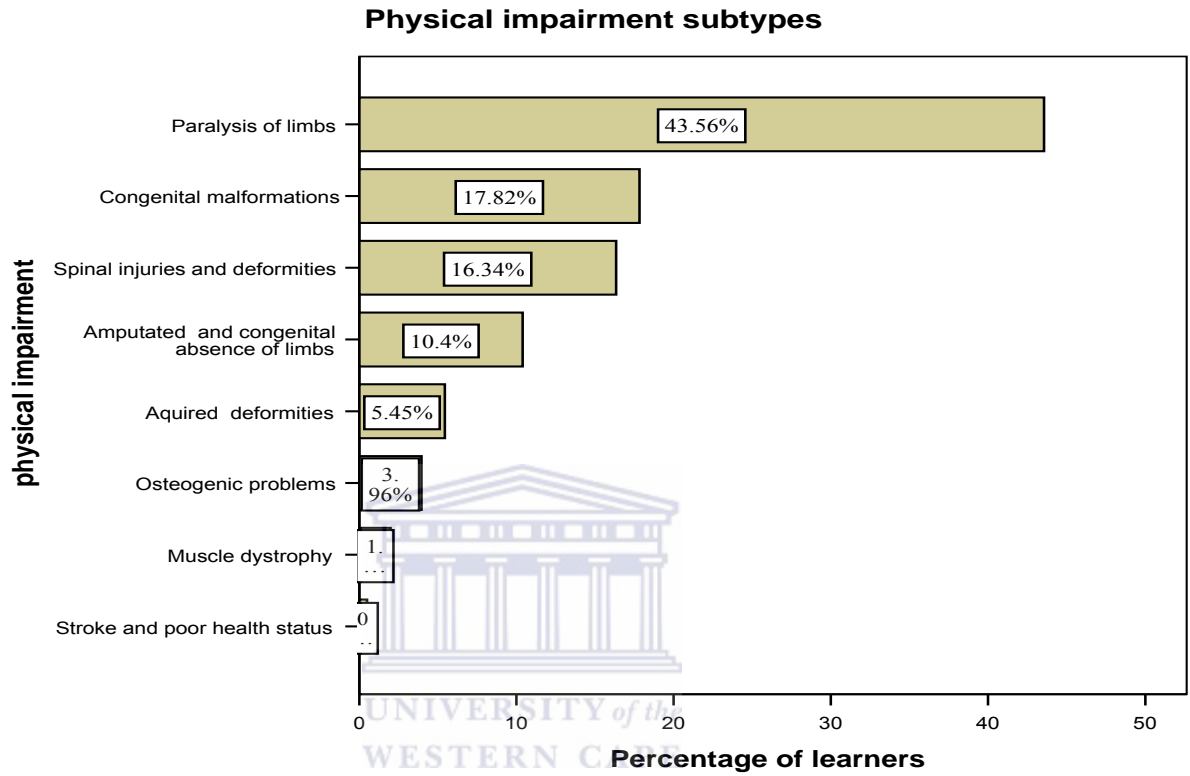
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Appendices

Appendix 1

Figure 4: Distribution of impairments subtypes by learners decreasing.



Appendix 2a

Barriers factor analysis loading

Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.296	24.073	24.073	2.514	11.429	11.429
2	1.523	6.924	30.996	2.485	11.298	22.727
3	1.434	6.518	37.514	2.038	9.262	31.989
4	1.352	6.144	43.658	1.924	8.747	40.735
5	1.258	5.718	49.377	1.596	7.257	47.992
6	1.089	4.951	54.328	1.394	6.336	54.328

Appendix 2b

Barriers_factor analysis

Variable	Factors					
	1	2	3	4	5	6
My health is not good enough.	-	-	-	.710	-	-
I'm too shy and feel embarrassed.	-	-	-	.561	-	-
I'm not the sporty type.	-	-	-	-	.439	-
I need to rest and relax in my spare time.	-	.491	-	-	-	-
I'm too lazy/not motivated/can't get started.	-	-	.667	-	-	-
I fear getting injured or damage to my health.	-	-	-	-	.713	-
I don't enjoy physical exercises.	-	-	-	-	.622	-
I'm too fat.	-	-	-	-	-	.759
I haven't got the energy.	.457	-	-	-	-	-
There's no one to do it with.	-	-	-	.574	-	-
I have an injury or disability that stops me.	-	-	-	-	-	.417
There are no suitable facilities nearby.	-	.660	-	-	-	-
I haven't got the right clothes or equipment.	-	-	.540	-	-	-
I haven't got time.	-	-	.525	-	-	-
Lack of transport has been a problem for me	-	.665	-	-	-	-
Uneven play grounds and compounds makes it difficult to do exercise	-	.674	-	-	-	-
People at home do not assist me to become active.	-	-	.648	-	-	-
People at school do not assist me to become active.	.547	-	-	-	-	-
Negative attitude towards me from my family has been problem.	.661	-	-	-	-	-
Negative attitude towards me from schoolmates has been problem.	.733	-	-	-	-	-
People discriminate or avoid being associated with me	.608	-	-	-	-	-
Lack of advice about exercise or physical education at school	-	.467	-	-	-	-

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.
 A. Rotation converged in 13 iterations.

Appendix 3a

Facilitator factor analysis loading

Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.242	32.855	32.855	4.111	21.638	21.638
2	1.804	9.496	42.351	2.248	11.830	33.469
3	1.337	7.037	49.388	2.062	10.851	44.320
4	1.063	5.593	54.981	1.585	8.343	52.663
5	1.027	5.404	60.385	1.467	7.722	60.385

Appendix 3b

Facilitator factor analysis

Variables	Factors				
	1	2	3	4	5
Making new friends,	.623	-	-	-	-
Having a friend to exercise with	.695	-	-	-	-
Learning and gain experience	.567	-	-	-	-
Strengthening my body to look good	.661	-	-	-	-
Gaining more self-confidence in doing exercises I like	.786	-	-	-	-
Gaining acceptance in my group	.701	-	-	-	-
Gaining self-satisfaction.	.679	-	-	-	-
Improving my ability to move without assistance from others	.483	-	-	-	-
Enjoying and having fun	-	-	.628	-	-
Maintaining a healthy body	-	-	.554	-	-
Having access to suitable facilities	-	-	-	-	.617
Having the right clothes or equipment.	-	-	.806	-	-
Reducing my body weight.	-	-	-	-	.709
Encouragement from friends to be active	-	-	-	.797	-
Encouragement from family to be active	-	-	-	.724	-
Positive attitude towards me from family members	-	.811	-	-	-
Positive attitude towards me from schoolmates and teachers	-	.847	-	-	-
Positive attitude towards me from other people	-	.792	-	-	-
Physical education classes and exercise advice at school	-	-	-	-	.587

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a Rotation converged in 6 iterations.

Appendix 4

Questionnaire for cross-sectional study on physical inactivity among adolescents with disabilities attending high schools in Kenya

Dear Participant ☺

I am gathering information about the health of adolescents with disabilities in high schools in Kenya. This research is conducted as part of my Master of Science studies at the University of the Western Cape, South Africa. Your school has been selected purposively to participate in the study, and I would like to ask you some questions about health and health practices.

You do not have to answer any question you do not want to. Any information you give me will be confidential. If you have any questions, please ask. Use the phone number provided.

*Instructions: Mark **X** in the circle or write in space provided*

Section A: Demographic data

1. Which one of these groups would you say best represents your race?

African White Asian Other [specify]

2. What level are you in school? Form I Form II Form III Form IV

3. What is your gender? Male Female

4. What is your age?Years

5. What is your school called?

6. Is your family monthly income from all sources between.....Kenya Shillings:
i. 5000-10000
ii. 10000-15000
iii. 15000-20000
iv. 20000-25000
v. 25000-30000
vi. 30000-35000

The following questions are about health problems or impairments you may have.

7. What physical impairment do you have? Please write -----
(**example:** *paralysis both legs after polio, or spinal cord injury after road accident*).

8. Do you use special equipment, such as a cane, crutches or a wheelchair?

Yes No

9. Do you now have any other health problem that requires you to use special equipment, such as eyes spectacles, hearing aids? Specify -----

Yes No -

10. To what extent does it affect your physical activity

0=Not at all 1= A little 2=Some what 3= Mostly 4=Completely

Section B: Physical activity scale

11. During the past 7 days how often did you engage in *stationary activities* such as reading, watching TV, computer games, or doing handcrafts?

Never 1-2days 3-4days 5-7days

a. What were these activities?-----Done at? Home, School or community

b. On average, how many hours per day did you spend in these *stationary activities*?

Less than 1hr 1 but less than 2hr 2-4hr More than 4hr

12. During the past 7 days, how often did you *walk, wheel, push outside* your home or school *other than specifically for exercise*. For example, getting to class or walking to the shop or other errands?

Never 1-2days 3-4days 5-7days

a. On average, how many hours per day did you spend wheeling or pushing inside or outside school?

Less than 1hr 1 but less than 2hr 2-4hr More than 4hr

13. During the past 7 days, how often did you engage in *light sport or recreational activities* such as playing cards, billiards or pool, physiotherapy/ occupational therapy exercise; example stretching, use of a standing frame or other similar activities?

Never 1–2days 3–4days 5–7days

a. What were these activities?-----Done at? Home, School or community

b. On average, how many hour per day did you spend in these *light sport or recreational* activities?

Less than 1hr 1 but less than 2hr 2–4hr More than 4hr

14. During the past 7 days, how often did you engage in *moderate sport and recreational* activities such as table tennis, softball, dancing, wheeling wheelchair or pushing for pleasure or other similar activities?

Never 1–2days 3–4days 5–7days

a. What were these activities? Write here-----

b. On average, how many hours per day did you spend in these *moderate sport and recreational* activities?

Less than 1hr 1 but less than 2hr 2–4hr More than 4hr

15. During the past 7 days, how often did you engage in *strenuous sport and recreational* activities such as jogging, running, wheelchair racing (training), physical education, off-road pushing, aerobic dance, cycling (hand or leg), singles tennis, rugby, basketball, walking with crutches and braces, or other similar activities

Never 1–2days 3–4days 5–7days

a. What were these activities? Write here-----

b. On average, how many hours per day did you spend in these *strenuous sport or recreational* activities?

Less than 1hr 1 but less than 2hr 2–4hr More than 4hr

16. During the past 7 days, how often did you do any exercise *specifically to increase muscle strength and endurance* such as lifting weights, push-ups, pull-ups, dips, or wheelchair push-ups, etc?

Never 1–2days 3–4days 5–7days

a. What were these activities? Write here-----

b. On average, how many hours per day did you spend in these *exercises to increase muscle strength and endurance*?

Less than 1hr 1 but less than 2hr 2–4hr More than 4hr

School activity

17. During the past 7 days, how often have you done any *light School activity*, such as dusting, sweeping classroom or dormitory floors or polishing shoes?

Never 1–2days 3–4days 5–7days

a. On average, how many hours per day did you spend doing *light School activity*?

Less than 1hr 1 but less than 2hr 2–4hr More than 4hr

18. During the past 7 days, how often have you done any *heavy school activity* such as, scrubbing floors, washing windows, or walls, etc?

Never 1–2days 3–4days 5–7days

a. On average, how many hours per day did you spend doing *heavy school activity*?

Less than 1hr 1 but less than 2hr 2–4hr More than 4hr

19. During the past 7 days, how often you done washing clothes?

Never 1–2days 3–4days 5–7days

a. On average, how many hours per day did you spend washing clothes?

Less than 1hr 1 but less than 2hr 2–4hr More than 4hr

20. During the past 7 days how often have you done cleaning school compound including mowing, collecting waste such as fallen leaves and waste papers in school compound, etc?

Never 1–2days 3–4days 5–7days

a. On average, how many hours per day did you spend doing cleaning school compound?

- Less than 1hr 1 but less than 2hr 2-4hr More than 4hr
-
21. During the past 7 days, how often did you *care for another person*, such as schoolmate?
- Never 1-2days 3-4days 5-7days
-
- a. On average, how many hours per day did you spend *caring for another person*?
- Less than 1hr 1 but less than 2hr 2-4hr More than 4hr
-

Section C: Barriers to Physical Activity Scale

Read statements in the table below and indicate **how much** each prevents you from engaging in physically activity. *Instructions: Mark X in the box provided*

What prevents me from engaging is....?

1. My health is not good enough.
2. I'm too shy and feel embarrassed.
3. I'm not the sporty type.
4. I need to rest and relax in my spare time.
5. I'm too lazy/not motivated/can't get started.
6. I fear getting injured or damage to my health.
7. I don't enjoy physical exercises.
8. I'm too fat.
9. I haven't got the energy.
10. There's no one to do it with.
11. I have an injury or disability that stops me.
12. There are no suitable facilities nearby.
13. I haven't got the right clothes or equipment.
14. I haven't got time.
15. Lack of transport has been a problem for me
16. Rough play grounds and compounds makes it difficult to do exercise



	0=Not at all	1= A little	2= Some what	3= Mostly	4=Completely

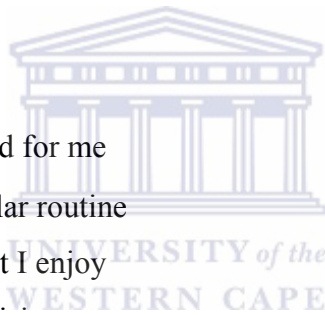
17. People at home do not assist me to become active.
18. People at school do not assist me to become active.
19. Negative attitude towards me from my family has been problem.
20. Negative attitude towards me from schoolmates has been problem.
21. People discriminate or avoid being associated with me
22. Lack of advice about exercise or physical education at school

Section D: Facilitators to physical activity Scale

Instruction: Read each statement and use the scale provided below to indicate **how well you are able to do** each of the health practices. *Mark X in the box provided*

I AM ABLE TO:

1. Do exercises that are good for me
2. Fit exercise into my regular routine
3. Find ways to exercise that I enjoy
4. Know when to quit exercising
5. Do stretching exercises
6. Keep from getting hurt when I exercise



0=Not at all	1= A little	2= Some what	3= Mostly	4=Completely

Instruction: Read statements in the table below and indicate how much each makes you to engage in physical activity. *Instructions: Mark X in the box or write in space provided*

How much it makes me engage

7. Making new friends,
8. Having a friend to exercise with
9. Learning and gain experience

0=Not at all	1= A little	2= Some what	3= Mostly	4=Completely

- 10. Strengthening my body to look good
- 11. Gaining more self-confidence in doing exercises I like
- 12. Gaining acceptance in my group
- 13. Gaining self-satisfaction.
- 14. Improving my ability to move without assistance from others

0=Not at all	1= A little	2= Some what	3= Mostly	4=Completely

How much it makes me engage

- 15. Enjoying and having fun
- 16. Maintaining a healthy body
- 17. Having access to suitable facilities.
- 18. Having the right clothes or equipment.
- 19. Reducing my body weight.
- 20. Encouragement from friends to be active
- 21. Encouragement from family to be active
- 22. Positive attitude towards me from family members
- 23. Positive attitude towards me from schoolmates and teachers
- 24. Positive attitude towards me from other people
- 25. Physical education classes and exercise advice at school

Thank you ☺

Appendix 5

Letter of information

Dear respondent,

I am a postgraduate student doing a Master of Science degree in the department of physiotherapy at the University of the Western Cape. As part of the study I'm expected to conduct a research study. The title of my research is "physical inactivity among adolescents with physical disabilities attending high schools in Kenya." Information gathered in this study will be important to plan holistic physiotherapy rehabilitation, physical education and health promotion programs for you and other adolescents in the country.

If you agree to participate in this study I will consult with you to arrange a suitable time and day for collection of the relevant information. Participation in the study will involve filling a questionnaire taking at least 30 minutes. The information you give will be treated with utmost respect and confidentiality.

This provides you with an opportunity to appreciate and to contribute to scientific research that may provide information about physical inactivity among adolescents with physical disabilities that could be useful to physiotherapists, physical education teachers, health promoters and others.

There is no risk to you for participating in this study, and it is expected that you will experience minimal discomfort or stress from the questions asked in the questionnaire. You don't have to respond to every question or provide information you do not want to provide and can withdraw from participating at any time.

Occasionally, a follow-up interview might be necessary to clarify some information. The researcher could request your participation for the follow-up interview before a lapse of two years.

All participants will be identified using codes and the information kept in a secure filing cabinet or safe so as to safeguard their anonymity and all the individuals directly or indirectly referred to in the questionnaire. In the future the researcher will destroy all code lists.

If you have any questions or concerns before or after the study, you may contact me through phone or email given hereunder.

Mr. Joseph Matheri-

Phone: 27.76.856.7071: **Email:** 2656995@uwc.ac.za or mmatheri@gmail.com

Appendix 6a

CONSENT FORM *(For learner)*

September 5, 2006

I..... agree to participate in the study being conducted by Mr Joseph Matheri a post-graduate student doing masters degree in the Department of Physiotherapy, at the University of the Western Cape, South Africa. He has informed me that this is a study for his Masters degree designed to gather information about the level of physical inactivity, barriers and facilitators of physical activity among adolescents with disabilities attending high schools in Kenya:

I understand that:

- Participation in the study is voluntary and will involve filling a questionnaire taking at least 30 minutes mutually as agreed upon by me and the researcher.
- The benefits I may expect from the study are: a) an appreciation of research on adolescents with disabilities and b) an opportunity to contribute to scientific research that may provide information about physical inactivity, barriers and facilitators of physical activity among adolescents with disabilities that could be useful to adolescents with disabilities, physiotherapists, physical education teachers, public health promoters and others.
- The researcher does not foresee any risks to me for participating in this study, and it is expected that I will experience minimal discomfort or stress from the questions asked.
- I do not have to respond to every question or provide information I do not want to provide and I can withdraw from participating at any time.
- The researcher may contact me within the next two years to request for clarification of responses I will enter in the questionnaire.
- codes identifying participants will be kept in a secure filing cabinet or safe so as to safeguard the anonymity of myself and all the individuals directly or indirectly referred to in the questionnaire(s). I understand that in the future the researcher will destroy all code lists.
- Only people associated with the study will see my responses. To protect privacy pseudonyms will be assigned for publications and presentations, unless written consent is provided. My responses will not be associated with my name; instead my name will be converted to a code number when the researchers store the data.
- The researcher will answer any other questions about the research either before or after the research. If I have any other questions or concerns I can address them to the researcher by email or phone.

<ul style="list-style-type: none">• Contact Numbers of Researcher: Mr. Joseph M.Matheri Phone: 27.76.856.7071 Email:2656995@uwc.ac.za or mmatheri@gmail.com

Signature _____ Witness _____

Agree /decline; to participate in this study and I understand I may withdraw from participating at any time.

Appendix 6b

Consent form (For guardian)

September 5, 2006

I..... agree my son/daughter (delete if not applicable) to participate in the study being conducted by Mr Joseph Matheri a post-graduate student doing masters degree in the Department of Physiotherapy, at the University of the Western Cape, South Africa. He has informed me that this is a study for his Masters degree designed to gather information about the level of physical inactivity, barriers and facilitators of physical activity among adolescents with disabilities attending high schools in Kenya:

I understand that:

- Participation in the study is voluntary and will involve filling a questionnaire taking at least 30 minutes mutually as agreed upon by me and the researcher.
- The benefits he/she may expect from the study are: a) an appreciation of research on adolescents with disabilities and b) an opportunity to contribute to scientific research that may provide information about physical inactivity, barriers and facilitators of physical activity among adolescents with disabilities that could be useful to adolescents with disabilities, physiotherapists, physical education teachers, public health promoters and others.
- The researcher does not foresee any risks to him/her for participating in this study, and it is expected that he/she will experience minimal discomfort or stress from the questions asked.
- He/she does not have to respond to every question or provide information he/she does not want to provide and I understand he/she can withdraw from participating at any time.
- The researcher may contact him/her within the next two years to request for clarification of responses he/she will enter in the questionnaire.
- codes identifying participants will be kept in a secure filing cabinet or safe so as to safeguard his/her anonymity and that of all the individuals directly or indirectly referred to in the questionnaire(s). I understand that in the future the researcher will destroy all code lists.
- Only people associated with the study will see his/her responses. To protect privacy pseudonyms will be assigned for publications and presentations, unless written consent is provided. His/her responses will not be associated with his/her name; instead his/her name will be converted to a code number when the researchers store the data.
- The researcher will answer any other questions about the research either before or after the research. If I have any other questions or concerns I can address them to the researcher by email or phone.

<ul style="list-style-type: none"> • Contact Numbers of Researcher: Mr. Joseph M.Matheri Phone: 27.76.856.7071 Email:2656995@uwc.ac.za or mmatheri@gmail.com
--

Signature _____ Witness _____
 Agree /decline to give my consent for him/her to participate in this study and I understand he/she may withdraw from participation or decline to participate.

Appendix 7

Approval letter from University of the Western Cape Higher Degrees Committee



UNIVERSITY OF THE WESTERN CAPE

Private Bag X17 P BELLVILLE P 7535 P South Africa
☐ (021) 959-3683/2746 P ☐ (021) 959-2755
E-mail: csjohnson@uwc.ac.za

Higher Degrees Committee

Faculty of Community and Health Sciences

16 November 2006


*The Research & Ethics Committee
Ministry of Education
Kenya*

Dear Sir/Madam

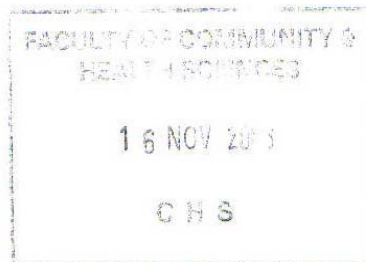
Research project of **Mr. Joseph Mwangi Matheri (Student Number: 2656995)**

This letter confirms that **Mr. Joseph Matheri (2656995)** is a postgraduate student in the Community and Health Sciences faculty at UWC. **His** proposed research entitled, "**Physical inactivity among adolescents with physical disabilities attending high schools in Kenya**", has been examined by the Higher Degrees Committee and found to be of high scientific value, methodologically sound and ethical. We fully support the research and urge you to allow **him** access to your organisation.

Yours sincerely



.....
Dr G. Reagon
Chairperson Higher Degrees Committee



Appendix 8

Ministry of Science & Technology Research Authorization

MINISTRY OF SCIENCE & TECHNOLOGY

Telegrams: SCIENCE TEC", Nairobi

Fax No.
Telephone: 318581
When replying please quote



JOGOO HOUSE
HARAMBEE AVENUE
P. O. Box 60209-00200
NAIROBI
KENYA

MOST 13/001/36C 714/2

7th December 2006

Joseph Mwangi Matheri
Kenya Medical Training College
P.O. Box 30195
NAIROBI

Dear Sir,

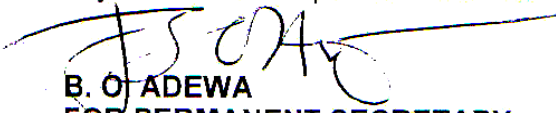
RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on, *'Physical Inactivity among Adolescents with Physical Disabilities attending High Schools in Kenya'*

I am pleased to inform you that you have been authorized to carry out research in Thika, Mombasa and Kisumu Districts for a period ending 28th February 2007.

You are advised to report to the District Commissioners and the District Education Officers of the respective Districts you will visit before embarking on your research project.

On completion of your research, you are expected to submit two copies of your research report to this office.


B. O. ADEWA
FOR PERMANENT SECRETARY

The District Commissioners
Thika District
Mombasa District
Kisumu District

The District Education Officer
Thika District
Mombasa District
Kisumu District

Appendix 9

Permission to conduct the study at SA Joytown secondary school



The Salvation Army

JOYTOWN SECONDARY SCHOOL
(for Physically Handicapped Students)
PO BOX 1370,
THIKA, KENYA

Stand for
Dare for *Christ*

TELEPHONE: 067-30588

**UNIVERSITY OF THE WESTERN CAPE
PRIVATE BAG X17 BELLVILLE P 7535
SOUTH AFRICA**

JOSEPH MWANGI MATHERI – STUDENT NO. 2656995

The above named has requested and been permitted to conduct his research in this school.

He is doing that with the co-operation of the Guidance and Counseling Department in the school.

It is our hope that his research will pave way to the foundation of proper physical activities for adolescents with physical disabilities.

Kamonye L.M
Principal

Principal
S.A. Joytown Sec. Sch.
For Physically Handicapped
P.O. Box 1370-01000, Thika

UNIVERSITY of the
WESTERN CAPE

Appendix 10

Permission to conduct the study at SA Joyland secondary school

The Salvation Army

Kenya Territory
Joyland Secondary School for physically Handcapped

P.O. Box 19494 Kisumu
Telephone: 057 - 2022441



Our Ref: JSSS/124/M/3(4)

Your Ref:

Date: 19 January 2007

Mr Joseph M Matheri
Box 30195
NAIROBI

Dear Sir

THE SALVATION ARMY
JOYLAND SPECIAL SECONDARY SCHOOL
P. O. BOX 19494 KISUMU - 40100
TEL: (057) 22441
DATE: 17th Jan. 2007

REF: PERMISSION TO CONDUCT A RESEARCH

I am glad to let you know that you have been granted permission to conduct research on "PHYSICAL INACTIVITY AMONG ADOLESCENTS WITH PHYSICAL DISABILITIES ATTENDING HIGH SCHOOLS IN KENYA," as requested for on your letter dated 16th November, 2006. You are free to interact with the students on 23rd and 24th January, 2007 from 2:00 pm to 4:00 pm.

Please note that our school's population is 120 students but under the inclusive programme, only 40% are Physically Challenged; the rest are regular. I trust this will not cause any inconvenience.

Sincerely

P J Otieno(Mrs)
Deputy Headteacher

FOR: HEADTEACHER

UNIVERSITY of the
WESTERN CAPE

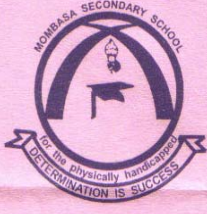
WILLIAM BOOTH - Founder
SHAW CLIFTON - General
HEZEKIEL ANZEZE - Territorial Commander

Appendix 11

Permission to conduct the study at Mombasa secondary school

**MOMBASA
SECONDARY
SCHOOL**

**For the
physically
handicapped**



P.O. Box 86231
PHONE: 473745
MOBILE: 072 303196
MOMBASA, KENYA

25TH JANUARY 2007

JOSEPH MWANGI MATHERI
KENYA MEDICAL T. C.
P.O. BOX 30195
NAIROBI

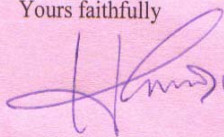
DEAR MR JOSEPH,

RE: **RESEARCH AUTHORIZATION**

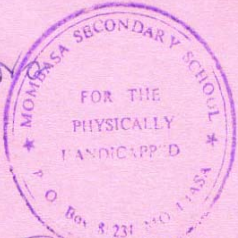
This is to authorize you to carry out the research referred above as per the Ministry Authorization of 7th December 2006 ref MOST/13/001/36C714/2.

I would appreciate if you can avail to us a copy of your findings and recommendations for our improvement at the end of your course.


Yours faithfully



NDORO H K
PRINCIPAL



TOTAL - STUDENTS WITH IMPAIRMENTS 60
|| WITHOUT IMPAIRMENTS 140
TOTAL 200



TEACHER IN CHARGE

