

**PERCEIVED BENEFITS OF, BARRIERS AND HELPFUL CUES TO
PHYSICAL ACTIVITY AMONG TERTIARY INSTITUTION
STUDENTS IN RWANDA**

By

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ABSTRACT

According to literature, particularly from data obtained from the World Health Organisation (WHO), physical inactivity or sedentarism is one of the leading causes of the major non-communicable diseases, which contributes substantially to the global burden of diseases, death and disability. The burden of mortality, morbidity and disability attributable to non-communicable diseases is currently greatest and is continuing to grow in the developing countries. Most declines in physical activity are during the transition from high school to College or University. The aim of the study was to ascertain perceptions of physical activity, specifically; perceived benefits of, perceived barriers and perceived helpful cues (motivational factors) to physical activity among tertiary institution students in Rwanda, and to find out whether demographic and background characteristics have an influence on these perceptions. A cross-sectional and descriptive study with quantitative design was conducted. Five hundred (500) tertiary institution students were randomly sampled from purposively selected departments and classes at each of the five government educational tertiary institutions in the country. A pre-coded self-administered questionnaire with a small number of open-ended questions was administered to the students. A response rate of 425 (85%) was obtained. Data were analysed by descriptive and inferential statistics with SAS version 8. Frequencies and percentages for students' demographics, mean score values with standard deviations for each perception variable were descriptively obtained. Mantel-Haenszel Chi-square (MHC) with inclusion of False Discovery Rate (FDR) at 5% for multiple test adjustment, Spearman's correlation (r) and Kruskal Wallis H tests were used to identify the significant influence of demographic and background variables on perceptions. The average age was 26.4 years with a standard deviation (SD) of 3.8. Males constituted 63% while females were only 37% of the sample. Five categories of

professional study courses were identified and many students were following arts courses. The majority of the students were motivated to participate in physical activity by their families and friends. However, more than 70% were not participating in physical activity at tertiary level. A good number of students had previously participated in physical activity in their primary school (62%) and secondary school (73%). A decline in physical activity participation was identified from primary through secondary school level but tremendously from secondary school level to tertiary level. Psychological benefits of physical activity were some of the most important perceived benefits cited by the students. Most of the important barriers cited concerned equipment and time constraints to exercising. The students felt that having a friend to participate with in physical activity was one of the most important helpful cues. Significant differences in perceptions of physical activity were observed between genders. Females perceived more barriers to physical activity compared to males. Students in education as a professional study course indicated more understanding of physical activity issues than the rest of the students. Associations were found between previous participation and the current perceptions of physical activity. Most perceived barriers were negatively associated with previous participation in physical activity while perceived benefits were positively associated with previous participation in physical activity. The findings demonstrate an influence of the demographic and physical activity background characteristics on perceptions of physical activity among the students. The study concludes that physical activity promoting programmes should consider the factors influencing the physical activity perceptions during the interventions. It is better to motivate individuals according to their interests or what they consider to be important for them during such interventions. In addition, it was felt that the physical activity programmes should be emphasized right from childhood.

KEYWORDS:

Physical activity

Students/young adults

Perceived benefits

Perceived barriers

Perceived cues

Health promotion

Prevention

Chronic/non-communicable diseases

Sedentary lifestyle

Rwanda.



DECLARATION

I hereby declare that “*Perceived benefits of, barriers and helpful cues to physical activity among tertiary institution students in Rwanda*”, is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

David Kabagema TUMUSIIME

Signature.....



November 2004

Witness: Dr. José FRANTZ

.....

DEDICATION

I dedicate this mini-thesis to my mother, Edinance MUKAKARANGWA

AND

my father, late Yokana KABAGEMA



Thank you for your parenting care that made me whom I am.


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In the first place, I thank God who is above all, for everything He made me pass through. I would like to acknowledge the efforts made by the Rwandan government through the Ministry of education for financing my studies. I wish to extend my appreciation to Kigali Health Institute administration and the entire staff in general for their assistance, support and encouragement towards my further studies. My sincere gratitude to my supervisor, Dr José Frantz for the courage, critics, sacrifices and guidance, which permitted me to produce this kind of work. I am grateful to Professor Richard Madsen for the assistance in statistical work and many other wise critics during the core process of data analysis. I am incredibly grateful to all those Tertiary Institution students in Rwanda who participated in this study, and voluntarily contributed with their views and perceptions on physical activity. I sincerely, thank all those who assisted me during the data collection, especially Mr Sentama E., Robert and others. I cannot forget all my colleagues and classmates, the Rwandan students community and all other friends whom we shared the happiness and stressful times in all academic angles while at UWC.

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LET THE GLORY BE TO GOD AND HIS PEACE BE WITH YOU ALWAYS

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ABBREVIATIONS

CDL	Chronic Disease of Lifestyle
CMH	Cochran – Mantel-Haenszel
EBBS	Exercise Benefit/Barrier Scale
EU	European Union
FDR	False Discovery Rate
HBM	Health Belief Model
ISAE	Institut Supérieur d’Agriculture et d’élevage
KHI	Kigali Health Institute
KIE	Kigali Institute of Education
KIST	Kigali Institute of Science, Technology and Management
MHC	Mantel-Haenszel Chi-Square
NUR	National University of Rwanda
SAS	Statistical Analysis System
UWC	University of the Western Cape
WHA	World Health Assembly
WHO	World Health Organisation

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

In this chapter, the background of the study is given to highlight how physical inactivity is a health burden, threatening issues towards people's health worldwide and the initiatives of the World Health Organisation (WHO) to address the growing burden of chronic diseases as a result of physical inactivity. The chapter also reflects on the physical activity levels among different age groups especially the young adults in some countries around the world as well as in Rwanda. Examples of theories for behaviour change as a need for physical activity promotion, the statement of the problem, aims and objectives of the study are all given. Lastly, the significance of the study and the definitions of key terms used in this study are all outlined in this chapter.



1.2 BACKGROUND OF THE STUDY

Lack of physical activity or sedentarism, is one of the leading causes of the major non-communicable diseases, which contributes substantially to the global burden of diseases, death and disability (WHO, 2002a). Preliminary data from a WHO study on risk factors suggest that inactivity is one of the 10 leading global causes of death and disability. More than two million deaths each year are attributable to physical inactivity (WHO, 2002a; WHO, 2003a). According to Booth (2000), chronic diseases of lifestyle accounts for 50% of all deaths in developing economies and 85% of all deaths in developed economies. Overall, ischaemic heart diseases followed by cerebro-vascular disease were the leading causes of death throughout the world. Physical inactivity is an established risk factor for

cardiovascular disease, colon cancer and probably other cancers, non-insulin-dependent diabetes, overweight, hypertension, anxiety and depression (Booth, Bauman & Owen, 2002).


In countries around the world between 60% and 80% of adults are simply not physically active enough to benefit their health (WHO, 2002a; WHO, 2003a). Again, most of the people in the world are tending to live, and some are already living in a technologically advanced society in which physical activity is becoming an ever more peripheral of their daily lives (Biddle & Mutrie, 2001).

Following the successful World Health Day (2002) with the theme “Move for Health”, the World Health Assembly (WHA) urged Member States to celebrate a “Move for Health” day each year to promote physical activity as essential for health and well being. The Assembly formally launched “Move for Health” as an annual initiative with broad links into communities around the world. “Move for Health” was launched as part of a broader WHO initiative to address the growing burden of chronic diseases through its Global Strategy on Diet, Physical activity and Health, also mandated by the 55th WHA (WHO, 2003b).

Traditionally, major causes of illness and death in developing countries, in particular sub-Saharan Africa, have been linked to infectious diseases and under-nutrition, and these are still public health problems in these countries (Caballero, 2001). However, currently the situation is alarming where an existing burden of infectious diseases is compounded by the HIV/AIDS epidemic (WHO, 2002a). In addition to these alarming problems of infectious diseases faced by sub-Saharan countries, Dr David Nyamwaya, Regional Adviser for health

promotion at the WHO Regional Office for Africa (AFRO), reported that in Africa, as elsewhere in the developing and developed world, non-communicable diseases have become a major epidemic due, in part, to a rapid transition in lifestyle leading to reduced physical activity, changing diets and tobacco use (WHO, 2002a). Dr Nyamwaya adds that although distinct physical activity patterns are not yet discernible in Africa, “there is a clear and unmistakable tendency towards sedentary lifestyle among all age groups”. A rise in chronic disease mortality has been projected for all developing regions of the world, due to an anticipated increase in life expectancy, changes in diet and lifestyle associated with industrialization, and urbanisation (WHO, 2002a). The technologically advancing societies in which physical activity is becoming a meagre in the lives of the people is another predisposing factor to the rise of chronic diseases of lifestyle (Biddle & Mutrie, 2001).



It is estimated that by 2020, chronic diseases of lifestyle in sub-Saharan Africa will constitute almost 50% of the burden of disease (Sobngwi, Mbanya, Unwin, Aspray & Albert, 2001). Rapid urbanisation with changes in lifestyle in Africa and other developing countries, especially dietary habits and physical activity patterns, could partially explain the ongoing epidemiological transition (Sobngwi *et al.*, 2001; Doll, Paccaud, Bovet, Burnier & Wietlisbach, 2002). Torun, Stein, Schroeder, Grajeda, Conlisk, Rodriguez, Mendez & Martorell (2002)  their study commented that rural to urban migration in developing countries leads to change in lifestyle and that living or working in an urban environment increases sedentarism. The urban environment is associated with increased opportunities for mechanized or sedentary employment, which accelerates the development of adult ‘high risk’ lifestyle (Torun *et al.*, 2002). The reason being that in the urban environment, the main activities are sedentary ones. This phenomenon has also been observed in several

African countries and it is becoming more popular among the youth as well as people of working age who are threatened by sedentary working conditions (WHO, 2002a).

Similar to the above phenomenon about lifestyle behaviour changes in Africa, such changes are also in Rwanda. Specifically, following the civil war from 1990 to 1994 in the country, many Rwandan people who were living in exile as refugees returned to the country. Most of the people, who returned, came to settle in urban areas for job opportunities and security reasons. Again as consequences of the civil war, the country is undergoing various programmes of development and re-adjustment in education, health, science and technology sectors, among others, (Rwandan Ministry of Finance, 2001). As a result, most of the people are migrating from rural [where the main occupational activity is agriculture, (Organization Social Science Research in Eastern and Southern Africa, Rwanda Chapter, 2002)] to urban areas in which most of the developmental programmes take place and for job opportunities.

Although few studies have been carried out in Rwanda, at least the one done to assess the level of physical activity among adult working women in urban areas, proved that the women there live a sedentary lifestyle, especially those who do “desk top” office work. This is an indication that the change in lifestyles has made the majority of Rwandan women to live a sedentary lifestyle, which predisposes them to chronic diseases (Kagwiza, 2003). Similarly, this phenomenon may be occurring among other groups of the population in Rwanda.

With reference to research conducted in the United States of America, Sunnisk, Petosa, Utter, & Zhang (2002) demonstrated that a substantial proportion of college students are

not physically active on a regular basis. Grubbs and Carter (2002) proved that correlations between physical activity during adolescence (13 to 18 years) and during young adulthood (21 to 35 years) are low. Further more, literature indicates that the highest rate of decline in physical activity occurs in late adolescence and early adulthood in 18 to 24 years age group (Sallis *et al.*, 1999; Sumnisk *et al.*, 2002). Strong evidence came from the study by Haase, Steptoe, Sallis, & Wardle (2004) on leisure-time physical activity in university students from 23 countries. The evidence demonstrates that prevalence of physical inactivity was higher in the developing countries than in developed ones (Haase *et al.*, 2004).

According to a study carried out in Rwanda on “habitual activity patterns among the adolescent learners concluded that the learners spent more hours on sedentary activities than non-sedentary activities (Murenzi, 2001). Bray and Born (2004) highlighted that the transition from high school to college or university is a complex phenomenon that has been a topic of sustained interest to both educational professionals and researchers. The transition presents a process characterised by change, ambiguity and adjustment across a number of previously salient life domains, which include changing in social, physical activity, psychological, emotional and even cultural in nature. Therefore, physical activity is altered during the transition; it may have important acute physical and psychological consequences for the university or college students. The decline in physical activity experienced during the transition from high school to the tertiary institution (college or university) may lead to patterns of inactivity that persists throughout one’s tertiary institution years and beyond (Bray & Born, 2004).

According to Sallis *et al.* (1999), physical activity is influenced by a variety of psychological, social, cultural, and environmental variables. It is reasonable to assume that

effective interventions should alter those variables that appear to mediate the behaviour. Modifiable variables have been consistently associated with physical activity. These are self-efficacy, social support, perceived barriers, perceived benefits, and enjoyment (Sallis, *et al.*, 1999).

Furthermore, the Health Promotion Model developed by Pender, states that perceived benefits and perceived barriers to action are some of the central important motivational factors behind the advised action (Grubbs & Carter, 2002). Again, health education theories suggest that health behaviours are influenced in part by the perceived benefits of, and barriers to a specific action (O’Dea, 2003). In addition to perceived benefits and barriers, the Health Belief Model (HBM) suggests that cues (motivating factors) to action would activate that readiness and stimulate overt behaviour (Glanz, 1998). Jiska, Cohen-Mansfield, Marcia, Guralnik & Jack (2003) also considered the perceived barriers as one of the major determinants of physical activity participation.

Therefore, basing on the above described concepts about the specific cognitions that influence an individual’s behaviour to specific action, the researcher finds it of utmost importance to take into consideration the perceived benefits of, barriers and helpful cues to physical activity participation, as a first step to promote activity participation. Jiska *et al.* (2003) clarified that barriers and motivators like perceived benefits and helpful cues for exercises, is a first step in developing strategy to promote exercise/ physical activity. Again, efforts to understand why people are or are not physically active have lead to the study of a large number of potential influences. Among these are “barriers” to physical activity participation. Barriers can be real or perceived and represent significant potential

obstructions to adoption, maintenance, or resumption of participation in physical activity (Booth, *et al.* 2002).

In Africa, particularly in Rwanda, there is scarcity of information about the students' perceived benefits of, barriers and helpful cues to participation in physical activity. This study aimed to determine the perceived benefits of, barriers and helpful cues to physical activity among the tertiary institution students in Rwanda, find out whether there was an influence of demographic and background characteristics on these perceptions.

1.3 PROBLEM STATEMENT

Physical inactivity is an established risk factor for most chronic diseases of lifestyle. In countries around the world between 60% and 80% of adults are simply not physically active enough to benefit their health. The decline in physical activity is mostly experienced during the transition from high school to the tertiary institution (College or University), which leads to patterns of inactivity that persists throughout one's tertiary institution years and beyond. It is not known to what extent the tertiary institution students in Rwanda perceive the benefits of, barriers and helpful cues (motivational factors) to physical activity participation, which may be influenced by the demographic and background characteristics.

1.4 AIM OF THE STUDY

The aim of this study was to ascertain the perceived benefits of, barriers and helpful cues (motivational factors) to physical activity among tertiary institution students and find out whether there was an influence of demographic and background characteristics on these perceptions.

1.5 SPECIFIC OBJECTIVES

1.5.1 To identify perceived benefits of physical activity among the tertiary institution students.

1.5.2. To identify perceived barriers to physical activity among the tertiary institution students.

1.5.3 To determine perceived helpful cues (motivational factors) to physical activity participation among the tertiary institution students.

1.5.4 To determine the influence of demographics (gender, professional study course) and physical activity background characteristics (previous and current participation in physical activity), on perceived benefits of, barriers and helpful cues to physical activity among the students.

1.6 SIGNIFICANCE OF THE STUDY

Among the strategies suggested by the World Health Assembly, the health sector was requested to take the leading role in making policy decisions, through the Global Strategy on physical activity to address the growing burden of chronic diseases (WHO, 2003b). It is hoped therefore, that the results of this study will be a baseline to developing physical activity promotion programmes among tertiary institution students as young adults. This will be by the tertiary institutions in collaboration with the ministry of Education in Rwanda. It is in accordance with Tergerson and King (2002) that stated that to increase

physical activity levels, it is important to determine subjects' perceived benefits, barriers, and cues to engaging in physical activity.

“Prevention is better than cure”. Most of the challenging chronic health problems that sometimes result in disabilities rehabilitated by physiotherapists are caused by risk factors due to physical inactivity (Australian Physiotherapy Association, 2002). Therefore, physiotherapists in Rwanda will be challenged and helped by the results of this study to develop more preventive measures of such chronic health problems rather than rehabilitating them. This will be done through promoting physical activity, which is likely to prevent chronic conditions including back pain, chronic diseases of lifestyle and some disabilities.



Hopefully, the promotion of physical activity among tertiary institution students as young adults who are soon entering into the field of work and are expected to be the “leaders of tomorrow” will later influence the public to become physically active. Huddleston, Mertesdorf, & Araki (2002) argued that it is, of course the pre-professional student who will educate, motivate and guide others towards a physically active lifestyle. Again, young university graduates start both careers and families and have less access to group activities, programmes, and facilities. If they are to stay active they must develop their own activity programmes while contending with numerous obstacles (Sallis *et al.*, 1999). The current school physical education programmes in most of the Rwandan institutions is not effective to prepare students for this transition for self-directed physical activity. Therefore, the results of the current study will help with any interventions for the need to promote physical activity among the tertiary institution students in Rwanda, and probably in other developing countries in general. Again, presently, Rwanda is trying to promote the health

and well being of her citizens including the youth through sports and other related activities (Rwandan office of the Director of health in the National youth council, 2003). The study results will be a source of documented information on perceptions of physical activity among tertiary institutions students as young adults. This information will help the Ministry of Health and the Ministry of Youth, Sports and Culture, in Rwanda to develop strategies of promoting health of the youth and other young Rwandan adults in general. Hence, enhancing a multisectoral approach to promote health of the young Rwandan adults. Multisectoral policy is one of most preferred and encouraged strategies in health promotion, (Coulson, Goldstein, Ntuli, 2002) and was emphasised by WHO as the policy in support of physical activity promotion among populations, (WHO, 2003b).

The results of this study may aid in the development of strategies to prevent health related risk factors due to inactivity among the tertiary institution students and other young Rwandan adults. Physical inactivity is an established risk factor for cardiovascular diseases, colon and possibly other cancers, non-insulin dependent diabetes, overweight, and hypertension, anxiety and depression (Booth, 2000).

1.7 DEFINITION OF KEY TERMS

Physical activity: This is any bodily movement produced by skeletal muscles that results in energy expenditure and is positively correlated with physical fitness (Centre for Disease Control and Prevention, 2002).

Perceived benefits: One's opinion of the efficacy of the advised or recommended action (Glanz, 1998).

Perceived barriers: One's opinion of the tangible and psychological costs of the advised or recommended action (Glanz, 1998).

Perceived helpful cues: One's opinion on strategies to activate and motivate readiness to an advised action (Glanz, 1998).

Sedentary: This means sitting habitually or inactive habits (Saunders, 2001) that is the work or activities in which an individual spends a lot of time sitting down and not moving (Hornby, 2000).

Lifestyle: Lifestyle comprises the aggregate of an individual's actions and behaviours of choice, which can affect health-related fitness and health status (Bouchard, Shephard & Stephen, 1993)

Chronic diseases of lifestyle: These are a group of diseases that share similar risk factors as a result of exposure, over many decades, to unhealthy diets, smoking, lack of exercise and possibly stress. The major risk factors include high blood pressure, tobacco addiction, high blood cholesterol and diabetes. These diseases are also called non-communicable diseases or degenerative diseases (Fourie, 2001).

Health Promotion: It is the process of enabling people to increase control over, and to improve, their health; to reach a state of complete physical, mental and social well-being, (Coulson, Goldstein & Ntuli, 2002)

Chapter one describes the background of the study, which includes consequences of physical inactivity and levels of physical activity in different populations. It indicates how WHO has put forward physical activity to be one of the strategies to reduce the burden of CDLs due to sedentarism or physical inactivity. The chapter highlights the motivation for the study, which is due to that most of declines in physical activity are during the transition from high school to college and university levels. Theories and factors affecting behaviour change are briefly described. Finally, the statement of the problem, aim and objectives, significance of the study and lastly the definitions of key terms are all given by this chapter

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter briefly reviews the benefits of physical activity in general and the factors influencing behaviour change and physical activity participation. This is followed by the factors that influence the perceptions (perceived benefits, barriers and helpful cues) to physical activity participation. The rationale of the promotion of physical activity among the tertiary institution students is also described, the methods used by other studies to assess the perceptions of physical activity and lastly the role of physiotherapy in promotion of physical activity.

2.2 HEALTH BENEFITS OF PHYSICAL ACTIVITY

In order for individuals to invest time and resources in an activity, they must first perceive a high probability of achieving a positive outcome from that activity (Grubbs & Carter, 2002). WHO (2003c) discovered that one of the major challenges in the prevention of non-communicable diseases and the promotion of physical activity is communicating the importance of benefits of physical activity to health.

Scientific evidence shows that regular physical activity, in its broadest sense, provides people of all ages with substantial physical, social and mental health gains and well being throughout their life span (Biddle, Fox & Boutcher, 2000; WHO, 2003d). Benefits of physical activity have been well documented and are numerous. This section briefly highlights the benefits, which are highly beneficial to tertiary institution students and young adults in general.

2.2.1 Psychological and mental benefits

There is strong evidence from studies that physical activity has beneficial effects on mental health or psychological well being. According to studies carried out among young adults in United States of American (USA) College male and female students, those who exercised regularly had reduced stress-related disorders, reduced depression illness and high self-esteem (Biddle et al, 2000). The authors commented that there is a growing interest in the contribution of exercise to alleviate problems of mental illness, especially in this group of young adults. Studies also indicate that physical activity can be effective in reducing depression, improving mood state, and enhancing self-perceptions of well being (Stathi, Fox & McKenna, 2002). Some researchers have shown that physical activity can lower anxiety, decrease tension, relieve stress and influence sleep (Hong & Dimsdale, 2003).



Interestingly, there is evidence that physical activity can even go further and reduce some health-related risk behaviour like smoking, alcohol and drug use, as a result of improved psychological well being. This was pointed out on the World Health Day 2002 that involvement in properly guided physical activity and sports can also foster the adoption of other healthy behaviour including avoidance of tobacco, alcohol and drug use and violent behaviour among the youth and/or young adults. It was also mentioned that physical activity could even foster healthy diet, adequate rest and better safety practices (WHO, 2002b; WHO, 2003e).

Biddle & Mutrie (2001) highlighted the following on the topic “psychological outcomes of physical activity”. They argue that physical activity is beneficial to health-related quality of life, emotional and mood state, enjoyment, self-esteem, anxiety and reactivity to stress,

non-clinical depression, personality and psychological adjustment, exercise and sleep. Exercise improves cognitive functioning, *“I found that I worked better and thought more clearly when I was in good physical condition”* by Nelson Mandela, *Long walk to freedom*, 1994 (Biddle & Mutrie, 2001). Various studies indicated that participation in exercise and physical activity in general was associated with good academic performance (Biddle & Mutrie, 2001). A similar argument was presented by WHO that children who are more physically active showed higher academic performance (WHO, 2003e)

2.2.2 Physiological benefits and prevention of risk factors of chronic diseases of lifestyle

Pigman, Gan & Krousel-Wood (2002) reported that physical activity reduces the risk of cardiovascular diseases, some cancers and type 2 diabetes. These benefits are mediated through a number of mechanisms: in general, it improves glucose metabolism, reduces body fat and lowers blood pressure. Physical activity has an effect on the lipid and lipoprotein metabolism. It contributes to an increase in high-density lipoproteins-cholesterol (Fentem, 1994). As a result, coronary heart disease and, possibly, strokes that cause some of the permanent and challenging physical disability like hemiplegia, are prevented. It can also inhibit blood-clotting processes, which counters acute precipitants of cardiac arrest (Fentem, 1994). Physical activity may enhance myocardial oxygen delivery and utilisation (Pollock, et al., 1998). As it was recommended by the WHO (2002a); WHO (2003d); Diehl, Brewer, Van Raalte, Shaw, Fiero & Sorensen (2001) and Centre for Disease Control and Prevention (1999), participation in physical activity can improve cardiovascular fitness, prevent or delay the development of high blood pressure and reduce symptoms of chronic depression.

Physical activity can also reduce the risk of developing colon cancer (Manley, 1996; Slevin, 2002, & WHO, 2003d). Mackinnon (2002) proved that physical activity may reduce the risk of colon cancer by effects of *prostaglandin*, reduced intestinal transit time, and higher antioxidant levels. Fentem (1994) had discovered that physical activity is associated with lower risk of breast cancer, which may be the result of effects on hormonal metabolism. Breast cancer is a major health concern for women at all ages, over the world, which may start in the early stages of young adulthood (Mackinnon, 2002). There is convincing evidence that women who have been active throughout their lives decrease their risk of breast cancer (Bahr, 2001; Gilliland, Li, Baumgartner, Crumley & Samet, 2001; Littman, Voigt, Beresford & Weiss, 2001; Mackinnon, 2002; Steindorf, Schmidt, Kropp & Chang-Claude, 2003).



Physical activity is recommended as part of the management regimen for subjects with Type 2 Diabetes Mellitus (Van Rooijen , Rheeder, Eales & Molatoli, 2002). This is due to the fact that regular physical activity induces weight loss and positive changes in glucose metabolism, as proved by several studies (Pigman *et al.*, 2002). Physical activity improves glucose tolerance by increasing insulin sensitivity and may reduce the insulin requirement in insulin-treated diabetics (Birrer & Sedaghat, 2003).

2.2.3 Physical and musculoskeletal benefits

Developing muscle strength and flexibility is important to improve one's ability to perform tasks and reduce the potential of injury (Pollock *et al.*, 1998). The benefits of regular physical activity specifically for children, adolescents and young adults included improving

strength and endurance, building healthy bones and muscles, and controlling weight (Centre for Disease Control and Prevention, 1999). It has been proven that a physically active lifestyle prevents obesity and results in strengthened musculoskeletal structures contributing to improve functioning of the system (Kohl & Hobbs, 1999). Kesaniemi, Danforth, Jensen, Kopelman, Lefebvre & Reeder (2001) indicated that peak bone mass is achieved in physically active young adults. In addition, it is believed that young adults who are physically active influence the enhancement of uptake of calcium in the bones (Savage & Michael, 1998; Shilton & Naughton, 2001). Therefore, a physically active lifestyle should be considered important in determining bone mass and also throughout life even at the age of 70 years or older. It can therefore, minimise osteoporosis and falls in old persons. In addition to maintaining bone density, strength training is also important particularly for improving and maintains muscle strength, joint stability, balance and flexibility (Di Brezzo, Fort & Hoyt, 2002).



Regular physical activity improves control of body weight, and regulates energy balance, thereby preventing obesity-related disease and excessive weight gain (Fentem, 1994). Obese people who are active have a lower mortality and morbidity rate than people whose weight is normal but who are sedentary. This means that for overweight or obese people, starting and maintaining a regular exercise programme yields important health benefits, even in the absence of substantial weight loss (Bahr, 2001). Exercises have been recommended by various studies, as one of the major priorities in the prevention and treatment of low back pains (Mooney & Leggett, 1996; Richardson, Jull, Hodges & Hides, 1999; Schneiders, Zusman & Singer, 1998; & O'Sullivan, 2000). The same authors proved that with exercises especially those aimed at stabilizing the back muscles, an individual is

provided with “natural back corset” of his or her back spine, which will protect and prevent any occurrence of back pain due to back instability.

2.2.4 Social benefits

The significance of physical activity for society is not only limited to health. There is more evidence that physical activity also has importance in, among other things, working life, socialization and education (Yang, Telama, Leino & Viikari, 1999). However, the social benefits of physical activity go hand in hand with socialization, as was mentioned by the above authors that the significance of physical activity depends on the levels of physical activity of the population. The children who participate in regular physical activity often enjoy lots of positive experiences such as fun, enjoyment, and success and peer relationship (Yang *et al.*, 1999). Huddleston et al. (2002) also highlighted that most of the highly scored reasons for participation in physical activity among the young adults, were having fun/enjoyment and competitions with others. This is a strong benefit of physical activity for socialization. In the same line, university students in one of the studies reported that some of the important reasons for participating in physical activity was having fun with their friends and establishing interpersonal relationships (Savage & Michael, 1998). The WHO makes it clear that play, games and other physical activities give young people opportunities to have social interaction and integration as well as for learning the spirit of solidarity and fair play, among others (WHO, 2002b). WHO goes further to say that active lifestyles through physical activity provide people of all ages with opportunities to make new friends, maintain social networks, and interact with other people of all ages. Physical activity is one of the important activities to build teamwork games and play that promotes

positive social integration and facilitates the development of social skills in young children (WHO, 2002b).

2.2.5 Economic benefits

According to the report by WHO (2003f), physical activity also has economic benefits especially in terms of reduced health care costs, increased productivity as well as healthier physical and social environments. Economic consequences of physical inactivity affect individuals, businesses and nations. Data from developed countries indicate that the direct costs of inactivity are enormous. For example, in the USA, physically active individuals save an estimated \$500 per year in health care costs according to 1998 data (WHO, 2003f). Unfortunately, no data are available from the developing world, but reduction of this kind of avoidable costs is, however, potentially important, especially in the developing world with great scarcity of resources and other problems (WHO, 2003f).



2.3 RECOMMENDED QUALITY AND QUANTITY OF PHYSICAL ACTIVITY FOR HEALTH

Lifestyle physical activity has deviated from the traditional methods of exercise prescription by advocating accumulated, unstructured activities of daily living, according to individual preference and conveniences (Pescatello, 2001). According to the literature, a lower risk of chronic disease can be achieved by incorporating moderately intense physical activities, which do not require a formal exercise programme, into every day life (Lee, Rippe & Wilkinson, 1995). Therefore, physical activity needs not be strenuous to promote health; neither should it be seen as a new action but as part of a person's daily life settings and activities (WHO, 2002a). Although physical activity does not need to be vigorous to provide health benefits, the amount of health benefits is directly related to the amount of

regular physical activity; hence the amount of physical activity is more important than the type or intensity (Lee *et al*, 1995; U.S. Surgeon General, 1996).

The quality and quantity of exercise needed to attain health-related benefits may differ from what is recommended for physical-fitness benefits. Exercise requiring moderate endurance and performed on an almost daily basis is more likely to be adopted and maintained than vigorous physical activity. This kind of exercise is probably the most feasible exercise prescription, with considerable potential to reduce coronary heart diseases while increasing the likelihood of long-term compliance in individuals who are completely sedentary (Kennon, 1996).

It is recommended by WHO (2003e) that for an average sedentary adult, engaging in at least 30 minutes of physical activity of moderate intensity, every day, or on most days of the week, will be sufficient to obtain health benefits. Moreover, those 30 minutes can be accumulated throughout the day in small bouts of activity or exercise (Lakka *et al.*, (2003). It is not necessary to practice vigorous sports, join costly fitness clubs, or purchase special equipment to achieve health benefits (WHO, 2003e).

The American Public Health recommendations for physical activity have been expanded to a broader spectrum of activity including: gardening, walking, swimming, and housework, in addition to more vigorous aerobic exercises such as jogging, to derive health benefits (Centre for Disease Control and Prevention, 1995). Rippe (1995) highlighted that moderately brisk walking seems to fit into all the research criteria. Walking has no adverse health effects, little risk of injury, and requires no health-club membership or special equipment except for a good pair of shoes (Frills *et al.*, 2003; Lee *et al*, 1995). Therefore,

although walking is not without risks, the main reasons for its popularity are that it requires little skills and training and the cost is minimal (Sawatzky & Naimark, 2002). According to Heath & Smith (1994) walking was the most common type of leisure time reported in a research done on patterns of physical activity among both adult males and females in the USA. Men were likely to select sports and conditioning activities whereas women were more likely to select group activities such as aerobics and video/television-led home exercise (Heath & Smith 1994).

2.4 RATIONALE OF PROMOTION OF PHYSICAL ACTIVITY AMONG TERTIARY INSTITUTION STUDENTS

Grubbs and Carter (2002) demonstrated that the lack of continuation of regular physical activity from adolescence to young adulthood has had a significant impact on the morbidity and mortality rates in the USA. The same author urged that due to the fact that people aged 18 to 24 years display the highest rates of decline in physical activity; targeting primary care intervention to promote physical activity in this population is beneficial in decreasing morbidity and mortality. Makrides, Veinot, Richard, McKee & Gallivan (1998) discussed that when students leave home for university education, they are left to assume primary responsibility for their health. It is during this transition that the students have an increased risk for making unhealthy lifestyle choices, including physical inactivity (Makrides *et al.*, 1998). Bray and Born (2004) highlighted that the transition from high school to college or university is a complex phenomenon that has been a topic of sustained interest to both educational professionals and researchers. The transition presents a process characterised by change, ambiguity and adjustment across a number of previously salient life domains, which include changing in social, physical activity, emotional and even cultural in nature. Therefore, physical activity is altered during the transition and may hold important acute

physical and psychological consequences for the university or college students. The decline in physical activity experienced during the transition from high school to the tertiary institution (college or university) may lead to patterns of inactivity that persists throughout one's tertiary institution years and beyond (Bray & Born, 2004). The results from the study by Sumnisk *et al.* (2002) on physical activity among college students in the USA indicated that there is a need for physical activity promotion at the college level. The results indicated that a large percentage of students are not physically active. Surveys from individual countries indicate that the prevalence of adequate physical activity is relatively high in children and adolescents, but substantially lower in adults, suggesting that late adolescence and early adult life may be a critical period of transition (Haase *et al.*, 2004). It is important therefore to monitor trends in physical activity in young adults, and to understand factors such as attitudes, and knowledge of health benefits that may be associated with activity levels (Haase *et al.*, 2004).

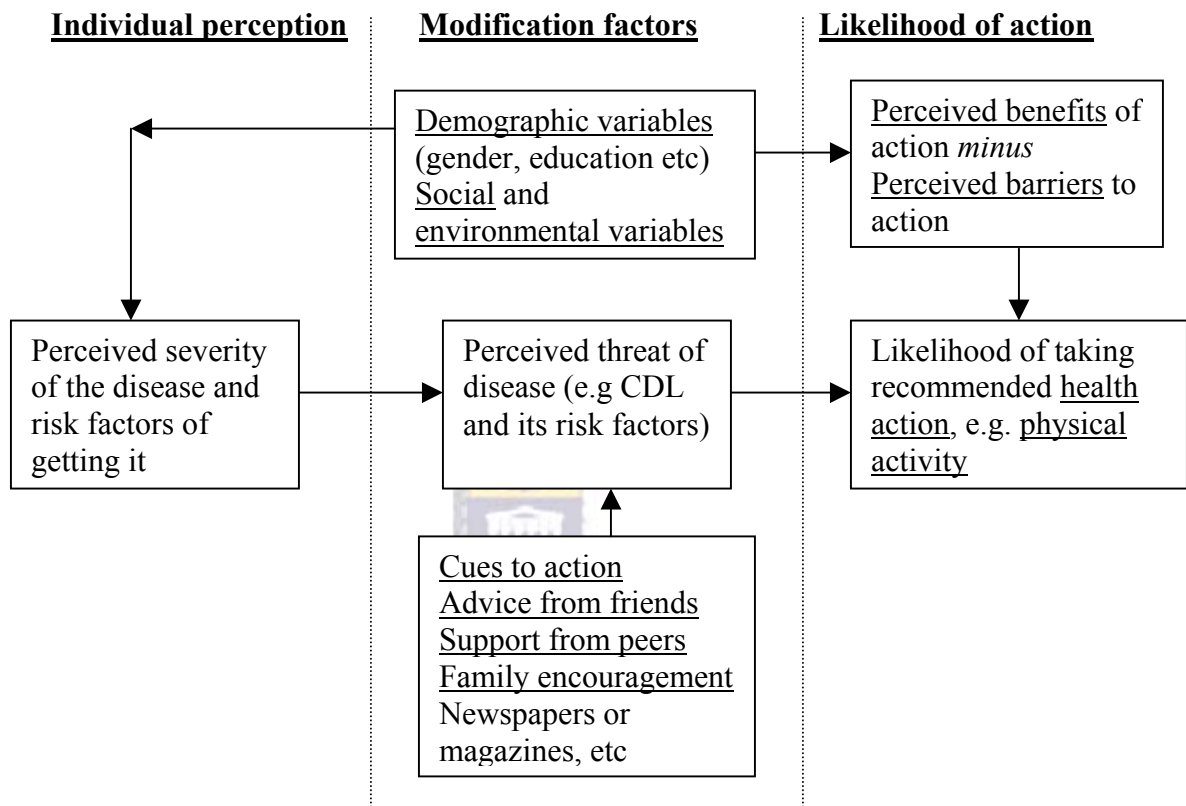


2.5 FACTORS INFLUENCING BEHAVIOUR CHANGE AND PHYSICAL ACTIVITY PARTICIPATION

Grubbs and Carter (2002) indicated that an individual's characteristics and experiences, as well as behaviour-specific cognitions such as perceived benefits and barriers are the central influencing factors to action. Glanz (1998) demonstrated the same factors with the concept of Health Belief Model (HBM). HBM is one of the known theoretical models, which highlights the influence of beliefs in decision-making (Naidoo & Willis, 2000). It addresses a person's perceptions of threat of a health problem and the accompanying appraisal of recommended behaviour for preventing or managing the problem. It is spelled in terms of four constructs representing the perceived threat and the net benefits: perceived susceptibility, severity, benefits and barriers. HBM better fits the challenges of changing

habitual unhealthy behaviour, such as being sedentary, smoking or overeating. In the HBM, an added concept, cues to action, would motivate and encourage an individual to take the advised action, (Glanz, 1998).

Figure 1. Diagrammatic representation of the Health Belief Model



Source: adapted from Bandura in Naidoo & Wills (2000).

Tappe, Duda and Ehrnwald (1989) demonstrated that perceived barriers, a construct first introduced in conjunction with HBM, has been used subsequently to successfully predict preventive health behaviour generally, and physical exercise behaviour specifically. However, such constructs have been introduced in conjunction with HBM, but less has been done to identify them among different age groups, especially in Africa and specifically in Rwanda.

2.5.1 Perceived benefits of physical activity

The strength of individual attitudes concerning the benefits of physical activity and knowledge about the role of physical activity in preventing chronic disease was an important evaluation done in most studies (Haase *et al.*, 2004). The same authors demonstrated that these psychological variables are relevant in health education planning, and may be associated with frequency of leisure-time physical activity. Unfortunately, the research investigating one of the psychological variables including perceived benefits as predictors of health behaviour has been inconclusive. Stutts (2002) indicated that knowledge of the benefits of physical activity and participation in physical activity was reported to be weak. However, others who have reviewed the physical activity literature have reported initial motivation to participate in physical activity may be related to perceived benefits of activity.



In the study conducted in the USA by Tergerson and King (2002) perceived benefits among high school students were to stay in shape, lose weight and increase energy level for females while for males the perceived benefits were to become strong, stay in shape and also to be competitive. Most perceived benefits of physical activity were identified in a nationally representative sample in the European Union (EU) as ‘to maintain good health’, ‘to release tension and ‘to get fit’. However, the proportions of EU respondents believing ‘to socialise’, ‘to control weight’ and ‘to have fun’ were good reasons for participating in physical activity (Zunft *et al.*, 1999). In the study by Juarbe, Turok and Perez-Stable (2002), which used open-ended questionnaires to collect the data, the researchers came out with themes of categorised perceived benefits of physical activity, among the Old Latin Women. The categories were ‘health promotion’, ‘improved gender roles’ and ‘physical fitness’ as benefits of physical activity.

With reference to Grubbs and Carter (2002), perceived benefits of regular physical activity were found to be strongly associated with physical performance, appearance, and personal accomplishment among the undergraduate students. In here, the authors compared their findings with other studies, which suggested that among male and female college undergraduates, health (fitness management) and appearance (weight management) were regarded the most important reasons to exercise. In contrast, studies featuring middle-aged or older adults cited perceived benefits such as chronic disease management, weight control, stress management, and personal enjoyment as the most important reasons to exercise. One would expect a younger population to be more concerned with performance and appearance rather than health issues such as chronic disease prevention (Grubbs & Carter, 2002).



Although, the perceived benefits of physical activity are interesting and well documented in most of the European and American regions, there is meagre information on how youth and young adults perceive the benefits in the rest of continents, specifically in Africa and particularly in Rwanda.

2.5.2 Perceived barriers to physical activity participation

Efforts to understand why people are, or are not, physically active has lead to the study of large number of potential influence. Among these are “barriers” to physical activity participation (Booth *et al.*, 2002). Barriers may either prevent the initiation of a new activity or decrease commitment and adherence to an existing pattern of activity (Grubbs & Carter 2002). The WHO (2002b); WHO (2003g) pointed out potential barriers to equitable population participation in physical activity as, lack of awareness about benefits, lack of national health, sport, educational and related policies. Also, lack of perception of the value

of sport in the society, prevailing local culture, economic and other competing pressures, time constraints, personal motivation, lack of support from family and friends, lack of access to sport facilities and past experience, and the lack of availability of local physical programmes were listed as potential barriers to the population (WHO, 2002b).

However, barriers can be real or perceived and represent significant potential obstructions to the adoption, maintenance, or resumption of participation in physical activity. In the study by Tappe *et al.* (1989), they identified perceived barriers to exercises among adolescent students as time constraints, unsuitable weather, school and schoolwork and lack of interest or desire and job responsibility. Following Tappe *et al.* (1989, Tergerson and King (2002), identified similar perceived barriers to physical activity among male and female adolescents in high school. However, the above studies identified perceived barriers to youth, the studies were conducted among adolescents (youth) of high schools in which the perceived barriers at that level may differ from those of students at institutions of higher learning. Not only did those studies of Tappe *et al.* (1989) and Tergerson and King (2002) consider high school students, but also the environment and weather may differ from one research setting to another. Several environmental factors are believed to affect physical activity participation and perceived barriers (Sallis, Marilyn, Calfas, Caparosa & Nichols, 1997).

Other factors that prevent youth or young adults from being regularly active were lack of time (WHO, 2002b; King *et al.*, 1992), motivation, insufficient support and guidance from others (family and friends) (WHO, 2003g), feeling of embarrassment or incompetence, lack of safe facilities and locales for physical activity and simple ignorance of the benefits of physical activity (WHO, 2002b). There are several studies on barriers among the youth but

most of them were conducted in high schools though similar situations may be prevailing in tertiary institution youth. There is a dearth of information on perceived barriers among tertiary institution students, especially in Africa as Dr Nyamwaya pointed out that distinct physical activity patterns are not yet discernible in Africa (WHO, 2002a). In some of the developing countries, physical activity is still believed to be needed only in developed countries (industrialised countries) because the developing countries still have other, more significant problems to tend to (WHO, 2002b).

In comparison, the studies on perceived barriers among older people, the most frequent perceived barrier is related to the time constraint. The study by Booth *et al.* (2002) on perceived barriers among older Australians, reported that ‘having no sufficient time to be physically active’ is one of the most frequently cited barriers. While, with same argument, Grubbs & Carter (2002) reported that time constraints were the most often mentioned barriers among the college undergraduates.

According WHO (2002b), some barriers are perceived by the subjects to be barriers while in the real sense they should not be. This was referred to as “myths about physical activity”, which includes; ‘being physically active is expensive, ‘it takes time, equipment, special shoes, and clothes etc’, ‘sometimes you have to pay to use sports facilities’ and “I am very busy: physical activity takes too much time”.

2.5.3 Helpful cues (motivational factors) to physical activity

In addition to perceived benefits and barriers as some of the concepts used in the HBM to change and promote specific behaviour of individuals, perceived cues are considered as helpful and motivational to the action adherence (Glanz, 1998). It is important to determine

the individual's perceived cues to engaging in physical activity in order to increase the physical activity levels (Tergerson & King, 2002). According to literature, family members, peers, mass media, school programmes and organizational activities have been identified as common helpful cues to engaging in physical activity. Savage and Michael (1998) emphasized that it is important to identify the university students' motivation for participation in physical activity programmes in order to meet their interest and encourage the activity adherence. Tergerson and King (2002) recommended that the physical activities, which involve group activities and social benefits, are important in promoting physical activity participation. Therefore, peer motivation should be supported to encourage and motivate youth to remain physically active. This also relates to what Henderson, Ainsworth & Barbara (2003) indicated in that social support which involves the family members, spouse and other social networks were means for finding companions for physical activity among the African American and American Indian women. Fun/enjoyment was one of the most motivating and encouraging reasons cited in literature, for most of the age groups to be engaged in physical activity participation but mainly the youth (Huddleston *et al.*, 2002). However, various researchers have cited such motivating and encouraging reasons for physical activity participation, but it is not known whether these could be the same reasons among the Rwandan youth, in order to encourage and motivate them for physical activity participation.

2.6 METHODS OF ASSESSING PERCEPTIONS OF PHYSICAL ACTIVITY; SPECIFICALLY, PERCEIVED BENEFITS OF, BARRIERS AND HELPFUL CUES

A number of methods have been used to assess the perceived benefits of, barriers and cues to physical activity in various studies among the youth populations. Tergerson and King (2002) used a questionnaire, which was developed using components of the HBM to

assessed perceived benefits of and barriers together with cues to physical activity among male and female adolescents in United States. The three components of the HBM were used to develop three subscales (perceived benefits, perceived barriers and perceived cues) on a seven point likert-type scale (1= strongly agree, 7 = strongly disagree) in a quantitative cross sectional study design. Besides the three subscales, the demographic and background characteristics of physical activity were included along with the measurements.

Previous to Tergerson and King (Nov. 2002), Grubbs and Carter (July, 2002) had used a written questionnaire to assess perceived benefits and barriers to regular exercises in a descriptive correlational study of college undergraduate students. Their instrument (Exercise Benefits/Barriers Scale [EBBS]) was developed from the constructs of Pender's Health Promotion Model. The questionnaire was a 4-point, Likert format to obtain strength of agreement with the item statement. Choices were scored at: 4=strongly agree, 3=agree, 2=disagree and 1=strongly disagree. Other items in the instruments were the demographic questions, which had similarity with the Tergerson's and King's (2002) method of assessing physical activity perceptions (Grubbs and Carter, 2002).

In the same line with Grubbs and Carter (2002), Stutts (2002) used the same scale (EBBS) to measure perceived benefits and perceived barriers to physical activity, developed by Sechrist 1987 (Stutts, 2002). Conversely, Tappe et al. (1989) had used a semi-structured questionnaire to measure perceived barriers to exercises among adolescents. However, few studies have measured the perceived cues to physical activity, though; most of the perceived cues items are measured within the perceived benefits and barriers to specific action.

2.6.1 Validity and reliability of the available instruments

Validity is a determination of the extent to which an instrument measures what we think is supposed to be measuring while reliability is the determination of whether the two administrations of an instrument produce the same results (Sirard & Russell, 2001).

Wu, Ronis, Pender, FAAN, & Jwo (2002) developed cultural sensitive, reliable and valid instruments to measure physical activity cognitions. The instrument developed was mainly guided by the components of the HBM, which have been used to predict or explain exercise behaviours in various age groups. The instrument also was adapted from other studies. Among the exercise behaviour, the perceived benefits, perceived barriers and perceived efficacy were measured and validated. The outcome of the validated instrument measures perceived benefits of, and barriers to physical activity, by using a 4-point Likert scale. The responses ranged from “strongly agree” = 1 to “strongly disagree” = 4. This is to eliminate the central point in which most of the respondent, especially the youth tend to go to (Wu et al. (2002). Though this instrument has been validated, the cultural sensitivity should be considered for its adoption to other studies, and its validity should always be pre-tested for its use in further studies.

2.7 ROLE OF PHYSIOTHERAPY IN THE PROMOTION OF PHYSICAL ACTIVITY PARTICIPATION

Internationally, the practice of health and health care are changing dramatically. In global terms, there is a considerable shift away from curing to prevention of illness in populations and the strengthening of community’s capacity to deal with its own health (Higgs, Refshauge & Ellis, 2001). Within this context physiotherapy plays an essential role in the

health care system. Therefore, as members of the health care team, physiotherapists play a key role as health specialists in being involved in the teaching or educating, advocating, and administering health change programmes at individual level, organizational, or community level (Huddleston *et al.*, 2002). The role of physiotherapists should be broader than the provision of treatment to the people with health problems. Physiotherapists are well placed to play a vital role in health promotion, by accepting to go beyond physiotherapist/patient partnership and, in turn, to address issues pertinent to groups, communities and societies (Copeland, 1999). Physiotherapists can assist the public by promoting physical activity and describing the type, quantity, and quality of activity that confers health benefits (Kennon, 1996). Physiotherapists are appropriately skilled and ideally suited to promote physical activity. They recognize the physical and psychological benefits of exercise/physical activity and are well versed in the art of motivating people (Carter & O'Driscoll, 2000).



The Australian Physiotherapy Association (2002) stated that physiotherapists are experts in exercise prescription for both the fit, healthy person that requires specific fitness and injury-prevention advice, and the injury and disabled person with specific needs and considerations. People that have not exercised on a regular basis can put themselves at risk for injury by starting a programme without professional advice. Physiotherapists, with their expertise in body mechanics, anatomy, and physiology can play a vital role in helping people develop appropriate and safe exercise programmes (Wilson, 2002). To ensure appropriate, effective, and safe exercise, it is important that a physiotherapist supervises exercise prescription. The physiotherapist uses appropriate techniques, perform with adequate initial assessment to identify the main problem and its cause in the case of an injured person and also undertake with ongoing reassessment and modification to provide appropriate treatment (Australian Physiotherapy Association, 2002).

However, whichever programme of physical activity/exercise campaign is followed, it is recognized that long-term success will depend on a wide, coordinated multi-level approach. Therefore, the physiotherapist will need to be part of a team of players that include Dieticians, Occupational therapists, Physicians, Psychologists and so forth. Members of a team may support each other in providing measurements of health improvement, which are valid and objective (Carter & O'Driscoll, 2002).

2.8 THE INFLUENCE OF DEMOGRAPHIC AND BACKGROUND CHARACTERISTICS, ON PERCEPTIONS OF PHYSICAL ACTIVITY

An understanding of the factors that influence physical activity behaviour is necessary for health psychologists and behavioural specialists interested in influencing sedentary population groups to become more physically active. Despite extensive research, the determinants of physical activity are not fully understood. However, among the determinants, which are already understood, demographic factors are one of the most influencing factors to physical activity (Carnegie, Bauman, Marshall, Mohsin, Westley-Wise & Booth, 2002).

2.8.1 Gender

There are many morphological and physiological differences between men and women, which are important and relative to fitness and exercise performance (Pollock *et al.*, 1998). Males are generally more active than females (Brownson, Baker, Housemann, Brennan & Bacak, 2001; Cooper *et al.*, 2000; Eyler & Vest, 2002; WHO, 2002a) and the gender difference is greater for high-intensity activities than for activities of low and moderate intensity (Malina, 2001). Men usually report greater levels of total and vigorous activity,

whereas women tend to report participating in low-to-moderate activities (Martin, Marrow, Jackson, Dunn & Andrea, 2000)

The differences observed between males' and females' levels of physical activity are likely because of each gender group's perceptions of the reasons for participation in physical activity. Each gender group has different major perceived motivating reasons and perceived barriers. Of various studies that investigated differences in reasons for participating in physical activity across the gender, Huddleston *et al.*, (2002) reported that competition as a reason for participation among females were scored higher than the males'. On the other hand, the males' scores for fun/enjoyment and challenge/achievement reasons for participation in physical activity were higher than for females.



A study by Ransdell *et al.*, (2002), mentioned that adolescent girls were at more a risk for inactivity compared to adolescent boys. The girls placed less value on participation in physical activity because the physical education programmes included activities, which were not of interest to them, a lack of self-confidence, and self-efficacy as far as their physical activity skills concerned. In the same way, adult women were also at a risk for inactivity. Some of the reasons for their inactivity included dual role conflict, safety concerns, lack of self-confidence in physical activity abilities, and lack of knowledge about how to develop and maintain a physically active program (Ransdell *et al.*, 2002).

2.8.2 Peer and family motivation

There is evidence that participation in physical activity and sport is popular during childhood and adolescence in many countries. Their participation is usually encouraged and supported by parents, teachers and peers (Yang *et al.*, 1999). Many studies emphasized

social support from family and peers as one of the major preferences for motivators to participate in physical activity (Carnegie *et al.*, 2002). The Centre for disease control and prevention (1995) emphasized that parents are believed to help their children maintain a physically active lifestyle by providing encouragement and opportunities for physical activity. The family events can include opportunities for everyone in the family to be active. Davidson, Cutting & Birch (2003) in their study “Parents’ activity-related parenting practices predict girls’ physical activity” concluded from the results that parents (both mother and father) can play an important role in promoting the physical and emotional well being of their daughters by encouraging them to be physically active. Not only, is the influence of parents for participation in physical activity among the children and adolescence important, but parents are also likely to influence their daughters and sons at the college and university levels. This was revealed in a study by Bray & Born (2004) where they found students that were living at home with parents showed more motivation for physical activity participation than the others living in university residences.

Peers were found to be one of the most motivating factors in promoting physical activity at university level. Sallis *et al.* (1999) indicated that peer leaders were used to be role models, during the project of “evaluation of a university course to physical activity: project GRAD”. The authors mentioned that peers are believed to be effective role models, and this can be generalized to most campuses. Furthermore, friend’s physical activity interacted with emotional support from friends are also motivating factor. That is, it was only related to own physical activity when relationship was emotionally close between the friends (Vilhjalmsson & Thorlindsson, 1998).

2.8.3 Previous participation in physical activity

It is commonly suggested that physical activity in childhood and adolescence is an important prerequisite for physical activity in adulthood (Yang *et al.*, 1999). In understanding what influences physical activity especially during young adulthood at college level, Suminski *et al.* (2002) mentioned that the youthful physical activity (participation in physical activity during adolescence/at high school level) had a substantial influence on the current physical activity participation. This contention that participation in sports during one's youth influences adult participation in physical activity was supported by other studies. The study on the influences of perceived constraints on a community-based physical activity programme, (Alexandris, Barkoukis, Tsorbatzoudis, & Grouios, 2003) identified lack of prior socialization into a specific activity as one of the interpersonal constraints.



Chapter two reviewed the existing literature in relation to the current study. This review focused mainly on the benefits of physical activity; which were categorised as; psychological and mental, physiological benefits which are much essential in prevention of risk factors of chronic diseases of lifestyle (CDL), physical and musculoskeletal benefits, social and finally the economic benefits of physical activity. Other themes reviewed were, the recommended quality and quantity of physical activity for health, the rationale for promotion of physical activity among tertiary institution students and the role of physiotherapy in the promotion of physical activity. More focus was put on the factors influencing behaviour change in relation to physical activity; specifically the perceived benefits, barriers and helpful cues. The available methods of assessing these factors were also reviewed. Lastly, the chapter reviewed the influence of demographic and background characteristics, on perceptions of physical activity.

CHAPTER 3: METHODOLOGY

3.1 INTRODUCTION

This chapter highlights the methods and procedures used for this study. It gives the background of the study setting, the study design used, the population that participated and how it was selected, the sample size and the procedure used to collect the data. The chapter also gives the details of the pilot study, the data analysis method used and the ethical issues put forward.

3.2 RESEARCH SETTING

The study was conducted in government tertiary education institutions in the Republic of Rwanda. Rwanda is a small land-locked country of about 26,338 km², located in central Africa. The country has twelve provinces and a total population of about 8.1 million people (Rwandan Ministry of Local Government, Community Development and Social Affairs, 2004). There are five government tertiary education institutions in the country; all of them offer education to students at an undergraduate degree level. The five tertiary institutions are distributed in three provinces, namely, Kigali city, Butare and Ruhengeri provinces. Three institutions: Kigali Institute of Science, Technology and Management (KIST), Kigali Health Institute (KHI) and Kigali Institute of Education (KIE) are situated in Kigali-the capital city of the country. One institution – The National University of Rwanda (NUR) is in Butare town – the second largest town to the capital city. The “Institut supérieur d’agriculture et d’élevage (ISAE)” is situated in Ruhengeri province. The tertiary education institutions in Rwanda offer different professional courses.

3.2.1 Kigali Health Institute (KHI)

This is a paramedical tertiary institution, which offers different paramedical courses to the students. It is situated in Kigali city and Kigali city province. This city is geographically located in central part of the country (Appendix I).

3.2.2 Kigali Institute of Science, Technology and Management (KIST)

KIST is a science and technology institution, which offers different courses in science and technology as well as management courses. It is situated in Kigali city province.

3.2.3 Kigali Institute of Education (KIE)

KIE is an educational teachers' training tertiary institution, and trains teachers for secondary school education. It is also situated in Kigali city province.

3.2.4 National University of Rwanda (NUR)

NUR offers all the courses in Science and Technology, Social Sciences, Arts and Humanities to the students. It is situated in Butare town: the second largest town in Rwanda. Butare town is geographically located in the southern part of the country, in Butare province, which is about 136 kilometres from Kigali city.

3.2.5 Institut Supérieur d'Agriculture et d'Élevage (ISAE)

ISAE is an Agriculture and Veterinary training tertiary institution in Rwanda. It is located in Ruhengeri province, which is situated in the northwest of the country at about 97 kilometres from Kigali city. Ruhengeri town is the third largest town in Rwanda.

3.3 STUDY DESIGN

A descriptive quantitative study design was used. The survey was cross-sectional in nature and a self-administered questionnaire was used to collect the data from the respondents. According to literature (Tergerson & King, 2002 & Tappe *et al.*, 1989) this study design was a worthy one to use in data collection from a large number of the study population. For this study, the design was used to identify perceptions of physical activity among a large number of students selected from five tertiary institutions in the Republic of Rwanda. The quantitative study design has advantages of: - explaining the social life of the participants, theory testing, objectivity approach and uses high levels of measurements which gives high levels of representativeness and generalisability of the findings (Sarantakos, 2000).

3.4 STUDY POPULATION, SAMPLE SIZE AND SAMPLING TECHNIQUE

3.4.1 Population

The study population included all the tertiary institution students registered for the 2003 academic year in the Republic of Rwanda. The total number of this population was approximately 15000 students who were registered for a full time study programme at the five government tertiary education institutions in Rwanda. A sample of five hundred (500) students was selected from this population of students. The inclusion criteria for the students in this study were both females and males who were on a full time programme and who voluntarily agreed to participate in the study.

3.4.2 Sample size

Five hundred (500) students were selected and given questionnaires. Four hundred and twenty five (425) students returned their completed questionnaires, giving a response rate of 85%. This sample size was decided upon by calculating proportionally and statistically,

basing on the number of students in each of the tertiary institutions selected for the study. For example proportional bigger number of students were taken from the institution, which had the biggest number of students. The reason for this kind of criterion was to get a representative number of students from each institution in the study sample. Table 3.1 indicates sample taken from each institution.

Table 3.1 Samples from each institution

Institution	No. of students (N)/institution	Sample (n)/institution
KHI	1437	50
KIST	3579	120
KIE	1692	55
NUR	7071	235
ISAE	1221	40
Total	15000	500

3.4.3 Sampling technique

The study was carried out in five different tertiary education institutions; namely; KIST, KHI, ISAE, KIE & NUR in the Republic of Rwanda. Students were selected from different faculties, departments and year classes in each institution. The study used two sampling techniques; namely purposive and random sampling techniques. The purposive sampling technique was used to select the departments and classes from each faculty at each institution. This technique is based on the judgement of the researcher, such that a sample is composed of the subjects that contain the most characteristics, which are representative or

typical of the population under study (De Vos, 2002). Particularly in this study, the criterion of the researcher was to take into consideration that all the different education disciplines such as faculties, departments and year classes in each of the institutions were represented in the sample. The researcher made sure that participants from all of the education disciplines were represented in the study sample.

In most of the cases however, the students' classes which were purposively selected had a large number of students which could not all be considered as the sample wanted from those particular students' classes. Therefore, the random sampling technique was used to select the wanted number of students from the purposively selected classes. For such classes, random selecting papers corresponding to the number of students in that particular class were marked with a "Yes" or "No" label. The number of papers labelled "Yes" corresponded to the number of students wanted from that particular class. All the labelled papers were put in a box and each student was allowed to randomly pick a single paper from the box. Those students who picked papers labelled "Yes" were requested to fill the questionnaires. In the case of the unavailability of the students in classes targeted, replacement classes were used to maintain the size of the sample for the study.

3.5 DATA COLLECTION

3.5.1. Instrumentation

A structured self-administered questionnaire with both pre-coded forms and a small number of open-ended questions was used (Appendix G). This type of survey is less expensive, the respondent can complete the questionnaire when it is convenient and can check personal records when necessary. This type of survey also offers anonymity and avoids interviewer bias. In addition, it is very effective, and response rates may be high for a target population

that is well educated or has strong interest in the topic or the survey organisation (Neuman, 2000). Again, the advantage of using questionnaires is that it is one way of obtaining data fairly quickly. It also allows one to be able to reach a large group of respondents at one time (Romaine, 1995).

The questionnaire for this study comprised an introductory letter on the first page, which explained the purpose of the study, the request for the respondents to participate and ethical issues considered. The questionnaire was divided into four sections and it was designed to assess and identify the demographic and background characteristics with regards to physical activity, the perceived benefits of, perceived barriers and perceived helpful cues (motivational factors) to physical activity, among the tertiary institution students in Rwanda. At the beginning of each section, instructions of how to complete the section were provided. The questionnaire consisted of 52 items: 46 were close-ended questions and only six were open-ended questions. The estimated time to complete the questionnaire was approximately 10 – 15 minutes.

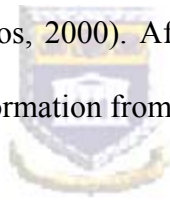
3.5.2 Sections of the questionnaire

Section A measured demographic and background characteristics by means of ten items (questions A1-A10). These characteristics included, gender, age, year of study, school department/course, friends and family members who participate and encourage participation in physical activity and finally the respondent's previous¹ physical activity participation background. The respondents were required to fill in their age in years for question A2 and the school department/course they belonged to, for the question A4. The

¹ Previous is considered to mean the participation in physical activity at primary and secondary school levels and even to some extent of tertiary level.

rest of questions in this section required that the respondents should tick the appropriate boxes or provide a Yes/No response.

The sections B, C and D, measured the tertiary institution students' perceptions of and involvement in physical activity. The questionnaire required students to tick an appropriate box, which indicated 4-point Likert rating scale responses, (4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree). The 4-point Likert scale was used in this study to prevent central tendency, which is common in youth populations (Wu et al., 2002). Likert scales are very popular among social scientists. The reason being that they have a high degree of validity even if the scale contains only a few items it provide single scores from a set of items, has very high reliability and allows ranking of the respondents and are relatively easy to construct (Sarantakos, 2000). After each section, open-ended questions were included to obtain additional information from the students.



Section B of the questionnaire measured perceived benefits of the physical activity and had 13 items (questions B1-B13). In the first 12 items (questions B1 – B12) participants were requested to indicate whether they strongly agreed to strongly disagreed, about why they exercise or would consider exercising. The last question (B13) was an open-ended question and required the respondents to give other reason(s) why they felt certain close-ended responses in this section could have been left out.

Section C measured perceived barriers to physical activity and included 17 items (questions C1 - C17). In the first 16 items (questions C1 – C16) participants were requested to indicate whether they strongly agreed to strongly disagreed, on the reasons to why they do not exercise or would not consider exercising. The last question (C17) was an open-ended

question and required the respondents to give other reason(s) why they felt certain closed-ended responses in this section could have been left out.

Section D measured perceived helpful cues (motivational factors) to physical activity and included 12 items (questions D1 - D12). In the first ten items (D1 - D10) students were asked to indicate whether they strongly agreed to disagreed that each of the given motivating factors are considered to be helpful in encouraging them to exercise. The last two questions (D11 & 12) were open-ended questions, which required the respondents to give other reason(s) and suggestion(s) that could motivate them to participate in physical activity.

3.5.3 Validity and reliability of the instruments

Validity determines the extent to which an instrument measures what it is supposed to be measuring while reliability determines whether two administrations of an instrument produce the same results (Sirard & Russell, 2000; Sarantakos, 2000). Therefore, to ensure validity and reliability of the instruments used in this study, the questionnaire was adapted from one, which was developed from the components of HBM and used to assess physical activity perceptions among high school adolescent learners (Tergerson & King, 2002). However, removing and adding some items modified this questionnaire. The modification was based on another questionnaire, which was developed and validated in the literature, to measure physical activity cognitions, mainly perceived benefits and barriers among the youth (Wu *et al.*, 2002), that was also relevant to this study. Modification of the adapted questionnaire was done with consideration to the Rwandan environment from which the current study was conducted. This was done because the adapted validated questionnaire had been used in studies conducted in United States of America, where environment is

quite different from Rwanda – an African developing country. The pilot study tested the content validity and reliability of the adapted questionnaire among the tertiary institution students in Rwanda, prior to the main study. In the pilot study the understanding of the questionnaire by the students was assessed in order to ensure that the questionnaire measured what was supposed to be measuring among this population. After the pilot study, some questions, which were not understood by the students, were rectified and some, which appeared repetitive, were deleted.

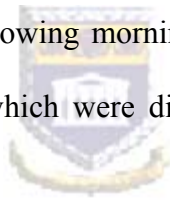
3.5.4 Language used in the data collection

Both English and French were used to give all the respondents an opportunity to answer in the language convenient to them. Currently, English and French are the languages used in the tertiary education institutions in Rwanda as modes of communication and teaching. Therefore, both languages are well understood by the students. To maintain the content of the questionnaire in both languages, a professional translator first translated the questionnaire from English to French after which another translator translated it back to English from French. The second version was similar to the original questionnaire set in English. This verification of the translated questionnaire was also done to ensure the validity of the instrument.

3.5.5 Procedure

The procedure of data collection began with the distribution of letters to seek permission from relevant authorities of the respective tertiary education institutions in which the research was conducted. In the letter to seek permission, the explanation of the nature of the study and its purpose were included (Appendix A). After the authorities granted the permission, the field research assistants were trained for two days on how to collect the data

from the students and other processes involved. The research assistants were chosen from the lecturers in the respective institutions in which the study was conducted. Students were then randomly selected from purposively selected departments and classes at each institution. The students were approached before the beginning of the fifth lesson (the period before the noon break), after making arrangements with the lecturer responsible for that particular lesson. Each lecturer was asked to spare at least 5 -10 minutes for the researcher to explain the study to the students and ask for their informed consent. After informed consent was obtained from the respondents, the questionnaires were distributed, and agreed to be collected after the lunch break, such that they could use the lunch break to fill out the questionnaires. Many completed questionnaires were collected at that particular time (after lunch break) and those who could not return them at that particular period given, were reminded to bring them the following morning. This procedure was fairly effective and out of the 500 questionnaires, which were distributed, 425 were returned, giving a response rate of 85%.



3.6 PILOT STUDY

A pilot study was carried out prior to the main study to pre-test clarity, understanding, reliability of the instrument and timing of how long the main study could take. The pilot study was conducted among a sample of 15 students who were conveniently selected from two institutions and who did not participate in the main study. Fortunately, most of the questions in the questionnaire were clear and understood by the students. The results from the pilot study indicated that the adapted and modified questionnaire could measure perceptions of physical activity among tertiary institution students in Rwanda. This proved the reliability of the questionnaire among this population. Minor rectifications were done immediately to suit the conditions of the tertiary institution students in Rwanda.

3.7 DATA ANALYSIS

3.7.1 Coding the data

Most of the data collected were ordinal or nominal in nature. It was first coded and the codes were entered into the Microsoft Excel computer programme. The nominal data were coded by using different ways of coding depending on the question. For example, the question on gender: male was given a code of 1 and female a code of 2. Questions that required Yes/No responses: Yes was given a code of 1 and No a code of 0. The ordinal data for sections B, C and D were all coded as “strongly agree” = 4, “agree” = 3, “disagree” = 2 and “strongly disagree”=1.

3.7.2 Minimising/Eliminating data entry errors

The process of double data entry was used to eliminate data entry errors. “Double data entry” is the process in which the data is entered twice with each entry on separate spreadsheets in the Microsoft Excel computer programme. The Statistical Analysis System (SAS) was used to find out where could be any errors by comparing the two spreadsheets of the entered data. Wherever non-matching observations were found, the corrections were made immediately with verification from the questionnaires of the affected Identification numbers.

3.7.3 Approaches to data analysis

Based on the aim of the study, which was to ascertain the perceived benefits of, barriers and helpful cues (motivational factors) to physical activity among tertiary institution students and to find out whether there was an influence of demographic and background characteristics on these perceptions, both descriptive and inferential statistics analysis were carried out. The SAS version 8 was employed in both analyses.

3.7.3.1 Descriptive statistic analysis

With the descriptive analysis, the demographic profile and background characteristics regarding physical activity and the perceptions of physical activity of the participants were obtained. The demographic profile comprised gender, age, year of study, school department/course, and then “having a friend and a family member who participated in physical activity”, “having a friend and a family member who encouraged the respondent to participate in physical activity”. The background characteristics regarding physical activity included “if the respondent was currently participating in any form of physical activity” and the “educational level at which the respondent happened to participate in physical” during the previous school lifetime.

For each of the sections on perceptions of physical activity, (perceived benefits, barriers, and motivating factors), the mean score values along with standard deviations and the number of respondents for each perception were descriptively obtained.

The physical activity participation adherence and trend through the different educational levels was also descriptively analysed. This was done by looking at how many students participated at primary school and continued participation at secondary school and then finally at tertiary level. Again, the students who participated at secondary school and then continued participation at tertiary level were identified. To do this analysis, a categorical variable named “*levels*” was created. There are three positions for this variable. A 1 in the first position indicates that they had exercised at the primary school level; a 1 in the second position indicates that they have exercised at the secondary school level, and a 1 in the third position indicates that they are exercising at the tertiary level. Thereby, 111 means participation at all three levels. A 110 means they exercised at primary and secondary

school level, but not tertiary levels. This was mainly for the purpose of analysis. Hence, the variable “*levels*” was defined as follows:

100 = Primary level only

110 = Primary and Secondary level only

111 = Primary, Secondary and Tertiary levels

010 = Secondary level only

011 = Secondary and Tertiary levels

101 = Primary and Tertiary levels

001 = Tertiary levels only

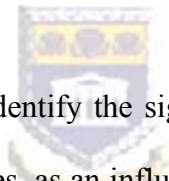
000 = None

3.7.3.2 Inferential statistic analysis

Inferential statistic analysis was used to answer the objective of identifying whether there was an influence of demographic and physical activity background characteristics on the perceptions of physical activity (perceived benefits, barriers and helpful cues), the relationships and associations between the variables were identified with statistical tests. One way to do the analysis was to identify whether there were differences in the responses on perceptions for the independent variables. The independent variables tested for the differences were: gender (male and female), professional study courses which had five categories of courses (Agriculture, Health sciences, Technology sciences, Education and Other Arts subjects), current situation regarding participation in physical activity (currently participating and non-currently participating students), and the previous participation in physical activity (participation at primary & secondary schools, at tertiary institution and the none participation at any of the levels). Since the response for each question was on a 4-point Likert ordinal scale (strongly agree = 4, agree = 3, disagree = 2 and strongly disagree = 1), looking at a test for trend (or for differences in the mean responses between, for

example male and female, in case of gender influence) was better than a simple statistical test that would be appropriate, for example, the Chi-Square test².

However, the Mantel-Haenszel Chi-square (MHC) test in SAS (Stokes, Davis, Koch, & Gary (1995). was used to establish whether the differences observed along with the mean and the standard deviations were significant. This test (MHC) was used to find out what the influence of gender; current situation regarding participation in physical activity and previous participation in physical activity was on perceptions of physical activity. In addition to the MHC test for significant influence of previous participation in physical activity on physical activity perceptions, Spearman's correlation (r) was used to identify whether the significance of the association was negatively or positively correlated.



Kruskal Wallis H test³ was used to identify the significance of difference across the five categories of professional study courses, as an influence on perceptions of physical activity among the students.

The fact that the analysis done was to look at many tests, it was important to include an adjustment for multiple testing. The Bonferroni adjustment is commonly used for this purpose, but it is, however, regarded too conservative. Therefore, the False Discovery Rate (FDR⁴) was also included. The significant differences identified were also controlled for multiple tests at a 5% FDR.

² The Chi-Square test does not make use of the ordinal nature of the responses

³ Kruskal Wallis H test is a non-parametric test equivalent to one-way ANOVA that tests whether several independent samples have the same means (Tyrone, 1995).

⁴ FDR: This is a method of adjusting for multiple tests that is less conservative than the Bonferroni adjustment

3.7.3.2.1 Analysis of the influence of previous participation in physical activity

Looking at the influence of previous (primary & secondary schools) participation in physical activity; it was important to take current participation into consideration. This is so because many students currently participating may also be ones that participated at earlier levels (primary and secondary school levels). Consequently the analysis done stratified⁵ on current participation. The statistical procedure that allows for this stratification is Cochran-Mantel-Haenszel (CMH) methodology (Stokes *et al.*, 1995).

Consequently, a single analysis of primary and secondary physical activity participation was done rather than one analysis for primary and a second analysis. For the purpose of the single analysis, the ordinal variable “*previous*” (for primary and secondary) was defined as: *previous*=0 if the student did not participate at both primary (primary=0) and secondary (secondary = 0); *previous*=1 if the student participated at primary (primary=1) and did not participate at secondary school (secondary=0); *previous* =2 if the student did not participate at primary (primary=0) and participated at secondary (secondary=1); *previous* =3 if the student participated at both primary (primary=1) and secondary (secondary=1). The logic was to create an ordinal variable that took on larger values for more participation and for recent participation. Since secondary would be more recent than primary, if a student had only one of these two levels of participation, they got a higher score (namely 2) for secondary than for primary (which would have a score of 1). A score of 3 was given for both secondary and primary, as it is indicative of more participation than for either primary alone or secondary alone.

⁵ A stratified analysis looked at the relationship between previous participation and the response to the questions for each level (or stratum) of current participation. The results of each stratum were combined into a single statistical test.

After the construction of an ordinal variable to describe the level of previous participation, an association of level of previous participation and the ordinal response to the questions on perceptions of physical activity, was looked at. A measure of association appropriate when both variables are ordinal would be based on ranks. A Spearman correlation is an example of such a measure. Hence, the analysis looked at the results of the CMH test for association and then considered the FDR 5%, as an adjustment for multiple testing.

3.7.3.3 Analysis of open-ended responses

The open-ended responses were not used for statistical analysis, and therefore, they were used “anecdotally”. This means responses were not presented in statistical summaries but were simply related to what some of the respondents had said ('Anecdote'⁶). This is given as a comment to some situations where relevant as "One respondent said that she/he did not like to exercise because 'it made her sweaty'. In other words, the researcher just provides some examples of what respondents wrote. The open-ended response information has been used in this study as complementary data to close-ended responses, for discussion and general comments.

3.8 ETHICAL CONSIDERATIONS

After the approval of the research proposal by the ethics committee and the Senate of University on the Western Cape, further permission was requested from the authorities of the respective tertiary education institutions in Rwanda to include the students into the study. The nature, aims and importance of the study to the students were explained to them and their consent was sought before the collection of the data. It was explained that the

⁶ Anecdote means what the respondent said

study was anonymous and voluntary, and that all the information obtained would be confidential. Further more, the right to withdraw at any time was guaranteed to every participant. Finally, the data was collected from only those whose informed consent was obtained and who were ready to voluntarily participate in the study.

In Chapter three, the study setting, which comprised five tertiary education institutions, the study design, study population, and sampling are described. In addition, the chapter also explains relevant methodological issues, such as data collection methods, which was mainly done my means of a self-administered questionnaire. The reliability and validity of the questionnaire were described. The study procedure, language and its translation, the pilot study are also highlighted. Data analysis by means of both descriptive and inferential statistical analysis and tests involved were given much attention in this chapter. Ethical considerations conclude the chapter.



CHAPTER 4: RESULTS

4.1 INTRODUCTION

In this chapter, both descriptive and inferential statistic results of the study are presented. The descriptive results mainly present the demographic and background characteristics. In addition, the main part of this chapter highlights the inferential statistic results of the relationships and associations found between some of the demographic/background characteristics and the physical activity perceptions: perceived benefits, barriers and helpful cues.

4.2 DEMOGRAPHIC AND BACKGROUND CHARACTERISTICS OF THE STUDENTS

4.2.1 Demographic characteristics

In total, five hundred questionnaires were distributed among tertiary institution students and 425 were completed and returned, giving a response rate of 85%. However, table 4.1 indicates how many questionnaires went to each institution and how many returns were received.

Table 4.1 Questionnaires to each institution and returned

Institution	Questionnaires given out	Returned questionnaires	Response rate (%)
KHI	50	47	94
KIST	120	89	74
KIE	55	41	74
NUR	235	210	89
ISAE	40	38	95
Total	500	425	85

Out of the 425 respondents, 267 (62.82%) were males while 158 (37.18%) were females. The respondents' ages ranged from 18 - 40 years. The mean age was 26.4 years with a standard deviation of 3.8 years. Most of the participants (46%) were in their second year of study, 25% in third year while 29% were in the fourth year. Table 4.1 indicates the frequencies and percentages of the respondents according to departments they belonged to or the courses followed.

Table 4.2 Demographic characteristics of the students

Variables		Number	Percentage
Gender:	Male	267	62.82
	Female	158	37.18
Year of study:	2 nd year	194	45.75
	3 rd year	107	25.24
	4 th year	123	29.01
Department/ Course:	Agriculture	57	3.41
	Health sciences	89	20.94
	Technology sciences	44	10.35
	Education	45	10.59
	Other Arts courses	90	44.71

4.2.2 Physical activity background characteristics of the students

The assessment of the physical activity background characteristics of the students identified whether the students had motivation from the family members and friends. This was referred to as peer motivation. Students' current participation in physical activity was also

assessed. In addition, assessment to find if the students participated in physical activity in their previous school lifetime and adhered to this participation was done. This is reported as the physical activity participation trend and adherence along the educational levels.

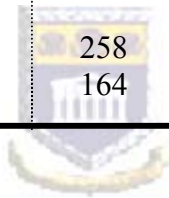
4.2.2.1 Peer motivation to participation in physical activity by the students

The number of responses varied slightly from question to question due to some respondents who left some responses blank. Among the students who returned the questionnaires (N=425), 420 responded to the question of having a friend who participated in physical activity and 83.33% of these respondents had a friend that participated and 74.53% had a family member that participated in the physical activity. Again, the majority of the students (79.38%) had a friend who encouraged them to participate in physical activity and 61.14% had an encouragement for participation in physical activity from a family member. Table 4.2 indicates the frequencies and percentages of the students who had peer motivation to participation in physical activity.

Table 4.3 Peer motivation to participation in physical activity

Variable questions and responses	Frequency	Percentage
Do you have a friend who participates in any form of physical activity?		
Yes	350	83.33
No	70	16.67
Do you have a family member(s) who participate(s) in any form of P.A?		
Yes	316	74.53
No	108	25.47
Do you have a friend who encourages to exercise?		
Yes	335	79.38
No	87	20.62
Do you have a family member who encourages to exercise?		
Yes	258	61.14
No	164	38.86

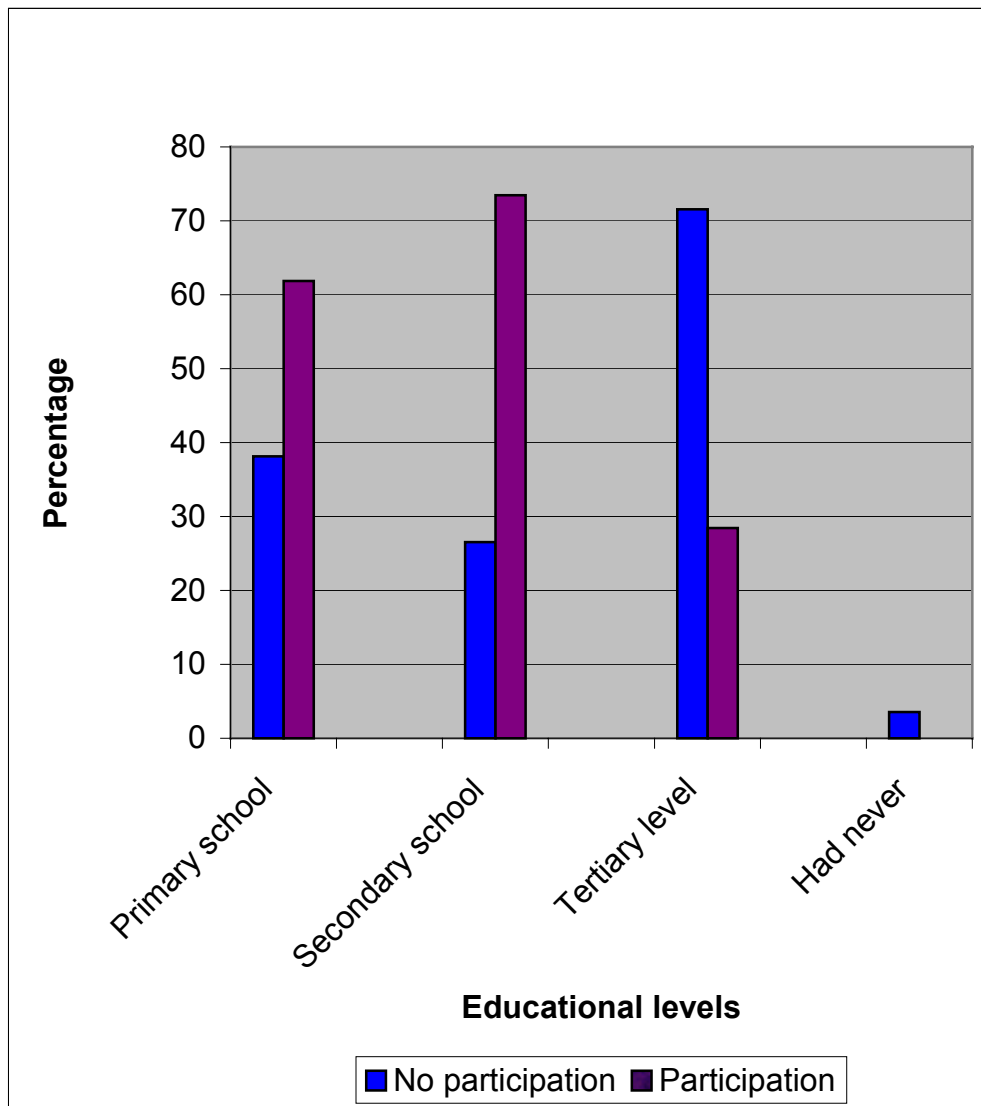
P.A = Physical activity



4.2.2.2 Participation in physical activity

Of the total number the students, 119 (28.33%) were currently participating in physical activity at the tertiary level while 301 (71.67%) were not participating. However, Figure 4.1 illustrates that 261 (61.85%) had participated in physical activity at primary school level, 310 (73.46%) at secondary school level and only 15 (3.55%) had never exercised or participated in physical activity at any of the educational levels.

Figure 4.1 Participation in physical activity at different educational levels



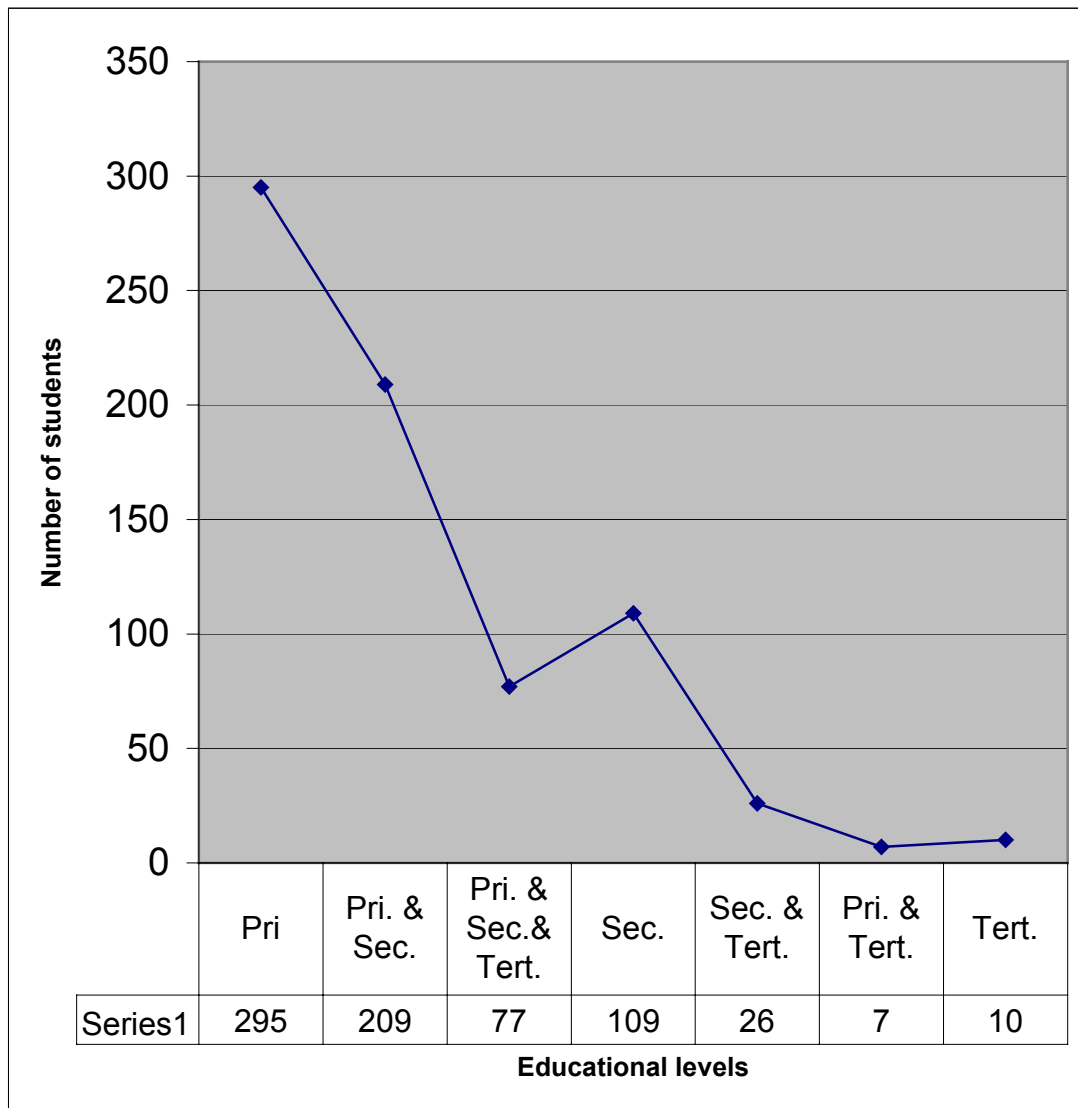
4.2.2.3 Physical activity participation trend and adherence along the educational levels

The analysis was done (as explained in section 3.8.3.1 of the methodology of data analysis) to obtain the adherence in participation to physical activity at different educational levels.

The analysis looked at how many students participated at primary school and continued participating at secondary school level and finally if the same students participated at tertiary level. Furthermore, the analysis looked at those students who participated at secondary school and then continued participation at tertiary level, those who initiated their

participation at secondary and continued at tertiary level. The others were those who may have participated at primary school level but did not participate at secondary school level and finally participated at the tertiary level. The analysis also looked at the students who initiated participation at the tertiary level, without participating at any of the previous educational levels. The results are presented in Figure 4.2 below illustrates the trend and adherence to participation in physical activity along the educational levels. The figure reveals that among 295 students who participated at primary level, 209 continued their participation at secondary level and only 77 were able to maintain their physical activity participation at tertiary level. The same figure further indicates that 109 students initiated their participation in physical activity at secondary school level but only 66 were able to continue with participation at tertiary institution level. It was discovered that students who participated at primary school level and then stopped participation at secondary level, hardly resume their participation at tertiary level. This is revealed by the smallest number of only seven students who participated at primary and then did not participate at secondary level but finally participated again at tertiary level. Moreover, it was found that only 10 students initiated physical activity participation at tertiary level. However, the trend of participation in physical activity declined tremendously from secondary school level to tertiary level.

Figure 4.2 Adherence in physical activity participation along educational levels



Pri. = Primary school level

Sec. = Secondary school level

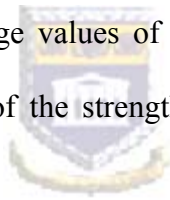
Tert. = Tertiary level

4.3 STUDENTS' PERCEPTIONS ON PHYSICAL ACTIVITY

Perceptions on physical activity, specifically perceived benefits, barriers and helpful cues, were assessed among the tertiary institution students on a four-point Likert scale (1=strongly disagree, 2=disagree, 3=agree and 4=strongly agree). The minimum value for each response was 1 for strongly disagree and the maximum value was 4 for strongly agree.

Descriptive statistics were used to get the number of respondents, the mean score value of the four-point scale measurements (strongly disagree, disagree, agree and strongly agree) and percentage of each strength of agreement, for each variable question. For convenience, the results are presented in descending order with regard to the mean score value of the four-point scale measurements for each response. This indicates which perception had the highest and the lowest mean score in the sample.

The presentation of the results also indicates the number of students that responded to each variable question and percentages for each strength of the agreement (strongly disagree, disagree, agree, and strongly agree). The results are presented according to each specific section of perceptions, namely, perceived benefits, barriers and helpful cues. Also, for each section of the perceptions, the average values of the number of respondents responded, mean score values and percentages of the strength of agreements, were included in the results.



4.3.1 Perceived benefits of physical activity

In response to the question on perceived benefits, the respondents were asked to respond accordingly to the questions on the reasons why they exercise or would consider exercising. Table 4.3 illustrates that the five most likely benefits of physical activity considered by the respondents to be the reasons for exercise were “*Exercise helps me to reduce stress*” (with the mean score $M=3.277$), “*Exercise improves my self-esteem (feel better about my self)*” ($M=3.234$), “*Exercise helps me to increase my energy level*”, ($M=3.212$), “*Exercise helps me to become strong*” ($M=3.209$), and “*Exercise improves my Cardiovascular Fitness (protects my heart)*” ($M=3.200$). The least likely benefits of physical activity considered by

the students were “*Exercise helps me to lose weight*”, (M=2.562), and “*Exercise helps me to become more physically attractive to others*”, (M=2.752).

Table 4.4 Perceived benefits of physical activity

Variable statements	N	Mean score	Strongly agree %	Agree %	Disagree %	Strongly disagree %
Exercise helps me to reduce stress	412	3.277	39.1	50.2	10.0	0.7
Exercise improves my self-esteem (feel better about my self)	418	3.234	32.3	59.6	7.4	0.7
Exercise helps me to increase my energy level	420	3.212	32.6	58.1	7.1	2.1
Exercise helps me to become strong	422	3.209	31.1	59.3	7.5	1.4
Exercise improves my cardiovascular fitness (protects my heart)	416	3.200	31.7	58.9	7.0	2.4
Exercise allows me contact with my friends	417	3.192	35.5	51.6	9.6	3.4
Exercise helps me to stay in shape	421	3.147	31.8	53.6	10.1	3.5
I have fun when I exercise	412	2.980	27.4	48.3	9.4	4.9
Exercise helps me to be competitive (enjoy competition with others)	420	2.952	24.3	50.7	21	4
Exercise helps me to do something attractive with other people	409	2.858	19.6	52.1	23	5.4
Exercise helps me to become more physically attractive to others	408	2.752	18.4	43.9	32.4	5.4
Exercise helps me to lose weight	413	2.562	12.1	43.1	33.7	11.1
Average	416	3.048	27.99	52.45	15.68	3.75

4.3.2 Perceived barriers to physical activity

Regarding perceived barriers, the respondents were asked to respond accordingly to the questions on the reasons why they do not exercise or would not consider exercising. As shown in Table 4.4 below, the three most likely barriers to physical activity perceived by the students were “*I do not have right equipment to exercise*” (M=2.616), “*I want to do other things with my time*” (M=2.563), and “*There are other interesting things to do*” (M=2.550). The least likely barriers to physical activity considered by the students were “*I do not think exercise is important*” (M=1.856), and “*I am not interested in exercising*” (M=1.925).



Table 4.5 Perceived barriers to physical activity

Variable statements	N	Mean score	Strongly agree %	Agree %	Disagree %	Strongly disagree %
I do not have right equipment to exercise	417	2.616	17.3	38.6	32.6	11.5
I want to do other things with my time	419	2.563	12.4	42.2	34.6	10.7
There are other interesting things to do	416	2.550	11.8	41.1	37.5	9.6
I have too much home work	415	2.429	9.2	37.6	40.2	13
I do not have time to exercise	415	2.376	11.8	28	46.3	14
I do not have a good place to go and exercise	417	2.350	10.8	27.3	48.0	10.8
I am not motivated	414	2.256	7.2	29.2	45.4	18.1
Exercise tires me	414	2.193	5.3	26.8	49.8	18.1
I do not have safe a environment to go and exercise	413	2.179	9.2	19.9	50.6	20.3
I do not have any one to exercise with	413	2.102	6.3	21.5	48.2	24.0
I do not think exercise will give the results that I want	416	2.099	6.0	20.4	51.0	22.6
I think exercise is too hard	413	2.083	5.8	16.9	56.9	20.3
I do not enjoy exercising	415	1.990	4.3	18.3	49.4	28.0
I do not know how to exercise	417	1.964	7.9	9.4	54.0	28.8
I am not interested in exercising	416	1.925	7.0	10.8	50.0	32.2
I do not think exercise is important	416	1.856	7.2	6.5	51.0	35.3
Average	415	2.24	8.7	24.65	46.6	19.8

4.3.3 Perceived helpful cues (motivational factors) to physical activity

The students were asked to respond accordingly to the questions on the reasons why each of the given motivating factors, was considered to be helpful in encouraging them to exercise. Table 4.5 illustrates that the four most likely helpful cues to physical activity perceived by the respondents to be helpful in encouraging exercising were “*Having a friend who participates in the exercises*” (M=3.18) “*Having a friend who encourages me to exercise*” (M=3.132), “*Watching exercises on TV*” (M=3.063), and “*Having organised physical activities inside the school*” (M=3.050). Table 4.5 indicates that the least likely helpful cue to physical activity considered by the students was “*Looking at my self in a mirror*” (M=2.182).



Table 4.6 Perceived helpful cues (motivating factors) of physical activity

Variable statements	N	Mean score	Strongly agree %	Agree %	Disagree %	Strongly disagree %
Having a friend who exercises	416	3.18	34.6	50.7	12.5	2.2
Having a friend that encourages me to exercise	418	3.132	32.3	52.4	11.5	3.8
Watching exercises on TV	415	3.063	30.4	50.1	14.9	4.6
Having organised physical activities inside the school	417	3.050	29.0	52.0	13.9	5.0
See pictures of physically fit people in magazines or on TV	416	2.978	30.3	44.2	18.5	7.0
Being reminded of benefits of physical activity	413	2.976	21.3	58.4	16.9	3.4
Reading about exercises in magazines	416	2.904	21.4	54.1	18.0	6.5
Having a family member(s) who exercise(s)	415	2.858	18.1	54.5	22.7	4.8
Having a family member(s) who encourage(s) me to exercise	416	2.844	17.8	56.3	18.5	7.5
Looking at my self in a mirror	413	2.182	8.0	25.4	43.3	23.2
Average	416	2.9	24.3	49.8	17.77	6.8

4.4 INFLUENCE OF DEMOGRAPHIC AND PHYSICAL ACTIVITY

BACKGROUND CHARACTERISTICS ON THE PERCEPTIONS OF PHYSICAL ACTIVITY

On answering the objective of identifying whether there was an influence of demographic and physical activity background characteristics on the perceptions of physical activity (perceived benefits, barriers and helpful cues), the relationships and associations between the variables were identified with statistical tests. The demographic variables tested for the

influence were gender and professional study courses while the background characteristics regarding physical activity, variables tested were current and previous participation in physical activity. One statistical test was used (as described in section 3.8.3.2: Methodology of data analysis).

4.4.1 Influence of gender on perceptions of physical activity

4.4.1.1 Differences in perceived benefits of physical activity across gender

Table 4.6 illustrates all the responses and the significant differences identified between the males' and females' perceived benefits of physical activity. The responses that are significantly different are “*Exercise helps me to become strong*” (with the mean score $M=3.270$ for male, and $M=3.103$ for female, [$p=0.0094$, $^*p=0.03872$]), “*Exercise helps me to be competitive*” ($M=3.075$ for male and $M=2.739$ for female, [$p<0.0001$, $^*p=0.00085$]), “*Exercise helps me to become more physically attractive to others*” ($M=2.857$ for males and $M=2.570$ for females, [$p=0.0006$, $^*p=0.01137$]) “*Exercise helps me to do something attractive with others*” ($M=2.946$ for male and $M=2.711$ for female, [$p=0.0036$, $^*p=0.02976$]). In the above responses the mean value scores by males are higher than those of the females, while “*Exercise helps me to lose weight*” reached higher scores in females ($M=2.740$) than in males ($M=2.456$), $p=0.0009$, $^*p=0.01137$.

*P: False Discovery Rate p-value < 0.05.

p: Raw p-value = unadjusted

Table 4.7 Differences in perceived benefits to physical activity across gender

Variable statements	Male			Female		
	N	Mean (SD)	Rank	N	Mean (SD)	Rank
Exercise helps me to become strong §	267	3.270* (0.621)	1	155	3.103 (0.646)	6
Exercise reduces stress	261	3.245 (0.669)	2	151	3.331 (0.661)	1
Exercise helps me to increase my energy level	265	3.234 (0.678)	3	155	3.174 (0.636)	5
Exercise improves my cardiovascular fitness	263	3.209 (0.692)	4	153	3.183 (0.622)	4
Exercise improves my self-esteem	265	3.204 (0.625)	5	153	3.288 (0.581)	2
Exercise helps me to stay in shape	267	3.180 (0.734)	6	154	3.091 (0.744)	7
I have contact with my friends when I exercise	263	3.179 (0.788)	7	154	3.214 (0.656)	3
Exercise helps me to be competitive §	267	3.075* (0.747)	8	153	2.739 (0.801)	10
Exercise helps me to have fun	258	2.996 (0.751)	9	154	2.961 (0.914)	8
Exercise helps me to do something attractive with others §	257	2.946* (0.732)	10	152	2.711 (0.858)	11
Exercise helps me to become more physically attractive to others §	259	2.857* (0.792)	11	149	2.570 (0.824)	12
Exercise helps me to reduce weight §	259	2.456 (0.859)	12	154	2.740* (0.791)	9

§ = Observed perceptions which are statistic significantly different across the gender

* = Higher mean score value compared to the other of the opposite gender

N= Number of respondents

SD= Standard deviation

Rank = Ranking by importance

4.4.1.2 Differences in perceived barriers to physical activity across gender

Table 4.7 indicates all the responses and the significant differences identified between the males' and females' perceived barriers to physical activity. The responses that are significantly different are: “*I want to do other things with my time*” (M=2.475 for male and M= 2.714 for female, [p=0.0052, *p=0.02976]), “*I think that exercise is too hard*” (M=2.000 for male and M=2.224 for female, [p= 0.0047, *p=0.02976]), “*I do not have anyone to exercise with*” (M=2.015 for male and M=2.456 for female, [p=0.0056, *p=0.02976]) and “*I have too much homework to do*”, (M=2.348 for male and M=2.570 for female, [p=0.0091, *p=0.03872]). In the responses where the significant differences are identified, the mean value scores by females are higher than those of the males.



*p: False Discovery Rate p-value < 0.05.
p: Raw p-value = unadjusted

Table 4.8 Differences in perceived barriers of physical activity across gender

Variable statements	Male			Female		
	N	Mean (SD)	Rank	N	Mean (SD)	Rank
I do not have right equipment to exercise	265	2.608 (0.936)	1	152	2.632 (0.843)	2
There are other interesting things	264	2.542 (0.853)	2	152	2.566 (0.769)	4
I want to do other things with my time §	265	2.475 (0.871)	3	154	2.714* (0.773)	1
I have too much home work §	264	2.348 (0.850)	4	151	2.570* (0.779)	3
I do not have time	265	2.317 (0.860)	5	150	2.480 (0.873)	5
I have no good places to go and exercise	265	2.283 (0.825)	6	152	2.467 (0.883)	6
I am not motivated	263	2.209 (0.890)	7	151	2.338 (0.729)	7
Exercise tires me	263	2.156 (0.768)	8	151	2.258 (0.828)	9
I have no safe environment for exercise	261	2.123 (0.877)	9	152	2.276 (0.823)	8
I do not think exercise gives me the results I want	265	2.087 (0.795)	10	151	2.119 (0.848)	12
I do not have anyone to exercise with	262	2.015 (0.835)	11	151	2.252* (0.818)	10
I think exercise is too hard §	261	2.000 (0.765)	12	152	2.224* (0.774)	11
I do not enjoy exercising	263	1.954 (0.755)	13	152	2.053 (0.867)	13
I do not know how to exercise	265	1.925 (0.863)	14	152	2.033 (0.784)	14
I am not interested in exercising	264	1.886 (0.856)	15	152	1.993 (0.810)	15
I think exercise is not important	264	1.807 (0.857)	16	152	1.941 (0.774)	16

§ = Observed perceptions which are statistic significantly different across the gender

* = Higher mean score value compared to the other of the opposite gender

N= Number of respondents

SD= Standard deviation

Rank = Ranking by importance

4.4.1.3 Differences in perceived helpful cues of physical activity across gender

Table 4.8 illustrates all responses; however, there were no statistically significant differences observed between males' and females' responses on this section of perceived helpful cues.

Table 4.9 Differences in perceived helpful cues of physical activity across gender

Variable statements	Male			Female		
	N	Mean (SD)	Rank	N	Mean (SD)	Rank
Having a friend who encourages me	265	3.158 (0.742)	1	153	3.085 (0.786)	1
Watching exercises on TV	263	3.103 (0.777)	2	152	2.993 (0.826)	4
Having organised physical activity inside the school	265	3.075 (0.750)	3	152	3.007 (0.865)	2
See pictures of fit people	265	3.030 (0.887)	4	151	2.887 (0.853)	5
Reminder of benefits of physical activity	262	2.962 (0.688)	5	151	3.000 (0.775)	3
Reading exercises in magazines	264	2.958 (0.776)	6	152	2.809 (0.844)	8
Having a family member who exercises	263	2.882 (0.790)	7	152	2.816 (0.713)	7
Having family member who encourages	264	2.837 (0.785)	8	152	2.855 (0.825)	6
Looking at my self in a mirror	263	2.209 (0.886)	9	150	2.133 (0.872)	9

N= Number of respondents

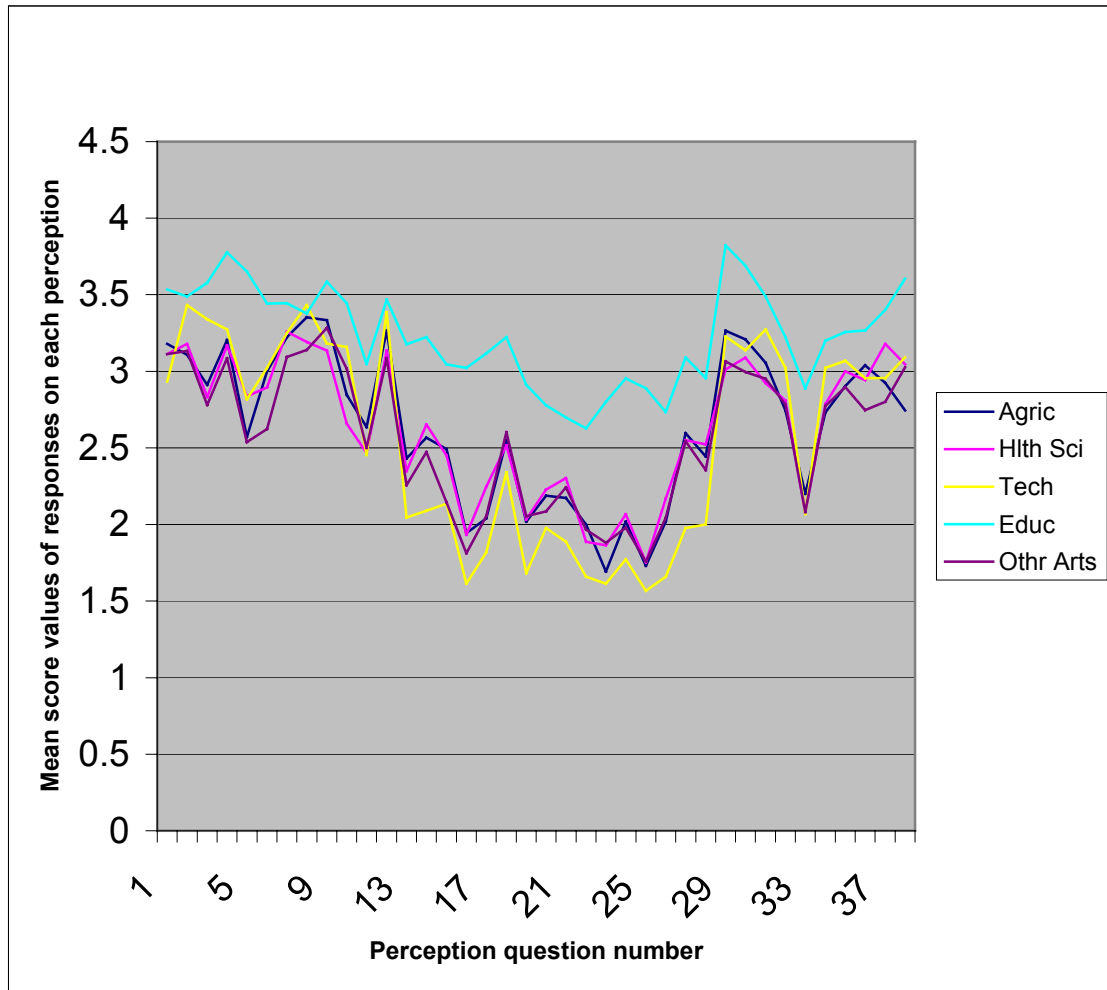
SD= Standard deviation

Rank = Ranking by importance

4.4.2. Influence of the students' professional study course on perceptions of physical activity

The school department or the course a student was enrolled in had been identified in the data. This identification provided the professional study courses the students were taking. Five different professional study course categories were identified among the students. To find out the influence of the professional study course on the perceptions of physical activity, the Kruskal-Wallis test was used to determine whether the responses differed significantly across the five groups of courses that were used. The significant level was set at 5% and most of the responses differed significantly ($p < 0.05$). However, the easiest way to see the professional study course differences is by using a graph showing the mean score values for each of the 38 responses on the perceptions (perceived benefits, barriers and helpful cues). Figure 4.3 below illustrates the differences in mean score values by students from different professional study courses. The differences are observed as different graphs by the different professional study courses, whereby some are consistently higher than others. The horizontal axis of the figure indicates the perception question number (the numbering of the questions is indicated below Figure 4.3), from which the mean score values of responses on each perception were computed. The vertical axis indicates mean score values for responses on each perception. By looking at graphs of the professional study courses on this figure, it is illustrated that the perceptions of the students who were taking education as a professional study course, consistently had higher mean score values than other groups. The other groups tend to be quite close together with no obvious pattern of one being consistently higher or lower than the others.

Figure 4.3 Illustration of differences in students' perceptions of physical activity with regard to their professional study courses



Agric = Agriculture courses
 Hlth Sci = Health science courses
 Tech = Technology science courses
 Educ = Education courses
 Othr Arts = Other Arts courses

List of perception questions as numbered on Figure 4.3 above

1. Exercise helps me to stay in shape
2. Exercise helps me to become strong
3. Exercise helps me to be competitive
4. Exercise helps me to increase my energy level
5. Exercise helps me to become more physically attractive to others
6. Exercise helps me to do something attractive with others
7. Exercise improves my cardiovascular fitness
8. Exercise improves my self-esteem
9. Exercise reduces stress
10. Exercise helps me to have fun
11. Exercise helps me to reduce weight
12. Exercise helps me to have contacts with my friends
13. I do not have time to exercise
14. I want to do other things with my time
15. I do not have good places to go and exercise
16. I do not know how to exercise
17. I do not have safe environment to go and exercise
18. I do not have right equipment to exercise
19. I do not think exercise will give the results I that want
20. Exercise tires me
21. I am not motivated to exercise
22. I do not enjoy exercising
23. I am not interested in exercising
24. I think that exercise is too hard
25. I do not think exercise is important
26. I do not have any one to exercise with
27. There are other interesting things to do
28. I have too much home work to do
29. Having a friend to exercise with
30. Having a friend who encourages me
31. Having organised physical activity inside the school
32. Having a family member who exercises
33. Looking at my self in a mirror
34. Having family member who encourages
35. Being reminded of benefits of physical activity
36. Reading about exercises in magazines
37. Seeing pictures of fit people in magazines or on TV
38. Watching exercises on TV



4.4.3 Influence of students' physical activity background characteristics on perceptions of physical activity

The physical activity background of the students was assessed. This assessment mainly looked at whether a student was currently participating in the activity, and also if the student used to participate previously at primary and secondary school levels. The relationships between the assessed physical activity background characteristics and the perceptions were statistically tested to identify the influence of the background on perceptions of physical activity.

4.4.3.1 Differences in perceived benefits of physical activity among currently and non-currently participating students

According to Table 4.9 below, it is illustrated that many differences were identified between the students who were currently participating and those who were not currently participating in physical activity. Most of the differences in mean score values of the two groups were statistically significant at FDR $p < 0.05$. The observed higher mean score values were higher for the currently participating students than non-currently participating ones. This indicates that the students who were currently participating are likely to consider more important perceived benefits of physical activity than the non-currently participating ones.

Table 4.10 Differences in perceived benefits of physical activity among current and non-current participating students

Variable statements	Non-current participants			Current participants		
	N	Mean (SD)	Rank	N	Mean (SD)	Rank
Exercise helps me to reduce stress §	295	3.224 (0.678)	1	113	3.398* (0.620)	2
Exercise improves my self-esteem §	299	3.191 (0.613)	2	115	3.339* (0.576)	5
Exercise helps me to increase my energy level §	299	3.167 (0.675)	3	117	3.325* (0.613)	6
Exercise helps me to become strong §	301	3.146 (0.637)	4	117	3.376* (0.612)	3
Exercising improves my cardiovascular fitness §	299	3.127 (0.668)	5	113	3.407* (0.622)	1
Exercise helps me to have contact with my friends §	299	3.124 (0.734)	6	114	3.360* (0.730)	4
Exercise helps me to stay in shape §	300	3.090 (0.733)	7	117	3.299* (0.746)	7
Exercise helps me to have fun	293	2.949 (0.803)	8	116	3.086 (0.840)	9
Exercise helps me to be competitive §	301	2.904 (0.792)	9	115	3.104* (0.742)	8
Exercise helps me to do something attractive with others	292	2.812 (0.801)	10	113	2.965 (0.743)	10
Exercise helps me to become more physically attractive to others §	292	2.671 (0.792)	11	112	2.955* (0.842)	11
Exercise helps me to reduce weight	295	2.573 (0.858)	12	114	2.518 (0.823)	12

§ = Observed perceptions which are statistic significantly different between current and non-current participating students

* = Higher mean score value compared to the other of the opposite group

N= Number of respondents

SD= Standard deviation

Rank = Ranking by importance

4.4.3.2 Differences in perceived barriers to physical activity among current and non-current participating students

Various differences in perceived barriers were found between the currently and non-currently participating students. The differences in perceived barrier mean score values by the two groups were statistically significant at FDR $p < 0.05$. This is illustrated in Table 4.9 whereby the higher mean score values were observed in non-currently participating students than in the currently participating ones. This is an indication that non-currently participating students perceived barriers stronger than the currently participating group of students.



Table 4.11 Differences in perceived barriers to physical activity among current and non-current participating students

Variable statements	Non-current participants			Current participants		
	N	Mean (SD)	Rank	N	Mean (SD)	Rank
I do not have right equipment to exercise	298	2.661 (0.889)	1	115	2.504 (0.940)	1
I want to do other things with my time §	298	2.644* (0.829)	2	117	2.333 (0.841)	2
There are other interesting things to do §	297	2.640* (0.831)	3	115	2.304 (0.763)	3
I have too much home work §	296	2.544* (0.818)	4	115	2.113 (0.792)	6
I do not have time §	296	2.463* (0.886)	5	115	2.130 (0.778)	5
I do not have good places to go and exercise	298	2.393 (0.863)	6	115	2.209 (0.789)	4
I am not motivated to exercise §	295	2.380* (0.828)	7	115	1.922 (0.774)	8
Exercise tires me §	295	2.329* (0.785)	8	115	1.861 (0.712)	11
I do not have a safe environment to go and exercise §	297	2.246* (0.868)	9	112	1.991 (0.822)	7
I think that exercise is too hard §	295	2.217* (0.800)	10	114	1.746 (0.592)	13
I do not think that exercise will give me the results I want §	297	2.178* (0.817)	11	115	1.870 (0.755)	10
I do not have any one to exercise with §	294	2.170* (0.854)	12	115	1.922 (0.763)	9
I do not enjoy exercising §	296	2.098* (0.820)	13	115	1.722 (0.669)	14
I do not know how to exercise §	298	2.044* (0.869)	14	115	1.748 (0.711)	12
I am not interested in exercising §	297	2.040* (0.857)	15	115	1.635 (0.717)	15
I do not think exercise is important §	297	1.943* (0.858)	16	115	1.635 (0.717)	15

§ = Observed perceptions which are statistic significantly different between current and non-current participating students

*= Higher mean score compared to the other of the opposite group

N= Number of respondents

SD= Standard deviation

Rank = Ranking by importance

4.4.3.3 Differences in perceived helpful cues among the current and non-current participating students

Looking at the influence of perceived helpful cues to participating in physical activity, it was found that there were no statistically significant differences observed between the currently participating students and non-current participants. However, both groups considered the helpful cues to be important in encouraging them to participate in physical activity. Table 4.10 demonstrates the comparisons in mean score values as the parameter used to identify the differences. The higher mean score values indicate how importantly the students considered the helpful cues to physical activity.

Table 4.12 Differences in perceived helpful cues among the current and non-current participating students

Helpful cues statements	Non-current participants			Current participants		
	N	Mean (SD)	Rank	N	Mean (SD)	Rank
Having a friend to exercise with	296	3.149 (0.702)	1	116	3.259 (0.782)	1
Having a friend who encourages me to exercise	298	3.104 (0.761)	2	116	3.216 (0.755)	2
Watching exercises on TV	295	3.064 (0.841)	3	116	3.052 (0.683)	6
Having organised physical activity inside the school	298	2.997 (0.785)	4	115	3.165 (0.805)	3
Being reminded of benefits of physical activity	296	2.953 (0.740)	5	113	3.053 (0.666)	5
Seeing pictures of fit people in magazines or on TV	297	2.936 (0.896)	6	115	3.096 (0.816)	4
Reading about exercises in magazines	297	2.882 (0.828)	7	115	2.974 (0.743)	7
Having family member who encourages me	297	2.872 (0.808)	8	115	2.783 (0.781)	9
Having a family member who exercises	296	2.851 (0.762)	9	115	2.887 (0.770)	8
Looking at my self in a mirror	295	2.220 (0.878)	10	114	2.088 (0.888)	10

N= Number of respondents

SD= Standard deviation

Rank = Ranking by importance

4.4.5 Influence of previous participation in physical activity on current perceptions of physical activity

Using the FDR $p < 0.05$, after the analysis on this section (as described in section 3.8.3.2.1 of the methodology on analysis) the values as marked with “*” in the Table 4.11 below correspond with perceptions where significant associations between previous participation in physical activity and current perceptions on physical activity, is found. It was discovered that the section of perceptions with the most associations with previous participation, is perceived barriers. However, the association was further determined whether it was negatively or positively correlated. This will be elaborated on more in the sections that follow.



Table 4.13 Illustration of significantly associated perceptions with previous participation in physical activity

Perceived benefits	FDR_P-value	Level of significance
Exercise helps me to stay in shape	0.93483	NS
Exercise helps me to become strong	0.82160	NS
Exercise helps me to be competitive	0.05472	NS
Exercise helps me to increase my energy level	0.51330	NS
Exercise helps me to become more physically attractive to others	0.00564*	S
Exercise helps me to do something attractive with others	0.03383*	S
Exercise improves my cardiovascular fitness	0.32652	NS
Exercise improves my self-esteem	0.36149	NS
Exercise reduces stress	0.57839	NS
Exercise helps me to have fun	0.73458	NS
Exercise helps me to reduce weight	0.93483	NS
Exercise helps me to have contacts with my friends	0.51330	NS
Perceived barriers		
I do not have time to exercise	0.01194*	S
I want to do other things with my time	0.09363	NS
I do not have good places to go and exercise	0.09076	NS
I do not know how to exercise	0.00000*	S
I do not have a safe environment to go and exercise	0.00019*	S
I do not have right equipment to exercise	0.02960*	S
I do not think exercise will give the results that I want	0.00799*	S
Exercise tires me	0.24648	NS
I am not motivated to exercise	0.05472	NS
I do not enjoy exercising	0.07051	NS
I am not interested in exercising	0.02773*	S
I think that exercise is too hard	0.01293*	S
I do not think exercise is important	0.00030*	S
I do not have any one to exercise with	0.00039*	S
There are other interesting things to do	0.30344	NS
I have too much home work to do	0.09076	NS
Perceived helpful cues		
Having a friend to exercise with	0.14164	NS
Having a friend who encourages me	0.62805	NS
Having organised physical activity inside the school	0.92172	NS
Having a family member who exercises	0.73458	NS
Looking at my self in a mirror	0.02773*	S
Having family member who encourages	0.51330	NS
Being reminded of benefits of physical activity	0.74034	NS
Reading about exercises in magazines	0.51330	NS
Seeing pictures of fit people in magazines or on TV	0.09076	NS
Watching exercises on TV	0.00643*	S

* Denotes statistic significant FDR value at significance level of 0.05.

S = Significant

NS = Not significant

4.4.5.1 Associations between previous participation and current perceptions on physical activity

After discovering that there were significant associations between some of the current perceptions on physical activity and previous participation in physical activity, it was then important to know whether the association is positive or negative. A positive association would mean that higher mean score values on previous participation correspond with higher responses (corresponding to more strongly agree) about the statements on perceptions. A negative association would mean that higher mean score values on previous participation correspond with lower responses (corresponding to more strongly *disagree*) about the statements on perceptions. The Spearman's correlation test was used to test whether the correlation was negative or positive, between previous participation in physical activity and perceptions, with regard to the results for both current and non-current participants. It was noted that in most of the cases where the association was significant, the correlations were negative, as presented in Figures 4.5, 4.6 and 4.7 for perceived benefits, perceived barriers and perceived helpful cues respectively. It is important to note in the following Figures at the direction of correlation (whether negative or positive). Most of the graph bars of the significantly associated variables are likely to be shorter than non-significant ones.

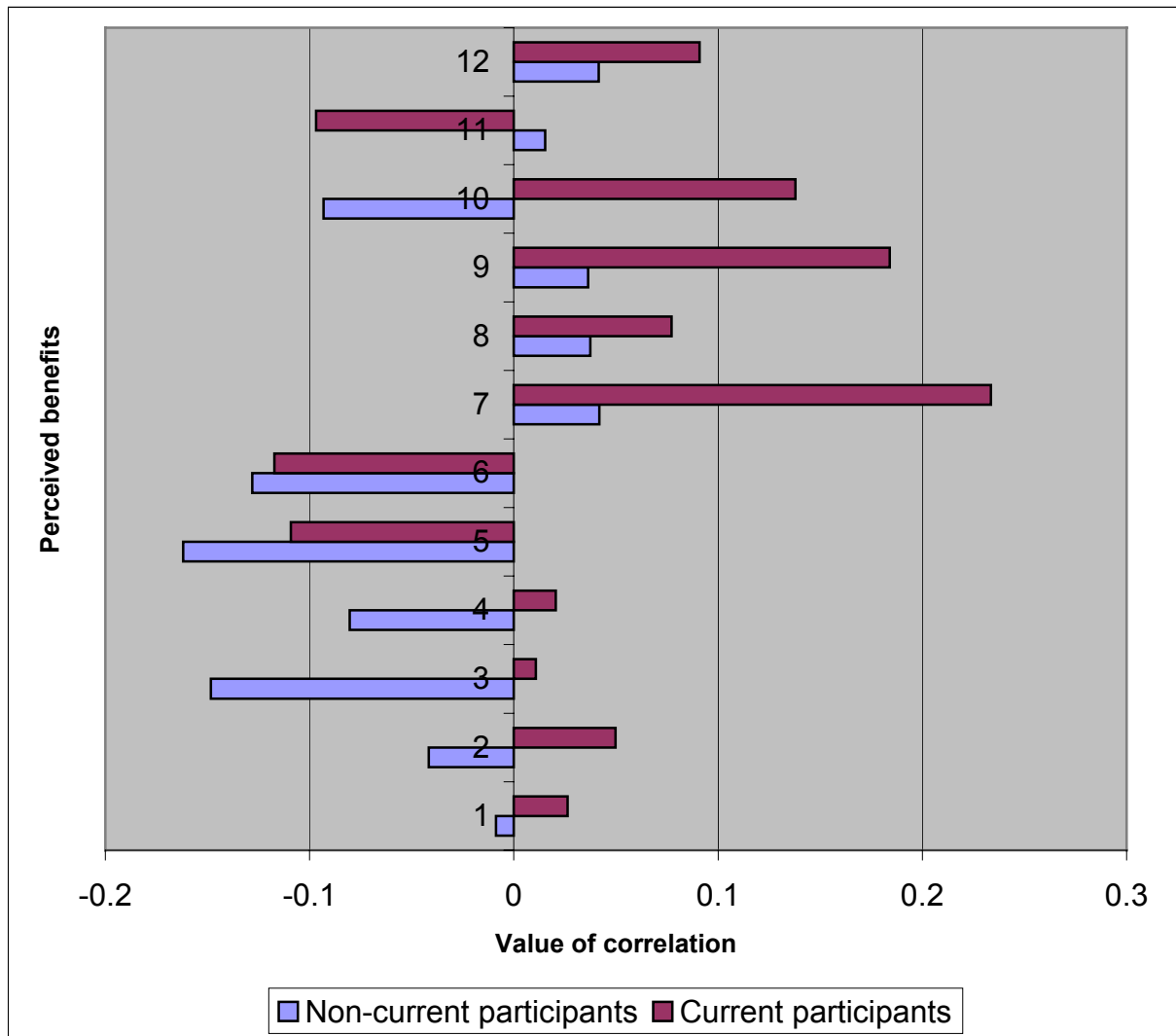
4.4.5.1.1 The association between previous participation and current perceived benefits on physical activity

The perceived benefits of physical activity “*exercises help me to become more physically attractive to others*” (5 in Figure 4.5) and “*exercise helps me to do something attractive with other people*” (6 in Figure 4.5) were the only significant perceived benefits identified, as indicated in Table 4.11. Figure 4.5 illustrates that the graph bars of these perceptions are

all towards the left, meaning that there were negative correlations to the previous participation in physical activity for current and non-current participants. This indicates that the students, who previously participated highly in physical activity, strongly disagreed that each of the two perceived benefits of physical activity is an important reason for them to currently participate in physical activity. While benefits like “*exercise improves my cardiovascular fitness*” (No. 7) and “*exercise reduces stress*” (No. 9) were positively correlated to previous participation in physical activity. This means that students who previously participated highly in physical activity strongly agreed that each of the two was a strong benefit of physical activity and an important reason for them to exercise or consider exercising.



Figure 4.4 Correlation between previous participation and perceived benefits of physical activity



Perceived benefits as presented in Figure 4.5

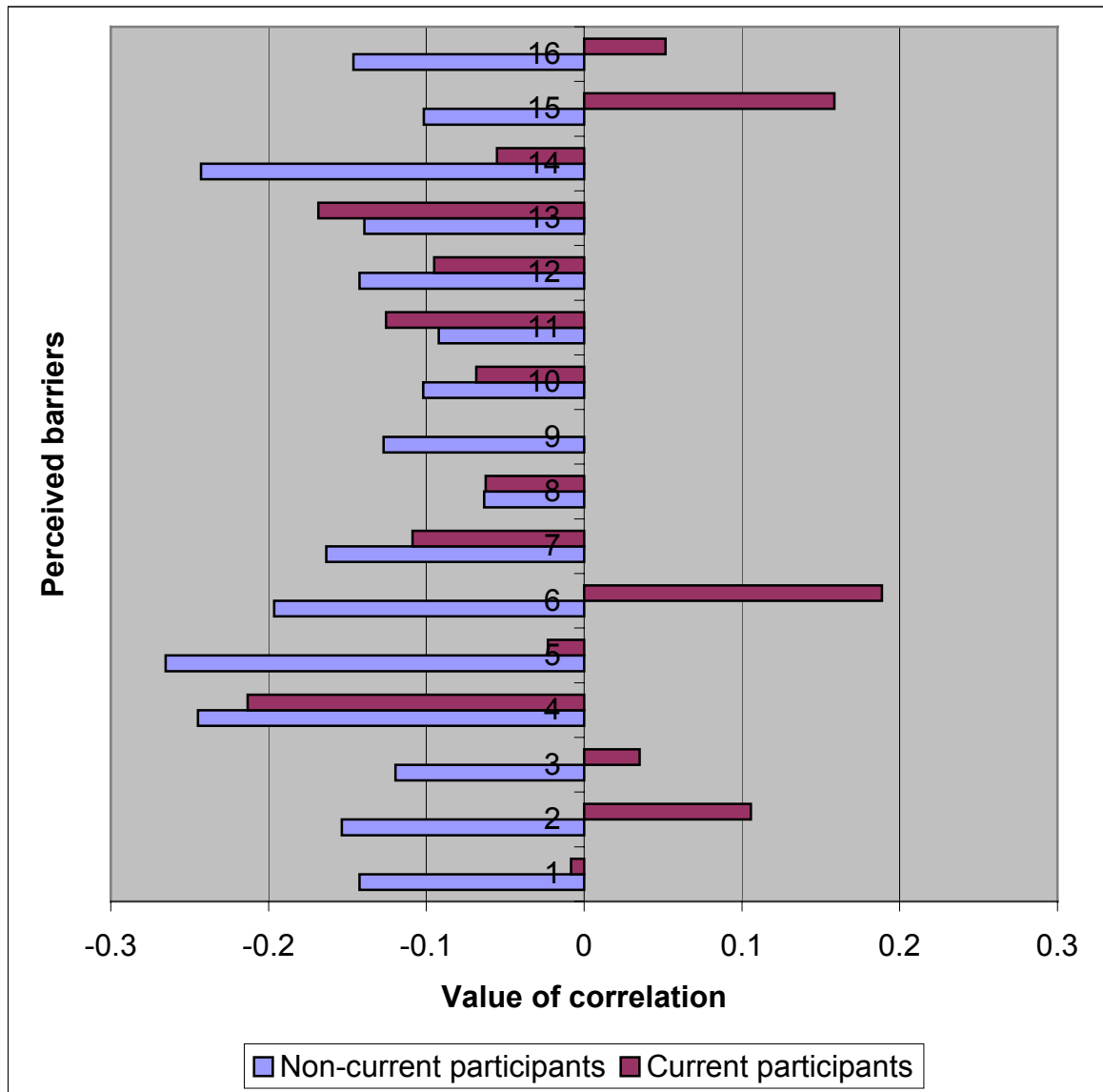
1. Exercise helps me to stay in shape
2. Exercise helps me to become strong
3. Exercise helps me to be competitive
4. Exercise helps me to increase my energy level
5. Exercise helps me to become more physically attractive to others
6. Exercise helps me to do something attractive with others
7. Exercise improves my cardiovascular fitness
8. Exercise improves my self-esteem
9. Exercise reduces stress
10. Exercise helps me to have fun
11. Exercise helps me to reduce weight
12. Exercise helps me to have contacts with my friends

4.4.5.1.2 The association between previous participation and current perceived barriers to physical activity

Most of the perceived barriers were significantly associated with previous participation in physical activity (as indicated in Table 4.11). Almost all the significant associations were towards the left, meaning that there were negative correlations. Only the perceived barrier “*don’t have right equipment to exercise*” (No.6) for currently participating students, is towards the right direction, hence positive correlation with previous participation in physical activity.

It indicates that the students, who previously participated highly in physical activity for current and non –current participants, strongly disagreed that most of the perceived barriers to physical activity are important reasons stopping them from currently participating in physical activity. However, the students who previously participated highly in physical activity strongly agreed that the lack of equipment for exercising was an important reason stopping them from exercising.

Figure 4.5 Correlation between previous participation and currently perceived barriers of physical activity



Perceived barriers as presented in the Figure 4.5

1. I do not have time to exercise
2. I want to do other things with my time
3. I do not have good places to go and exercise
4. I do not know how to exercise
5. I do not have safe environment to go and exercise
6. I do not have right equipment to exercise
7. I do not think exercise will give the results I that want
8. Exercise tires me
9. I am not motivated to exercise
10. I do not enjoy exercising
11. I am not interested in exercising
12. I think that exercise is too hard

13. I do not think exercise is important
14. I do not have any one to exercise with
15. There are other interesting things to do
16. I have too much homework to do

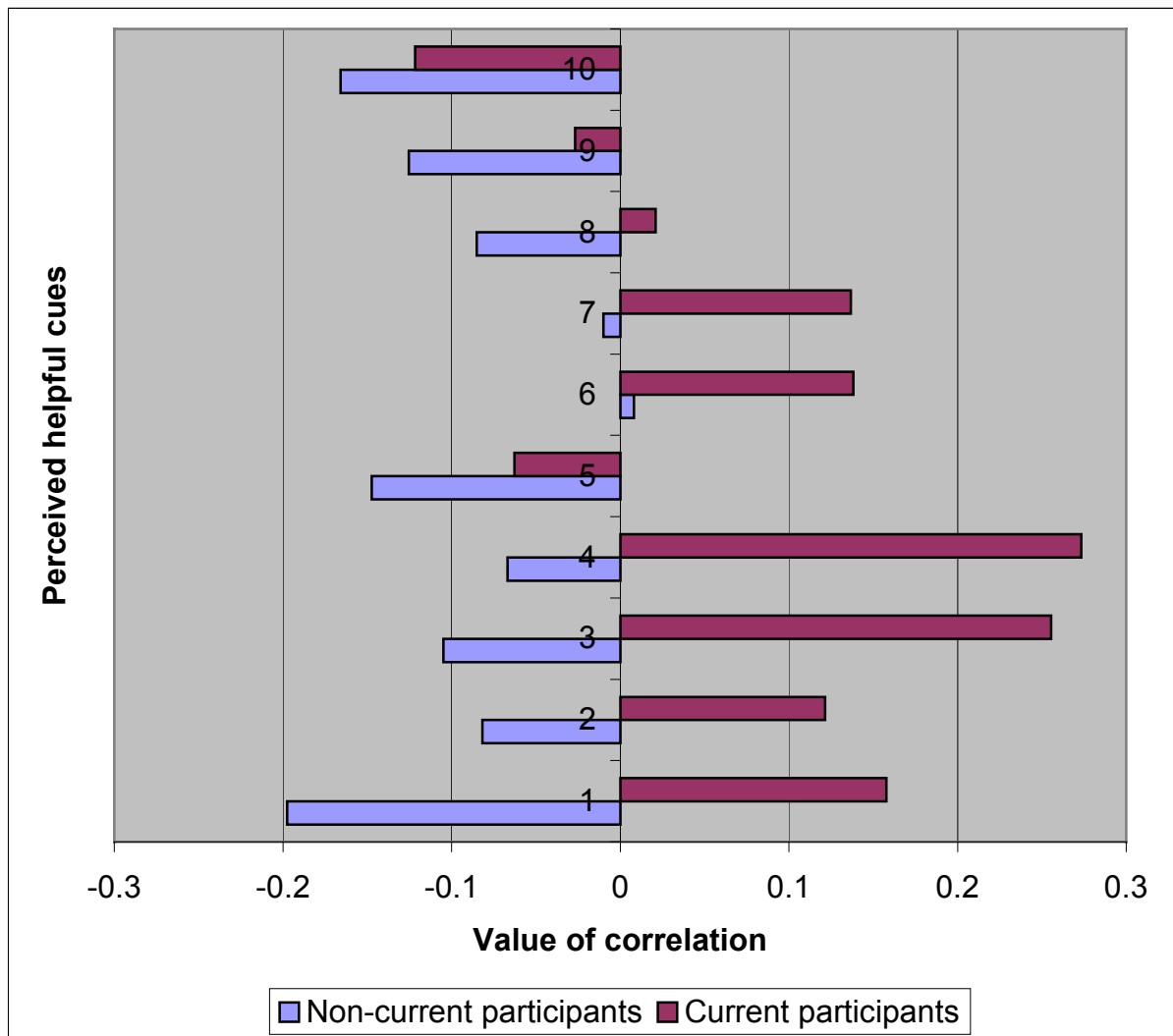
4.4.5.1.3 The association between previous participation and currently perceived helpful cues to physical activity

Figure 4.7 illustrates that most of the perceived helpful cues to physical activity for currently participating students were positively associated with previous participation in physical activity. This indicates that currently participating students who previously highly participated in physical activity; strongly agreed that the perceived helpful cues are helpful in encouraging them to currently participate in physical activity. However, the positively associated perceived helpful cues were not statistically significant, as illustrated in Table 4.11.



The significantly associated helpful cues for currently participating students are negatively associated with previous participation. Almost all the perceived helpful cues for non-currently participating students are negatively associated with the previous participation in physical activity. However, only the perceived helpful cues: “*looking at myself in a mirror*” (No.5) and “*watching exercises on TV*” (No.10) were statistically significant and negatively associated with previous participation in physical activity, for both current and non-current participants in physical activity. This means that the students who previously participated highly in physical activity did not consider any of the two helpful cues to be important in encouraging them to exercise or consider exercising.

Figure 4.6 Correlation between previous participation and perceived helpful cues



Perceived helpful cues as presented on the figure

1. Having a friend to exercise with
2. Having a friend who encourages me
3. Having organised physical activity inside the school
4. Having a family member who exercises
5. Looking at my self in a mirror
6. Having family member who encourages
7. Being reminded of benefits of physical activity
8. Reading about exercises in magazines
9. Seeing pictures of fit people in magazines or on TV
10. Watching exercises on TV

Chapter four presents the findings of this study. Males constituted 63% while females were only 37%, in the sample. Five categories of professional study courses were identified and many students were following Arts courses. In general, the majority of the students were motivated to participate in physical activity from their families and friends. However, more than 70% were currently not participating in physical activity. The majority of the students had previously participated in physical activity in their primary school (62%) and secondary school (73%). A decline in physical activity participation was identified from primary through secondary school level but a tremendous decline was identified from secondary school level to tertiary level. Psychological benefits of physical activity were some of the most important perceived benefits cited by the students. Most of the important barriers cited concerned equipment and time constraints to exercising. The students felt that having a friend to participate with in physical activity was one of the most important helpful cues. Significant differences in perceptions of physical activity were observed between genders. Females perceived more barriers than males. Students in education as a professional study course indicated more understanding of physical activity issues than students in other courses. Interesting associations were found between previous participation and the current perceptions of physical activity. Most perceived barriers were negatively associated while perceived benefits were positively associated with the previous participation in physical activity. This indicates an influence of the demographic and background characteristics on perceptions of physical activity among the students.

CHAPTER 5: DISCUSSION

5.1 INTRODUCTION

This study aimed to ascertain perceptions of physical activity, specifically; perceived benefits of, perceived barriers and perceived helpful cues (motivational factors) to physical activity among tertiary institution students in Rwanda. The study also aimed to explore whether there were demographic and physical activity background characteristics have an influence on the perceptions. The findings are discussed in relation to previous similar studies to give inferences. Finally, the limitations and the strengths of this study are highlighted.

5.2 DEMOGRAPHIC AND PHYSICAL ACTIVITY BACKGROUND

CHARACTERISTICS



5.2.1 Demographic characteristics

A good response rate of 85% was obtained in this current study. This indicated willingness and interest of the respondents to be involved in physical activity. It gives much hope for successful future beneficial interventions aimed at promoting physical activity for health benefits among the tertiary institution students and young adults in general in Rwanda.

In the sample of the current study, the number of females was less compared to the males. This could be due to the fact that more males attend tertiary institutions in Rwanda than females. Females constituted only 25% of the tertiary institution students in the year 2000 (Mazimpaka, 2003). There are numerous factors that influence this phenomenon; for example, cultural and economic factors in Rwanda. However, these were not in the scope

of this the current study, therefore were not identified. This can be a point of interest for further studies.

There was a wide age range among the students. The ages ranged from 18 to 40 years, with an average age of 26.4 (SD = 3.8). This was a representative age range for the young adult age group; which was of interest to this current study. However, this age range is common in Rwandan tertiary institutions. Usually after the high school education in Rwanda, students are offered a certificate called “Diplôme de Fin d'Etudes secondaires” in French (International Association of Universities, 2003). This certificate gives the students opportunity to get employment before entering the institution for higher education. This is likely to delay students' enrolment into tertiary education at a younger age and thus, this can be one of the reasons why a wide age range was found among the students in Rwanda. In addition, Rwanda faced some years of instability during 1990 – 1994 due to the civil war. This may have caused some of the students to drop out of the schools to resume their studies some years later.

5.2.2 Peer motivation and participation in physical activity

Evidence suggests that the key to behaviour change lies beyond mere information or compulsive sports practice and is highly dependent on individual motivation, social support, and environmental conditions (Nahas, Goldfine & Mitchell, 2003). Peer motivation specifically by family members and friends is one of the major factors contributing to physical activity participation among populations especially in young adults and adolescents (Tergerson & King, 2002). This factor was assessed among the students in this study. Most of the students had friends and family members who encouraged them to participate in physical activity and who also participated in physical activity themselves.

However, the majority of the participants were currently not participating in physical activity. This is somehow contrary to what should be expected from students regarding participation in physical activity, since they were motivated to participate in physical activity by their families and friends. Carnegie *et al.* (2002) and Sallis *et al.* (1999) also stated that motivation from peers is one of the strongest determinants of participation in physical activity, but there could be barriers that outweigh the motivating factors and then stop the individual from participating. Grubbs & Carter (2002) mentioned that barriers to physical activity might either prevent the initiation of a new activity or decrease commitment and adherence to an existing pattern of activity. Therefore, although tertiary institution students in Rwanda have motivation from the peers to participate in physical activity, they seem to have more of the perceived barriers that prevent them from participating. Some of the students emphasised the barriers they have experienced through the following open-ended responses: “*there are not enough food or better feeding after exercises*” and another student mentioned, “*lack of necessary equipments hinders my frequency of the exercise*”. This indicates some of the barriers perceived by the students as they participate in the physical activity.

5.2.3 Previous physical activity participation and transition through educational levels

Bray & Born (2004) demonstrated with their study that participation in physical activity usually decreases tremendously during the transition from the secondary to tertiary levels of education. Similarly, the current study found that a higher participation in physical activity mostly occurred at secondary (73.46%) and primary (61.85%) levels respectively. In Rwanda, the sports and recreational facilities are much more available and organised for the students at the secondary school level than at the primary school level. This could explain the reason why more students participated in physical activity at secondary school level. In

general, people do not exercise because scientific evidence indicates that they should. It appears that the traditional sports-centred physical education curricula, aggravated by the time allocated to such programmes, are not effective in promoting active lifestyles (Nahas *et al.*, 2003; Prodaniuk, Plotnikoff, Spence & Wilson, 2004). The current study indicates a great concern for health promoters to target this group (tertiary institution students) to promote physical activity as a need to prevent risk factors for the majority of CDLs. Physical activity is widely recognised as an important behavioural characteristic for health promotion and disease prevention (Nahas *et al.*, 2003). In the same line, the 57th World Health Assembly has recently emphasised that the Member States need to prevent the alarming burden of CDLs currently emerging, by promoting physical activity and healthy diet (WHA, 2004).



5.3 PERCEPTIONS OF PHYSICAL ACTIVITY AMONG TERTIARY INSTITUTION STUDENTS IN RWANDA

5.3.1 Perceived benefits of physical activity

Theoretical models help to explain how physical activity behaviours can be influenced. From these theories, strategies can be derived to facilitate the adoption of more active lifestyles, such as helping people to find more benefits than barriers (Nahas *et al.*, 2003). However, it is strategically important to first identify what the people know before helping them to find what they do not know. Regular physical activity is strongly associated with better physical and psychological health outcomes, and the promotion of physical activity is now a high public health priority (Humpel, Owen & Leslie, 2002). This study found out that the tertiary institution students in Rwanda considered psychological benefits of physical activity to be very important. Reducing stress and improvement of self-esteem were the most important psychological benefits of physical activity cited in this study.

Biddle and Mutrie (2001) had also highlighted reducing stress and improvement of self-esteem as some of the important psychological benefits of physical activity. Worries associated with stressful life events are considered strong barriers to physical activity and should receive special attention during the university years and beyond (Nahas *et al.*, 2003). Studies carried out among male and female college students in the USA; found that those who exercised regularly experienced reduced stress-related disorders, reduced depression illness and high self-esteem (Biddle *et al.*, 2000). According to Haase *et al.* (2004) psychological variables are relevant to health education planning, and may be associated with frequency of leisure-time physical activity benefit. Scientific literature shows that the significant physical and psychological benefits of physical activity for individuals should be attended to during the intervention programmes (Juarbe *et al.*, 2002). Therefore, the psychological benefits cited by the students in this current study can be given attention during health education programmes to promote physical activity among the tertiary institution students in Rwanda. Nahas *et al.* (2003) indicated the psychological and environmental determinants that are most modifiable to high school and college physical education.

A study conducted by Grubbs and Carter (2002) among male and female college undergraduates in the USA highlighted the importance of exercising for appearance (weight management). However, the students in Rwanda rated exercising for appearance as one of the least important benefits of participating in physical activity. Nevertheless, some benefits of physical activity were cited to be more important than others in this study, but in general, (as indicated by average mean score values of the perceived benefits from results in Table 4.3) the students perceived most of the benefits of physical activity to be important reasons to exercise or even considering exercising. This makes it interesting and important for

physical activity promoters in Rwanda to use benefits of physical activity to encourage and motivate the population specifically the students for physical activity participation in future interventions.

5.3.2 Perceived barriers to physical activity

Nahas *et al.* (2003) indicated that several investigations have reported that a person's perceived barriers to exercise are an important determinant of how active he or she becomes. Tappe *et al.* (1989) identified the most frequent perceived barriers to exercises by adolescent students as time constraints, unsuitable weather, school and schoolwork and lack of interest or desire and job responsibility. Following Tappe *et al.* (1989), Tergerson and King (2002) identified similar perceived barriers to physical activity among male and female adolescents in high school. The students in the current study placed more emphasis on lack of equipment, time and having interests in doing other things, as barriers to participation in physical activity. However, it should be noted that those studies of Tappe *et al.* (1989) and Tergerson *et al.* (2002) were conducted among high school students. In addition, the environment and weather may differ from one research setting to another. Several environmental factors are believed to affect physical activity participation and some of those factors are perceived to be barriers in some cases (Sallis *et al.*, 1997). The perceived barriers to physical activity participation by tertiary institution students in Rwanda seem to have some slight differences from what is reported in the literature by other studies from different research settings. It may seem that in a country like Rwanda that is recovering from major civil war, public health concerns have more important priorities than physical activity participation. However, it is high time that health promoters in Rwanda emphasis physical activity promotion which is a public health concern, as it was

highly recommended by WHO (WHO, 2002a) and even more at the recent 57th WHA (WHA, 2004).

The perceived barriers of physical activity identified in this study are related to what WHO (2002b) mentioned as the “myth of physical activity” and commented on as the major barriers to physical activity in generalised populations. The WHO reported that barriers which include; “*being physically active is expensive*”, “*it takes time, equipment, special shoes, and clothes etc*”, “*sometimes you have to pay to use sports facilities*” and “*I am very busy: physical activity takes too much time*”, were some of the major perceived barriers to physical activity (WHO, 2002b). Nahas *et al.* (2003) mentioned that in most of the studies, the principle reason for people not being active is lack of time. However, the same authors contend that “lack of time” may also fall under the category of “convenient excuses” for not being physically active. Therefore, identifying the reasons for the lack of time among the Rwandan tertiary institution students is important for further research and intervention purposes because different students may have different reasons for lack of time.

The least likely barriers to physical activity considered by the students in this study were “*I do not think exercise is important*” and “*I am not interested in exercising*”. Having considered these two barriers as the least important ones, is an indication that even if some strong barriers stop the students from participating in physical activity, there is hope that at least they have knowledge about the importance of physical activity to their health and are interested in participation. It was further mentioned by some of the respondents through the open-ended responses that “*sometimes I am interested to do physical exercises but I am discouraged by not finding the type of exercise to practise*” and then another one said, “*exercises give me strength, it also keeps someone physically fit but we do not have necessary equipment to do it*”. It is thus important, for physical activity promoters to

identify such hindrances perceived by subjects when trying to promote physical activity. It is encouraging that most of the students in this study disagreed (46.4%) and 19.8% strongly disagreed that barriers are not important reasons to stop them from participating. However, 24.65% agreed that barriers are important reasons to stop them from participating in physical activity. This group of students needs to be focused on and be helped to overcome the barriers to physical activity participation.

5.3.3 Perceived helpful cues to physical activity

Various studies indicated the importance of cues (motivating factors) to physical activity behaviour. Social support from friends and families is one of the major motivating factors to physical activity (Bauman, Sallis, Dzewaltowski & Owen, 2002). Tergerson and King (2002) highlighted “having a friend to exercise with” as one of the most motivational factors to participation in physical activity among adolescent students. This current study also identified “*having a friend who participates in the exercises*” as the highly scored cue to physical activity participation among tertiary institution students in Rwanda. It is very important to make social connections with peers and the role of friends in the lives of most of the young and middle-aged groups. Thus, activities using social reinforcement to participation in physical activity may help these age groups to start and maintain programmes. Another helpful cue considered by the students in this current study was “*having a friend encourages me to exercise*”. This is in line with social motivation, which has been a strong indicator for physical activity participation especially among the adolescent populations (Tergerson & King, 2002). Understanding why people are or are not physically active should be the basis of promoting the physical activity behaviour for individuals or groups of people (Booth *et al.*, 2002). Direct support relates to a situation such as exercising together or doing home tasks, and indirect support such as taking or

encouraging a friend or family member to be more active, influences behaviour directly or indirectly (Nahas *et al.*, 2003). Therefore, the perceived social support identified by this studies gives a basis of how to motivate the students by increasing the support from the friends and family members. It is hypothesised that if intervention did not increase participants' perceived social support, then the intervention would not have an effect (Bauman *et al.*, 2002).

5.4 INFLUENCE OF DEMOGRAPHIC AND PHYSICAL ACTIVITY

BACKGROUND CHARACTERISTICS ON THE PERCEPTIONS OF PHYSICAL ACTIVITY

Demographic and physical activity background characteristics are important determinants of interpersonal behaviour (Nahas *et al.*, 2003). The identification of these determinants should be the first step taken in the promotion of health behaviours like physical activity (Carnegie *et al.*, 2002). The influence of the demographic and background characteristics was identified among the tertiary institution students in Rwanda.

5.4.1 Influence of gender


The differences in perceptions of physical activity across the gender were tested to identify the influence of gender on physical activity participation. Among the perceived benefits of physical activity, the first strong significant difference was that males felt more strongly that exercises help them to become strong while females felt more strongly that exercises help them to reduce stress. Some of the students explained further through the open-ended responses that “*exercises reduce stress*”. One of the female students said that “*the exercises reduce my stress and help me to study well: it relaxes my mind and body, I forget other problems when I'm doing it*” This was an indication that this student feels

relieved of the stress when she exercises, and this is an important reason why she exercises. However, the difference between the males and females perception of “exercise helps me to reduce stress” was not significant. In some of the previous studies, Tergerson and King (2002) identified “*Exercise makes me strong*” is a frequently cited by male students as an important benefit of physical activity. Based on this, physical activity or exercise promoting programmes should acknowledge the fact that males and females engage in physical activity for different reasons. It would be beneficial for physical activity promoters to plan different activities for males and females depending on the interests of each group.

Other differences in perceived benefits identified by this study among the male and female students were that males perceived strongly that exercises help them to be competitive, to do something attractive with others and to become more physically attractive to others. On the other hand, female students considered more strongly, compared to males, that exercises help them to reduce weight. Usually, females do not like being overweight, especially in the Rwandan culture, and males appreciate being muscular and to have physical strength. Pollock *et al.* (1998) mentioned that there are many morphological and physiological differences between men and women, which are important, relative to fitness and exercise performance. Such morphological and physiological differences could be the reasons of the different perceived benefits according to each gender’s interests for exercising. Therefore, this study indicates that gender is one of the demographic factors, which influences perceptions on physical activity. Therefore educational activities to promote physical activity for both males and females should comprise such benefits for physical appearances for females and increase physical strength for males.

This study also noted that males perceived more strongly the benefits of physical activity to be important reasons for them to engage in physical activity compared to females. Similarly, males are reported by the previous studies to generally be more active than females (Brownson *et al.*, 2001; Cooper *et al.*, 2000; Eyster & Vest, 2002; WHO, 2002a). Gender difference is greater for high-intensity activities than for activities of low and moderate intensity (Malina, 2001). Men usually report greater levels of total and vigorous activity, whereas women tend to report participating in low-to-moderate physical activities (Martin *et al.*, 2000). Hence, males may perceive more benefits of physical activity compared to females because of such reasons.

According to studies, which evaluated levels of physical activity among the university students, Haase *et al.* (2004) recently discovered that the trend across groups of countries was present in low-frequency activity in women but not in men. The reasons may be that females perceive more barriers than males. Several differences were identified between the males and females in this study. Females perceived more barriers compared to the male students, but the significant ones were few. For example, the females perceived strongly that they want to do other things with their time, have too much homework, do not have anyone to exercise with and think exercise is too hard. Similarly, in the study by Tappe *et al.* (1989) identified the most frequent barriers to physical activity among adolescents as “*wanting to do other things with their time*” for females. The same authors concluded that females perceived time as a significant barrier to physical activity. The findings of this current study are consistent with the findings of previous studies in that the most strongly perceived barriers to physical activity, by especially females, concerns time. Therefore, it is important to physical activity promoters to explain and prescribe the activities that are of the interests to the participants. Physical activity should not only be perceived as a kind of

sports in which one has to go for competitions and takes much time but should be rather simple and enjoyable like a few minutes of brisk walking, jogging, etc, to benefit health (WHO, 2003; lkka *et al.*, 2003; Centre for Disease Control and Prevention, 1995; Rippe, 1995; Heath & Smith, 1994; Frills *et al.*, 2003; & Lee *et al.*, 1995).

No major or significant differences in perceived helpful cues of physical activity among the tertiary institution students were identified by this study. Both males and females considered “*having a friend who encourages them to exercise*” as the most helpful cue to becoming involved in physical activity. However, this diverts from findings of the study among adolescents by Tergerson and King (2002) whereby “*having a friend who encourages to exercise*” was felt more strongly by the females. As this current study was conducted among the tertiary institution students who are young adults at the university setting, their feelings about encouragement for exercise participation from their friends may not be an entirely important helpful cue as to adolescents in high schools. Therefore, this current study regard the influence of gender on perceived helpful cues to physical activity among tertiary institution students in Rwanda, as not being significant.

5.4.2 Influence of the professional study course

As a demographic factor, the professional study course can influence the behaviour of an individual (Huddleston *et al.*, 2002). This study identified that students who were following education as a professional study course (those who were being trained to be teachers) had higher score values on perceptions of physical activity compared to the other students who were doing different professional study courses. This indicates that the students doing education as a professional study course have more understanding of physical activity than those who do other courses. This is probably due to the fact that the education course offers

subjects like sports and physical education (Kigali institute of Education, 2003). This provides the students with more insight into physical activity. It identifies how the professional study course may influence an individual's perceptions depending on what he/she is studying. For the other courses, although students were being trained in different fields of profession, their perceptions on physical activity did not differ much. However, this study indicates that the education course has an influence on perceptions of physical activity among the students but cannot give a conclusive reason to why this is the case. This can be a topic of interest to be investigated further in other studies.

5.4.3 Influence physical activity background

Beliefs in health benefits may stimulate one to participate in physical activity, but might also emerge in people who are currently active (Haase *et al.*, 2004). In this study the students who were currently participating in exercises or physical activity considered benefits of physical activity to be more important reasons to make them to participate compared to the currently non-participating students. It may be therefore that the students who had knowledge about the benefits of physical activity were likely to be currently participating. In addition, being currently participating may give an individual more knowledge and positive perceptions about the physical activity.

Again this study found that the students who were currently participating considered in the first place that "*exercising improves their cardiovascular fitness*" while the currently non-participating students considered that "*exercises help them to reduce stress*". Improving cardiovascular fitness is one of the important physical activity health benefits, especially as in cases where physical activity is highly recommended to reduce and prevent the burden of

chronic disease of lifestyle, especially cardiovascular related diseases (Pigman, *et al.*, 2002; WHO, 2002a; WHO, 2003d; WHA, 2004; Diehl *et al.*, 2001; & Centre for Disease Control and Prevention, 1999). This is an interesting point when that considering the cardiovascular fitness improvement, as a motivation, for even currently non-participating students will be an important strategy in the promotion of physical activity and the prevention of health risk factors especially those related to cardiovascular disorders. This was highly recommended by WHO 2002 (WHO, 2002b) as one of the important strategies in combating the burden of chronic diseases especially those with a cardiovascular origin. This has all been re-emphasised by 57th WHA (WHA, 2004).

As opposed to the perceived benefits of physical activity, students who were currently participating in physical activity considered the barriers to physical activity as less important reasons that could stop them from participating. The currently non-participating students considered the barriers as important reasons to stop them from participating in the physical activity. However, there was not a remarkable difference in the ranking of the most perceived barriers according to their order of importance, by both currently and currently non-participating students. Benefits and fewer barriers are possible by increasing the awareness of benefits and trying to remove or minimise the barriers. This is an important strategy to encourage physical activity promoters to make the individuals change their behaviour. Glanz (1998) stated with the consideration of HBM that for an individual to experience behaviour change that individual should perceive more benefits than barriers.

Helpful cues or motivating factors to physical activity especially, peer and family member influence has been documented by other studies to be important in encouraging physical activity participation in most of the age groups (Tergerson & King, 2002).

There was no significant difference in perceived helpful cues between the currently and currently non-participating students identified in this study. It was noted that both currently and currently non-participating students considered the helpful cues to be important in encouraging them to participate in the physical activity.

The results of this current study showed that there is influence of previous participation (participation at both primary and secondary school levels) to physical activity and the current perceptions on physical activity. Associations were found between previous participation and the current perceptions on physical activity, but the most associations were found with the perceived barriers (Table 4.11). According to Sumnisk *et al.* (2002) early or previous (childhood, adolescence) participation in physical activity is likely to be carried over into adulthood. This study proved that most of the significant associations found between the previous participation and perceptions were negative associations. This means that the students, who previously participated highly in physical activity, strongly disagreed against the importance of the perceptions on physical activity. For example, the students who previously participated highly in physical activity strongly disagreed that the barriers were important reasons to stop them from currently participating in physical activity. Therefore, students that previously participated are likely not to find or perceive many barriers to participation.

On the other hand, few significant associations that were found between previous participation and perceptions were positive. Students who previously participated highly in physical activity strongly agreed that these benefits of physical activity are important reasons for making them want to participate in physical activity. Associations that are more positive were found for helpful cues to physical activity. Students who previously

participated in physical activity strongly agreed that the helpful cues are important reasons to encourage them to participate in physical activity.

The findings of this study revealed that the influence of previous physical activity participation is significant in some areas of perceptions, especially the perceived barriers. The youthful (previous) physical activity can be encouraged and considered when designing physical activity promotion programmes for tertiary institution students and young adults in general. Such programmes at primary and high school levels should stress the importance of lifelong physical activity as they attempt to make activity enjoyable during these stages. Repeated exposure to positive experiences with physical activity may be an effective strategy for alleviating sedentary lifestyles. Conversely, it would be important to target tertiary institution students who had little previous physical activity experience.



5.5 LIMITATIONS OF THE STUDY

The following limitations of this study should be noted:

All data were self-reported, thus vulnerable to misrepresentation through errors in simplification or exaggeration.

The questionnaire mainly consisted of close-ended, and a few open-ended responses. This limited the study to gain deeper information on the perceptions of physical activity. A triangulated study design would be better.

The survey was conducted among tertiary institution students, which should be exercised with caution for generalisation of the findings to other youth or young adults that could benefit from the programme development from the findings of this study.

The study omitted statistical analysis of open-ended responses, which was not easy for such a quantitative survey; however, the responses were used as complementary data to close-ended questions in order to make inferences and comments in the discussion of results.

Despite its limitations, this study had the following strengths:

The study used a questionnaire, which was adapted from validated ones in the literature, and was modified to suit this study. Therefore, the questionnaire was valid to measure perceptions of physical activity and contributed to the understanding of beliefs about the physical activity among the students. This will help in developing the activity promotion programmes basing on the interests of the students to motivate them.

The sample was randomly drawn from purposively selected school departments and classes, the response rate was high, and the study questionnaire included variables, which correlated with physical activity in previous studies. In addition, the analysis considered numerous interactive relationships between variables.

Chapter five interprets the results of the study, compares and contrasts the findings of the current study with similar studies, and presents both the immediate and long-term impact of the findings. Finally, limitations and strengths of the study are highlighted.

CHAPTER 6: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1. INTRODUCTION

This chapter provides the summary of the study. The fundamental findings of the study are pointed out in the conclusion and finally the recommendations made from the study are given in this chapter

6.2 SUMMARY

The overall aim of the study was to ascertain perceptions of physical activity, specifically; perceived benefits of, perceived barriers and perceived helpful cues (motivational factors) to physical activity among tertiary institution students in Rwanda. In addition, the study aimed to explore whether demographic and physical activity background characteristics had an influence on these perceptions of physical activity.

The motivation of the study was that, according to the literature, particularly from WHO data, lack of physical activity is a major underlying cause of death, disease, and disability. Being physically inactive is highly increasing among the populations as people all over the world are tending to live, and some already are, living in technologically advanced societies. Rapid urbanization with changes in lifestyle in Africa and other developing countries, such as Rwanda, increases this risky behaviour. As a result, epidemiology of chronic diseases of lifestyle is becoming worse in these countries because of other additional associated problems such as poverty, infectious diseases like AIDS, etc. The most declines in physical activity are during the transition from high school to college or

university. Physical activity is influenced by a variety of psychological, social, cultural, and environmental variables such as perceived benefits, barriers, motivating factors or support and enjoyments. It is reasonable to assume that the effective interventions should alter those variables that appear to mediate the behaviour. It was not known how the tertiary institution students in Africa, specifically in Rwanda, perceived such variables that influence physical activity behaviour.

Government tertiary education institutions in the Republic of Rwanda were used as research setting. A descriptive quantitative study was conducted. Both female and male students registered for the 2003 academic year, who voluntary agreed to participate in the study, were recruited. Five hundred (500) students from all five tertiary education institutions were randomly selected from purposively selected departments and classes at each institution. Self-administered close-ended and few open-ended questionnaires were used to collect the data. Descriptive and inferential statistical analyses were done to analyse the data from close-ended responses, by using SAS. Open-ended responses were not analysed statistically, and were used as “anecdote” to give inferences and comments in the discussion as complementary information to the analysed one from close-ended responses.

A response rate of 85% was obtained. The average age was 26.4 with a SD of 3.8 and the males constituted 63% of the sample while females were only represented 37% of the sample. Five categories of professional study courses were identified and many students were following Arts courses. In general, the majority of the students were motivated to participate in physical activity by their families and friends. However, more than 70% were currently not participating in physical activity. The majority of the students had previously participated in physical activity in their primary school (62%) and secondary school (73%).

A decline in physical activity participation was identified from primary through to secondary school level but tremendous decline was experienced from secondary school level to tertiary level.

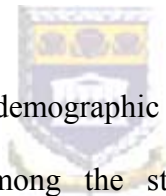
Psychological benefits of physical activity were some of the most important perceived benefits cited by the students. Most of the important barriers cited concerned equipment and time constraints. The students felt that having a friend to participate with in physical activity was one of the most important helpful cues.

Significant differences in perceptions of physical activity were observed between genders. Females perceived more barriers than males. Students following education as a professional study course (those being trained to be teachers) indicated more understanding of physical activity issues than the rest of the subjects. This proved that their demographic and background characteristics have an influence on perceptions of physical activity. Interesting associations were found between the previous participation and the current perceptions of physical activity. Most perceived barriers were negatively associated while perceived benefits were positively associated with the previous participation in physical activity.

6.3 CONCLUSION

The main aim and objectives of this study were achieved. The findings indicate that the tertiary institution students considered generally, that benefits of physical activity were important reasons for participation in physical activity and the majority included psychological benefits. This gives much hope for a successful intervention programme aimed at promoting physical activity in this group. However, an individual may perceive

many benefits of the advised action but still would not go for it. This was evident in this study, due the large number of the students who were currently not participating in physical activity. It is interesting that this study identified some of the important barriers that may be stopping students from participation, though they perceive benefits of physical activity. Therefore the most important barriers, namely equipment and time constraints should be eliminated or dealt with in order to change the behaviour of the sedentary student. The study also identified the helpful cues to action for better behaviour change, and this is in line with the concept of HBM. The findings of this study in line with the previous ones indicate that social support mainly from friends and parents in an important motivating factor. This factor should be given more attention and emphasis for promotion of lifelong physical activity among individuals.



Evidence exists of the influence of demographic and background characteristics on the perceptions of physical activity among the students in this study. The currently participating students perceived benefits of physical activity to be important for them in getting involved in participation in physical activity, than currently non-participating students. The currently non-participants perceived the barriers to physical activity to be the important reasons that would prevent them from participating in physical activity. Cardiovascular benefit was considered the most important for currently participating students, while stress reducing was considered the most important benefit of physical activity for currently non-participants. The physical activity promoting programmes should consider these factors influencing the behaviour during the intervention. It is better to motivate individuals according to their interests or what they consider to be important for them during such interventions. Associations were found between previous participation and the current perceptions of physical activity where students who participated in physical

activity previously perceived fewer barriers. Physical activity programmes should be emphasized right from childhood.

6.4 RECOMMENDATIONS

The following recommendations are offered, based on the results of the study:

Physical activity promotion

1. The tertiary education institutions seem to be logical places for physical activity promotion because the students, who are soon entering different workplaces and taking on family responsibilities, can influence extensive population, including their children.

Therefore, it is recommended that physical-activity promotion intervention be incorporated into the tertiary education institutions' programmes, as health education. The institutions' programmes should eliminate some of the perceived barriers to physical activity by providing relevant information to students. Particular health education should focus on information that would reflect physical activity as not to be time consuming. In addition motivation for participation should specifically involve the awareness of the most perceived benefits of physical activity such as psychology benefits. Participation in social and peer activities should be encouraged and supported with accessibility to programme facilities and equipment. Physical activity programmes might include education on guiding the students on how to find out the quality of exercises needed for health benefits.

2. It is important that the institutions' physical activity promotion programmes should use the students' most strongly perceived benefits of physical activity such as psychological well-being and physiological benefits of physical activity. These should be focused on as motivational factors to participation in physical activity.

3. As a means to increase physical activity participation depending on gender influence, design strategies that focus on activities to reduce stress for female and to increase energy levels for males.

4. Physical activity health-education programmes should be implemented in schools from primary level to ensure that teachers and learners acquire knowledge about physical activity and its benefits and the related health risk of a sedentary lifestyle. Emphasis will also need to be placed on attitudes, beliefs of barriers, behavioural skills, and the confidence to adapt and maintain healthy lifestyles throughout their adult hood.

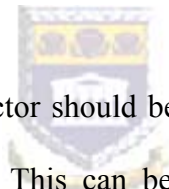
5. Strategies to promote lifelong physical activities in physical and health education programmes should be designed, thus helping to establish an early pattern of physical activity behaviour that can persist into the adult years should be emphasized.

6. The Ministry of Education should establish a policy in schools that promotes physical activity participation in lifelong non-sedentary activities, which will also introduce the teaching of physical education and its benefits into the curriculum.

7. It is also important that programmes of physical activity be available to the whole Rwandan youth community. Marketing a leisure-time activities campaign and other physical activities of daily living such as walking and household activities through the media (newspapers and magazines, internet, television and radio) is worthwhile.

8. Educational leaflets and videos should be provided in public places such as workplaces, schools, and other public places, in order to increase awareness of the benefits, motivation of physical activity and change the way people perceive barriers to physical activity.

9. The Ministries of Education and Health, Ministry of Youth, Culture and Sports need to support physical-activity programmes for Rwandan youth and young adults in general, and work together to create effective interventions. Importantly, these Ministries need to increase the awareness of risks of physical inactivity, motivate the youth with most important perceived benefits of physical activity like psychological and physiological benefits, increase availability and accessibility of physical-activity facilities to youth, and provide a supportive environment.



10. Social support as a motivating factor should be given more emphasis while aiming at promoting lifelong physical activity. This can be done through establishing home and community-based physical-activity interventions that target parents and their children. It is also recommended that parents play an important role in promoting the physical and emotional well-being of their children by encouraging them to be physically active because the physical activity behaviour, started at childhood, can carry over into youthful and adulthood.

11. Schools should be able to provide safe and enjoyable extracurricular non-sedentary activity programmes that meet the needs and interests of all students

12. Professionals such as physiotherapists should be involved in designing programmes for physical activity promotion.

Further studies

13. Perceptions of physical activity among tertiary institution students may differ from other youth and young adults in general. More studies in this area should be carried out, to obtain perceptions of other Rwandan youth and young adults regarding participation in physical activity.

14. More research can be conducted to find out why gender has such a big influence on perceptions of physical activity; particularly; why female students perceived stronger barriers than their counterpart males

15. Further study can be done to investigate why students from the education departments in Rwandan universities (teachers' training course) on perceptions have a better understanding of the benefits of physical activity.



16. Another study, which combines both quantitative and qualitative study designs (triangulation), could be conducted for deeper insights into the perceptions and levels of physical activity among the tertiary institution students.

This final chapter summarized, and outlined the relevant points of the current study. It made recommendations for future actions, including the development of physical activity-promotion programmes and future research on physical activity.

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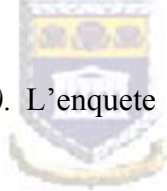
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