

# **EXERCISE PREFERENCES AND EXPECTATIONS OF YOUNG FEMALE STUDENTS IN A UNIVERSITY ENVIRONMENT**

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at  
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The crest of Stellenbosch University is centered behind the text. It features a shield with various symbols, topped with a crown and a banner. The Latin motto 'Pictura colunt cultus recti' is visible at the bottom of the crest.

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## **DECLARATION**

**By submitting this thesis electronically, I, the undersigned, declare that the entirety of the work contained in this thesis is my original work, that I am the owner of the copyright thereof (unless explicitly otherwise stated) and that I have not previously, in its entirety or in part, submitted it at any university for the purpose of obtaining any qualification.**

## **ABSTRACT**

The study investigated the exercise preferences of female university students participating in exercise modes presented at the local gymnasium and their expectations of the outcomes of such participation. Secondly, the study aimed to determine the most important reason for their participation and whether this was satisfied by their choice of exercise mode. A third aim was to determine other reasons that contributed to the selection of exercise environment and mode.

The size of the research group of the pilot study was 210 (n=210). For the final longitudinal study, over a period of three years, it was 985 (N=985). The study population was selected on a basis of convenient sampling, availability and interest among young female gymnasium members, (aged 18 to 27 years). Their participation was voluntary. Original questionnaires were constructed for the purpose of the study to provide general demographic and physical characteristic information of the participants, their exercise preference and choice of exercise mode, reasons for participation in particular exercise modes, time spent on physical activity, frequency of attendance of exercise sessions, exercise motivators, barriers to exercise, medication and supplementation prevalence, health problems and smoking. The questionnaire was completed in a five to 10 minute time slot before the commencement of exercise classes at the gymnasium. Information required on the questionnaire was verbally explained to the participants during the initial few minutes of data capturing. Guidance was given for each section of the questionnaire during the five to 10 minute period allocated for completion. Data was captured on Microsoft Excel spreadsheets and the analysis was performed using Statistica for Windows (Statsoft SA-2008). Descriptive statistics were used to analyse and present the data. The results of the study indicated that most (34.4%) young female students who regularly attended group exercise sessions at the gymnasium preferred participating in the exercise modality punchline (a boxing aerobic modality), with the aim of losing weight (45%) and improving their general fitness (24%).

Convenience factors were indicated as being the most important motivators to exercise on campus. The gymnasium location and accessibility, as well as the wide range of exercise modes presented at the gymnasium, were key motivators to participate in physical activity regularly. Time constraints, academic responsibilities and a full social programme were experienced as the most important barriers to exercise. Low incidences of major health problems were reported. The results from the study confirm the initial research theory, namely that weight management and weight loss are important to young female students. Exercise mode however is randomly selected and not representative of information that is available to assist this group with planning a balanced exercise programme. An information specific programme within a gymnasium environment could provide more targeted results. There is no relationship between the choice of exercise mode and the post-exercise effect they expect.

**Key words:** young female students, exercise environment, exercise mode, physical activity, exercise preferences, exercise benefits, weight management, weight loss, university setting, health-related behaviour, health-risk behaviour

## OPSOMMING

Die doel van die studie was om die oefenvoorkeure en oefenverwagtinge van jong damestudente wat gereeld by die plaaslike universiteitgimnasium oefen, vas te stel. Tweedens wou die studie die belangrikste redes vir deelname bepaal, en of hierdie verwagting gerealiseer het met die keuse van oefenmodaliteite in hierdie oefenomgewing. 'n Derde doel was om vas te stel watter ander redes 'n bydrae sou maak tot die keuse van 'n oefenomgewing en oefenmodaliteite.

Die navorsingspopulasiegroep was jong dames in 'n universiteitsomgewing. Tydens die verkennende studie was die getal kandidate 210 ( $n=210$ ). Vir die finale longitudinale studie, oor 'n tydperk van 3 jaar, was dit 985 ( $N=985$ ). Die jong dames by die spesifieke universiteitgimnasium is geselekteer op grond van beskikbaarheid en belangstelling in die navorsing en was tussen die ouderdom van 18 en 27 jaar. Hul deelname was vrywillig. 'n Vraelys is spesiaal vir hierdie navorsing opgestel. Die vraelys het inligting ingewin oor algemene demografiese aspekte en fisieke kenmerke van die deelnemers, oefenvoorkeure en verwagtings van oefenmodaliteite, redes vir die seleksie en deelname in oefenmodaliteite, tyd bestee aan oefening, frekwensie van deelname, motiveerders vir oefening, beperkende faktore ten opsigte van gereelde deelname aan fisieke aktiwiteit, medikasie en suplementasie gebruik, gesondheidsprobleme en rook. Die vraelys is voltooi in die eerste vyf tot 10 minute van oefenklasse, voor die aanvang van die gereelde gimnasiumprogram. Inligting op die vraelys is verbaal aan die teikengroep verduidelik in die eerste paar minute van elke klas. Tydens hierdie tydperk is gereeld inligting oor elke vraag verskaf vir kontrole en akkuraatheid van voltooiing van die vraelys. Data oor die veranderlikes is in die rekenaarprogram Microsoft Excel gekodeer en die statistiese ontleding is deur middel van Statistica vir Windows (Statsoft SA 2008) gedoen. Beskrywende data is gebruik om die resultate te ontleed en aan te bied.

Die resultate van die studie dui daarop dat die meeste jong damestudente (34.4%) punchline ('n boks-aërobiese oefenmodaliteit) verkies het, met die doel om gewig te verloor (45%) en hul algemene fiksheid te verbeter (24%).

Gerieflikheidsfaktore is aangedui as die belangrikste motiveerders vir deelname aan gereelde fisieke aktiwiteit op kampus. Hierdie faktore sluit in die ligging van die plaaslike gimnasium, toeganklikheid asook die wye reeks oefenmodaliteite wat aangebied word. Te min tyd, akademiese of werksomstandighede en 'n vol sosiale program word as die vernaamste redes vir oefenonthouding aangedui. Minimale rapportering van gesondheidsprobleme het voorgekom. Die resultate bevestig die inisiële navorsingsteorie, naamlik dat jong damestudente gewigsbeheer en gewigsverlies as belangrik beskou. Die seleksie van oefenmodaliteite is egter lukraak. Dit is nie verteenwoordigend van goeie inligting wat beskikbaar is om 'n gebalanseerde oefenprogram vir spesifieke uitkomst te kan saamstel nie. Daar is nie noodwendig 'n verwantskap tussen hul keuse van oefenmodaliteite en die voordele wat dit ingevolge hul verwagting inhoud nie.

**Sleutelwoorde:** jong damestudente, oefenomgewing, oefenmodaliteite, fisieke aktiwiteit, oefenvoorkeure, oefenuitkomst, gewigsbeheer, gewigsverlies, universiteitsomgewing, gesondheidsverwante gedrag, gesondheidsrisikogedrag

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- Opinions expressed and conclusions arrived at, are those of the researcher and not necessarily influenced by organisations involved in the research.

## **DEDICATION**

To my late parents, Fredal and Christoffel von Solms Fourie  
and  
my husband Bern

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# CHAPTER 1

## PROBLEM STATEMENT AND RESEARCH AIM

### 1.1 INTRODUCTION

Despite the knowledge and evidence that physical activity has many health benefits, most populations across the world have become increasingly sedentary. More than 50% of the adult populations of industrialised countries are so inactive that they have a significantly increased risk for adverse long-term health outcomes (Leslie, Sparling & Owen, 2001:116). It is the opinion of Pate, Pratt, Blair, Haskell, Macera, Bouchard, Buchner, Ettinger, Heath, King, Kriska, Leon, Marcus, Morris, Paffenberger, Patrick, Pollock, Rippe, Sallis and Wilmore (1995:402) that, if the growing sedentary society in most countries changes to one that is physically more active, health organisations and educational institutions must communicate to the public the amount and type of physical activity needed to prevent disease and promote a healthier lifestyle. Regular physical activity has for a long time been regarded as an important component of a healthy lifestyle. Rozmus, Evans, Wysochansky and Mixon, (2005:27) concurs with this opinion and adds that the benefits of a healthy lifestyle include an increased life expectancy, as well as an enhanced quality of life. Over the past decade this impression has been reinforced by new scientific evidence and is now a well-established element of the public health agenda (Pate *et al.*, 1995:403; Eyler, Matson-Koffman, Young, Wilcox, Wilbur, Thompson, Sanderson & Evenson, 2003:5; ACSM, 2007c:1).

According to the latest recommendations of the American College of Sports Medicine (ACSM) and many other leading health promoting organisations, such as Healthy People 2010 and the American Heart Association (AHA), there can be enormous benefits to the health of all individuals if they adopt a more active lifestyle that can improve their health and individual wellbeing (Pate *et al.*, 1995:403; CDC, 2006:1; ACSM, 2007c:1).

Most people can substantially improve their health and quality of life by including a moderate amount of physical activity in their daily life (Whaley, 2006:5). Research supports the notion that physical activity need not be vigorously intensive in order to improve health. The emphasis should rather be on the amount than on the intensity of physical activity, as this could offer more options for people to select activities they enjoy. These can vary according to their personal preferences and life circumstances. This will encourage more people to make physical activity a regular and sustainable part of their life (SGR, 1994:4). Exercise behaviour in this regard is therefore a key factor and an important motivator to bring about change in the lifestyle of people, to include more physical activity as part of daily living. According to Melbye (2005:7), this exercise behaviour is described as a person's typical pattern of fitness activity participation, which includes variables such as location of exercise participation, mode of exercise, group or individual activity, motivators to exercise, time of exercise and exercise adherence. Epidemiologists, health professionals and experts in exercise science agree with these facts and have consensus about this matter (Surgeon General's Report (SGR) on Physical Activity and Health, 1994:4; Whaley, 2006:6).

University and college students' activity patterns and exercise behaviour often mirror those of society. The transition from adolescence to young adulthood usually coincides with various transitions of lifestyle. These transitions are also associated with a sharp decline in physical activity (Dinger, 2000:19; Bell & Lee, 2005:227). According to Wallace and Buckworth (2003:209), few studies have assessed the prevalence of exercise behaviour and factors influencing exercise adoption and maintenance among university and college students. The health status of university/college students is linked to the behaviours they choose to adopt at this particular stage in their lives (Dinger, 2000:19). The time spent at university or college represents an important transition period in the life of most young people and should be an ideal time point for interventions to reduce the risk of developing chronic disease of lifestyle (CDL) (Hendricks, Herbold & Fung, 2004:982).

The behavioural and lifestyle choices people make early in their life influence their subsequent health status. The adoption of negative health behaviours could therefore put the young adult at risk. As the lifestyle of this vulnerable group is influenced by many factors, there is a need to educate young university students on the lifelong implications of their choices, which might later influence their health behaviour. Tertiary education campuses are settings where there are important, yet partially neglected, opportunities to influence the health and physical activity habits of young adults (Leslie *et al.* 2001:116 & 119). Shankar, Dilworth and Cone (2004:161) report that university and college students' exercise behaviour is at risk. According to their research, between 40% and 50% of young adults on university campuses do not participate in a structured exercise programme. The American College Health Association (ACHA) reports that, on average, 35% of students on college campuses are overweight or obese. A further 46% of students are attempting to lose weight, suggesting false perceptions regarding personal body weight and body image. Only a third of these students reported receiving any education from their college or university regarding physical activity, healthy weight management and weight loss guidelines (NASPE, 2007:1). Academic staff, coaches, administrators and university health personnel are in a unique position to influence the lifestyle choices of students positively, before damaging behaviours are initiated and ingrained (Dinger, 2000:19). The university and college environment provides an ideal setting to make physical activity convenient and enjoyable, as well as provide students with the knowledge and understanding of the value of more responsible health behaviours. It is important to understand why students engage in certain health behaviours and help them to reduce health-risk behaviours that could impact their quality of life.

## 1.2 BACKGROUND TO THE RESEARCH PROBLEM

The health of students at tertiary educational institutions (e.g. university or college) is a matter of increasing concern (Cilliers, Senekal & Kunneke, 2006:234).

There is a need to improve the services and knowledge to educate students on university campuses about their health, health practices, wellbeing and lifestyle choices. Not many studies have been conducted in university settings internationally (Wallace & Buckworth, 2003:209; Hivert, Langlois, Berard, Cuerrier, & Carpentier, 2007:1267) and nationally there are only a few known studies in the South African context (Cilliers *et al.*, 2006:241) that address the specific needs of today's students. These needs involve assistance with developing coping mechanisms to deal effectively with the challenges of the transitions they face to manage health-related problems. Universities and colleges are often settings where students experience independence and freedom from direct supervision and parental control for the first time (Rozmus *et al.*, 2005:25). It is also one of the first times in an individual's developmental life that their own choice of behaviour has the potential to influence their current and future health status (Dinger, 2000:19; Dawson, Schneider, Fletcher & Bryden, 2007:38). Health is a multidimensional concept that requires life-long attention and the university environment provides the ideal setting for health promotion services and education. These services should take into account the natural development processes of students as well as identify specific health-related behaviours of this population subgroup (Rozmus, *et al.*, 2005:26). Tertiary education campuses are settings that provide unique circumstances that challenge the young adult in various ways. Young adults, especially students on tertiary educational campuses, often face many new personal stressors and challenges, such as greater academic and social pressure, as well as questioning values, beliefs and goals, which may not always be the same as the parental values they encountered at home (Rozmus *et al.*, 2005:25).

Attitudes and beliefs are key determinants of health behaviour. Efforts to maintain positive health beliefs require consistent reinforcement. Information and encouragement must therefore be presented to emerging adults regularly (Steptoe, Wardle, Cui, Bellisle, Zotti, Baranyai & Sanderman, 2002:102).

As stated previously, the stage of transition into adulthood is characterised by the adaptation to a new environment in which the young adult is free to make their own choices and decisions about lifestyle behaviours. Certain of these lifestyle behaviours are observed more often among young female students. These include smoking, inactivity, weight gain and obesity that could increase their risk of developing other chronic diseases of lifestyle (Dinger, 2000:19). It makes the young female student a high risk group for a wide range of health and weight-related problems (Cilliers *et al.*, 2006:235). Many contributing factors are reported in literature that could influence this group to adopt negative lifestyle behaviours. Moving away from home, poor social adjustment and being accepted by others (especially in a peer group) seem to be an important part of the psycho-social aspects influencing lifestyle decisions among young women (Hesse-Biber & Marino, 1991:201).

At this stage of emerging adulthood, women become increasingly concerned about their physical appearance and about maintaining an attractive and culturally acceptable body shape (Striegel-Moore, Silberstein, French & Rodin, 1989:104). Literature confirms the tendency of young female students having an intense focus on thinness and weight reduction (Senekal, 1988:2; Striegel-Moore *et al.*, 1989:499; Cilliers *et al.*, 2006:236; Klaczynski, Goold & Murdy, 2004:309; Shankar, Dilworth & Cone, 2004:162). It also reveals a universal preoccupation with body image among these young women that has intensified over the past decades (Shankar *et al.*, 2004:160). Many women place a high premium on their physical appearance, especially in modern western societies (Klaczynski *et al.*, 2004:307). The cultural ideal of a trim female body can often not be attained and maintained, despite participation in physical activity and the implementation of dietary modifications.

Female students living away from home are three times more likely to report weight management and body image problems compared to those living with parents, especially in the first few years of tertiary education (Barker, 2007:1). Young women in particular are in an age group where comparisons of self-objectification are very evident as part of a culture to fit in with their peers.

Self-presentational concerns may be a major source of motivation for participating in physical activity. According to Kowalski, Crocker and Kowalski (2001:55), these concerns include aspects such as weight management, body tone and general physical appearance. Socio-cultural pressures on women to maintain the ideal “thinner” appearance and a physically fit body, as well as the high social acceptability of using physical activity as a means to deal with weight, may act as motivators to alter their body image. The pressure to achieve the aesthetic standard of a lean and toned body for women, the reward for appearing attractive and the health benefits of a normal weight have resulted in people’s attempts to alter their body size and shape (Hausenblas & Fallion, 2006:33). Researchers have found that young women tend to exercise more in order to alter their appearance than for health-related reasons (Hlavenka, 2005:2). They engage in dieting and exercise behaviours aimed at losing weight and toning their body, with the ultimate goal of an improved appearance (Greenleaf, McGreer & Parham, 2006:189). Several studies indicate that physical activity is an important component of a weight management programme for female students (Senekal, 1988; Cilliers *et al.*, 2006:241). Unfortunately many women appear to exercise for reasons pertaining more toward physical appearance than for health benefits, especially those with higher self-objectification (Strelan, Mehaffey & Tiggeman, 2003:90).

Overweight and obesity are increasing among all age groups in developed as well as developing countries (WHO, 1998:1). Weight gain can occur at any age, but it is often the transition period from high school to university or college when some individuals experience a more rapid increase in weight (Shankar *et al.*, 2004:159).

The first years in university or college are associated with significant weight gain, ranging from one to two kilograms per year on average (Hivert *et al.*, 2007:1262). Body weight goals should therefore be realistic. Acceptable healthy weight loss methods should be used to prevent emerging weight fluctuations. It seems that young female students at universities and colleges do not have the necessary skills and knowledge to address their weight management concerns. Information about a woman's body weight and exercise habits has an interactive effect on imagined perceptions of her physical attractiveness (Ginis & Leary, 2006:979). Preventing weight gain may be easier than promoting weight loss (SGR, 1994:232), therefore early intervention programmes, models and guidelines that include physical activity should be provided to this group of young women.

A number of challenges are associated with promoting physical activity among population subgroups such as students on university and college campuses. Some of these challenges include the perceived benefits the group has of exercise, the time that can be put aside for exercise, the duration of exercise bouts, the effort or intensity exerted during participation and the recommendations from professionals in an exercise environment (Daley & Maynard, 2002:3). The exercise environment in which people are physically active and the social interaction during this time contributes to how this group could perceive and respond to various physical demands (Turner, Rejeski & Brawley, 1997:119). According to Van Niekerk (2000:30), students come to exercise in a university gymnasium to take a break from their academic schedule. These students have a desire to exercise (for various reasons) and expect results from this participation. Sensitivity and awareness about exercise preferences are an extremely important concept when promoting the benefits of exercise to this group. Providing a wide range of exercise options to young female students could influence their exercise habit positively. Types of physical activity and specific exercise modes that could contribute to their health should primarily be considered by gymnasium management for inclusion in the activity offering at a gymnasium.

The provision of the latest fitness trends that have commercial value for a gymnasium should be a secondary aim in such an environment.

Global fitness and equipment surveys reveal the developing trends in the health and fitness industry. Yearly, the top trends predict new ways of exercising and the role fitness professionals will play in the industry.

Current trends support the idea that health and fitness professionals as well as fitness facilities will be held to a higher level of accountability to improve service to clients in the health and fitness industry. Quality, health-directed and client-centred exercise prescription has become more important in modern society, as time constraints challenge the world population. Themes, trends and education that are currently developing will assist the fitness professional to design more balanced and focused exercise programmes for all types of clients. It has become important for all exercise environments to keep up with the latest global fitness and equipment trends, as well as to ensure that all staff that are responsible for programme prescription are well-trained and qualified through accredited programmes.

Exercise is considered to be an activity that is performed during leisure time, therefore people want to have fun but still experience some reward toward their health and wellbeing. Fitness centres and facilities are figuring out new ways to keep members engaged with interesting classes and exercise options. It's all about creating a positive and health enhancing experience (Rollauer, 2006:1). A fundamental objective of exercise prescription is to change the personal health behaviours of people in order to include habitual physical activity. The most appropriate exercise prescription for a particular individual is the one that is most helpful in achieving behavioural change. The art of exercise prescription is the successful integration of exercise science with behavioural techniques that result in long-term programme compliance and attainment of the individual's goals (ACSM, 2000:140). Exercise modes provide a popular way to accumulate the needed physical activity requirements recommended by the ACSM for health benefits.

Most of these modes of exercise improve several health-related components of fitness that include cardiorespiratory fitness, muscle strength and endurance, power and agility, as well as body composition. Balkin, Tietjen-Smith, Caldwell, and Shen (2007:32) remark that some aerobic exercise modes do not always contribute to a significant decrease in all health-related areas. This makes it necessary to advise students on a balanced exercise programme, incorporating different types of exercise modes that will meet their specific needs as well as reduce the environmental stressors of a university setting.

Previous large-scale intervention programmes for preventing several health-risk behaviours among students have failed (Hivert *et al.*, 2007:1262). In almost all exercise environments, bigger benefits and improved service could be derived from targeting smaller groups. Gymnasiums and exercise environments could appeal more to niche audiences with specific needs. Weight management with a weight loss focus is an example of such a target area. The benefits of such a targeted programme include attracting new clientele, addressing specific needs of clients and improved health-enhancing services, while keeping current members motivated.

According to Hivert *et al.* (2007:1267-1268), very few interventions, based on research, with a health and choice of lifestyle focus, have previously been conducted in tertiary populations. A study conducted at Sherbrooke University, Quebec, Canada (2007) demonstrated the effectiveness of a seminar-based educational and behavioural programme to prevent weight gain in young, healthy adults in a university setting. This is a model of a niche market programme. A programme focus with modest reduction over a period of time in healthy young adults is associated with detectable benefits on various health indicators (Hivert *et al.*, 2007:1262) and addresses the specific need of this population group to manage weight gain responsibly.

To maintain some stability during the transition years away from home, students should be encouraged, guided and assisted to incorporate health-promoting behaviours.

Organisations of higher education as well as their partners that provide health services should attempt to develop effective strategies that will promote the adoption of a more physically active lifestyle. These strategies should include educational programmes, the creation of facilities and accessible information campaigns that could make it easier for students to become and remain more active. Education in health and healthy living is an essential component in the educational landscape of a university district. Faculty research is also a key element for education in health and healthy living, as well as to provide information about lifestyle and decision-making with health consequences (University Neighborhoods Revitalisation Plan, 2007:1).

It will be in the interest of Stellenbosch University to ensure that goals are in place to provide wide-ranging health services to students. This will ensure that all students are able to reach an optimal level of health, to be able to maintain this health status and enable every student to reach their full potential in the academic environment of the university. Any disruption of the student's physical, psychological and social welfare will have an impact on the academic offering and results of the university.

Changes over the last decade in the attitudes and behaviours of young adults are generally not toward healthier lifestyles. Persistent efforts are required to establish favourable health habits in young adults (Steptoe *et al.*, 2002:103). Behaviours that promote healthy lifestyles ensure that young adults will experience optimal health and personality development, which will strengthen their capacity to withstand stressors of the university environment (Duffy, 1993:25).

### **1.3 AIM OF THE STUDY**

The interest in health, health-risk behaviours and lifestyle choices among university and college students has increased in recent years (Leslie *et al.*, 2001:116; Eyler *et al.*, 2003; Lowry, Galuska, Fulton, Weschler, Kann & Collins,

2002:18; Hivert *et al.*, 2007:1263; NASPE, 2007:2). Data from a number of research studies on the typical behaviour of students on the above mentioned topic is found for the student population in the USA (Leslie *et al.*, 2001:116; Lowry *et al.*, 2002:18; Eyler, *et al.*, 2003:6), Canada (Hivert *et al.*, 2007:1263), Europe (Bolman, Lechner & Van Dijke, 2007:2; Plasqui & Westerterp, 2004:689; St-Pierre, Karrelis, Conus, Minault, Rabase-lhoret, St-Onge, Tremblay-Lebeau & Poehlman, 2004:5994) and Australia (Leslie *et al.*, 2001:116). There is however a lack of comparable research on these topics for the student population in a South African context (Senekal, 1988:6; Cilliers *et al.*, 2006:235).

Physical activity assessment is particularly important for evaluating the effectiveness of interventions as well as the association between physical activity and chronic disease risk factors in young adults, a group with a high risk of sedentary behaviour and weight gain (Washburn, Jacobson, Sonko, Hill & Donnely, 2003:1374). With the knowledge from existing research available, it is possible to link health-risk behaviours and lifestyle choices of young adults with the increased risk of a variety of health-related diseases. This could become an important research focus for campus communities to be able to shape the behaviours of students.

The primary research aim of this study was to track the exercise preferences and changes of choice of exercise mode among young female students, the expectations they had from these choices and relate the expectations to health indicators. The indications of a weight loss and weight management focus, as post-exercise effect, were of particular interest. The study attempted to investigate the perception that young women have of the outcome of their choice of self-selected group aerobic exercise modes in a university environment. The relationship between the perceived participation goals and the actual post-exercise effect provides information that can be used as a contributor to compile more accurate information on the relevance of exercise choice in exercise programmes and the outcomes thereof.

The study also proposed to investigate factors related to the general health status of young female students, such as exercise habit, motivators to exercise, barriers to exercise, use of medication and supplementation, typical health problems and smoking.

## **1.4 LIMITATIONS**

The study was conducted over a period of three years. This timeframe had an impact on some of the comparative results of choice of exercise mode and some health-related indicators among the research population.

The growing membership of the Stellenbosch University Gymnasium during the three year period, including the improvement and enlargement of the facilities, necessitated certain adjustments to the research instrument. The choice of exercise mode was different for each year due to the expansion of the aerobic section of the gymnasium. Furthermore, the logistical dimension of capturing data in different venues with different supervisors could have influenced the way in which questions on the completion of the questionnaire were addressed. Self-reported information on survey questionnaires are commonly used in research with large study population groups but might have influenced results on body mass index (BMI) scores for the groups. The self-reported information on physical characteristics, body weight and body height could be subjective and not as accurate as needed.

## **1.5 TERMINOLOGY**

The following definitions and context descriptions are applicable to the terminology that is used in this study.

- **Health:** The World Health Organisation (WHO) defines “health” as a “state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity” (WHO, 1949:100).
- **Wellness:** “Wellness” is a holistic concept that includes mental and physical components. It is a process of self-care that includes understanding emotional and physical needs, as well as the lifestyle that is needed to meet those needs (Balkin *et al.*, 2007:30). It is the constant and deliberate effort to stay healthy and achieve the highest potential for wellbeing. It encompasses seven dimensions – physical, emotional, mental, social, environmental, occupational and spiritual – and integrates them all into a quality life (Hoeger & Hoeger, 2009:515).
- **Hypokinetic diseases:** This term refers to negative or hazardous health conditions that are associated with a sedentary lifestyle. “Hypo” denotes “lack of” and “kinetic” refers to movement or activity. Therefore the term implies a lack of physical activity (Hoeger & Hoeger, 2009:511).
- **Physical fitness:** Mosby’s *Emergency Dictionary* defines “physical fitness” as “the ability to carry out daily tasks with alertness and vigor with energy left to meet emergencies or to enjoy leisure activities” (Mosby, 1989). It is the ability to meet the ordinary as well as the unusual demands of daily life safely and effectively, without being overly fatigued and still have energy left for leisure and recreational activities (Hoeger & Hoeger, 2009:513).
- **Health-related/enhancing physical fitness:** “Health-related physical fitness” is defined as “a state characterized by (a) an ability to perform daily activities with vigor, (b) a demonstration of traits and capacities that are associated with low risk of premature development of the hypokinetic diseases” (i.e. those associated with physical inactivity, such as heart disease, stroke, type two diabetes, colon and breast cancers and osteoporotic conditions) (Pate, 1988:174; Hoeger & Hoeger, 2009:7).

“Health enhancing physical activity” is the participation in any form of physical activity that benefits the health and fitness of the individual without undue harm or risk to the person (EUPHIX, 2008:1).

- **Functional fitness:** “Functional fitness” is defined as having the physical capacity to perform normal everyday activities safely and independently, without undue fatigue, and includes components such as lower body and upper body muscle strength, lower and upper body flexibility, aerobic endurance, motor agility and dynamic balance (Toraman & Ayceman, 2005:565).
- **Physical activity:** Taber’s *Cyclopedic Medical Dictionary* defines “physical activity” as “a general term for any sort of muscular effort, but especially the kind that intends to train, condition or increase flexibility of the muscular and skeletal systems of the body” (Taber, 2005:1). It is any bodily movement produced by skeletal muscles, requires energy expenditure and produces progressive health benefits (Hoeger & Hoeger, 2009:7).
- **Recommended physical activity:** This refers to reported moderate-intensity activities in a usual week (i.e. brisk walking, bicycling, vacuuming, gardening or anything that causes small increases in breathing or heart rate) for  $\geq$  30 minutes per day,  $\geq$  five days per week; or vigorous-intensity activities in a usual week (i.e. running, aerobics, heavy yard work or anything that causes large increases in breathing or heart rate) for  $\geq$  20 minutes per day,  $\geq$  three days per week or both. This can be accomplished through lifestyle activities (i.e. household, transportation or leisure activities) (CDC, 2007:1212).
- **Exercise:** “Exercise” is a subclass of physical activity and is defined as “planned, structured, purposeful and repetitive bodily movement done to improve or maintain one or more components of physical fitness” (ACSM, 2000:4).

According to Knuttgen (2003:32), “exercise” can be defined as any activity involving the generation of force by activated muscles, including activities of daily living, work, recreation and competitive sport.

- **Inactivity:** Less than 10 minutes per week of moderate or vigorous-intensity lifestyle activities (i.e. household, transportation or leisure-time activity) (CDC, 2007:1212).
- **Aerobic exercise:** Exercise that is of moderate intensity, undertaken for a long duration. “Aerobic” refers to the use of oxygen in the energy-generating process of a muscle (Wikipedia, 2007:1) and describes many types of exercise that require oxygen to produce the necessary energy (Hoeger & Hoeger, 2009:508).
- **Aerobics/group aerobic exercise classes:** “Aerobics” is a popular form of aerobic exercise. Aerobic classes generally involve rapid stepping patterns performed to music, with cues provided by an instructor. “Group aerobic exercise classes” can be divided into two major types: Freestyle or pre-choreographed aerobics (Wikipedia, 2007:2). “Aerobic dance” is a series of exercise routines performed to music (Hoeger & Hoeger, 2009:508).
- **Cardiorespiratory fitness:** The ability to perform large muscle, dynamic, moderate to high intensity of exercise for prolonged periods of time (ACSM, 2000:68). The ability of the lungs, heart and blood vessels to deliver adequate amounts of oxygen to the cells to meet the demands of prolonged physical activity (Hoeger & Hoeger, 2009:509).
- **Body composition:** The relative percentage of body weight that is fat-free tissue (ACSM, 2000:60). It points to the fat and non-fat components of the human body and is important in assessing the recommended body weight of an individual (Hoeger & Hoeger, 2009:508).

- **Muscular fitness:** The integrated status of good levels of muscular strength and muscular endurance. “Muscular strength” is the maximal force that can be generated by a specific muscle or muscle group (Hoeger & Hoeger, 2009:512). “Muscular endurance” is the ability of a muscle group to execute repeated contractions over a period of time, sufficient to cause muscular fatigue or to maintain a specific percentage of the maximum voluntary contraction for a prolonged period of time (ACSM, 2000:81).
- **Flexibility:** The ability to move a joint through its complete range of motion (ACSM, 2000:85). “Flexibility” refers to the achievable range of motion at a joint or group of joints without causing injury (Hoeger & Hoeger, 2009:256).
- **Exercise prescription:** Exercise prescriptions are designed by health or fitness professionals to enhance physical fitness, promote health by reducing risk factors for chronic disease and ensure safety during exercise participation (ACSM, 2000:139).
- **Physical activity guidelines:** These are recommendations from the American College of Sports Medicine (ACSM), Centres for Disease Control and Prevention (CDC), the National Institute of Health and the Surgeon General’s Report on Physical Activity and Health that call for: “30 minutes or more of moderate-intensity activity per day on all or most days of the week in order to obtain significant health benefits” (DiPietro, 1999:1). New science has added to the understanding of the biological mechanisms by which physical activity provides health benefits and the physical profile (type, intensity and amount) that is associated with enhanced health and quality of life. The update focuses on the types and amounts of physical activity needed by healthy adults to improve and maintain health (ACSM, 2007c:1).
- **Young adult:** According to the Educational Resources Information Centre, the age level descriptors for young adults are 18-30 years, (ERIC Thesaurus, 2001:1).

- **University environment:** Historically, universities have been defined as a community for advanced knowledge creation and for instruction of an elite group of youth (Husén & Postlethwaite, 1994:6547). A university environment is a very specific environment in which young adults live for a period of time during the transition from adolescence to young adulthood. Attending university is a life transition for most young people (Leslie *et al.*, 2001:119).
- **Health-risk behaviour:** A term expressing behaviour that exposes the individual to hazardous circumstances, consequences or mischance (Concise Oxford Dictionary of Current English, 1972:1078).

Risk factors are lifestyle and genetic variables that may lead to disease (Hoeger & Hoeger, 2009:514).

- **Lifestyle:** An individual's actions and manner of existence (Concise Oxford Dictionary of Current English, 1972:701).
- **Exercise preference:** "Exercise preference" is a factor that contributes to the choice of exercise mode. "Preference" refers to the linking of one thing better than another, the thing, object or variable that one prefers (Concise Oxford Dictionary of Current English, 1972:960).
- **Exercise perception:** A psychological variable that influences the choice of exercise. Positive perceptions make people choose a certain type of exercise, while negative perceptions will have the opposite effect (Turner, *et al.*, 1997:119).
- **Expectation:** The probability of an outcome; awaiting; anticipation; a situation characterised by waiting for an event or outcome to happen (Concise Oxford Dictionary of Current English, 1972:425).

- **Exercise mode:** A way or manner in which something is done or exists. An exercise mode is the prevailing way in which a specific set of exercises or construct of movements are presented (Concise Oxford Dictionary of Current English, 1972:777).
- **Body mass index:** The body mass index (BMI), or Quetelet index, is used to assess weight relative to height. It is calculated by dividing body weight in kilograms (kg) by body height in metres squared (m<sup>2</sup>) and is expressed as BMI kg/m<sup>2</sup> (ACSM, 2000:63).
- **Overweight:** A condition that is above the recommended body weight to body height range, with a BMI kg/m<sup>2</sup> ratio of  $25.0 \geq \text{BMI} < 30.0 \text{ kg/m}^2$ , but below obesity levels of a BMI kg/m<sup>2</sup> of  $\geq 30.0 \text{ kg/m}^2$  (Howley & Franks, 2003:553).
- **Obesity:** Obesity may be classified as a body mass index (BMI) of  $\geq 30.0 \text{ kg/m}^2$  and is functionally defined as the percent body fat at which disease risk increases (ACSM, 2000:214).
- **Exercise trend:** A trend is a general development or change in a situation or in a way people behave (Thompson, 2007:7). An exercise trend refers to the development of a new mode of exercise (research based or commercially driven) or a change/adapted format of a current presentation of an exercise mode. It is also seen in current situations (e.g. fashion trends) or in a way people behave (e.g. the digital trend) (Thompson, 2007:7).
- **Exercise fad:** A fashionable exercise mode that is taken up with great enthusiasm for a brief period of time; a craze (Thompson, 2007:7).
- **Motivators to exercise:** These refer to an individual's attitudes, desire or will towards participation in physical activity, the reasons why interest is shown in exercise and why the choice is made to participate in exercise (Weiss & Gill, 2005:S73).

- **Barriers to exercise:** Any psychological, physical and environmental factors that can affect the physical activity behaviour of an individual (Heath, 2006:75).
- **ACSM:** The largest sports medicine and exercise science organisation in the world, founded in 1954 and currently located in Indianapolis, Indiana, USA. It has more than 20 000 international, national and regional members.

Their mission statement reflects the following goal: The American College of Sports Medicine (ACSM) promotes and integrates scientific research, education and practical applications of sport medicine and exercise science to maintain and enhance physical performance, fitness, health and quality of life (ACSM, 2007b:1).

## 1.6 EXPLANATION OF CHAPTERS

Brief descriptions of the thesis chapters are now provided. Chapter two reflects a review of literature on topics and concepts related to the health in general as well as health-related, fitness and lifestyle concerns of young female students in a university setting. The research method and research instrument that was used for the study is described in chapter three. The data analysis, presentation and discussion of the research results, with descriptive tables and figures, are provided in chapter four. The conclusions from the research, discussions, recommendations and research contribution are made in chapter five.

## **CHAPTER 2**

# **LITERATURE STUDY**

### **2.1 INTRODUCTION**

This chapter presents a review of literature that aims to provide descriptions of concepts and define terminology related to health and wellbeing. These concepts highlight the importance of regular participation in physical activity as a contributor to health. Further relevance of these concepts is clarified when the factors influencing the health of young female university/college students are presented. Exercise preferences and outcomes of exercise choice in this population group are important factors that influence their health and wellbeing goals. The outcomes of these choices often indicate that the perceived benefits of exercise are in contrast with the actual post-exercise effect of participation in a particular physical activity. A closer look is provided regarding the factors that influence exercise choice, the motivators to exercise, the barriers or constraints to exercise that are experienced and the typical health-related issues of young female students. A history of the development of group aerobic exercise (as presented in gymnasiums) is given as background to the wide variety of exercise modes young women can choose from and participate in. Descriptions of the various exercise modes follow to provide clarity on typical content focus and exercise effect of these modes. Global trends influence the development of these exercise modes and are traced since 2000 to establish the influence of choice of exercise modes and the changing pattern of choice among these young women. A review of literature for the study would not be complete without contextualising the typical university environment and the factors that influence and affect the lifestyle choices among these young female students. Key events that have influenced research trends in physical activity and health are presented and provide a link to the research topic and related issues addressed in the current study.

## 2.2 GENERAL BACKGROUND

Regular physical activity is essential for the prevention and management of hypokinetic conditions. These conditions or diseases include lower back problems, coronary heart disease, overweight and obesity, hypertension, hypercholesterolemia, colon cancer, diabetes mellitus and many other conditions that are a result of negative lifestyle choices and poor health (Plowman & Smith, 2003:605; Rozmus *et al.*, 2005:26; Whaley, 2006:7; Powers & Howley, 2007:7). As a result of these risk factors (that serve as constraints or barriers to participation in physical activity), many individuals are taking cognisance of the importance of including physical activity as part of a healthy lifestyle. The beneficial aspects of participation in regular physical activity can include an ability to perform everyday tasks more effectively, reduce depression, develop a positive body image, improve mood and relieve anxiety. Participation in regular physical activity can enhance an individual's quality of life and health (Plowman & Smith, 2003:606) and has many health benefits that can prevent certain diseases (Whaley, 2006:7). To retain these benefits, one must remain physically active throughout life (Toraman, 2005:561; Whaley, 2006:7).

Modern lifestyles influenced by industrial development, urbanisation, socio-economic status, personal and urban safety, peer pressure, the environment, age and many other factors can contribute to a state where a majority of populations become inactive. According to several research studies (Crawford & Eklund, 1994:70; Plowman & Smith, 2003:606; Toraman, 2005:561) available today, most individuals are sedentary or not regularly active, even with the knowledge that exercise is beneficial to their health. It is therefore important to promote the benefits of increased physical activity among all population groups, especially with a broader health perspective in mind.

To justify the context for the research topic, it is of interest to note the trends in research paradigms, designs, settings and methods, which have influenced academic endeavours on health and fitness over the past few decades.

## 2.3 TRENDS IN RESEARCH PARADIGMS

Trends in sport, exercise psychology and exercise science methods in recent years reflect developing trends in academic scholarship and research methods (Weis & Gill, 2005:S72). According to a recent survey of research articles on exercise science published over the past 75 years, presented by Ainsworth & Tudor-Locke (2005: S40), on health and physical activity, most of the research articles have contributed to a better understanding of the role physical activity plays in the health of individuals and specific populations.

Research and published articles ranged from descriptions of laboratory and community research done on humans and animals, presented reviews of topics and conferences proceedings and created forums for discussions about current topics in physical activity and health. All the articles reflect a growth from basic inquiry about physical responses to exercise, to more recent studies focusing on the effects of exercise on physical fitness and health in various populations and population subgroups. At the turn of the 20<sup>th</sup> century, research about exercise and the human body focused on the development of anthropometrical methods to evaluate the physique and ways to assess school children's physical fitness. Little was known about how the human body responded to exercise and the role exercise played in maintaining good health and preventing disease (Ainsworth & Tudor-Locke, 2005:S41). In recent years, a recognised paradigm shift in research toward more public health concerns and health outcomes related to the benefits of physical activity is noticed (Ainsworth & Tudor-Locke, 2005:S41; Whaley, 2006:5).

Table 2.1 presents noted activities and key events that have influenced research in physical activity and health in decades from the 1930s to present day research.

*Table 2.1: Key events that influenced research in physical activity and health*

<b>Decade</b>	<b>Key events that influenced research topics in physical activity and health</b>
<b>1930s</b>	Great Depression; Birth of exercise physiology; Conferences on child health and protection; Growth of Harvard Fatigue Laboratory
<b>1940s</b>	WWII; Founding of the Physical Fitness Research Laboratory, University of Illinois; American Medical Association developed a health and fitness programme
<b>1950s</b>	Korean War; Kraus-Weber youth fitness tests showed low fitness levels in US children; White House Conference on Fitness of American Youth; American College of Sports Medicine (ACSM) founded; Epidemiological studies started to identify cardiovascular disease risk factors; First epidemiological study about occupational physical activity mortality, published by Jean Morris
<b>1960s</b>	Vietnam War; Expansion of girls' and women's sports; Leisure education movement commences; publication of College Alumnus Study on Physical Activity and first heart attack; Development of American College of Sports Medicine position stand for improving cardiovascular fitness
<b>1970s</b>	Leisure and education movement more prominent
<b>1980s</b>	Start of the Physical Activity and Public Health Movement; First Toronto Conference on Status of Research in Physical Activity, Fitness and Health; Results from epidemiological studies about physical activity, morbidity and mortality
<b>1990s</b>	Governmental and organisational position stands for physical activity, health promotion and disease prevention; Surgeon General's Report on Physical Activity and Health; Second Toronto Conference on Status of Research in Physical Activity, Fitness and Health; Toronto Conference on dose response issues for energy expenditure and health outcomes; American Heart Association classifies physical inactivity as a risk factor for coronary heart disease
<b>2000s</b>	Overweight and obesity are declared an epidemic; Robert Wood Johnson Foundation funds research to study physical activity and the environment; Policy changes and increasing physical activity in older adults; Global initiatives are supported to identify the prevalence of physical inactivity and increase physical activity in all communities

Adapted from Ainsworth & Tudor-Locke (2005:S41)

Several other research themes have emerged from literature published over the past years, indicated by Ainsworth and Tudor-Locke (2005:S41). These include research on population subgroups (women, children, etc.); lifestyle and signs of the times; fitness and fitness standards; physical activity; dose response and exercise; environmental influences on health; aged-related fitness; activity topics; patterns of physical activity; epidemiology and exercise in general. Weis and Gill (2005:S73) report on other academic focuses and emerging disciplines, such as psychological research related to physical activity and health concerns, including survey and experimental methods to gather information. Questions and models have become more complex and researchers focused more on the interacting influences of multiple factors on behaviours in varying sport and exercise science contexts.

According to Powers and Howley (2007:6), the present research interest in physical activity, health and fitness was stimulated in the early 1950s by two major findings in America. These were, firstly, autopsies on young soldiers killed during the Korean War that showed the development of significant coronary artery disease. Secondly, Hans Kraus showed that American children performed poorly on minimal muscular fitness tests compared to European children. Powers and Howley (2007:6) further point out that due to these and other findings, a number of organisations (that originated in America), with the intervention of US presidents Eisenhower, Kennedy and Nixon, today are key role players for health and fitness issues on an international basis. These organisations are the President's Council on Youth Fitness, the American Alliance for Health, Physical Education and Recreation and Dance (AAHPERD) and the President's Council on Physical Fitness and Sport (Powers & Howley, 2007:6). By the mid-1980s it was clear that physical inactivity had become a major public health concern (Powell & Paffenberger, 1985:118) and would influence future research endeavours.

In 1995 the Centres for Disease Control and Prevention (CDC) and the American College of Sports Medicine (ACSM) published a public health physical activity recommendation, stating:

“Every adult should accumulate at least 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week” (Pate *et al.*,1995:402).

The Surgeon General’s Report on Physical Activity and Health was published a year later, highlighting the fact that physical inactivity was killing adults. At that stage 60% of the adults in the USA did not engage in the recommended physical activity and 25% were not active at all. This report was based on a large body of evidence available from epidemiological studies, small-group training studies, clinical investigations and other academic research showing the positive effects of an active lifestyle (Powers & Howley, 2007:7). An updated ACSM publication reflects a review of evidence published since this initial recommendation and considers key issues not fully clarified in the original documentation (ACSM, 2007c:1). The update focuses on the type and amount of physical activity healthy adults need to improve and maintain their health. The two conclusions from this report that remain important are:

“Significant health benefits can be obtained by including a moderate amount of physical activity on most, if not all, days of the week. Through a modest increase in daily activity, most people can improve their health and quality of life. Additional benefits can be gained through greater amounts of physical activity” (Whaley, 2006:6).

The relevance of these trends influencing research in physical activity and health becomes clear when it is linked to the aim of the current study. It focuses on physical activity and a population subgroup of young women, with weight management issues, uncertainty about lifestyle choices, the influence of environment on physical activity and the link provided for improved health and fitness as outcomes.

According to Ainsworth and Tudor-Locke (2005:S44), this research focus will continue to be important as researchers strive to understand how to promote sustainable levels of health-related activity to specific populations in macro- and micro-environments.

Several concepts and operational definitions of terminology related to the current study will now be described and defined.

## **2.4 CONCEPT DEFINITIONS**

### **2.4.1 Health**

The World Health Organisation (WHO) defines “health” as:

“A state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity” (WHO, 1949:100).

According to Howley and Franks (2003:8), “health” can also be defined as “being alive with no major health problems”. They link two primary goals or benefits of exercise participation with this state, that of the delay of death and the avoidance of disease.

Heath (2006:73) is of the opinion that health and fitness should result from regular participation in exercise and proper exercise prescription and defines “health” as:

“Physical and emotional wellbeing (not merely the absence of disease).”

### **2.4.2 Wellness**

Wellness is a holistic concept that includes mental and physical components. It is a process of self-care that includes understanding emotional and physical needs, as well as the lifestyle that is needed to meet those needs (Balkin *et al.*, 2007:30). According to Stephenson, Pena-Shaff and Quirk (2006:109), wellness is developmentally an important concept for young adult women. This could be attributed to the fact that young women have more difficulty in managing the transitional adaptations associated with emerging adulthood (Weitzman, 2001:63).

### 2.4.3 Physical activity

The literature on physical activity and the prescription of physical activity is extensive and provides a wide variety of definitions and descriptions. The American College of Sports Medicine (2000:4) and Leenders, Sherman, and Nagaraja (2000:1320) are of the opinion that physical activity is an extremely important component of a healthy lifestyle and describe “physical activity” as:

“Any bodily movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure.”

Knuttgen (2003:31) and Burrows, Eves and Cooper (1999:1) take the description a step further by expressing that physical activity is a useful tool in health enhancement, health maintenance and rehabilitation.

Taber’s *Cyclopedic Medical Dictionary* defines “physical activity” as:

“A general term for any sort of muscular effort, but especially the kind that intends to train, condition or increase flexibility of the muscular and skeletal systems of the body” (Taber, 2005:1).

Further descriptions and explanations of “physical activity” reveal that it can be occupational or involve housework (Shepard, 2002:3), leisure activities, transportation (e.g. bicycling) (Shepard, 2002:3), entertainment (e.g. dancing), and sport (Shepard, 2002:3; Crespo & Williams, 2006:93).

Related terminology on “physical activity” has developed over the past years with specific additional focuses that distinguish each term. Such a term is “exercise”, a subclass of “physical activity”, which is defined as:

“Planned, structured, purposeful and repetitive bodily movement, done to improve or maintain one or more components of physical fitness” (ACSM, 2000:4).

Shepard (2002:2) defines “exercise” as:

“Any form of leisure activity that is undertaken for a specific purpose, such as the improvement of health, the increase of physical fitness or the extension of lifespan.”

According to Knuttgen (2003:31), “exercise” can be described as:

“Any activity involving the generation of force by activated muscles, including activities of daily living, work, recreation and competitive sport. The terms ‘physical activity’ and ‘exercise’ are often confused.”

#### **2.4.4 Physical fitness**

Most definitions of “physical fitness” are very broad and could be interpreted from a sporting as well as a health perspective.

Mosby’s *Emergency Dictionary* defines “physical fitness” more generally as:

“The ability to carry out daily tasks with alertness and vigor with energy left to meet emergencies or to enjoy leisure activities” (Mosby, 1989:1).

Taber’s (2005:1) general and basic definition of “physical fitness” is:

“The ability to carry out daily tasks with vigor and alertness, without undue fatigue and with ample energy to enjoy leisure-time pursuits and meet unforeseen emergencies.”

Taber’s (2005:1) adds another dimension to this basic definition by stating that it is also the “ability to withstand stress and persevere under difficult circumstances in which an unfit person would quit”.

It is implied in the above statement that physical fitness is more than the lack of illness – it is a positive quality that everyone has to some degree (Pate, 1988:175).

Physical fitness is minimal in the severely ill and maximal in the highly trained athlete. People who maintain a high level of fitness may have increased longevity compared to those who are sedentary. Other questions related to this term give direction to the actual meaning or focus of this concept in a certain context. Questions that are often asked in this context relate to what fitness exactly is and what people are fit for. Whaley (2006:3) describes “physical fitness” as a multidimensional concept and defines it as:

“A set of attributes that people possess or achieve that relates to the ability to perform physical activity and is comprised of skill-related, health-related and physiologic components.”

These non-performance components of physical fitness that relate to biological systems and that are influenced by habitual activity are described as:

- **Skill-related components:** Agility, balance, coordination, speed power and reaction time, associated with sport and motor skills performance;
- **Health-related components:** Cardiovascular endurance, muscular strength and endurance, flexibility and body composition;
- **Physiological components:** Metabolic (status of metabolic systems), morphologic (status of body compositional factors) and bone integrity (status of bone mineral density) (Whaley,2006:3).

The definition of “health-related physical fitness” differs from the more physiologic definition above and is described by Whaley (2006:3) as:

“The ability to perform daily activities with vigor and the possession of traits and capacities that are associated with low risk of premature development of hypokinetic diseases (e.g. those associated with physical inactivity).”

“Health-related physical fitness” can thus be viewed as a multifactorial construct that includes several components. Each component is a movement-related trait or capacity that is considered to be largely independent of the others (ACSM, 2000:57). These components include:

- **Cardiorespiratory fitness:** The ability to perform large muscle, dynamic, moderate to high intensity exercise for prolonged periods of time.
- **Body composition:** The relative percentage of body weight that is fat-free tissue.
- **Muscular fitness:** The integrated status of muscular strength and muscular endurance. Muscular strength refers to the maximal force that can be generated by a specific muscle or muscle group. Muscular endurance points to the ability of a muscle group to execute repeated contractions over a period of time, sufficient to cause muscular fatigue or to maintain a specific percentage of the maximum voluntary contraction for a prolonged period of time. Intrasession order of strength and endurance training influences adaptive responses to them. Improvement in endurance performance and aerobic capacity is significantly greater when the muscle endurance training precedes the strength training in the same session (Chtara, Chamari, Chaouachi, Koubaa, Feki, Millet & Amri, 2005:555).
- **Flexibility:** The ability to move a joint through its complete range of motion.

The concept that underlies “health-related physical fitness”, as described above, is the status of each of the above components and is associated with lower risk for the development of disease and/or functional disability (ACSM, 2000:57). The terms “fitness”, “physical fitness” and “physical conditioning” are used interchangeably, but in reality, physical and physiological preparedness are highly specific to a person’s objectives (Knuttgen, 2003:42).

Caspersen, Powell and Christenson (1985:126), defines “physical fitness” as:

“An attribute that people possess or achieve, such as aerobic power, muscular endurance, muscular strength, body composition and flexibility, achieved through participation in regular exercise.”

Early in the 1980s the Public Health Service of America listed “physical fitness and exercise” as one of the areas of concern related to improving the country’s overall health (Powers & Howley, 2007:5).

Regular participation in physical activity and/or exercise that brings about changes to either enhance general health or more specifically develop attributes to perform better in sport will have a physiological impact on the body. For these results to be specific and goal-orientated, client-centred exercise prescription is needed.

#### **2.4.5 Exercise prescription**

According to the ACSM (Whaley, 2006:135), exercise prescriptions are designed to enhance physical fitness, promote health by reducing risk factors for chronic disease and ensure safety during participation in exercise. All exercise prescription should be used with careful consideration and attention to the goals of the individual. Exercise prescription should include essential components such as appropriate mode(s), intensity, duration, frequency and progression of physical activity and should be applied for people of all ages and fitness levels, regardless of individual health status (Whaley, 2006:135). In time this prescription and the recommendations for the exerciser should be modified in accordance with observed individual responses.

Desired outcomes of exercise prescription, based on individual needs, may be achieved with exercise programmes. These have to vary considerably in structure. Individual interests, abilities and limitations in the design of any programme should be carefully monitored.

#### **2.4.6 Physical activity guidelines**

Recommendations from the ACSM, CDC, the National Institute of Health and the SGR on Physical Activity and Health call for:

“At least 15 minutes of running, 30 minutes of brisk walking or 45 minutes of playing volleyball or more of moderate-intensity

activity per day on all or most days of the week in order to obtain significant health benefits (Whaley, 2006:133).

In 2007, an update was done for the 1995 SGR Report on Physical Activity and Health which concurs with the ACSM and the American Heart Association (AHA) public health recommendations. New science has added to better understanding of the biological mechanisms by which physical activity provides health benefits and the physical profile (type, intensity and amount) associated with enhanced health and quality of life. The updated publication reflects a review of evidence published since the initial recommendation and considers key issues that were not fully clarified in the original documentation (ACSM, 2007b:1). The update focuses on the type and amount of physical activity (dose-response) needed by healthy adults to improve and maintain health. A panel of scientists, including physicians, epidemiological experts, exercise scientists and public health specialists reviewed advances in pertinent physiologic, epidemiologic and clinical scientific data, including primary research articles and reviews published since the original recommendations.

Eight improvements from the 1995 recommendations are made in the 2007 document:

***1. Moderate-intensity physical activity was clarified***

The 1995 document simply specified “most, preferably all, days per week” as the recommended frequency, while the new document calls for “five days per week” as the recommended minimum.

***2. Vigorous-intensity physical activity was explicitly incorporated in the recommendation***

To acknowledge the preferences of some adults for vigorously intensive physical activity as well as the substantial science base related to participation in such activity, the recommendation has been clarified to encourage participation in either moderately and/or vigorously intensive physical activity.

Vigorously intensive physical activity was implicit in the 1995 recommendation. It is now an integral part of the physical activity recommendation.

**3. Specified: Moderately and vigorously intensive activities are complimentary in the production of health benefits and a variety of activities can be combined to meet the recommendation**

Activity combination is based on the amount (intensity x duration) of activity performed during the week and uses the concept of metabolic equivalents (METs) to assign an intensity value to a specific activity.

**4. Specified: Aerobic activity needed is in addition to the routine activities of daily life**

The updated recommendation clearly states that the recommended amount of aerobic activity (whether of moderate or vigorous intensity) is in addition to the routine activities of daily living which are of light intensity, such as self-care, casual walking or grocery shopping, or less than 10 minutes in duration, such as walking to the parking lot or taking out trash. Few activities in contemporary life are conducted routinely at a moderate intensity of at least 10 minutes in duration. Moderately or vigorously intensive activities performed as part of daily life (e.g. brisk walking to work, gardening with a shovel, carpentry) performed in bouts of 10 minutes or more can be counted towards the recommendation. Although implied, this concept was not effectively communicated in the original recommendation.

**5. “More is better”**

The new recommendation emphasises the important fact that physical activity above the recommended minimum amount provides even greater health benefits. The point of maximum benefit for most health benefits has not been established, but probably varies with genetic endowment, age, gender, health status, body composition and other factors. Exceeding the minimum recommendation reduces the risk of inactivity-related chronic disease. Although the dose-response relation was acknowledged in the 1995 report, this fact is now explicit.

## **6. Short bouts of exercise**

Although the original recommendation introduced the concept of accumulating short bouts of physical activity toward the 30-minute goal, there was confusion regarding how short these episodes could be. For consistency and clarity, the minimum length of these short bouts is clarified as being 10 minutes.

## **7. Muscle-strengthening recommendation**

Muscle-strengthening activities have now been incorporated in the physical activity recommendation. Although the 1995 recommendation mentioned the importance of muscular strength and endurance, it stopped short of making specific declarations. Available evidence now allows the integration of muscle-strengthening activities into the core recommendation.

## **8. Clarification in wording**

Minor word changes in the recommendation have been made in order to enhance clarity in communication. For example, the term “aerobic” or “endurance” has been added to clarify the type of physical activity being recommended and to differentiate it from muscle-strengthening exercises, which are now part of the core recommendation (ACSM, 2007b:2).

The beneficial effects of exercise are related in the following descriptions from literature.

### **2.4.7 Beneficial effects of exercise**

Several researchers have described the benefits of exercise. Regular physical activity that has health benefits for all populations is supported by numerous organisations and research (Strelan *et al.*, 2003:89; Whaley, 2006:133; Zoeller, 2007:99).

Research states that physical activity has been shown to lower the risk of dying prematurely and from heart disease, reduce the risk of developing diabetes

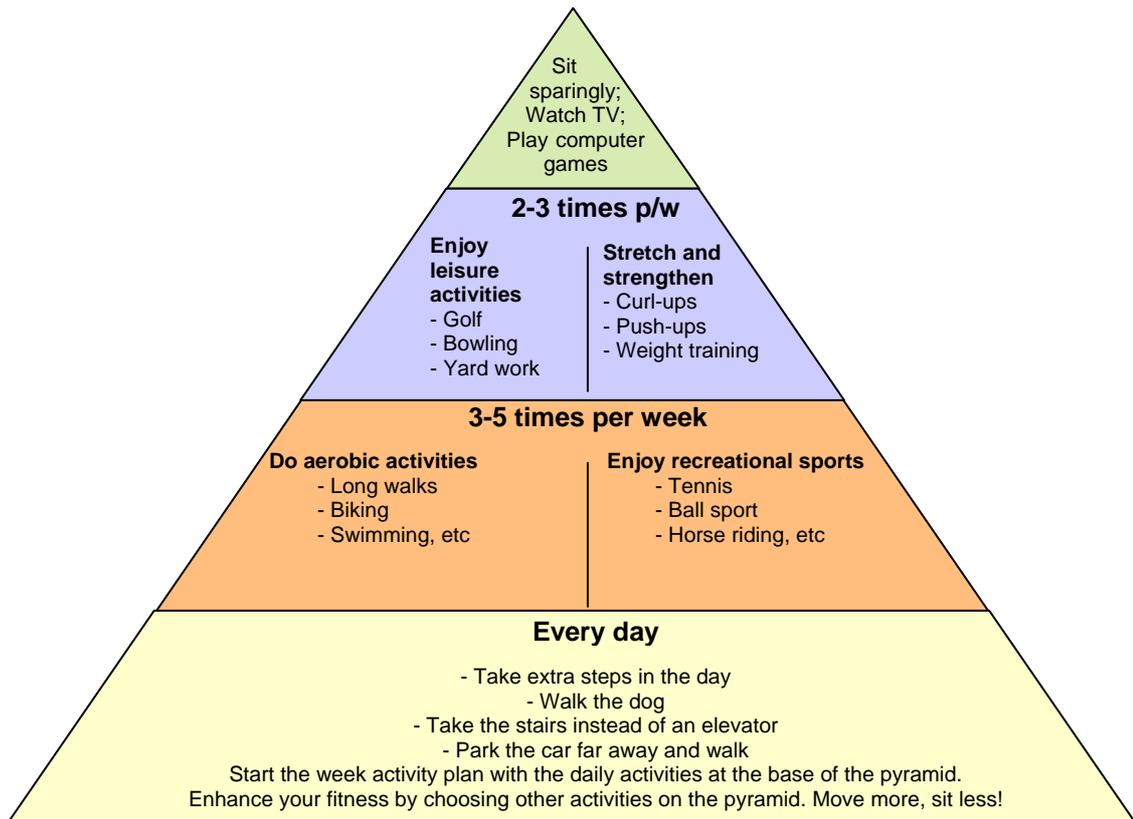
mellitus and high blood pressure, help maintain weight and healthy bones, muscles and joints, help lower blood pressure and promote psychological wellbeing (Powers & Howley, 2007:7). The primary focus for achieving health-related goals has been on prescribing exercise for improvements in cardiorespiratory fitness, body composition and strength (Zoeller, 2007:99). The CDC and the ACSM suggest that the focus should be broadened to address the needs of all sedentary individuals. Increasing evidence has shown that regular participation in moderately intensive physical activity (three to six metabolic equivalents [METs]) is associated with health benefits (ACSM, 2000:137). Weight management and weight loss are often primary goals of participation in exercise (Whaley, 2006:5). According to some of these researchers, exercise can be associated with effective long-term weight control (Resnicow, Yaroch, Davis, Wang, Carter, Slaughter, Coleman, Baranowski, 2000:617; Strelan *et al.*, 2003:89; Grogan, 2006:528). These experimental studies have documented the positive effect of exercise training on body weight and fat stores. Researchers and practitioners in the fitness industry also claim that certain types of aerobic activities are more effective than others with regard to weight loss (Gappmaier, Lake, Nelson & Fisher, 2006:564).

Other beneficial effects of exercise are also described in literature. It is well known that physical activity is an important factor in attaining peak bone mass (Sööt, Jürimäe & Jürimäe, 2006:293) that is especially important for women. Further, affective benefits of participation in exercise have been shown where there is high group cohesion and also in socially enriched exercise environments (Turner *et al.*, 1997:119).

Regular participation in exercise has been known to be an efficacious and a non-pharmacological method to improve a wide variety of physiological, social and psychological states, such as anxiety, depression, tension, tiredness, sense of wellbeing and vigour (Kennedy & Newton, 1997:201; Miller, Bartholomew & Springer, 2005:263). Zoeller (2007:101) is of the opinion that overall, aerobic exercise can yield health and cardiovascular benefits at intensities as low as 30% to 40% of the heart rate reserve (HRR), depending on age and current

level of physical activity. Progression to 60% and 80% of the HRR is recommended for most individuals to achieve full cardiorespiratory fitness.

To reach realistic goals for overall health improvement, the ACSM has developed the Physical Activity Pyramid (figure 2.1) that has been suggested as a way or guide to facilitate recommended activity levels for all days of the week.



*Figure 2.1: The Activity Pyramid Model*

Adapted from the ACSM (Whaley 2006:134)

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NASPE (2007) reports that an increase in daily activity levels of university and college students can enable them to reduce total cholesterol, low-density lipoprotein cholesterol, increase bone mass, decrease test anxiety and depression and improve self-esteem (NASPE, 2007:2).

These are all important factors that young adults are confronted with or have to cope with in a university setting. It is therefore important to establish the possible motives and intentions to exercise among this group.

#### **2.4.8 Exercise motives and intention**

People have diverse motives for engaging in physical exercise and these are important determinants of exercise participation (Ingledeu & Sullivan, 2002:323). According to Ingledeu and Sullivan (2002:323), this diversity is illustrated by the various instruments that have been developed to measure exercise motives. Studies on people's attitudes towards physical activity have shifted to new ways of understanding and thinking about physical activity motivation, or the reasons why individuals show interest in and choose to participate in physical activity. Situational motivation (that individuals experience while engaging in particular activities), the "here" and "now" of motivation to exercise, is an important factor influencing the choice of behaviour among individuals to improve health or health-related conditions (Parish & Treasure, 2003:176). Health promotion should begin with goal formulation, as the quality of health is influenced by lifestyle habits (Bandura, 2004:143). People's appraisals of their goals and of the mechanisms of self-regulation that guide them toward their goals provide useful context specific information and supplies part of the motivational impetus that energises performance (Maes & Gebhardt, 2000:344; Karoly, Ruhlman, Okun, Lutz, Newton & Fairholme, 2005:429). The emergence of behaviourism was a likely instigator for many initial studies examining social reinforcement as a performance motivator in exercise participation. According to Bandura (2004:144), the social cognitive theory specifies a core set of determinants which include knowledge of health risks and benefits of health practices that create a precondition for change. The achievement goal theory has been embraced as a viable approach to explain variations in physical activity motivation.

This theory implies that it is the dispositional goal orientations and social contextual factors that influence participants' achievement cognitions, emotions and behaviour (Weiss & Gill, 2005:S72). In another study conducted by Karoly *et al.* (2005:430), it is mentioned that it is difficult to pinpoint the mechanism(s) by which regular exercisers process goal-relevant information in order to strengthen the link between their intentions and their exercise behaviour. The fact that exercise goals are generally seen as involving more self-efficacy among individuals and that self-efficacy is higher among regular exercisers may provide useful insights (Karoly *et al.*, 2005:430).

Aspects such as socio-cultural pressures on women to maintain the ideal thin and physically fit body and the high social acceptability of using physical activity as a means to deal with weight concerns may also act as motivators to exercise (Kowalski *et al.*, 2001:55). Women commonly report weight management as a motivation for exercise (Neumark-Sztainer, Sherwood, French & Jeffrey, 1999:180; Hlavenka, 2005:1) and according to McLean and Barr (2003:190), exercise was the most frequently reported weight loss practice among women. Self-presentational concerns may be a major source of motivation for participating in physical activity, especially among women. These reasons include aspects such as weight control, body tone and general physical appearance/attractiveness (Cohn & Adler, 1992:70; Tiggeman & Williamson, 2000:120; Strelan *et al.*, 2003:90; Greenleaf, 2005:52). Young adults who reported that they exercise for health-related reasons exercised for longer periods of time (stronger exercise adherence) compared to those who exercise solely for appearance-related reasons (Hlavenka, 2005:5).

Burrows *et al.* (1999:61) report on other common motivators for participation in physical activity that include "the need to feel in good shape" and "improve or maintain health". Other frequently cited factors are to "feel a sense of achievement" and to "get outdoors". Many people perceive exercise as a means to "have fun". More often than men, women perceive that exercise makes them "feel good".

#### **2.4.9 Factors affecting choice of exercise**

According to Wright, O'Flynn and McDonald (2006:716), young people know the relationships between health and exercise, but this knowledge is taken up differently by young men and women, and within groups. These differences in meaning can provide a starting point to understand the factors that possibly affect health-related practices among this group. Several socio-psychological models (Health Belief Model and Protection Motivation Theory) have been applied to explore the determinants of an individual's participation in physical activity. These models depict the change of behaviour as a result of the individual's perceived threat to their personal health status (Godin & Shepard, 1990:103). One of the most relevant life-space sensitive approaches to the topic of exercise, is the Health Behaviour Goal Model (Gebhardt, 1997:345; Gebhardt & Maes, 2001:259). With this perspective, progress toward health-relevant goals such as exercise is hypothesised to be a function of the structural compatibility between health goals and other important life pursuits. The Health Behaviour Goal Model presumes that the likelihood of a person achieving a target such as exercise will be reduced through competition with alternative goals (Karoly *et al.*, 2005:432). Goal competition is seen as the comparison between exercising regularly and the pursuit of other life activities, such as going out for dinner, watching TV, studying, reading a book, going to movies or socialising. It is presumed that interfering goals such as university work and social activities occupy a great deal more time than the pursuit of exercise. These tasks are usually central and defining tasks of university students and fill the bulk of students' waking hours in a university environment (Karoly *et al.*, 2005: 433). In this study conducted by Karoly (2005) it was found that the most prevalent type of interfering goal among regular exercisers was the pursuit of academic activities (73%), followed by social goals (17%) and work/family activities (10%). Among irregular exercisers, 67% indicated an academic competing goal, 23% a social goal and 10% a work/family goal.

An individual's body image and possible implications of psycho-social functioning in a society and the related social physique anxiety should be

examined as factors affecting exercise choice, using some of these more sound theoretical frameworks (Sabiston, Crocker & Munroe-Chandler, 2005:69). Some of the most successful physical conditioning regimens, affecting participation in exercise, are those that are pleasurable and offer the greatest diversification to the participant (ACSM, 2000:247). Successful exercise experiences have been shown to raise self-efficacy for future bouts of exercise (Bartholomew & Miller, 2002:302). Further support for this contention, of other researchers presenting findings encouraging by studying goal cognition in the domain of exercise in a lifespan framework, are relevant in this context. It appears that patterns of goal cognition for exercise pursuits may help to maintain active lifestyles (Karoly *et al.*, 2005:434).

#### **2.4.10 Challenges and influences to participate in exercise**

A number of challenges are associated with promoting physical activity. Such challenges include the duration and effort of exercise, perceived benefits from participation and the recommendations from health and fitness professionals in an exercise environment. It is estimated that half of individuals who begin a physical activity programme, drop out within six months (Chao, Foy & Farmer, 2000:2). Numerous factors can influence regular participation in physical activity as well as exercise adherence before an individual experiences the actual benefits. People sometimes lack the motivation to participate in physical activity regularly, as it is voluntary and time consuming. Individual, social, environmental, medical and time factors can collectively influence exercise behaviour (Ransdell, Vener & Sell, 2004:12). It is reported that exercise participation may often extend an individual's working day or compete with other valued interests and responsibilities of daily life (Balady, Berra, Golding, Gordon, Mahler, Myers, Sheldahl, 2000:237). More should be done to ensure that people perceive exercise to be an enjoyable and valuable experience, regardless of additional effort or use of time. Several factors alone or in combination can enhance or suppress a decision to become physically active.

Previous research identified physical activity correlates of personal (self-efficacy and attitudes), interpersonal (social environment and level of social support) (McLeroy, Bibeau, Steckler & Glanz, 1988:351), community (sense of community), physical environment (presence of sidewalks and hills), policy (flexible work schedules) and nature to influence physical activity levels (Eyler *et al.*, 2003:6). Examples of biological variables that influence physical activity include health status (e.g. factors related to longevity) and a genetic disposition to sedentary behaviour due to defective dopamine system regulation (Ransdell *et al.*, 2004:12). Cultural beliefs and practices also exert strong influences on health-related behaviour (Balady *et al.*, 2000:239). Consistent influences on physical activity patterns among young adults include confidence in the ability to engage in regular physical activity, enjoyment of physical activity, support from others, positive beliefs concerning the benefits of physical activity and lack of perceived barriers to being physically active (SGR, 1994:8). Recent research also supports the affective influences of socially enriched exercise environments and group cohesion in an exercise environment (Bartholomew & Miller, 2002:308; Ransdell *et al.*, 2004:12). University students are more likely to exercise if they have social support for being active and women are more likely to exercise if the social support comes from the family (Wallace & Buckworth, 2003:212).

The social support influence is supported by research and states that family and friends can be role models and provide encouragement or be companions during physical activity (Wallace & Buckworth, 2001:2). Incorporating some mechanism of social support in the exercise prescription appears to be an important strategy for enhancing compliance (Ransdell *et al.*, 2004:12; Heath, 2006:75). Limited information exists about the needs of population subgroups of all ages and how determinants of physical activity may change over the life span because of puberty, normal aging, health conditions, types of occupation and other biological, social and environmental influences (SGR, 1994:248; Ransdell *et al.*, 2004:12). According to Ransdell *et al.* (2004:12), the biological variable that influences physical activity participation and that remains constant is gender.

Boys and men are more active in leisure time physical activity than girls and women, who tend to do less vigorous activity and more moderate activity (Parish & Treasure, 2003:180). This is reported for many regions, including the European Union, the USA, China, Australia, the Middle East and South Africa (Ransdell *et al.*, 2004;12). They also state that gender may be a key factor in the development of successful, population-specific physical activity intervention programmes.

Physical activity adoption and maintenance, also termed exercise participation and adherence, will stay an emerging issue as research topic (Weiss & Gill, 2005:S85). According to Kimiecik (2005:20), effective tertiary physical activity programmes should nurture the participant's intrinsic reasons for physical activity, as young adults are often distracted by society's external motives and are at high risk of losing touch with the intrinsic joy and meaning of movement.

The perception of the value and contribution of exercise to the health status of individuals will now be discussed.

#### **2.4.11 Exercise perception**

Perception is an important aspect that influences the choice of exercise among individuals and can therefore impact exercise behaviour. Positive perceptions make people choose a certain type of exercise, while negative perceptions will have the opposite effect (Turner *et al.*, 1997:119). Psychological variables, including the perception of a programme, appear to present major impediments to exercise compliance (ACSM, 2000:238). Research has confirmed that perceptions of a mastery climate in a physical activity environment were related to the preference of challenging tasks, the belief that success resulted from effort and motivation and satisfaction in the activity performed (Parish & Treasure, 2003:174).

#### 2.4.12 Exercise preference

Exercise preferences are an extremely important aspect to be considered when promoting the benefits of exercise (Daley & Maynard, 2002:4). Individuals differ in their preference of type or mode of exercise, the exercise environment and related factors. For exercise adherence behaviour, the physical activity context becomes important (Burke, Carron & Eys, 2005:171). According to Parfitt and Glenhill (2003:2), exercise intensity, fitness of participants, past experiences, the environment and goal orientation are all possible factors that may influence the individual's preference to exercise.

Exercise preference is one of several factors that contribute to exercise enjoyment. Women prefer to participate in more moderate activities, influenced by multiple role expectations, societal expectations relative to beauty, psychological issues and life conditions (Parfitt & Glenhill, 2003:1). This preference is further influenced by participation in physical activities during childhood where boys reported higher rates of participation in community sports that promote physical activity later in life (Ransdell *et al.*, 2004:12).

Differences in exercise preference result in differences for positive affect due to the exercise participation. According to Miller *et al.* (2005:265), participants report greater improvements in positive affect following high preference exercise modes than for low preference exercise modes. Differences in preferred activity also vary by culture (Ransdell *et al.*, 2004:12). Therefore the manipulation of exercise mode preference is successful in producing significant differences in exercise enjoyment (Miller *et al.*, 2005:270). By offering programmes that encourage more choice and are sensitive to related issues of preference, tertiary physical activity programmes can provide a vehicle for students to continue to engage in new and different activities that will encourage healthy lifetime practices (NASPE, 2007:2).

### **2.4.13 Barriers to physical activity**

Regardless of how firmly people believe that physical activity is beneficial to their health, there are many barriers that may limit or prevent regular activity. Whether these barriers are real or perceived, they represent significant potential obstructions to the adoption, maintenance or resumption of participation in physical activity (Booth, Bauman, Owen & Gore, 1997:131). A number of physical and environmental factors can affect physical activity behaviour (Ransdell *et al.*, 2004:12; Heath, 2006:75), and women are more likely to report barriers to exercise (Segar, Jayaratne, Hanlon & Richardson, 2002:339). Women and obese individuals are faced with several unique barriers to exercise participation, which could account for low initial enrolment, poor attendance and high drop-out rates reported in most exercise environments (ACSM, 2000:249). Leading factors identified for dissatisfaction with physical activity, over the past decade, were societal expectations (Ransdell *et al.*, 2004:12), dress code (burqa and hijab, inconvenience of dressing and undressing), exercise facilities, lack of progressiveness in physical activities presented and being required to participate in activities in which there was no interest (Ransdell *et al.*, 2004:12; Weis & Gill, 2005:S84). Unfavourable decisions to be physically active are also correlated to negative experiences in physical education at school (Hagger, Cale & Almond, 1997:145). Barriers that keep young people from participating in physical activity increase as grade level in the school setting increases (NASPE, 2007:1).

The living environment of people could promote or limit physical activity behaviour. This environment often presents significant barriers to participation in physical activity (e. g. lack of a bicycle, walkways away from vehicular traffic, inclement weather and unsafe neighbourhoods) (Ransdell *et al.*, 2004:12; Heath, 2006:75). Reports from literature indicate that a lack of sidewalks and limited or controlled access to places where women can be physically active are often reported as barriers to physical activity in rural residents (Heath, 2006:76).

The prevalence of crime and personal safety issues were common barriers to physical activity reported by women living in urban areas (Eyler *et al.*, 2003:5-6). In other environments, where the focus is primarily on more specialised physical activity participation, problems to participate are also reported. According to a survey conducted by the International Health, Racquet & Sports Club Association (IHRSA) of America and the George Washington University Medical Centre in 2005, the barriers that prevent most people from exercising in a gymnasium environment or a health club setting are:

- Exercising at a health club is intimidating
- Lack of time to exercise
- Lack of social support to exercise
- Memberships at fitness facilities cost too much
- More flexible options should be available regarding exercising times (IHRSA, 2005:4).

Other significant barriers to participation in physical activity that are reported are religious beliefs (Muslim women, fasting), life conditions (poverty, low education level, single parenthood), injury, psychological issues (poor body image, social physique anxiety) and a lack of time (Booth *et al.*, 1997:132; Ransdell *et al.*, 2004:12; Heath, 2006:75).

University and college students report intrapersonal, environmental and contextual barriers relative to physical activity. In particular, they have identified high academic workloads and part time jobs as reasons for inactivity. The lack of time, specific sport teams to join at their university or college and lack of transport to exercise and sport facilities were cited as specific barriers (NASPE, 2007:1).

The transition period for young adults from school to a tertiary environment and the new social, academic, psychological and physiological environment in which they find themselves provide challenges to decision-making on various important health and lifestyle choices.

Understanding the young adult is of vital importance if effective strategies are to be developed that will affect these choices positively.

#### **2.4.14 Young female university/college students**

The spectrum of age indicators for young adults or university undergraduates differ in literature and is somewhat arbitrary. It is often used to identify groups of students who pursue university degree studies. The age indicators are described as follows:

- In the Sallis study (Sallis, Calfas, Nichols, Sarkin, Johnson, Caparosa, Thompson & Alcaraz, 1999:1) typical university ages are indicated as between 18 and 21 years.
- In the report of the Surgeon General of the United States of America 17 to 23 years are cited (SGR, 1994:8).
- Age level descriptors according to the Educational Resources Information Centre (ERIC Thesaurus, 2001:1) are given as young adults being between 18 and 30 years.
- In the Leslie *et al.* study (2001:116) young adults are defined as those aged 18 to 30 years.

The group of young female students, aged between 17 and 25 years, used as a study population for this research can be described in the social context of the university setting. Carron and Hausenblas (1998:12) define this as:

A group is a social unit which consists of a number of individuals who stand in definite status and role relationships to one another and which possess a set of values or norms of its own regulating behavior of individual members, at least in matters of consequence to the group.

According to Leslie *et al.* (2001:117), young adults should not merely be a population of convenience for researchers. It is by virtue of young students in an educational setting and their educational level that today's university students

are the future social opinion leaders and policy makers. As such, their habits, beliefs and attitudes will be influential in shaping community norms and values. Karoly *et al.* (2005:428) refer to the manner in which this population subgroup selects, structures, cognitively reports and presents their important goals, which provide at best a cohort-specific look at motivational patterns that differentiate their choices in a specific set of circumstances. A decline in physical activity patterns for young adults is reported in literature. In this research, the typical university ages of between 18 and 25 years, frequency of doing vigorous exercises three or more times per week, declines by six point two percent (6.2%) for men and seven point three percent (7.3%) for women (Sallis *et al.*, 1999:1).

Young people are not vigorously active any more (SGR, 1994:6). Moreover, physical activity declines most rapidly during late adolescence and early adulthood (NASPE, 2007:1). The CDC (2006:1) reports that exercise participation figures drop for regular leisure time activity of up to 36.6% for university/college aged individuals. The university setting usually promotes sedentary behaviour patterns (lecture attendance, computer and internet usage, etc.). If these sedentary patterns are developed and reinforced during young adulthood, it is probable that they will persist through adulthood (Sallis & Owen, 1999:19; Fotheringham, Wonnacott & Owen, 2000:2; Owen, Leslie, Salmon, Fotheringham, 2000:153). Efforts to promote healthier lifestyle choices and practices among young adults as well as providing knowledge on physical activities that can be used in leisure time could shape their individuality in positive ways (NASPE, 2007:3).

A university setting is a very specific environment in which young adults live for a period of time during the transition from adolescence to young adulthood and is therefore important to contextualise for this research purpose.

#### **2.4.15 The university campus context**

Attending university is a life transition for most young people (Leslie *et al.*, 2001:119). Historically, universities have been defined as a community for advanced knowledge creation and for instruction of an elite group of youth (Husén & Postlethwaite, 1994:6547). This time spent at university or college represents an important transition period for most young people and should be an ideal time point for interventions to reduce chronic disease risk and improve general health (Hendricks *et al.*, 2004:982). Universities have a civic responsibility to address the current needs in society (Walsh, 2006:45).

The Unit for Student Health at Stellenbosch University states that the university environment should ensure policies to enable each student to reach their full potential. This would imply infrastructure to provide for the health and wellbeing of the student in this particular context. Stellenbosch University's Student Health Services aim to provide a wide range of health services to students that will ensure that all students are able to reach an optimal level of health, are able to maintain this health status and enable every student to reach their full potential in the academic environment of the university (De Villiers, 2007).

In a survey conducted at the San Diego University, 47% of postgraduate students reported a decrease in their physical activity compared to their student days. The data indicated a need for physical activity interventions targeting early adult age groups (Calfas, Sallis, Lovato & Cambell, 1994:324). They also state that many young university graduates start careers as well as families as soon as they leave campus and then 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. School physical education programmes do not effectively prepare students for this transition to self-directed physical activity (NASPE, 2007:1). There is a need to develop effective intervention programmes and create more structured advice and guidance opportunities that will assist and promote physical activity for university students (Calfas *et al.*, 1994:324).

Most of these students are not meeting the public health recommendations for vigorous physical activity (Calfas *et al.*, 1994: 325; Leslie *et al.*, 2001:116; Rozmus *et al.*, 2005:26; Hivert *et al.*, 2007:126; NASPE, 2007:1).

Healthy People 2000 specifically identify post-secondary institutions as settings where large numbers of young adults can be reached with health promotion programmes (USDHHS, 1991:1).

Tertiary education campuses are settings where there are important, yet partially neglected, opportunities to influence the physical activity habits of young adults (Leslie *et al.*, 2001:116 & 119). The university setting provides a physical environment with the potential to make physical activity convenient and enjoyable. The range of available modes of exercise in a university setting can provide opportunities to manipulate exercise according to personal preference, thereby maximising the exercise enjoyment factor to encourage regular participation in physical activity among young adults (Miller *et al.*, 2005:265).

Exercise options and the offering thereof are influenced by the development of exercise modes and related trends. A brief history of the development of exercise trends will now be provided.

#### **2.4.16 Exercise trends**

Surveys reported in literature provide information from various organisations across the world (ACE, IDEA, ACSM, 2002 - 2008) indicating that there is no shortage of new exercise trends emerging annually, aimed at helping the public to meet their health and wellness goals. Most of these surveys are designed to reveal trends in commercial, corporate, clinical and community fitness programme environments. These trends are expectations of frontline fitness professionals to help the health and fitness industry make critical programming decisions. There is a lot of credibility and accuracy as yearly trends take a look into each new year.

Although no-one has been able to predict the future accurately, these surveys help to track trends in the field that will help programme directors and fitness professionals make important business decisions on the presentation of exercise options to members (Thompson, 2007:13).

Watchers of fitness trends say:

The road to better health is usually paved with new exercise possibilities along with some “*old faithfuls*” that are poised to make comebacks (Bouchez, 2007:2).

The growing health and fitness industry reflects no shortage of gymnasium classes, workout videos, exercise equipment and devices (Carney, 2003:1). Researchers and opinion leaders are interested in exercise trends, not fads. Fads are introduced into the market each year and then fade away as quickly as they appeared. It is therefore important to understand the difference between a fitness fad and a fitness trend.

- **Fad:** This is a fashionable exercise mode that is taken up with great enthusiasm by the exercising public for a brief period of time; it is also seen as a craze (Thompson, 2007:7).
- **Trend:** An exercise trend refers to the development of a new mode of exercise (research-based or commercially driven) or a changed/adapted format of a current presentation of an exercise mode. It is also seen in current situations (e.g. fashion trends) or in the way people behave (e.g. the digital trend) (Thompson, 2007:7).

Numerous organisations spend a great amount of time, effort and money to monitor emerging trends in the health and fitness industries carefully. The following are reports from some of the more prominent organisations involved in the industry. The IDEA Health & Fitness Association of America releases an annual survey on global trends that will emerge in the health and fitness industry. A questionnaire is sent to a selection of IDEA businesses, programme directors and professional members.

The types of facilities that participate in the annual study include multipurpose health clubs, fitness-only health clubs, personal training studios, YMCAs/YWCAs, college/universities fitness centres, corporate fitness centres, group exercise studios, hospital fitness centres, parks/recreation departments and a number of independent facilities that present satellite classes (IDEA 2003:1).

The editors of the ACSM's *Health & Fitness Journal* set out to survey the health and fitness industry every year. Their first survey, conducted in 2006, was an attempt to determine trends that would shape and influence health and fitness programming. The survey was repeated in 2007, with the second annual Fitness Trends Survey of the American College of Sports Medicine (ACSM) and with some surprising results. Both surveys were designed to reveal global trends in commercial, corporate, clinical, community and special environments. The potential trends were scored by expert respondents from all over the world, including Asia, Europe, Africa, Australia, North America and South America. Well-educated and experienced fitness professionals who provide services in the health and fitness industry rate trends that could become the most important ones globally (Thompson, 2007:7). The data from the ACSM surveys over the last two years provides information for useful comparisons among the trends in the health and fitness industry, as well as information on the trends that held true throughout the years the surveys were conducted in.

According to the literature surveyed for the study (Wacholder, 2000:1; Miller, 2000:1; IDEA, 2003:1; Davis, 2003:1; Warner, 2003:1; IDEA, 2005:15; Waehner, 2006:1; Thompson, 2007:7; Davies, 2008:1) global fitness trends have changed over the past five years.

In the following paragraphs a summary is made of information retrieved from the IDEA Health and Fitness Association of America, the American Council on Exercise (ACE) and the American College of Sports Medicine (ACSM) and media releases for the years 2002 to 2008 on health and fitness predictions and trends:

**Before 2003:** Early in 2000, Wacholder (2000:1) stated that, “fitness today is at an all-time high, it is more about wellness than looking good. Feeling better and living better has begun to rival the ‘looking good’ standard.” She describes the gymnasiums of “yesteryear” as industrial-style spaces littered with free weights and jazzercise aerobic studios. The baby boomers, the first generation to grow up in the age of media infomania, want to prolong youth, stay healthy and live an active lifestyle for as long as possible. Thus, the health clubs of today are very different than a decade ago. She further reflects on trends of the early 2000s, of personal training becoming popular and people wanting a guide to help them process all the fitness information they are ingesting from the media and making it work from them. The health club trends started showing a greater variety of group programmes, providing motivation, social interaction and personalised instruction. According to Miller (2000:1), aerobic group training sessions should be varied to keep them interesting, giving people choices. In the early 2000s, step aerobics, slide classes, funk/hip hop and high impact aerobics were the exercise trends that were moving out.

Interest started to boom in the Far Eastern forms of exercise, which are gentle and mindful of movement and total body conditioning. Simultaneously, at the opposite end of the spectrum, there is a resurgence of the “hard-core” “no-pain no-gain” style of workouts. At a national level the popular classes include yoga, tai chi, spinning, body conditioning and sculpting, cardio-kickboxing and cross-training style classes (Stevens, 2000:1).

The American Fitness (2002:1) journal mentions that traditional style aerobic classes are not drawing the numbers like they used to. Industry experts are meeting this challenge with innovative group programming options that respond to consumer demand. Time efficient, simple, effective and more functional classes fall in this category.

In Canada, the *Toronto Star* predicted that in the 2000s, the beginning of a new millennium, the old exercises of the 20<sup>th</sup> century are out. You might want to take a spinning class, put on some boxing gloves or get in a Pilates class.

That's the look of fitness for the new 2000s (LIFE, 2000:np). An increase in the use of barbells in a group setting, called body-pump classes, a surge in strength training (especially among women) and kickboxing classes are reported. The latter is another intense exercise sport that more and more women are finding they enjoy even more than aerobic workouts (LIFE, 2000:np). Wacholder (2000:4) also mentions the technological advance in equipment, such as Cybex, Hammer Strength, Paramount, Technogym, Vector, Trotter, Precor and Reebok starting to emerge in newer gymnasiums.

**2003:** Participants in a survey conducted by IDEA (2003:1) on predictions for 2003 reported that 23% of their members/clients were between the ages of 18 and 34 years, 29% between 35 and 44, 24% between 45 and 54 and 18% were 55 or older. Member retention for IDEA registered facilities, after one year, was 72%. Personal training, fitness assessments, strength training and stretching exercises remained firmly established content and trends. At the same time rising stars such as Pilates and yoga as fitness programmes started showing the greatest appeal to consumers (IDEA, 2003:1).

The American College on Exercise (ACE), a workout watchdog group, said 2003 would be the year of a positive mind shift of how exercise is viewed, turning the focus from vanity to the mind-body workout and more senior citizen participation.

The top ten on the list of activities that were predicted for 2003 are Pilates, core strength workouts, active relaxation, sport-specific training, seniors and strength training, online personal training, traditional personal training, circuit-training classes, family affair classes and wellness exercise programmes (Davis, 2003:1).

**2004:** According to the ACE, fitness trend predictions for 2004 reflected a rising need to meet the demands of time-starved Americans, as well as making exercise part of preventative care for older adults, with a health-related focus shift (Warner, 2003:1).

ACE (Warner, 2003:1) reported that the most important trends were for more efficient workouts and exercise programmes in shorter periods of time; a search for kinder, gentler workouts, mind-body programmes such as Pilates and yoga, to offer a more holistic approach to physical fitness and wellness; functional fitness to help people perform daily activities with less pain and discomfort; lifestyle and performance coaching; smarter fitness equipment that provides feedback on most aspects of client participation; weight-loss and nutritional focus with more regular exercising and sensible eating; exercise as part of preventative care for older adults and simple programmes to get sedentary people moving, such as walking (Warner, 2003:1). The ACE survey predicted that the search for kinder, gentler workouts will continue, but the trend will be to blend mind-body workouts with those that are more traditional, such as yoga or stability ball/Swiss ball classes (Carney, 2003:1).

**2005:** The IDEA Trendwatch Reports for 2005 identified yoga, Pilates, stretching and flexibility programmes as those gaining in popularity. This trend is driven by baby boomers and new exercisers looking to improve balance, agility and posture (Davies, 2008:1). The IDEA Programme and Equipment Survey of 2005 (JOPERD, 2005:15) researched the latest fitness trends in health clubs, on college campuses and in recreation programmes. The 2005 survey indicated that one of the biggest emerging trends is the overwhelming popularity Pilates has garnered since 1997. In just seven years participation has sextupled (JOPERD, 2005:15). Other trends emerging are “partner training”, small group activities (e.g. indoor cycling) with social and cost benefits included in this trend. Overall, fitness class duration has been reduced, with most facilities offering 45 minute sessions instead of one hour classes. The fitness equipment of choice among customers, remain strength and cardio machines. Elliptical trainers are becoming more popular than stair climbers. Weight management classes are offered 32% less than in previous years.

Nutritional assessment and personal coaching have become more popular (JOPERD, 2005:15). According to Bouchez and Chang (2005:1), the experts predicted that high impact aerobics and expensive home gym equipment are something of the past.

Health trends on the way up include back-to-basics exercise formats, functional fitness, mind-body workouts and the “buddy system” of working out (Bouchez & Chang, 2005:1).

**2006:** According to the ACS, health and fitness trends for 2006 included more mind-body exercise, balance and functional training and more affordable and convenient personal training (Waehner, 2006:1). The most important findings and predictions about health and fitness trends, according to ACE, were:

1. Sport-specific training – Incorporating younger athletes in programmes;
2. Group personal training – Personalised small-group training sessions with family or friends;
3. In-home personal training – A growing trend that offers convenience and privacy;
4. Special fitness programmes for older adults – Programmes that focus on the special needs for seniors;
5. Simple accessible exercise – The use of pedometers or stair climbing in an unstructured environment;
6. Balance training – Many programmes to promote balance, such as tai chi, yoga, Pilates and other exercise devices such as balls and foam rollers will continue to grow;
7. Exercise in the workplace – Employers are starting to realise the value and benefits of healthy workers; wellness programmes that cover exercise, nutrition and stress relief will grow;
8. Restaurants will get healthy – Healthy options for diners by adding nutritional information;
9. Mind-body exercise – Pilates and yoga have been popular for several years and continue to be; these moving meditation activities promote balance, stress relief and a gentler, calmer way to exercise;

10. Functional fitness – Functional training which focuses on strength training to improve coordination, strength and endurance in everyday activities and by working the body the way it moves in real life can become a strong motivation to exercise adherence (Waehner, 2006:3).

A European and Asian survey from 2006 reveals that spinning or indoor cycling, boot camp style fitness programmes, dance-style salsa fitness classes, stability ball/Swiss ball exercise classes and martial arts-style exercise classes were among the most popular group exercise trends (Rediff News 2006:1-4). According to the International Health, Racquet and Sportsclub Association (IHRSA) in Boston, USA (Yara, 2006:1), staying on top of the latest fitness trends is important for all people involved in the health and fitness industry.

This means offering exercises that not only provide results faster, but also are increasingly tailored to clients' needs and interests. Exercise is considered a leisure activity and people want to have fun. Clubs are figuring out new ways to keep members engaged with interesting classes. Some of the latest offerings emerging in the American market are stiletto strength, a 30 minute routine of Pilates and strength training with a strength and stretch focus that uses classical dance moves to tone legs.

Another new interesting class is forza, a sword-wielding class, and masala bhangra, where members can tighten their abdominal muscles with an Indian dance class. Clubs are blending different types of modalities to create new workouts to counteract boredom. Appealing to niche audiences is also a growing trend. Many clubs are finding bigger benefits in targeting these smaller groups (IHRSA, 2006:2).

**2007:** An international ACSM survey that was sent to more than 4 000 fitness professionals around the world, including Asia and Europe, was designed to reveal trends in commercial, corporate, clinical and community fitness programme environments. Programmes to address and combat the childhood obesity epidemic ranked number one in the survey of top health and fitness trends released for 2007 (ACSM, 2006:1).

The top 10 predictions for 2007 were children and obesity, special fitness programmes for older adults, educated and experienced fitness professionals, functional fitness, core training, strength training, personal training, mind-body exercise, exercise and weight loss and outcome measurements (Thompson, 2006:8).

According to IDEA, an international membership organisation for health and fitness professionals, the top 10 list for 2007 was:

1. Buffet-style fitness that comprises a smorgasbord of choices around having fun, trying new things, taking risks and changing fitness routines;
2. Clubs and programmes with educated and certified fitness professionals to render a service to all clients in the health and fitness industry;
3. The way to weigh less – Weight control has become a big problem among all ages around the world; the benefits of physical activity for managing weight are safe and prove to have positive effects;
4. Getting personal – Personal training is booming because highly skilled guidance and individual attention can mean the difference between an activity programme that fades out or one that can last a lifetime;
5. Only the strong survive – Strength training may be the single biggest trend due to the increased awareness of its long-term health benefits;
6. More mindful, more meaning – Lifestyle and wellness programmes that assist with concentration, alertness, personal growth, improved productivity and so forth are becoming popular;
7. Convenience + Fun = Fit – Exercisers want the convenience of working out at home, buying home equipment and shorter workouts with 30 minute formats are common;
8. Sporting around – Programmes that teach sport skills and sport conditioning are becoming popular;
9. Box, cycle stretch – Indoor cycling, boxing-based classes and stretching programmes are on the most popular list; water fitness for older clients and non-intimidating classes for mature exercisers are growing;

10. How you live, not how you look – Feeling better is appealing to many people; baby boomers want to stay healthy and live vigorously for as long as possible (Fitness Link, 2007:1).

**2008:** For the ACSM Worldwide Survey to reveal the fitness trends for 2008, all current ACSM certified personal trainers, ACSM health and fitness instructors, ACSM health/fitness directors and ACSM programme directors as well as a select list of fitness professionals received a questionnaire. A total of 9 700 surveys were sent out, with a 25% return rate. Responses were received from all over the world, including Asia, Europe, Australia, Africa, North America and South America (Thompson, 2007:8). The responses were collated and ranked from highest to lowest to determine the fitness trends for 2008.

The top ten exercise/fitness trends for 2008 were:

1. Educated and experienced fitness professionals – The importance of certification for qualified individuals who serve the health and fitness industry is most important. This accreditation for the personal fitness trainer joins academic programme accreditation for Exercise Science (baccalaureate), and Exercise Physiology (graduate programmes in either exercise physiology or clinical exercise physiology);
2. Children and obesity – A trend toward more programmes to attack the ever-growing problem of childhood obesity;
3. Personal training – This trend continues as the profession of personal training becomes more of a reality and becomes more accessible to most people in all aspects of the health and fitness industry;
4. Strength training – A trend for men as well as women to incorporate strength training into their exercise routines as the health benefits become more known;
5. Core training – A trend that emphasises strength and conditioning of the stabilising muscles of the abdomen and back;
6. Special fitness programmes for older adults – Special attention to older adults continues to be a strong trend, but has fallen from a number two slot in 2007;

7. Pilates – A category of exercise made in the body-mind area, with overall body conditioning benefits;
8. Functional fitness – A trend towards using strength training to improve balance, coordination, strength and endurance to improve an individual's ability to do activities of daily living;
9. Swiss ball – The exercise ball or fitness ball has morphed into a number of new and exciting directions for children, young adults and even older adults; it teaches stability, balance and strength;
10. Yoga – This exercise trend is grouped in the body-mind area and has taken on a variety of forms in the past year, including power yoga and yugalates (Thompson, 2007:10-11).

The *Dallas Morning News*, (Megan Scott, 2007) predicts that 2008 will bring innovative exercise programmes and group exercise classes to the clients. Classes such as rebounding, hoop dancing, retro-aerobics and fusion workouts can become exciting new options. More public fitness campaigns to fight the bulge will emerge. Corporations will be getting on board to help support their employees in getting healthy. As the childhood obesity crisis continues, trends to let kids exercise outside the gym class will become popular. Technology has also led to more individualised workouts, as more people download workouts and pair their running shoes with their iPods (UL, 2008:1). Small boutique fitness centres for personal training, as well as Pilates and yoga studios, will emerge with more kids and young adults participating in these modes to relieve stress (Scott, 2007:1). A greater demand for group fitness classes and training sessions of 45 minutes or less are predicted for the near future. Workouts and exercise programmes will continue to respond to the critical need for time-starved individuals or populations in general to get an effective workout in a short period of time (ACE, 2007:1; IDEA, 2007:1).

Global fitness trends reveal interesting facts about emerging exercise modes and programme focuses. The health and fitness industry will find these results beneficial when constructing new revenue sources, enhancing present

programmes or reinforcing the trends with new and exciting ways to involve clients and patients (Thompson, 2007:12). A growing majority of women are joining as members in the commercial club category in the USA. Women constitute 60% of the national membership (IHRSA, 2005:1). In 2005, there were 14.6 million members at commercial gymnasiums in the USA in the “young adults” age group, comprising 35% of the market (IHRSA, 2005:1). Compared to other age groups, this population group had the largest market share in the health and fitness industry.

A comparison of exercise preferences of young female students over a period of three years, for the present study, revealed a close relationship to global exercise trends. It is noted that there is a time lapse between the emergence of an exercise trend in the USA and Europe, to the trend fully settling in the Southern African exercise context.

#### **2.4.17 Exercise prescription and programme goals**

Some of the primary goals of an exercise programme are to improve and maintain health status, reduce the risk of disease, relieve stress, modify body composition and improve general fitness (Whaley, 2006:134). A fundamental objective of exercise prescription is to bring about a change in personal health behaviour to include habitual physical activity. The most appropriate exercise prescription for a particular individual is the one that is most helpful in achieving behavioural change.

The art of exercise prescription is the successful integration of exercise science with behavioural techniques that result in long-term programme compliance and attainment of the individual’s goals (ACSM, 2000:140; Whaley, 2006:136). The ability to vary and alter activities according to personal preference, goal orientation, levels of fitness, task enjoyment, exercise intensity, previous experiences, environment and life circumstances are all possible factors that must be considered in exercise prescription.

These could influence or encourage people to make a choice of physical activity to be a regular and sustainable endeavour (Simons, Dewitte & Lens, 2003:148; Whaley, 2006:135). To be truly effective, health promoting programmes should be matched to the social, cultural and environmental characteristics of the target population (Resnicow *et al.*, 2000:616).

Several factors need to be considered when selecting an exercise mode as part of an exercise programme, as not all modes of exercise are comparable in terms of specific outcomes. Research supports that differences occur in exercise outcome as a result of exercise mode (Miller *et al.*, 2005:264). It therefore becomes important to select a mode of exercise that suits individual needs. Issues of exercise intensity and duration as well as any number of unmeasured pre-existing conditions that may lead a participant to self-select into a particular exercise mode, should be addressed (Miller *et al.*, 2005:264).

#### **2.4.18 Modes of exercise**

Extensive research indicates that participation in preferred modes of exercise will maximise the affective response to exercise and regulate a wide array of positive and negative psychological states (Bahrke & Morgan, 1978:324; Martinsen, 1987:94; Thayer, 1987:119; Berger & Owen, 1988:148; Dyer & Crouch, 1988:44; Yeung, 1996:124; Szabo, Mesko, Caputo & Gill, 1998:120).

A wide range of activities or exercise modes provide for individual variability relative to the skill and enjoyment factors of the individual which influence compliance to the exercise programme and the desired outcomes (ACSM, 2000:144). Literature provides varied descriptions or definitions of exercise modes.

The ACSM classifies aerobic exercise modes by varying skill demands of the activity (Kravitz & Vella, 2002:1; Whaley, 2006:140):

- **Group I activities:** *Provide a consistent intensity and inter-individual variation of energy expenditure that does not depend on the participant's*

*skill level. These activities are desirable in early stages of a rehabilitation programme (e.g. walking, cycling, treadmill and cycle ergometry, as well as simulated stair climbing).*

- **Group II activities:** *The rate of energy expenditure will vary greatly, depending on the person's performance ability (skill level). With higher skill levels a person can work harder and longer and consequently burn more calories, but also provide a constant intensity for a given individual. These activities are useful in the early stages of conditioning, but skill levels must be considered (e.g. aerobic dancing, bench stepping, hiking, swimming and water aerobics).*
- **Group III activities:** *These activities are highly variable in terms of energy expenditure and skill due to the performance demands of the activity. These activities provide group interaction and variety in exercise (e.g. basketball, racquet sports and volleyball).*

Other considerations the ACSM (Kravitz & Vella, 2002:1) deems important when selecting an exercise mode, are:

- **Specific mode considerations:** *Factors such as personal interest, equipment and facility availability, physical needs, injury risk and fitness goals, become important.*
- **Intensity of exercise:** *A major way to optimise energy expenditure is to vary the intensity of the exercise. Additional health and fitness benefits will be attained as the amount and intensity of exercise increase.*  
*It is important to choose a mode of exercise that can be adjusted or graded to overload the cardiorespiratory system that allows for high intensity intervals, interspersed with low to moderate intensity intervals.*
- **Upper and lower body modalities:** *Some exercise modes involve upper as well as lower body muscles. The way in which these muscles are engaged, will vary and should carefully be considered.*

- **Non-weight-bearing versus weight-bearing modalities:** *At the same level of intensity, most weight-bearing exercise modes will expend more calories during performance in comparison with non-weight-bearing modes. An additional benefit of weight-bearing exercise is the maintenance of bone mass and prevention of osteoporosis. The non-weight-bearing exercises will have much less trauma to the muscles and joints, the heart rate will generally be lower and longer exercise bouts can be maintained.*

According to Zoeller (2007:99), the recommended modes of exercise required that will improve cardiovascular fitness and the health-risk profile of individuals, employ large muscle groups in activities that are continuous and dynamic (e.g. walking, running/jogging, cycling, swimming, aerobic dance and inline skating). It is also stated that additional strength training is recommended as part of a complete exercise programme to provide additional health benefits (bone mass/density and prevention of osteoporosis) for the individual (Kravitz & Vella, 2002:1; Zoeller, 2007:99).

Before a detailed description is provided of some of the most frequently found aerobic exercise modes in gymnasium settings, a brief history of the development of the aerobic format of structured exercise classes is provided.

Dr Kenneth Cooper, a physician at the San Antonio Air Force Hospital in Texas, devised a form of exercise that helped to prevent coronary artery disease. He called the system aerobics (Cooper Institute, 2007:1). This introduced a new word and a new concept of exercising to America and the world. The exercises were initially invented for the physical conditioning of astronauts. As years went by, it was observed that these types of exercises were also useful for the general population. Different modes of aerobics, such as dance aerobics and step aerobics, developed (Cooper Institute, 2007:1). Cooper published a book called *Aerobics* in 1968. It included many forms of exercise with a more scientific description and rationale. The book was an instant success. During the next two decades, aerobic dance and aerobic exercise in various formats spread throughout the USA and the rest of the world (Cooper Institute, 2007:2).

Jacki Sorenson is credited with originating this significant fitness movement by taking the original aerobic format of exercise Cooper developed and setting it to music (Monroe, 2007:112). After this, aerobic dance was born. It has evolved into many multifaceted exercise classes found in gymnasiums across the world. From the solid foundation Cooper provided for the aerobic exercise modalities, a format of structured exercising developed into a universal, global industry. Millions of people started exercising, motivated by his preventative medicine research and inspiring books. Various formats and modes of aerobic exercise developed, with the additional use of interesting devices to enhance the exercise experience for the individual.

The Cooper Institute in America (Cooper Institute, 2007:1), provides the following benefits of participation in aerobic modes of exercise:

- Aerobics help strengthen the heart and lungs, which in turn leads to better expulsion of waste materials such as carbon dioxide.
- It increases the efficiency of the heart by elevating blood stroke volume.
- More efficient use of oxygen helps burn fat more effectively.
- It strengthens the defense system of the body, lowers blood pressure and helps reduce the risk of developing diabetes and other life-threatening diseases.
- Aerobic activity increases HDL cholesterol and decreases LDL cholesterol and helps a person to recover from any sort of disease.
- The cardiovascular system becomes more efficient and assists with weight maintenance as age increases.

Traditional style group aerobic classes are not drawing the numbers they used to. At present aerobic programme directors market known and older formats of aerobic workouts in many different ways to prevent members and clients from losing interest in classes. Industry experts and manufacturers are meeting the challenge and demands of the current trends in the industry with innovative group programming options (American Fitness, 2002:1). Participants are looking for a variety in their workout regimens, as well as more specific exercise programming and equipment.

This is aimed at improving the individual's performance capabilities (ACE 2007:1). New group aerobic exercise mode trends are continuously being developed.

The latest emerging exercise modes are:

- **Cy-Yo:** A one-hour workout combining 10 minutes of yoga, 40 minutes of speed cycling on a stationary bike and then 10 minutes of yoga to cool down and refocus the mind (Bouchez, 2007:1).
- **Yoga-fit:** A merge of traditional yoga with a variety of other activities, including strength training, core muscle building and butt firming (Bouchez, 2007:1).
- **Yogalites:** A combination of yoga and Pilates (IDEA, 2007:1).
- **Stompers:** A new cardio class with "stair climbers" placed in a group in a small area of a gymnasium or exercise hall (American Fitness, 2007:1).
- **Zumba:** A Latin American dance-based fitness class (Institute of Fitness Professionals: Newsletter, August 2008).
- **Rebounding:** A group exercise session with exercises performed on small trampolines. It has great sport and fitness applications (Institute of Fitness Professionals: Newsletter, August 2008).
- **Air stepper:** A class using a variation of the half ball or bosu ball, designed to give a full body workout. The focus is on core and strength training. Other small exercise devices are used during this workout (Virgin Active, 2008).
- **Kangoo jump:** A group exercise session using Kangoo boots, known for explosive conditioning benefits during plyometric training. A great cardiovascular, muscular strength and general fitness conditioning class (Virgin Active, 2008).
- **Gliding:**\* A group exercise session utilising individual gliding disks that add a new dimension of intensity and resistance (contact with the surface) to an aerobic workout. Activities engage multiple muscle groups while core muscles are sensitised to keep the body vertical and stable.

Combination classes are being developed to include body toning exercises to gliding movements, with a result of glide & tone classes emerging (\*Stellenbosch University (SU) Gymnasium, November 2008).

- **Watercrew rowing:**\* An interesting new aerobic exercise session introducing the stationary patented “water flywheel” with traditional conditioning exercises and formats. This class provides for a no to low impact workout and can successfully be combined with slide board classes. The natural fluid connection of the rower’s paddle in the water dampen the harsh mechanical feel typically experienced during conventional rowing. The intensity of this type of workout can be increased by rowing harder and faster (\*SU Gymnasium, November 2008).
- **Capoeira:**\* A Brazilian, systemised martial arts class, fusing dance-like and traditional fighting techniques with music and acrobatic flair. This exercise class provides for a no-contact and low impact exercise session, developing total body awareness, body control, flexibility, concentration and unusual visual and kinetic awareness. Movement actions flow from one to the following in “fight-with-partner” sequences. This is a fun class for youth and young adults (\*SU Gymnasium, November 2008).
- **Trailblazing:** A military-style, outdoor and adventure class, adding Kangoo jumps (Virgin Active, 2008).
- **Kettlebells:**\* An aerobic workout class with a resistance training focus. The Russian kettlebell is a traditional cast iron weight that could replace other traditional lever bars, barbells, dumbbells, etc. This class format utilises the kettlebell as training device to develop muscle strength and endurance as well as create new opportunities for interesting overall body conditioning (\*SU Gymnasium, 2008).
- **Belly dancing:**\* This workout combines and provides for a fusion of many different ethnic dancing styles and music (African, Middle Eastern and Asian) as a base for class content. This exercise mode focuses on movements and exercises that will stimulate all creative movers and dancers and at the same time provide for freedom of movement and an excellent stress release opportunity. Most of the movements, basic steps and

techniques include typical circular motions of isolated body parts (torso, hips, arms, etc.). The centre of gravity of the whole body stays low and provides for a no to low impact total body conditioning and aerobic workout (\*SU Gymnasium, 2008).

(\*Exercise modes that are being introduced in the aerobic section of the SU Gymnasium from 2008 to 2009).

Gymnasium members expect to be provided with the latest fitness trends and are demanding more and more each year, which means offering exercise formats that not only provide results fast, but also are increasingly tailored to clients' interests (Yara, 2006:1). Although research suggests that weight-bearing aerobic exercise at self-selected intensity will illicit the highest energy expenditure, several other considerations should be kept in mind for selecting an exercise mode. Because of the great diversity of aerobic exercise options and equipment, more and more exercise enthusiasts now prefer to cross-train on a variety of exercise modes (Kravtitz & Vella, 2002:2). Gyms are starting to offer more than the latest machinery to their clients. Larger university settings provide for a greater range of facilities and a broader range of physical activity, sport and active recreation options (Leslie, *et al.*, 2001:120). At the SU Gymnasium, 37 different structured group exercise modes are offered to clients in the aerobic section, and five other modes of exercise to the students and members during the research period.

In the following paragraphs a description of the different types of exercise modes presented by the SU Gymnasium are provided. The compilation of these descriptors for various exercise modes are the researcher's (Van Niekerk, 2002:1-8) own compilation of known or less known exercise modes, as found in most gymnasium environments today. According to the researcher's knowledge, no comprehensive scientifically supported descriptors of exercise modes could be found in the literature. Brief references to or about aerobic exercise modes are found in literature and not all the possible mode descriptions can be found in one source.

It was deemed necessary to create and provide a descriptive database of the various exercise modes presented at the SU Gymnasium and which the study population experienced. Great care has been taken in compiling these definitions/descriptions, incorporating the researcher's comprehensive experience and involvement of 28 years in the South African health and fitness industry, as well as including references from as many primary and secondary literature sources as possible. These following descriptors provide a contextual framework for interpreting exercise preference and the expected outcomes of participation. Further relevance for these descriptors become clear when a final model is presented against which the energy expenditure per exercise mode is provided according to metabolic equivalent intensities (MET). This could assist participants or fitness professionals with selecting an exercise mode that will meet the need of energy expenditure and participation outcome of the client per exercise mode. Participants should be able to select and participate in an activity that is most suitable to their specific needs and goals of exercise pattern, as well as keeping their typical lifestyle circumstances in mind.

In figure 2.2 the researcher developed an original "key" to describe the various aerobic group exercise modes as found and used during this study. Following the "key", the current known title/term/name of an exercise mode is provided, with a description of the typical exercise content and focus, class structure and style, as well as an indication of an exercise outcome. This is followed by an advised competency level for participation in a particular mode.

Comments from various sources about the background, value or contribution of an exercise mode are provided for each exercise mode.

This suggested format attempts to provide a comprehensive set of information on a particular exercise mode (the selection of exercise modes are those that were relevant during the research period).

In the following text, a key for the description of various exercise modes is provided (figure 2.2).

- **Name or types of exercise mode:**  
Specific name/title/type of the exercise mode and a description of the focus and typical class content for the exercise mode.
  
- \* **Levels of competency for participation:**  
An indication of the competency level advised for participants for the specific class:
  - \***B** = Beginner
  - \***I** = Intermediate
  - \***A** = Advanced
  
- **L: Literature review of comments on the exercise mode:**  
Literature references on the exercise mode and the specific value or contribution the particular exercise mode offers.

*Figure 2.2: A key for describing various aerobic group exercise modes*

- **Aerobics / Aerobic dancing:**

A low to high impact, group aerobic exercise class, consisting of a combination of choreographed movements, performed to music. The focus of the class content is large-muscle activities that provide a cardiovascular workout that will improve muscular strength and endurance. A variety of arm and leg movements are added with traditional aerobic exercise combinations (static and dynamic) to complement the conditioning focus of the total body.

A stretching component is included to increase overall flexibility and improve the range of motion at the joints.

\* **Competency level:** Beginner, intermediate or advanced

> **Literature:**

In 1972 Jacki Sorensen, an Air Force wife stationed in Puerto Rico who was familiar with Dr Kenneth Cooper's Air Force aerobics programme, developed a set of vigorous dance routines set to lively music and gave birth to the group aerobic exercise or aerobic dancing format. Since then, aerobic dance exercise has evolved into many styles (Bishop, 2002:1).

Aerobic exercise has shown in numerous instances to be helpful in maintaining normal levels of energy expenditure and weight loss over long periods of time in obese subjects (Ashutosh, Methrotra & Fragale-Jackson, 1997:252).

Aerobic exercise has shown in numerous instances to be helpful in maintaining normal levels of energy expenditure and maintain weight loss over a long period of time in obese subjects (Ashutosh *et al.*, 1997:252). High as well as low intensity aerobic dance have resulted in increased positive and decreased negative mood states (Bartholomew & Miller, 2002:301).

Aerobics and aerobic dancing are some of the most common and popular fitness activities for women in most countries. Both are fun yet functional ways to exercise and promote cardiorespiratory development. High impact aerobics is an intense activity that exerts a great amount of vertical force on the feet and produces the highest rate of aerobics injuries (Hoeger & Hoeger, 2009:284).

● **Aerobics (Low impact):**

These classes provide a safe, overall, basic aerobic workout with a difference. Exercises are performed to moderately paced music to allow for execution of large movements of arms, body and legs.

Exercise combinations and routines are easily adjusted to individual fitness levels. This type of class is designed to provide an aerobic exercise experience without the risk of injury (often the result from more high impact movements).

It is ideal for any new participant to the aerobic section of a gymnasium environment and those returning after bouts of inactivity, illness or a period of recovery. Easy-to-follow exercises and body conditioning movements will focus on improving all major muscle groups. (Low impact refers to a workout focus where the aim is to reduce the impact of the feet, joints and body as a whole, on the floor, when exercising.) A stretching component is included to increase overall flexibility and improve the range of motion at the joints.

\* **Competency level:** Beginner, intermediate or advanced

> **Literature:**

The lessening of impact shock during typical low impact aerobic exercises makes it a good activity for people who are prone to shinsplints. Class sections with the typical stationary choreography allow for arm movements that elevate the heart rate. Many women lack good upper body strength that can be improved by these upper body resistance exercises (Bishop, 2002:72).

Regular attendance of recreational aerobic exercise classes, with the appropriate intensity, duration and time (length), have significantly improved the functional ability in women (Pantelic, Kostic, Mikalacki, Duraskovic, Cokorilo & Mladenovic, 2007:19).

During low impact aerobics the impact on the feet and legs is less, as one foot always remains in contact with the floor. The recommended exercise intensity is more difficult to maintain. Sustained movement throughout the exercise class is crucial to keep the heart rate in target cardiorespiratory zones (Hoeger & Hoeger, 2009:285).

Low impact aerobics are those movements involving large muscle groups used in continuous rhythmic activity in which one foot contacts the floor at all times.

It is an excellent way to begin an exercise programme for those who have not exercised for some time and want to ease into an aerobics programme (Indianetzone, 2008b:1).

\* Other aerobic evolved exercise mode combinations have developed from the original aerobic dance classes and have become modified versions of the original format. These classes include a wide repertoire of hybrid formats, such as aero-step, sport aerobics, cardio-tone and aero-skip, combining different focus classes and utilising various fitness enhancing devices).

• **Aero-step:**

An exercise class with a combination of typical aerobic and step class movements, choreographed to music, for group exercise instruction. The class content focuses on improving cardiovascular fitness and toning the lower extremities (legs and buttocks). The combination of traditional aerobic dance movements and step combinations, on and off the bench/step, provide an interesting alternative from the traditional classes and adds a new physical and cognitive challenge for the participant. The variety of movements for the arms, body, legs and footwork create a total body conditioning experience. A stretching component is included in the class to increase overall flexibility and improve the range of motion at the joints.

\* **Competency level:** Beginner, intermediate or advanced

> **Literature:**

Step aerobics was invented and popularised by Gin Miller in the late 1980s. She teamed up with Reebok to create the Step Reebok programme. Step aerobics consists of patterns of stepping onto and off a bench. The bench height can be adjusted (Bishop, 2002:73).

Bench/step exercise is a highly popular training modality that is widely believed to be effective for improving various facets of physical fitness, especially muscular fitness and body composition (Engels, Currie, Luek & Wirth, 2002:71).

The basic step moves involved in this type of workout include directional changes, using traditional high to low impact choreography of movements to create a good cardiovascular and strength enhancement workout (Virgin Active: Class descriptors, 2004).

Step aerobics is viewed as a high intensity but low impact activity. Even though one foot is always in contact with the floor or bench, this activity is not recommended for individuals with ankle, knee or hip problems (Hoeger & Hoeger, 2009:285).

- **Aero-tone:**

A combination of low and high impact aerobic movements and traditional body toning exercises, in a group setting, choreographed to music. The purpose of the class content is total body conditioning. A variety of small exercise devices, such as mats, stretch bands, light hand weights and exercise balls can be used in combination or complementary to the more traditional exercises in order to achieve the targeted conditioning outcomes. A stretching component is usually included at the end of a class to facilitate overall flexibility and improve the range of motion at the joints.

- \* **Competency level:** Beginner, intermediate or advanced

- > **Literature:**

The combination of aerobic exercises and body toning content (strength and endurance exercises) in an exercise class is to shape, define and firm muscles while building muscular strength and endurance. It is an opportunity to firm up the body.

Men often focus on developing a muscular appearance, particularly with respect to their abdomen and chest. When enough resistance is used, a man's muscles will visibly increase in size (Bishop, 2002:85).

For weight loss purposes, activities should be performed at a low intensity (such as aero-tone) for a long duration. It is optimal to burn 300 kcal per exercise session or four kcal per kilogram of body weight per exercise session (Robert, Jones & Bobo, 1996:314).

It is a conditioning class that is suitable for all levels of fitness, increasing strength and muscle definition. It also improves flexibility, balance, body alignment and posture (Virgin Active, 2004:2).

- **Aero-punch:**

An exercise class combining aerobic dance, typical martial arts and traditional boxing movements, choreographed to music, in a group setting. The focus of the class content is to improve cardiovascular fitness, muscular strength and endurance, explosive strength in the upper body, agility, visual focus and acuity that provide a total body workout. This class is more athletic and sporting. The expressive nature and strength release of some arm and leg movements provide an opportunity for good stress release. A stretching component is included at the end of the class to increase overall flexibility of the body and improve the range of motion at the joints.

\* **Competency level:** Beginner, intermediate or advanced

- › **Literature:**

Exercise programmes such as boxerobics, cardio knockout and boxercise use boxing footwork and punches, rope jumping, shadow boxing and bag punching to develop strength and aerobic conditioning (Bishop, 2002:70).

The class format includes a combination of aerobic movements, martial arts and boxing skills. It is a controlled cardiovascular upper and lower body workout, improving muscle strength and flexibility (Virgin Active, 2004:2).

Aerobic kickboxing, boxing aerobics and aero-punch are the favourite forms of kickboxing among women. It is a great weight management tool, and one of the

foremost calorie burners of all fitness activities. Approximately 800 kcal are burned per hour in such a class. The techniques and typical exercises executed in this exercise mode help to build confidence, self-esteem, self-control, a positive mental attitude, endurance, muscle strength and weight management. It also assists with reducing stress levels (Jameson, 2007a:1).

- **Aquafitness/Aquarobics:**

A variety of structured exercises and movements, performed to music, in a heated indoor pool, with or without small exercise devices. The class content aims to improve overall body toning, muscle strength and cardiovascular fitness. The medium of water provides the necessary resistance, with no impact on the body or joints. This exercise mode is especially beneficial for pregnant women, obese individuals, people recovering from sport injuries and surgical procedures. A special stretching component, performed in the water, is included to increase the overall flexibility of the body and improve the range of motion at the joints.

- \* **Competency level:** Beginner, intermediate or advanced

- > **Literature:**

Overweight people find chest deep water a motivating factor because their bodies are hidden from others while performing their exercise session (Lepore, Gayle & Stevens, 1998:16).

Exercising in water has become increasingly popular and is therapeutically beneficial. It is a viable form of conditioning for people with orthopaedic disabilities. Water is an equalising medium; its gravity minimising nature reduces compressive forces, providing a better exercise environment for people with arthritis, back pain, osteoporosis or other medical conditions that may restrict training on land (Takeshima, Rogers, Watanabe, Brechue, Okada, Yamada, Islam & Hayano, 2002:544).

Water aerobics involves a variety of body and dance movements performed in water. It starts with simple exercises, which become more advanced.

It may be done in waist or chest deep water, depending on the type of exercise (Indianetzone, 2008b:1).

This form of exercise is fun and safe for all people of all ages. Besides developing fitness, it provides an opportunity for socialisation in a comfortable and refreshing setting. Most exercises are designed to elevate the heart rate. The vigorous limb movements performed against the water's resistance provide the training stimuli for cardiorespiratory development. Because of this resistance to movement, strength gains with water aerobics seem to be better than with land-based aerobic activities. Water exercises also help the joints move through a fuller range of motion, promoting flexibility throughout the body (Hoeger & Hoeger, 2009:286).

● **Aqua-sport:**

A high intensity, advanced water-aerobic fitness class, performed in a deep, heated indoor pool, to music, in a group setting. The content of the class is focused on challenging the fitter individual and sporting fraternity to achieve a higher level of cardiovascular fitness, muscle strength in an alternative off-season, no-impact workout. A special stretching component, performed in the water, is included to increase overall flexibility and improve the range of motion at the joints.

\* **Competency level:** Intermediate or advanced

➤ **Literature:**

Deep water aerobics uses floatation devices to suspend the individual in a vertical position and is usually advised for more competent exercisers. The deep water provides for buoyancy that decreases the impact stress on the joints of the lower extremities. Water offers 12 times more resistance than air. In water both directions of a movement meet with resistance, therefore people burn more calories exercising in water (Bishop, 2002:78).

It has been reported that the resistance water provides increases the energy cost of certain types of work/effort/exercise and the VO<sub>2</sub> is higher while ambulating in waist deep water compared to walking on a treadmill at the same speed. It also improves cardiorespiratory fitness in young and middle-aged adults (Takeshima *et al.*, 2002:547).

Aquafitness and aqua-sport exercise workouts aim to improve all the components of fitness: muscular strength and endurance, body composition, aerobic capacity, flexibility or joint mobility as well as improving neuromuscular coordination (Kindersley, 2003:34).

Aqua-sport can be an excellent alternative activity for very fit people. Programmes for athletes are usually planned specifically to improve performance in a particular sport (Egger, Champion & Bolton, 2006:11).

- **Body toning:**

A low to non-impact, overall body conditioning class, performed to music, in a group setting. All movements and exercises systematically focus on developing the main muscle groups of the body, using own body weight and a variety of small exercise devices, such as mats, hand weights, stretch cords, exercise balls and steps, to complement the exercise focus and outcome. The content of this class format incorporates aerobic content (locomotor and non-locomotor movements), various gentle resistance training techniques and a stretching component to increase overall flexibility and the range of motion at the joints. The use of apparatus and the exercise combinations focus on improving muscular strength all over. Regular participation in this type of class will assist in the prevention of osteoporosis and osteoarthritis.

\* **Competency level:** Beginner, intermediate or advanced

### > Literature:

Participation in low impact exercise is associated with decreased anxiety, tension, depression, anger, fatigue and confusion, but with enhanced vigour (Berger & McInman, 1993:745).

The format centres around muscle developing exercises. How the muscles are worked, and whether the emphasis is on body conditioning, hypertrophy, muscular strength or muscular endurance, will differ among programmes (Bishop, 2002:85).

From a health behaviour perspective, sedentary individuals may gain positive psychological benefits from participating in low intensity exercise modes in comparison with the higher intensities of exercise which may lead to exercise distress, discomfort and reduced enjoyment (Daley & Welch, 2003:220).

This exercise mode focuses on total body conditioning. The improvement of muscle definition will better equip the individual with the execution of everyday activities (ACSM, 2007a:2).

### • Body dynamics:

A group fitness class, performed to music, focusing on the core stabiliser muscles of the body, for the improvement of balance, pro-prioception and the range of movement at the joints. The class is ideal for individuals who have difficulty in moving, are recovering from surgery or need special individualised attention. A stretching component is included to increase overall flexibility. The body-mind approach makes this exercise session soothing and relaxing, yet provides the necessary overall fitness focus. Participants will experience that the content and presentation contribute to a better sense of self.

\* **Competency level:** Beginner, intermediate or advanced

### > Literature:

Exercise, dance and emotion are inseparable and can develop, refine and even completely transform a person's emotional state (Chodorow, 1991:41).

Physical change will occur with any exercise. The addition of a variety of movement, sound and rhythmical sources will transform repetitive motion into an experience that is personally fulfilling and emotionally healing (Spindell, 1996:2).

The emphasis on core training is becoming increasingly popular. Core training strengthens the muscle surrounding the spine, such as the pelvis and abdominal muscles. This type of training can improve back stability and make everyday activities easier (ACSM, 2007a:2).

Core board training is a useful tool in any functional training programme. The rotational push-up, an excellent core exercise, can only be done on a Reebok core board, It utilises the rotational capabilities of the board to work the muscles of the upper back, along with the chest muscles (Boyle, 2004:140).

### • **Bosu ball:**

A dynamic group aerobic exercise class, performed to music, with maximum time spent on the bosu ball. The content of the class has a sport conditioning focus. Improved cardiovascular, muscular strength and endurance outcomes are targeted. Movements are executed in all anatomical planes (sagittal, frontal, horizontal) and are performed to improve stabilisation, balance, agility and flexibility. A stretching component is included to increase overall flexibility and improve the range of motion at the joints.

\* **Competency level:** Beginner, intermediate or advanced

### > Literature:

One of the most popular balance training classes is bosu ball. These classes strengthen the core muscles as well as their stabilisers, the muscles that keep

your ankles, knees, hips and torso upright. Balance is a key to all sports. Any bosu exercise, from sit-ups to one-legged squats to push-ups, strengthens the joint muscles that keep you stable (Bodywork: Fitness Report 2004).

Several plyometric exercises, such as the exploding step-up and the lateral step, on the bosu ball assist with the conditioning of tennis players. The bosu ball provides an unstable surface, which improves body awareness (Sullivan, 2005:71).

Instability devices (bosu ball) are commonly employed in fitness and rehabilitation centres for their purported benefits in injury prevention, rehabilitation and improving balance. This type of training has been demonstrated to augment trunk-muscle activation, vertical-jump height and balance, improvement of core stability, balance and reduction in injuries (Drinkwater, Pritchett & Behm, 2007:400).

- **Ball & all:**

A group aerobic class, performed to music, with no-impact movement content, using the Swiss ball as exercise device. The focus of the class content is to improve muscle strength, total body conditioning as well as develop effective and balanced handling of the body. A stretching component is included to increase overall flexibility and improve range of motion at joints.

\* **Competency level:** Beginner, intermediate or advanced

- > **Literature:**

In the gymnasium, from cardio to resistance training and stretching, ball workouts help to achieve complete fitness. It can be used in a multifaceted way to achieve great abdominal and cardiovascular conditioning. A large number of stretches and resistance training exercises for all muscle groups can be executed for all over body conditioning (Sapat, 2006:3).

Different modes of training have been proven to be safe and effective for young adults. The use of balls, such as the Swiss ball or medicine ball, is becoming increasingly popular at training centres. Originally used in the rehabilitation of muscle function, these balls are now being used to improve health-related fitness, performance-related fitness and participatory self-efficacy. The exercises can be used to enhance muscle strength, muscle power, flexibility, endurance, coordination, agility, balance and speed. This type of training requires the participant to use their mind as well as their body. Some exercises are easy to perform, but others are complex and require the individual to think about what they are doing (Faigenbaum & Mediate, 2006:25).

The Swiss ball allows for a wide range of activities to be performed on it and it can assist with the development or improvement of core strength and balance training (ACSM, 2007a:2).

Swiss ball exercises provide an inexpensive and effective exercise format to challenge, integrate and train multiplanar functional movement abilities (Wilson, 2000:26).

- **Callanetics:**

A group exercise class performed with or without music, using a variety of focused exercises. All movements are executed with repetition, in a small range, to improve overall body toning. Small exercise devices could be added to enhance the exercise focus or purpose. Movements are slow and controlled, specific muscle groups are targeted with the execution of a variety of exercise, to achieve overall muscle conditioning. The class has no aerobic work and is therefore a good addition to any aerobic programme. A stretching component is included at the end of the class to increase overall flexibility of the body and improve the range of motion at the joints.

\* **Competency level:** Beginner, intermediate or advanced

### > Literature:

This type of sculpting exercise format is especially designed to condition all muscle groups by utilising small hand weights or other resistance equipment. The main objective of the class is to improve muscular strength and endurance. Movements are executed with resistance provided by a combination of body weight, hand weights or other devices to improve muscle strength and endurance (Egger *et al.*, 2006:114).

Typical exercises executed in this programme can improve strength, flexibility and balance, making everyday activities more enjoyable with less risk of injury (ACSM, 2007a:2).

Physical stress symptoms such as elevated heart rate, blood pressure and general muscular tension can be reduced by participating in regular structured exercise sessions, with a lower or no-impact focus (Sharkey, 1990:23).

### • Cardio workout:

A high impact, cardiovascular, group aerobic class, performed to music. The class format could also include specific structured fitness content, performed at different “stations”, in a circuit format, for a specialised focus on improving all fitness components. A stretching component is included to increase overall flexibility and improve the range of motion at the joints.

\* **Competency level:** Beginner, intermediate or advanced

### > Literature:

According to Sapat (2006:1), some hybrid-type aerobic training programmes have recently been developed. One of the most recent trends is military-style station training. This is a workout with an athletic challenge. It includes exercises such as push-ups, hurdles, drills and kicks and punches. It is easy to follow and the moves concentrate on intensity. It challenges the body and muscles in unconventional ways, tones and tightens and burns fat.

A large body of knowledge has reported that vigorous aerobic exercise in various formats assists the individual with a “feel better” experience due to participation in physical activity (Boutcher, 1993:804).

Every exercise mode has its pros and cons. What determines the extent of fitness development is the quality of the programme and the individual's effort performing exercises at the training stations, not necessarily the equipment used (Hoeger & Hoeger, 2009:220).

- **Circuit training:**

This type of training can be executed on a gymnasium floor/level, using a variety of stationary training devices and exercise machines.

This format of exercising can also be structured and presented in an exercise hall. All components of physical fitness can be enhanced through this type of workout, as well as contribute to the improvement of overall health. Selection of specific skill-related exercises, executed with or without devices and machines, can further enhance sport-specific performance. The background music played in the gymnasium usually provides a tempo to utilise during such a workout. Buzzers indicate the specific time spent at each station or training equipment. Individual flexibility exercises are performed on mats provided within this area.

\* **Competency level:** Beginner, intermediate or advanced

- > **Literature:**

Everyone can benefit from participating in circuit training. Special fitness requirements of the individual can be accommodated in a session. Some circuit programmes are high in intensity and variety and do not cater for individual needs. Circuit training is safe, effective and a fun approach to exercising that can be enjoyed by a variety of people (Lawrence & Hope, 2003:2).

For individuals who are trying to maximise strength gains, the exercise programme will be more time effective if two or three exercises are alternated within a circuit that require different muscle groups.

People wait two to four minutes before proceeding to a new set on a different exercise in a gymnasium circuit (Hoeger & Hoeger, 2009:222).

This format of exercise includes a series of exercise stations set up in a specific order. Participation progresses from one station to the next, without rest, depending on the type of training desired. Circuits can consist of aerobic, anaerobic, flexibility, muscular strength and muscular endurance stations (Bishop, 2002:80).

- **Core stability:**

A group exercise class, performed with or without music, including typical Pilates and related movements.

This class format has the purpose to tone and improve the core muscles of the body, improve posture and create an awareness of correct breathing methods during exercise execution. A stretching component is included to increase overall flexibility and improve the range of motion at the joints.

- \* **Competency level:** Beginner, intermediate or advanced

- > **Literature:**

The trunk (spine) and pelvis are referred to as the “core” of the body. Core muscles include the abdominal muscles (rectus abdominus, transversus abdominus, internal and external obliquus), hip muscles (front and back) and spinal muscles (lower and upper back). These muscles are responsible for maintaining the stability of the spine and pelvis. A strong core allows a person to perform activities of daily living with greater ease, improves sports performance through a more effective energy transfer from large to small body parts and decreases the incidence of lower back pain (Hoeger & Hoeger, 2009:224).

The emphasis on core training is becoming increasingly popular. Core training strengthens the muscles around the spine, such as the pelvis and abdominal muscles. This type of training can improve back stability and make everyday activities easier (ACSM, 2007a:2).

Core stability provides central body control and allows you to generate power by maximising the efficiency of your muscular effort. It is the ability of your trunk to support the effort and forces from your arms and legs, so that muscles and joints can perform in their safest, strongest and most effective positions (Elphinston & Pook, 1999:6).

Several exercise classes are currently focusing on the conditioning of core muscles (transverse abdominal and pelvic floor muscles) through balance and stability training that incorporates strength, flexibility and aerobic exercises. Foam rollers, core board, stability ball, bosu ball and floor work are used to facilitate the desired results (Mercer, 2003:42).

- **Dance dynamics:**

An aerobic exercise class using a combination of hip hop and funk dance-style movements, combined with any other related dance or exercise styles, to create a fun, group dance class with a difference. It is a very effective exercise session where the content of the class has a dance focus. This type of class enhances expression of movement, improves movement memory and choreographic ability, as well as provides an opportunity to improve general fitness. A stretching component is included to increase overall flexibility and improve the range of motion at the joints.

- \* **Competency level:** Beginner, intermediate or advanced

- > **Literature:**

Dance and associated movement have proven to be very effective in achieving a variety of therapeutic goals, such as activating the physical body, expanding

the participant's imagination, releasing tension, improving coordination and assisting in developing a positive self-image (Kavanaugh, 1995:5).

Everyone can dance, because dance is the freedom of expression; it is movement to music. Dance has always been universal in every culture. A dancing format of exercise is one of the healthiest ways to get in shape. It develops stamina and strength. The beauty of this approach is that you are slowly building on the strength of your core, the abdomen, back and gluteal muscles. Core strength is the base of dance exercises. It is used for balance, stability and flexibility (King, 2007:64).

Ballet, country line dancing, salsa and hip hop, among many others, inspire dance-type aerobics. It is essentially an hour workout beginning with a warm-up, stretching, target heart rate dancing movements and a floor stretching ending (Indianetzone, 2008e:1).

- **Flamenco fitness:**

A vibrant group exercise class, inspired by the flamenco (Spanish) dance style and music, combined with flexibility movements to improve the figure. It is a very effective exercise session where the class content has a stronger dance focus enhancing individual expression, movement memory and choreographic ability, with all the fitness benefits added. A stretching component is included to increase overall flexibility and improve the range of motion at the joints.

- \* **Competency level:** Beginner, intermediate or advanced

- > **Literature:**

According to Sapat (2006:3), this apparent "exercise" form is energetic, elevating and sexy. In 2006 fitness enthusiasts took to the different dancing-style classes in a big way, as opposed to slogging away at the treadmill. Unless done non-stop and at a good intensity, dancing is not technically a "cardio workout". It shows weight reduction in otherwise sedentary people, but does not reduce fat or tone the body.

The integration of the artistic process and physical activity among individuals in a social context can help to promote personal growth and benefit health (Warren, 1993:4).

The use of different forms of dance for healing or therapeutic purposes is not a new concept (Chodorow, 1991:1). As today's workplaces are often sterile and dehumanising, it is not surprising that dance in its many forms is used and seen as therapeutic in health and fitness centres around the world (Warren, 1993:4).

- **Indoor cycling/Studio cycling:**

A no-impact, group, indoor cycling exercise class, performed to music on stationary studio cycles. The focus is on improving cardiovascular fitness and muscle endurance. Classes could include special focus sessions and be structured for specific event training, such as hill climbing.

A stretching component is included to increase overall flexibility and improve the range of motion at the joints.

- \* **Competency level:** Beginner, intermediate or advanced

- > **Literature:**

Cycling and recumbent cycling are popular non-weight-bearing exercise modes. There are fewer traumas to the muscles and joints, the heart rate can be graded and thus longer bouts of exercise can be performed (Kravitz & Vella, 2002:2).

Spinning is a fun team exercise which includes a one-hour session of non-stop cycling on a stationary bike and a great cardiovascular workout. It is a major calorie burner, with repetitive movements that make it easy for most people to exercise. A disco-like atmosphere makes it enjoyable. The sessions must be coupled with weight training for a fit and toned body (Sapat, 2006:1).

It is an indoor exercise session which combines the foundations of traditional cycling movements with added motivational physical activity coaching in an exercise studio. The intensity of the class will vary as different traditional cycling conditions are simulated. Adjustment of difficulty (resistance) is done according to individual fitness levels (Atlanta University Fitness Center, 2007:2).

Spinning/Indoor cycling is a no to low impact activity typically performed on stationary bicycles (developed by Johnny Goldberg) under direction of a certified instructor in an exercise studio, with dimmed lights and motivational music.

This exercise modality gained immediate popularity upon its introduction in the mid-1990s. The five workout stages – seated flat, seated hill climb, standing running, standing hill climb and jumping – are used to simulate actual cycling training and racing. The workouts are divided into endurance, all terrain, strength, recovery and advanced training (Hoeger & Hoeger, 2009:288).

- **Jogging/Running:**

Jogging or running is one of the most popular forms of aerobic exercise. Exercise sessions can be performed on an indoor running track or on a stationary treadmill, or in the natural outdoor environment. It is one of the most natural and convenient ways of exercising. It is imperative to add a stretching session at the end of the running session to mobilise body parts and improve the range of motion at joints in the body.

- \* **Competency level:** Beginner, intermediate or advanced

- > **Literature:**

The popularity of jogging in the USA started shortly after the publication of Dr Kenneth Cooper's first aerobics book in 1968. Jim Fixx's *Complete Book of Running* in the mid-1970s further contributed to the phenomenal growth of jogging as the predominant fitness activity in the USA. Jogging three to five times per week is one the fastest ways to improve cardiorespiratory fitness.

The risk of injury, especially for beginners, is however greater than walking. This activity is easily abused if people run too fast or too long without proper preparation. A good pair of shoes is a must for all runners and joggers (Hoeger & Hoeger, 2009:284).

From an energy expenditure viewpoint, running will burn more calories than walking due to the increased intensity of the activity. The increased zeal boosts energy expenditure, but compounds the risk of injury to the feet, ankles, knees and back (Kravitz & Vella, 2002:2).

- **Punchline:**

An exercise session combining high and low impact movements (derived from typical boxing, tae bo and martial arts exercise content), performed to music in a group setting. The focus of the class is to improve cardiovascular fitness, explosive strength, agility, focus and visual acuity and at the same time provide a total body workout. This type of class is more athletic and sporting. Exercise devices such as boxing gloves, boxing mitts and punch bags could be used during an exercise session. Partner work (sparring) could be included as part of the structured exercise content. A stretching component is included towards the end of the class to increase overall flexibility and improve the range of motion at the joints.

- \* **Competency level:** Beginner, intermediate or advanced

- > **Literature:**

This is a new exercise format with a martial arts style and focus. The inclusion of music makes it fun. Like most martial arts, it strengthens the muscles while improving balance and focus. The participation of Hollywood celebrities in this exercise mode has made it popular (Sapat, 2006:4).

It is a group exercise class focusing on a combination of boxing, kickboxing, footwork, bag work and muscular strengthening to provide a high intensity workout (Atlanta University Fitness Center, 2007:2).

As rhythmic aerobics has grown, non-dance-like styles have emerged. Programmes such as boxercise, boxaerobics and cardio knockout have taken expertise in boxing and applied it to rhythmic aerobics. The first boxing-style aerobic exercise formats started in 1992, initiated by Frank Thiboutot (Bishop, 2002:69).

- **Punchline choreography:**

A dynamic, advanced group exercise class that includes low and high impact movements, several “katas” from the martial arts, to create a highly choreographed cardiovascular exercise session, performed to music. The focus of the class is to improve cardiovascular fitness, explosive strength, agility, focus and visual acuity and provide a total body workout. This class is more athletic and sporting. A stretching component is included to increase overall flexibility and improve the range of motion, firstly at all major joints in the body and then targeting specific joints.

\* **Competency level:** Beginner, intermediate or advanced

- > **Literature:**

A new form of workouts based on martial arts. The inclusion of music makes it fun and a whole new experience. Like most martial arts, it strengthens the muscles while improving balance and focus (Sapat, 2006:4).

Katas are set forms in pre-established sequences of defensive and offensive techniques of martial and combat movement combinations. It is practiced in stationary positions or with body movements in various formal stances. Basic techniques such as punching, kicking, sparring, blocking and striking are practiced (Imamura, Yoshimura, Nishimura, Nakazawa, Teshima, Nishimura & Miyamoto, 2002:431).

Boxing-style aerobic workouts use boxing footwork and punches, rope jumping, shadow boxing and bag and focus mitt workouts to develop strength and aerobic conditioning (Bishop, 2002:70).

- **Punchline technique:**

A group exercise session, performed to music, including low and high impact movements, with a typical boxing and martial arts content (including upper body, core and lower body movements), with more focus on correct technique of execution of specific exercises and movements to improve body management, muscular strength and endurance. This class is more athletic and sporting. A stretching component is included towards the end of the class to increase overall flexibility and mobility at all the major joints.

\* **Competency level:** Intermediate or advanced

› **Literature:** The techniques and typical exercises executed in this exercise mode help to build confidence, self-esteem, self-control, a positive mental attitude, endurance and muscle strength. It assists with weight management and stress reduction. It is a tremendous workout that focuses action on areas such as the legs, hips, gluteus muscles and abdominals (Jameson, 2007a:1)

This exercise format has the objective to safely mainstream the workout of a fighter to the general public because of the fitness and self-defence benefits. This style of group fitness uses jogging, jabs, punches and a number of shadow boxing and self-defence moves, alone or in combination. When equipment is available, the programme can use free-standing bags, focus pads and punch mitts (Bishop, 2002:70).

- **Pilates Combo:**

A low intensity, low impact, group exercise class, combining exercises and movements from the original Pilates, callanetics and body toning methods. The focus of class is to improve physical and mental conditioning, progressively develop and stabilise the core muscles (abdominal and back), improve balance, flexibility and the range of movement throughout the body. The exercise outcome is to improve overall health and wellbeing. Stretching exercises are included as part of the class content, with the purpose to improve mobility at all the major joints in the body.

\* **Competency level:** Beginner, intermediate and advanced

> **Literature:**

The Pilates method is a unique system of exercises German physical therapist Joseph Pilates developed in the 1920s to progressively strengthen and tone muscles, improve posture, provide flexibility and balance and unite body and mind towards the goal of overall fitness and wellbeing. Modern Pilates programmes are modified versions of the original method and can include a wide repertoire of hybrid programmes, such as Pilates-method and Pilates-based programmes (Van Niekerk, 2002:1).

Pilates is an excellent exercise mode to strengthen and stretch the body (IDEA, 2005:15).

Pilates training is a balanced body workout that promotes a strong, supple body with a flat stomach, balanced legs and a strong back.

It aids with overall flexibility without causing bulky muscles. Pilates provides a complete exercise session, helps the mind to relax, reduces stress and promotes good posture (Jameson, 2007b:2).

Pilates-based training is distinguished by the use of specially designed resistance training devices. Exercises follow specific and ordered sequences and emphasise core movements and body balancing. Participants focus on concentration, control, movement flow, precision, body centering and breathing (Ives, 2000:75).

Pilates exercises have become increasingly popular in recent years. This exercise modality was used primarily by dancers, but now it is embraced by a large number of fitness participants, rehabilitation professionals and professional athletes. Pilates exercises are performed either on a mat (floor) or on/with specialised equipment to help increase strength and flexibility of deep postural muscles (Hoeger & Hoeger, 2009:226).

- **Slide:**

A low impact, high intensity, group aerobic exercise session, performed to music on a slide board as training device. The class focuses on improving cardiovascular fitness, muscular strength and endurance, speed, agility, coordination and proprioception. Slide board movements resemble or simulate typical skiing actions on a stationary exercise device. It is a very effective lower body (legs and buttocks) and core conditioning (abdominal and vertebral area) exercise class. The intensity can be varied by adapting body position and including additional arm and leg movements during the execution of exercises. A stretching component is included to increase overall flexibility and improve the range of motion at the joints.

\* **Competency level:** Beginner, intermediate or advanced

- > **Literature:**

Simulated skiing involves both upper and lower body muscles and requires a fairly proficient skill development phase before fully realising the energy expenditure benefits of the exercise mode (Kravitz & Vella, 2002:2).

Functional activities occur in all planes of motion and require acceleration and dynamic balance to perform them efficiently. Slide board training elicits a highly complex and integrated system of movements to train the entire kinetic chain, using all planes of movement and to establish high levels of functional strength and neuromuscular efficiency (Wilson, 2000:27).

According to Reebok, Scandinavian skaters have used the slide board concept and action for close to a century. Lateral motion training has been used by sport enthusiasts as part of their physical conditioning, by physical therapists for rehabilitation purposes and by fitness enthusiasts in the form of slide aerobics. Slide aerobics and lateral motion training is used to enhance muscular strength and endurance, core stabilisation, power, proprioception, agility, balance, improved body composition and cardio-respiratory fitness (Van Niekerk, 2008b:46).

Shorter boards result in faster lateral motion steps, while longer boards emphasise strength and power development (Bishop, 2002:82).

- **Sport slide:**

A more advanced exercise class compared to the traditional slide class. This type of class incorporates higher intensities of speed and more typical lateral motion training (LMT). The class focuses on improving cardiovascular fitness, muscular strength and endurance, speed, agility, coordination and proprioception. The slide board movements resemble or simulate typical skiing actions, but are performed on a stationary exercise device. It is a very effective lower body (legs and buttocks) and core conditioning (abdominal and vertebral area) exercise class. The class content can serve as effective cross-training opportunity to most sporting codes and will enhance and complement the conditioning of most sport participants. A stretching component is included to increase overall flexibility and improve the range of motion at the joints.

\* **Competency level:** Intermediate or advanced

> **Literature:**

Slide training or the lateral movement training system has been used by Olympic speed skaters for general fitness conditioning. It is good for developing the cardiorespiratory system, agility and balance, as well as muscular strength and endurance. Movement training in all anatomical planes is facilitated by this piece of fitness equipment (Bishop, 2002:83).

Sport-specific training (progressive adductor loading and isometric and concentric contractions), including slide board skating, significantly reduces groin strain injuries (Wollin & Lovell, 2006:159).

For the last decade, the best known and most popular form of lateral motion training within the fitness industry has been known as slide board training. This exercise mode, using the slide board, is a closed kinetic chain, weight-bearing,

aerobic activity, which imparts low-impact forces to the lower extremity. The altering of body position (lower) during the slide motion on the slide board, in the frontal plane of movement, the additional use of arm movements during sliding motions and an increase in intensity/tempo, will provide additional conditioning benefits for the participants. The development of agility, speed, explosive power and quickness will be experienced if additional smaller training devices are added and combined with a workout. Movements on the slide board are executed in all the anatomical planes and provide a great challenge for the fitness enthusiast (Van Niekerk, 2008a:32).

- **Slide & tone:**

A no-impact, group exercise class, performed to music that combines typical slide and body toning content. Small exercise devices, such as mats, stretch cords, sticks, ropes and exercise balls, are added during the class to complement or enhance fitness outcomes during the performance of the exercises. The combination of typical content of two exercise modalities (slide and body toning) makes this an interesting exercise option, with added focus on lower body strengthening as well as total body conditioning. A stretching component is included to increase overall flexibility and improve the range of motion at the joints.

\* **Competency level:** Beginner, intermediate or advanced

- › **Literature:**

The exercise format, including simulated skiing, involves both upper and lower body muscle groups. It requires a fairly proficient skill development phase on the slide board, with correct body and movement technique during the execution of movements before the full benefits of cardiorespiratory endurance, muscle strengthening and endurance benefits are experienced (Kravitz & Vella, 2002:2).

Some of the greatest features of slide aerobics are that it is a very low to non-impact activity that can be performed at a low or high intensity.

The gliding motion is a wonderful lower body workout and is especially good for toning the inner thigh (Bishop, 2002:81).

- **Step:**

A low impact, aerobic, group exercise session, performed to music, using an adjustable step or bench. The class focuses specifically on lower body exercises and movements to improve muscular strength and endurance of the major muscle groups of the lower extremities (legs and buttocks) and improve overall cardiovascular fitness.

Upper body conditioning is acquired through the addition of specific arm movements that are combined with the step actions. A stretching component is included towards the end of the class to increase overall flexibility and improve the range of motion at all the joints in the body.

\* **Competency level:** Beginner, intermediate or advanced

> **Literature:**

Step aerobics was invented and popularised by Gin Miller in the late 1980s. She teamed up with Reebok to create the Step Reebok programme. Step aerobics consists of stepping on and off a bench. The height of the bench is adjusted according to the fitness level of the participant – low for beginners and higher for more advanced participants (Bishop, 2002:73).

Step aerobics is viewed as a high intensity but low impact activity (Hoeger & Hoeger, 2009:285). Step exercise sessions are suitable for the development or maintenance of cardiorespiratory fitness and a healthy body composition in adults (Sutherland, Wilson, Aitchison & Grant, 1999:595).

Aerobic step dance is a leisure activity practiced by many people in order to improve cardiovascular fitness. It is characterised by the use of various heights of the bench from which participants move continuously up and down, with complementary arm movements and following the music rhythm.

The intensity can be modulated and body mass can be manipulated by the addition of different overload strategies, such as small handheld weights or adding loads to the torso (La Torre, Impellizzeri, Rampinini, Casanova, Albert & Marcora, 2005:264).

- **Beginner-step:**

An easy to follow, low impact, aerobic exercise and group step class, performed to music, with a focus on teaching the correct basic step technique and typical step movement patterns. Choreography and terminology of basic stepping and floor movements are introduced to the participant.

It has an easy-to-follow class format, providing the opportunity to establish good technique and execution of movements that can later be used in higher level Step classes. A stretching component is included to increase overall flexibility and improve the range of motion at the joints in the body.

- \* **Competency level:** Beginner or intermediate

- > **Literature:**

Beginner step clients are encouraged to use the lowest step height and then advance gradually to a higher step or bench to decrease the risk of injury (Hoeger & Hoeger, 2009:285).

Step aerobics has the potential to provide the opportunity for weight loss in individuals who attend classes regularly (Sutherland *et al.*, 1999).

It is an exercise class where basic movements are taught in simple patterns with a change of direction on the traditional step platform (Virgin Active, 2004:3).

Step aerobics involves stepping on and off an elevated platform, rhythmically or to a certain beat. It helps the participant expend calories and boosts heart health and the development of good HDL cholesterol (Indianetzone, 2008c:1).

One of the advantages of step aerobics is that people of different fitness levels can perform the movements. The amplitude at which steps are performed as well as arm movements determine the intensity (Bishop, 2002:73).

- **Intermediate step:**

A group aerobic and step class, performed to music, for participants who have mastered the basic step movement patterns and terminology. The choreography of movement combinations in this step class is slightly more advanced. The focus of the class is to improve muscular strength and endurance, as well as cardiorespiratory fitness. A stretching component is included to increase overall flexibility and improve the range of motion at the joints.

\* **Competency level:** Intermediate or advanced

> **Literature:**

The duration or frequency of a step aerobics session should be more than 20 minutes, three times per week, to enhance the potential of the exercise mode to promote weight loss. An increase in step height will significantly increase oxygen uptake, heart rate and energy expenditure and is consistent with previous studies on step aerobics (Olson, Williford, Blessing & Greathouse, 1991:1312; Woodby-Brown, Berg & Lati, 1993:164; Sutherland *et al.*, 1999:496).

The intensity of step aerobics classes can be adapted and controlled by the height of the bench and the type of exercise, with added arm movements.

Even though one foot is always in contact with the bench/step, this activity is not recommended for individuals with ankle, knee or hip problems (Hoeger & Hoeger, 2009:285).

- **Advanced step:**

An intense, low to high impact cardiovascular workout, introducing exciting step movements and advanced choreography.

Movement combinations are taught with additional propulsions and arm movements to increase the intensity of the workout. These dynamic and challenging step movements contribute to overall body conditioning and stronger arm movements are used to maximise an upper body workout. This class provides an excellent fitness as well as cognitive challenge, the latter involving the focused visual following of movements demonstrated by the instructor and of learning and performing step combinations in less time than usual. A stretching component is included to increase overall flexibility and improve the range of motion at the joints.

\* **Competency level:** Advanced

› **Literature:**

Step aerobic sessions may be a useful mode of exercise for promoting improvements in both aerobic fitness and body composition for individuals between the ages of 17 and 25 years (Sutherland *et al.*, 1999:502).

A good exercise session advised for the more experienced member. A high intensity workout, of advanced level, that includes a variety of typical step choreography and floor movements to challenge the individual (Virgin Active, 2004:2).

Various forms of step aerobics have been developed to add another dimension to the aerobics programme. Variety adds enjoyment to workouts (Hoeger & Hoeger, 2009:285).

• **Swimming:**

A traditional water-based aerobic exercise format, using different styles of swimming strokes for travelling in water.

\* **Competency level:** Beginner, intermediate or advanced

### > Literature:

Swimming involves much less pressure on the bones and joints, which allows the swimmer to exercise for longer periods of time, possibly expending as much energy as higher intensity workouts (Kravitz & Vella, 2002:2).

Aerobic training (e.g. swimming) in water elicits similar body composition changes to exercise on land, but could further prevent injuries caused by excessive strain on joints. Non-weight-bearing activities, such as swimming or running in water, should be considered for weight control purposes (Gappmaier *et al.*, 2006:567).

Swimming is an excellent form of aerobic exercise as it uses almost all the major muscle groups in the body, providing a good training stimulus for the heart and lungs (Hoeger & Hoeger, 2009:285).

Distance or lap swimming is a more traditional form of aquatic exercise performed in water, and a good option for individuals who cannot walk or run for extended periods of time (Midtlyng, 1990:1).

### • Walking:

Walking is a natural, easy, safe, convenient and inexpensive form of aerobic exercise that requires very little skill. It can be done on an indoor walking circuit, on a stationary treadmill or in a natural outdoor environment. Challenges to the level of participation by the individual can be added by increasing walking tempo, adding arm movements or inclination of the body. It is imperative to add a stretching session at the end of the walking time to increase overall flexibility and improve the range of motion at the joints. Special focus for flexibility exercises should be on the leg area.

\* **Competency level:** Beginner, intermediate or advanced

### > **Literature:**

This is a popular and inexpensive mode of exercise that carries a low risk of injury. It is one of the most commonly reported activities among women. This mode of exercise provides protective properties against heart attack and other coronary events. Walking has also been reported to be associated with a lower risk of type two diabetes. Moderate levels of fitness, associated with a reduction in all-cause mortality, are attainable through brisk or fast walking (Hardman, 2001:1195).

Some people choose to carry handheld weights during walking in the hope of enhancing energy expenditure. Although this increases the perceived intensity of the exercise, research reveals that this additional equipment does not satisfactorily increase energy expenditure (Kravitz & Vella, 2002:2)

A rapid walk of as little as 10 minutes is associated with a significant increase in energy expenditure and tension release for as long as two hours following the walk (Bartholomew & Miller, 2002:301).

Walking for fitness is a convenient, inexpensive, lifelong, healthy activity that millions of people enjoy as exercise. Studies have established that brisk walking, at speeds of four miles (6.4 km) per hour or faster, can improve cardiorespiratory fitness. Regular walking can also prolong life significantly (Hoeger & Hoeger, 2009:282).

### • **Weight workout:**

A no impact, group exercise session, performed to music. This type of class includes typical weight area exercises, using a solid bar and adjustable loose weights.

The focus of the class is conditioning all the major muscle groups of the body, improving cardiovascular fitness, overall flexibility and the range of motion at joints. It is imperative to add a stretching session to attain the latter two goals.

\* **Competency level:** Beginner, intermediate or advanced

> **Literature:**

An exercise class that brings free weights to the aerobic floor and incorporates all the scientific principles of resistance training in a standardised group workout session (Virgin Active, 2004:2).

Strength training in any format plays a vital role in maintaining bone health for women and helping to prevent osteoporosis. These exercise sessions should include at least 8 to 10 strength training exercises and should be done at least twice a week (ACSM, 2007a:1).

Resistance training, alone or in combination with aerobic exercise, contributes to improved glucose control in people with type two diabetes (Zoeller, 2007:101).

• **Yoga:**

A no impact, group exercise class which focuses on the improvement of posture, breathing and the ability to relax. It also assists in improving muscular strength, overall fitness and flexibility. The body-mind therapeutic qualities of this exercise mode assist with the development of quality of being and inner focus, integrating a sense of body and soul without a religious connotation.

\* **Competency level:** Beginner, intermediate or advanced

> **Literature:**

Mind-body exercise has become widely popular in fitness facilities for performance enhancement and general wellness.

They are combined with conventional physical therapy for people who require musculoskeletal rehabilitation (Ives, 2000:67).

Some of the latest fitness trends for 2008 include smaller fitness centres offering Pilates and yoga, with more kids and young adults participating in these modes to relieve stress (Scott, 2007:1).

Western interest in yoga exercises have developed gradually since the last century, particularly since the 1970s. Yoga is an excellent stress coping technique. It is a school of thought in Hinduism that seeks to help the individual attain a higher level of spirituality and peace of mind. Exercise focused yoga is based on principles of self-care. Yoga practitioners adhere to a specific code of ethics and a system of mental and physical exercises that promote control of mind and body. The system of exercises can be used as a relaxation technique for stress management. The exercises include a combination of postures, diaphragmatic breathing, muscle relaxation and meditation that help to buffer the biological effects of stress (Hoeger & Hoeger, 2009:405).

- **Power yoga:**

A stronger, more physically oriented exercise class, with all the benefits of the original yoga class, but providing an added exercise challenge with advanced yoga and body conditioning exercises. More experienced yoga participants will enjoy this class. The body-mind therapeutic qualities of this exercise mode assist with the development of overall quality of being and inner focus, integrating a sense of body and soul without a religious connotation.

- \* **Competency level:** Intermediate or advanced

- > **Literature:**

Yoga provides an exercise opportunity other than the higher impact modes of exercise found in modern gymnasiums. The key elements of body-mind activities include proper posture, breathing awareness and overall body awareness (Padget, 2002:1).

By incorporating elements of mental and spiritual fitness, individuals will take better care of their entire being and psychological self, not just their body (ACE, 2007:1).

Yoga was developed as a challenging form of exercise, a complete and balanced fitness programme to harness strength and endurance (Padget, 2002:8). It can positively influence flexibility, hypertension and ventilation in participants. The development of cardiorespiratory fitness has been seen in sedentary and elderly people (Ives, 2000:70).

Yoga exercises help to align the musculoskeletal system and increase muscular flexibility, muscular strength and endurance and balance. It raises self-esteem, clears the mind, slows respiration, promotes neuromuscular relaxation, increases body awareness, relieves back pain and increases oxygen consumption and metabolic rate. Some Yoga classes have a more athletic style (Hoeger & Hoeger, 2009:405).

#### **2.4.19 Health-risk factors among young female students**

Lifestyles and health beliefs appear to be established early in life, setting a pattern for later years. It is therefore important to monitor the trends in health behaviours in young people and to understand the factors that might impact on their uptake of certain health behaviours (Steptoe *et al.*, 2002:97). University and college females are engaging in behaviours that have a potentially negative impact on their health status (Dinger, 2000:19; Hendricks *et al.*, 2004:982). Wright *et al.* (2006:707) state that individuals are held to be morally responsible for the prevention of illness by knowing and avoiding the risk factors associated with ill health. Individuals thus have a duty to monitor their own wellbeing constantly and to mediate and invest in choices and practices that enhance health (Wright *et al.*, 2006:708). Students who enter the university environment and experience a greater freedom from parental supervision, find themselves in a new environment, with a variety of opportunities that could influence these lifestyle and health choices. This new freedom presents them with stressors associated with a different structure to daily life and greater responsibilities than they previously experienced (Rozmus *et al.*, 2005:25). Young adults are not passive consumers of particular regimes of discourses, but take up these

discourses in different ways (Wright *et al.*, 2006:708). Steptoe *et al.* (2002:102) report that the stage where and when the young adult explores a clearer sense of self, a need emerges that often manifests itself in the exploration of risk taking behaviours. Health education has been found to assist students in choosing behaviours that help them to achieve healthier lifestyles (Rozmus *et al.*, 2005:25). Therefore information on all aspects of student life is critical for the design of prevention and intervention efforts, as universities and colleges continue to grapple with the risky behaviour of their student population (Cranford, Eisenberg & Serras, 2008:1). The prevalence of health-risk behaviours that include the use of substances such as tobacco (Dinger, 2000:19), alcohol (Hendricks *et al.*, 2004:988), marijuana (Cranford, Eisenberg & Serras, 2008:1) and other drugs, as well as unsafe sex (Hendricks *et al.*, 2004:988) and eating problems (Rozmus *et al.*, 2005:26; Barker, 2007:1) have been well-documented among undergraduate students.

For the purpose of this study only a few of these health-risk behaviours are explored, in the context of the relationship of these behaviours as possible contributors to the health status of young female students in a university setting.

### **a. Inactivity**

Physical activity declines with age and the most rapid declines appear to occur during late adolescence and early adulthood (Stephens, Jacobs & White, 1995:155; Dinger, 2000:21; Parish & Treasure, 2003:173; Cilliers *et al.*, 2006:236). The decline in physical activity participation starts earlier in females than in males, especially for vigorous activities (Leslie *et al.*, 2001:118; Eyler *et al.*, 2003:5; Parish & Treasure, 2003:173). Seasonality in physical activity participation should also be taken into account when studying the relationships between physical activity and health.

Plasqui and Westerterp (2004:693) report that most active young adults fail to maintain their activity levels in winter. It is reported in several studies that the exercise behaviour of university and college students is at risk (Shankar *et al.*, 2004:161). In these studies, between 40% and 50% of young adults do not

participate in a structured exercise programme, with some of the reasons for being inactive a lack of self-efficacy, a lack of support from others, an inability to enjoy exercise and not believing there are benefits from being physically active. The 1995 National College Health Risk Behaviour Survey showed that the majority of students in the USA were not involved in regular exercise (Dinger, 2000:19; Lowry *et al.*, 2002:22). In the USA it was 23.5% for adults in 2005. These are statistics are according to the CDC Behavioural Risk Factor Surveillance System (Haskell, Lee, Pate, Powell, Blair, Franklin, Macera, Heath, Thompson & Bauman, 2007:1423).

Participation in physical activity is known to be beneficial for all people, and is described as the strongest and most consistent predictor of long-term weight loss and maintenance (O'Brien & LeBow, 2006:200).

## **b. Overweight and Obesity**

The prevalence of overweight and obesity is increasing rapidly in developed as well as developing countries (Roubenhoff, 2006:265; Whaley, 2006:216). According to some of the most recent statistics from the USA, 65% of this population is currently overweight and 31% are obese (Whaley 2006:216). This tendency is also reported for younger generations. The average weight of children, adolescents and young adults have progressively increased over the past two decades (Skemp-Arlt, 2006:45). Hivert *et al.* (2007:1262) report that it has been confirmed that a significant and rapid weight gain occur during the early years of adulthood. An average rate of weight gain of more than naught point seven kilograms (0.7 kg) per year over a span of 10 years is reported in young adults aged 18 to 30 years.

Overweight is defined as a body mass index (BMI) of 25.0 to 29.9 kg·m<sup>-2</sup>, and obesity as a BMI of 30.0 kg·m<sup>-2</sup> or greater (Whaley, 2006:58). The assessment of overweight and obesity involves two measures, namely body height and body weight.

To calculate the BMI, divide the body weight in kilograms by the body height in metres squared ( $\text{kg}/\text{m}^2$ ). The BMI describes body weight relative to body height and is strongly correlated with total fat content in adults (Whaley, 2006:58).

Obesity is a complex multifactorial chronic disease that develops from an interaction of genotype and the environment. It involves the integration of social, behavioural, cultural, physiological, metabolic and genetic factors (Whaley 2006:216-217). Obesity develops when a chronic, quantitative imbalance exists between energy intake and energy expenditure. Obesity and its associated metabolic disorders are among the leading causes of illness and mortality worldwide (St-Pierre *et al.*, 2004:5993).

To unbalance the energy equation in the direction of weight loss requires decreasing food energy intake, increasing physical activity or altering both simultaneously (Tarek, 2003:2; Whaley, 2006:216).

Obese individuals have an increased risk for injury during exercise and this may require that the intensity of exercise be maintained at or below the intensity recommended for improvement of cardiorespiratory fitness (ACSM, 2000:216). Among obese individuals unique barriers to exercise include previous negative experiences with exercise, as well as the psychosocial and physiological burdens of their excess weight. These obstacles can be overcome with careful programme design that includes interventions to improve self-efficacy (Blair, Horton & Leon, 1996:335). People who are excessively fat exercise too little relative to their caloric intake. According to the Physical Activity and Health Report by the Surgeon General, low levels of physical activity resulting in fewer calories used than consumed, contribute to the high prevalence of obesity in the USA (US Department of Health and Human Services, 1996:1).

Table 2.2 provides the classification of categories for overweight and obesity indication.

*Table 2.2: Classification of overweight and obesity with BMI kg-m<sup>-2</sup> categories*

<b>Weight category</b>	<b>BMI (kg-m<sup>-2</sup>)</b>
Overweight	25.0-29.9
Obesity class:	
I	30.0-39.9
II	35.0-39.9
III	≥ 40.0

(Adapted from Whaley, 2006:58)

Overweight and obesity are important factors to take into consideration, as they have been recognised as risk factors in the development of a number of chronic diseases (Whaley, 2006:216). These are coronary heart disease, hypertension, gallbladder disease, some types of cancer, dyslipidemia and non-insulin dependent diabetes (diabetes mellitus) (Lowry *et al.*, 2002:18; Whaley, 2006:216).

Regional studies in Africa indicate a growing prevalence of overweight and obesity in certain socio-economic groups. This can be illustrated by the high prevalence of obesity (44%) found in black women in South Africa's Cape Peninsula (Brown, 2003:3). Figures for obesity among South African women reported for 2004 by the Sport Science Institute of South Africa (2004:1) are 34.4% for the Cape Town area, 22.6% for the Durban area and 33.3% for Johannesburg. In a recent study Cilliers (2006:240) conducted at Stellenbosch University, more than 25% of the participants did not participate in any physical activity that is performed for the purpose of conditioning the body and improving or maintaining their physical fitness.

Several organisations have recommended and updated certain amounts of physical activity for adults to prevent weight gain and regain during the past years. In 2001 the ACSM updated its stand on weight loss and prevention of

weight gain for adults. They concluded that individuals (in today's society) should increase their activity to 45 minutes of exercise to facilitate weight loss. In 2002 the Institute of Medicine (IOM) in the USA recommended 60 minutes of moderately intensive physical activity per day to prevent weight gain. According to the International Association for the Study of Obesity (IASO), 45 to 60 minutes of moderate physical activity per day are required to prevent the transition to overweight and obesity in adults. The prevention of weight regain may require 60 to 90 minutes of moderate activity per day (ACSM, 2006:6). These organisations collectively recommend additional volumes of physical activity, above the initial 30 minutes mentioned in the original Surgeon General's Report (Whaley *et al.*, 2006:7). It is therefore well-established that exercise is an important factor in promoting weight loss and preventing weight gain in all age groups (Lowry *et al.*, 2002:26; Powers & Howley, 2007:73).

### **c. Smoking**

Despite extensive public health education efforts, especially about the use of tobacco, more young adults begin smoking each day and recent data indicates that the prevalence among young females is now equal or slightly more than among males (Nichter, Nichter, Vuckovic, Tesler, Adrian & Ritenbaugh, 2004:305). One of the principal factors related to long-term exercise non-compliance is cigarette smoking, with a rate of 59% in the USA (ACSM, 2000:238). According to Nichter, Nichter and Van Sickle (2004:416), a review of literature on tobacco use among adults often fails to differentiate which product is consumed. There is broad information on patterns of use, age of initiation for tobacco use and age groups used in estimating the prevalence of smoking. This makes age-specific examination of tobacco use difficult. Most observational data suggests that patterns of tobacco use vary widely by age group, region, gender and socio-economic status. There is considerable concern about increasing smoking levels among college/university students (Steptoe *et al.*, 2002:102; Awotedu, Jordaan, Ndukwana, Fipaza, Awotedu, Martinez, Foyaca-Sibat & Mashiyi, 2006:14; Cranford *et al.*, 2008:1).

Over the past few decades the prevalence of smoking among women increased, as cultural, social, societal and economic restrictions disappeared. Women now have more freedom to smoke (Crisp, Sedgwick, Halek, Joughin & Humphrey, 1999:657). The numbers of women who smoke have increased and this has an influence on their health, income, unborn babies and family interaction (Hendricks *et al.*, 2004:982; Kamanzi & Adejumo, 2005:85). Despite many health trends, a larger portion of young women now use tobacco more than ever before (Knuttgen, 2003:31). As cigarette smoking increases, the negative aspects of “passive smoking” have increased as well (Mackay, 1998:411). Adolescents and young adults start smoking for various reasons, among others “peer pressure” (Knuttgen 2003:31), “for friendship” (Nichter *et al.*, 2008:424), “not to feel out” and appear “in style” (Nichter *et al.*, 2004b:426), “to relieve tension” (Nichter *et al.*, 2004b:424) and to “look more mature” (Knuttgen 2003:31).

In developing regions, particularly Africa, there is a rise in the prevalence of smoking and it ranges from 17% to 32% among adults (Awotedu *et al.*, 2006:15). The prevalence of smoking in South Africa varies in different population groups, with rates of 49% among coloured people, 37% among white people, 28% among Indian people and 23% among black people (Awotedu *et al.*, 2006:15). According to the South African Health Review 2000, tobacco use has dropped from 34% in 1992 to 24% in 1998. Data on the prevalence of smoking among adolescents and young adults became available for the first time in 1998 and indicated that 14% of males and six percent (6%) of females were smokers (Kamanzi & Adejumo, 2005:81). In South Africa, as in many countries, tobacco use is associated with success, adventure and sexual attractiveness. These reasons guarantee that young adults who have the need to be “accepted” in a group will experiment with smoking (DoH 1999:145).

Although there is a large body of knowledge about the dangers of smoking, little success has been experienced to lower the impact of tobacco-related illnesses and death. According to the World Health Organisation (WHO), tobacco is responsible for more than four point nine (4.9) million deaths per year, which

could rise to 10 million by 2030. By 2030, 70% of these deaths will be in developing countries, like South Africa, where 25 000 people die each year as a result of smoke-related illnesses (Mackay, 1998:411; Awotedu *et al.*, 2006:15). Cigarette smoking is a major risk factor for cardiopulmonary disease. The use of tobacco is seen as one of the main causes of preventable mortality in the world (Warren, 2002:252). Besides the known negative health outcomes of smoking in young women, it has been associated with concerns about weight gain, dieting behaviours and perceptions of themselves being overweight. Young women consciously start smoking as a means of controlling their weight (Potter, Pederson, Chan, Aubut & Kovall, 2004:399).

Smoking cessation is a major goal of risk factor management in overweight individuals. Fear of weight gain upon smoking cessation is an obstacle for many individuals when considering strategies for weight management. It is recommended that if weight gain should occur, it should rather be treated through dietary therapy, physical activity and behaviour therapy, with the primary emphasis on the importance of abstinence from smoking (ACSM Expert Panel, 1998:1867). During a study conducted on the campus of Stellenbosch University in 2004, 13% of young female students smoked. Awotedu *et al.* (2006:17) report a prevalence of an average of 26% in a study conducted on the campuses of seven universities in the Eastern Cape. Literature reveals a range of findings on smoking as a weight control strategy and some of these researchers found that young women who engage in unhealthy weight loss methods are more likely to be smokers (Nichter *et al.*, 2004a:306). A group who indicated that they previously smoked, but stopped, had a higher BMI than the students who did not smoke (Cilliers *et al.*, 2006:236). Smoking is prevalent in tertiary institutions (Awotedu *et al.*, 2006:14) and cigarette smoking needs to be reduced in this group of young adults (Dinger, 2000:21).

#### **d. Weight management practices**

Many women consciously try to limit their food intake to achieve or maintain a desired body weight (McLean & Barr, 2003:185).

Research confirms that it is “normative” for people in today’s society to experience weight concerns and make sporadic attempts to change their weight (Neumark-Sztainer, Sherwood, French & Jeffrey, 1999:180; O’Brien & LeBow, 2006:195). Reduction in body fat is a need or goal of many exercise participants. Exercise programmes and prescription can be designed to aid in accomplishing such an objective. The contributing variables of body fat are many, but the fundamental determinant of body weight and body composition is caloric balance.

Physical activity and or exercise energy expenditure in excess of 2 000 kcal per week have been successful for short-term as well as long-term weight control (Zoeller, 2007:101). In a study Cilliers *et al.* (2006:236) conducted at Stellenbosch University, a third of the 360 participants thought they were overweight. This perception was negative, as results show that only 10% of the students were actually overweight or obese. It was also reported that most of the 360 participants (84%) were not satisfied with their weight.

The optimal approach to weight loss combines a mild caloric restriction with regular endurance exercise and avoids nutritional deficiencies (Saris, 1996). When the exercise component of a weight loss programme is designed, the balance between intensity and duration of exercise should be manipulated to promote a high total caloric expenditure (300 to 500 kcal per day and 1 000 to 2 000 kcal per week for adults) (ACSM, 2000:216). Caloric balance refers to the difference between caloric intake (the energy equivalent of food ingested) and caloric expenditure (the energy equivalent of resting metabolic rate, activity and thermic effect of food). Body weight is lost when caloric expenditure exceeds caloric intake and weight is gained in the opposite situation (ACSM, 2000:215). For many people more than 30 minutes of moderately intensive activity may be necessary to maintain their weight. Individuals with relatively high daily energy expenditure tend to be less likely to gain weight over time, compared to those who have a low energy expenditure. For weight control and weight loss programmes, the ACSM (2006:219) recommends a long-term reduction in body

weight of at least five percent (5%) to 10% and a minimum energy expenditure of 300 kcal per session (ACSM, 2000:215) three times per week, or 200 kcal per session, four times per week. Since the control of body weight responds to calories consumed as well as the number of calories expended during activity, both intake and expenditure have to be considered by the individual trying to prevent unhealthy weight gain or achieve weight loss (ACSM, 2007c:3).

Research has shown the importance of aerobic exercise in weight loss programmes. The main effect of physical activity is thought to be related to its contribution to the total caloric deficit. The caloric cost of training depends on intensity, duration and frequency of the activity. Therefore it is assumed that training results are independent of the mode of aerobic activity, as long as the parameters are kept equal (Gappmaier *et al.*, 2006:564). An active lifestyle helps participants to maintain their weight loss. Participants who maintained their weight loss reported engaging in regular vigorous exercise three times per week for at least 30 minutes (Anderson, Wadden, Bartlett, Zemel, Verde, & Franckowiak, 1999:340). Weight loss in overweight and obese individuals improves physical, metabolic and endocrinological complications (Brown, 2003:8). The optimal approach to weight loss is one that combines a mild caloric restriction with regular endurance exercise (Whaley, 2006:219).

Research supports the contention that young women are more impressionable and likely to be judged on their appearance. They are therefore more susceptible to a variety of weight management practices (Strelan *et al.*, 2003:90). It is also reported that the strongest and most consistent reasons for exercise relate to appearance (Strelan *et al.* (2003:94). Many individuals prompted by body dissatisfaction begin to exercise for weight management reasons (Ingledeew & Sullivan, 2002:336).

#### **e. Dietary modifications**

A substantial number of young women are under dietary treatments mainly for aesthetic purposes, rather than for nutritional impairments. The number of

young women with normal or slightly higher BMI values undergoing dietary treatments is gradually increasing (Siervo, Boschi & Falconi, 2003:193). According to them, disordered eating can be viewed on a continuum. At one end of the continuum, the extreme disordered eating conditions are anorexia nervosa and bulimia nervosa and at the other end the preoccupations with weight and restrictive eating. These disorders may appear at any time, but adolescents and young adult girls are the most vulnerable. Dietary restraint and modifications are eating behaviours governed by cognitive processes (McLean & Barr, 2003:185). McLean and Barr observed that the goals of dietary modification are to try and limit food intake, to reduce or maintain body weight and fat scores, decrease elevated plasma total and low-density lipoprotein cholesterol and lower blood pressure. This process of changing eating behaviours is complex and includes the individual's motivation and readiness for change.

O'Brien and LeBow (2006:200) reflect that no commercial- or clinical programme or research model has been able to demonstrate significant long-term weight loss for more than a small fraction of the participants. Other methods, such as analysing eating patterns using a food diary, establishing realistic dietary goals, providing instruction on food preparation and eating out, as well as altering the eating environment, are common intervention strategies to assist with positive behavioural change for this syndrome (Steen & Butterfield, 1998: 28). Body image dissatisfaction is another important syndrome and risk factor that can lead to unhealthy eating patterns, extreme dieting behaviours and the development of more serious eating disorders (Strelan *et al.*, 2003;89; O'Brien & LeBow 2006:196; Skemp-Arlt, 2006:45). This could also have negative influences on the menstrual irregularity of the individuals, which could later have dire health consequences and long-term ramifications. The impact could be on infertility and bone health (McLean & Barr, 2003:190).

A university environment may serve as the place where an eating disorder may develop (Martz, Graves & Sturgis, 1997:295; Koch, 2002:7; Davy, Benes &

Driskell, 2006:1674). According to these researchers, university/college students have many responsibilities during the day and various factors determine their selection of food and their eating habits, e.g. a shortage of time, convenience of acquiring food, cost of food, their current health status and weight control issues.

After reviewing recent research, O'Brien and LeBow (2006:196) suggest that programmes with the best empirical success to manage the diet of young adults are those that include the provision of instruction in new, non-dieting orientated behaviours, emphasising salient and short-term goals to assist individuals in adopting these behaviours and directing their intervention to a specific population as opposed to utilising a more generalised approach. A psychoeducational format of intervention is effective for healthy weight management and can lead to attitudinal and behavioural change in young female students (O'Brien & LeBow, 2006:208). Hesse-Biber and Marino, (1991:211) however maintains that the majority of female students will experience chronic eating problems throughout their tertiary career.

Health and fitness professionals may be able to assist in achieving some of the more realistic objectives of weight management and weight loss needs among this group of young adults. A consultation with a registered dietician should be encouraged as part of this multidisciplinary team.

#### **f. Stress management**

Being stressed is equated with being anxious, and stress occurs when demands from the environment challenge an individual's adaptive capacity or ability to cope (Sakellariou & Papadopoulos, 2008:70).

It is also associated with a variety of emotional correlates, including anger, alarm, vulnerability, depression, the development of asthma (Sakellariou & Papadopoulos, 2008:70) and a lack of control. Stress is a factor in university life that can lead to many risky behaviours. Parental expectations, adjustment from a supervised life during childhood to university freedom, financial obligations,

peer pressure and other factors of emerging adulthood have all been noted to contribute to the experience of stress among young adults (Rozmus *et al.*, 2005:27).

Stress management techniques aimed at attenuating physiological responses like heart rate and blood pressure, inducing an improved sense of wellbeing, enhancing coping mechanisms and promoting positive thinking, have become popular methods to assist individuals (ACSM, 2000:254). In this regard, the benefits of physical exercise for many psychologically related conditions have been reported for decades (Balkin *et al.*, 2007:31). The evidence for exercise being helpful in reducing stress is substantial (Anderson & Sutherland, 2002:19; Brown, 2003:8; Balkin *et al.*, 2007:31). For many people, the improved emotional and physiological state that often accompanies acute stress responses seems to attenuate after a bout of exercise.

Bartholomew and Miller (2002:301) report reduced tension, anger, depression and fatigue, along with increased vigour, following participation in group exercise sessions. According to them, general post-exercise increase in wellbeing, along with lessened psychological distress and fatigue, are experienced. Participation in regular exercise can therefore also reduce depression and improve psychosocial functioning, mood and quality of life in most individuals (Brown, 2003:8). Exercise has been identified as a proactive coping strategy in adults (Ingledew & Sullivan, 2002:335). Anderson and Sutherland (2002:19) concur with the fact that exercise may help to alleviate feelings of distress and mild depression, but mention that as a sole intervention it does not always improve measures of anxiety. According to Balkin, Tietjen-Smith, Caldwell and Shen (2007:31), the aspect of weight loss can also be associated with anxiety.

The importance of distinguishing the effects of mood and anxiety disorders with substance use and prevalent in stress and weight management practices are often seen among young adult women and cannot be neglected (Cranford *et al.*, 2008:10). Therefore, more focused prevention and intervention efforts, targeted at subgroups of students which are at a greater risk for patterns of co-

occurrence of substance use in these circumstances should be advised (Cranford *et al.*, 2008:10).

#### **2.4.20 Energy/caloric expenditure goals**

For the purpose of the present research and justification of the research theory, a brief contextualisation of literature on energy expenditure goals is important. Physical activity is the most variable component of total energy expenditure and is therefore important in the regulation of energy balance (Plasqui & Westerterp, 2004:688). The interaction of physical activity intensity, duration and frequency determines net caloric expenditure from the activity (ACSM, 2000:151; Whaley, 2006:148). Many health benefits and training adaptations associated with increased physical activity are related to the total amount of work accomplished during a training session. The caloric thresholds necessary to elicit significant improvements in  $VO_{2max}$ , weight loss or a reduced risk of premature chronic disease may differ. Therefore individualised exercise prescriptions should be designed with energy expenditure goals in mind (Whaley, 2006:148).

The ACSM recommends a target of 150 to 400 kcal of energy expenditure per day in physical activity and/or exercise (Haskell, 1994:649). For participation in physical activity to be beneficial for young adults, it is recommended that they engage in at least 30 minutes per day of moderately intensive activity and additional vigorous activity for added benefits (Leslie *et al.*, 2001:117). Leslie *et al.* (2001:117) further states, that the distinction between moderately and vigorously intensive activities is very relevant for this group. They provide the following description of these intensities:

**(1) Moderate intensity:** Activity that makes you breathe harder or puff or pant, such as the recreational activities of brisk walking, climbing stairs or cycling leisurely. It is quantified at an exercise intensity of three to six METs or an expenditure of seven kilo-calories per minute.

**(2) Vigorous intensity:** Activity that makes you breathe harder or puff or pant, such as sport and fitness activities that include running, aerobic classes and sports. The exercise intensity is quantified at greater than six METs or more than seven kilo-calories per minute.

The measurement and estimation of energy expenditure during exercise has many applications. Adequate knowledge of the energy requirements of physical activities is important in order to plan a training, fitness and/or dietary programme effectively. This is especially true to any exercise assisted weight loss programme. In the fitness industry, many clients enquire about the amount of calories that are expended during an exercise bout. An understanding of human energy expenditure, knowledge of measurement procedures and their practical application and significance is a critical tool for all professionals providing a service in the health and fitness industry.

#### **2.4.21 Exercise intensity**

Exercise intensity and the duration of exercise determine the total caloric expenditure during a training session and are inversely related (Whaley, 2006:141). Exercise intensity is a dimension of physical activity (PA) that signifies the level of physical exertion associated with executing the activity (ACSM, 2000:145). PA intensities are categorised in absolute terms as “light” (<3 METs), “moderate” (3-6 METs) or “vigorous”(>6 METs), in accordance with guidelines issues by the Centres for Disease Control (CDC) and American College of Sports Medicine (ACSM) (Balady *et al.*, 2000:146). More uniformity has been evident in recent years, with the widespread adoption of the METs. This is an absolute index of intensity and most physiological responses to exercise are governed by the relative intensity of the exercise (Hardman, 2001:1193).

A certain MET intensity might be a warm-up for one person, but require a near-maximal effort for another. Exercise physiologists have commonly expressed

intensity relative to an individual's maximal oxygen uptake ( $\text{VO}_2 \text{ max}$ ), during the second half of the 20<sup>th</sup> century (Hardman, 2001:1193). This approach is valid across a broad range of fitness levels, but is inadequate for individuals with low functional capacity for whom the resting metabolic rate represents a higher fraction of  $\text{VO}_2 \text{ max}$ .

For these individuals (the majority of sedentary people), intensity is better expressed relative to oxygen uptake reserve. Available tables with information on the energy expenditure for various types of sport and other activities provide the most effective indirect method of estimating the energy cost of an activity (Hardman, 2001:1193). This information should be considered, as most aerobic classes or exercise modes presented in a gymnasium environment have a typical format of a slower warm-up, more vigorous core aerobic content, slower and more precise execution of muscular conditioning exercises and an even slower cool down and stretching section at the end of an exercise session.

Rating of perceived exertion (RPE) is also a valuable and reliable indicator in monitoring an individual's exercise tolerance and can be used effectively to monitor progress toward maximal exertion during exercise (ACSM, 2000:79). Perceived ratings of exertion correlate highly with exercise heart rates and work rates.

Borg's RPE scale was developed to allow the exerciser to rate their feelings during exercise subjectively, taking into account personal fitness level, environmental conditions and general fatigue levels (Noble, Borg & Jacobs, 1983: 523; ACSM, 2000:78).

RPE has proven to be a valuable aid in prescribing exercise for individuals/groups where a difficulty with heart rate estimation/palpitation occurs (ACSM, 2000:149). It has been found that the cardiorespiratory training effect and the threshold for blood lactate accumulation are achieved at a rating of "somewhat hard" to "hard", which approximates a rating of 12 to 16 on the category scale or 4 to 5 on the category-ratio scale (ACSM, 2000:78).

Improvements in health-related benefits and fitness from exercise can be achieved by a low intensity, longer duration regimen, whereas improvements in cardiorespiratory fitness are associated with higher intensity, shorter duration programmes (Whaley, 2006:141). The caloric costs of activities are variable and depend on the skill of the participant and/or the level of participation. It can provide a starting point for prescribing exercise intensity for individuals.

The caloric cost of an activity does not take into consideration the effect of environment, level of hydration and other variables that can alter the HR and RPE responses to exercise. The ability of individuals to undertake exercise successfully at a given absolute intensity is directly related to their relative effort as reflected by the HR and RPE (ACSM, 2000:146). The essential components of a systematic individualised exercise prescription include appropriate exercise mode(s) and the intensity, duration, frequency and progression of physical activity. This applies to programmes for all gender and age groups (Whaley *et al.*, 2006: 142).

Currently two RPE scales are widely used: the original or category scale, which rates exercise intensity on a scale of 6 to 20, and the revised or category-ratio scale of 0 to 10. This category-ratio scale uses terminology better understood by the subject for interpretation uses.

The greatest value of the RPE scale is that it provides exercisers of all fitness levels with easily understood guidelines regarding exercise intensity. These two categories are indicated in table 2.3.

*Table 2.3: The category and category-ratio scales for RPE applicable to the performance of physical activity*

Category scale	Category-ratio scale
6	0 Nothing at all "No I"
7 Very, very light	0.3
8	0.5 Extremely weak Just noticeable
9 Fairly light	0.7
10	1 Very weak
11	1.5
12	2 Weak Light
13 Somewhat hard	2.5
14	3 Moderate
15 Hard	3.5
16	4 Strong Heavy
17 Very hard	5
18	6
19 Very, very hard	7 Very strong
20	8
	9
	10 Extremely strong "Strongest I"
	11
	• Absolute maximum Highest possible

(Adapted from Whaley, 2006:77)

#### **2.4.22 Estimation of energy expenditure for use by large groups**

According to the ACSM (2006:287), the energy requirements of physical activity are calculated by measuring or estimating the oxygen requirements ( $\text{VO}_2$ ) of the amount of exercise or activity being performed. Measuring this  $\text{VO}_2$  requires expensive and sophisticated equipment, as well as the use of trained professional staff that can perform tests and interpret the data. These methods often do not lend themselves to large numbers of subjects and therefore become impractical in most non-laboratory or fitness situations (Whaley, 2006:287). Methods that are currently available to measure energy expenditure (EE) directly cannot or can only rarely be used in non-laboratory settings (Achten & Jeukendrup, 2003:518).

It is possible to estimate energy expenditure during different physical activities not necessarily performed in an indoor laboratory setting. When it is not possible or feasible to measure  $\text{VO}_2$  directly, reasonable estimates can still be made during steady-state exercise. Regression equations have been derived from laboratory data relating mechanical measures of work rate to their metabolic equivalents (Whaley, 2006:287).

The need to express the energy cost of exercise in simple units has led to the development of the term “metabolic equivalent intensity” (MET). The concept is simple: A MET is the amount of energy the body utilises during an activity that is in proportion to the amount of energy it uses at rest. At rest the body uses approximately 3.5 millilitres of oxygen per kilogram of body mass per minute ( $3.5 \text{ ml kg}^{-1} \text{ min}^{-1}$ ). This resting metabolic rate is known as 1.0 MET. If an activity increases energy expenditure (e.g. threefold), it is tabulated as MET intensity level (e.g. 3 MET). If the MET level of any activity is known, it can be converted into units of oxygen consumption by multiplying it by three point five (3.5). Thus, the energy cost of exercise can be described in multiples of resting  $\text{VO}_2$  (i.e. METs), which will simplify the quantification of exercise energy requirement.

A physical activity requiring a 10-MET energy expenditure (i.e. 10 times resting metabolic rate) represents a  $\text{VO}_2$  of  $3.5 \text{ ml kg}^{-1} \text{ min}^{-1}$  ( $10 \text{ METs} \times 3.5 \text{ ml kg}^{-1} \text{ min}^{-1} \text{ per MET} = 35 \text{ ml kg}^{-1} \text{ min}^{-1}$ ). This calculation provides  $\text{VO}_2$  in relative units ( $\text{ml kg}^{-1} \text{ min}^{-1}$ ), as in the example above (Powers & Howley, 2007:113). Metabolic equations can therefore be used to calculate the caloric consumption (expressed in kcal/min) of an activity. There are limitations in using MET values to determine the energy cost of an activity. Over- or underestimation of energy expenditure is possible when using this method (Ainsworth, Haskell & Whitt, 2000:S498).

The Compendium of Physical Activities (CPA) was developed in 1989 to facilitate the coding of physical activities (PAs) obtained from PA records, logs and surveys and to promote comparisons of coded physical activity intensity levels across observational studies (Ainsworth, Haskell & Leon, 1993:71). All activities are assigned an intensity level based on the rate of energy expenditure expressed in METs. Intensities of activities in the CPA are classified as multiples of 1 MET or as a ratio of the associated metabolic rate for the specific activity, divided by a standard resting metabolic rate (RMR) (Ainsworth *et al.*, 2000:S498). MET values were assigned to each activity based on the “best representation” of an intensity level from published lists and selected unpublished data.

The initial CPA received widespread acceptance among PA specialists in the exercise science and public health fields (Ainsworth *et al.*, 2000:S498). The updated version of the initial CPA developed in 1993 reflects additional activities identified by researchers in the past 10 years and presents measured MET intensities for some activities in which METs were estimated from similar activities. It also reflects public interest in evaluating the contributions of various types of physical activity to daily energy expenditure by providing additional categories for activities done during the day (Ainsworth *et al.*, 2000:S498).

For the activities in the updated CPA, the energy cost of physical activities was obtained from published literature and assigned a measured MET value, or it was estimated from similar activities with known MET values (Ainsworth *et al.*, 2000:S498). As stated by Ainsworth *et al.* (2000:S498), the CPA provides a coding scheme that links a five-digit code representing the specific physical activities performed in various settings, in order to categorise these activities by their major purpose/heading/name (first two digits of the code) and indicate the specific physical activity/mode (last three digits). The next adjacent column provides the exercise intensity of the physical activity/mode (separate two or three digits), with their respective metabolic equivalent (MET) intensity levels.

Table 2.4 provides an example of the use of this MET coding scheme/system, which effectively indicates energy expenditure levels during different exercise modes/bouts. This method provides a quick, functional and simple method to indicate the expected caloric/energy expenditure for general use. The use of the MET coding scheme/system, to calculate energy expenditure during physical activity, can be found in literature (McArdle, Katch & Katch, 2001:1104) and provides an excellent resource to establish caloric/energy expenditure in household, occupational, recreational and sports activities.

Table 2.4: An example of the use of the coding scheme for classifying MET intensities for physical activities

**EXAMPLE:** The five-digit code for aquafitness or water aerobics, **18355:4.0**, according to the CPA, is defined as:

Major heading	Specific activity	MET intensity
<b>18</b>	<b>355</b>	<b>4.0</b>
<b>Water activities</b>	<b>Water aerobics</b>	<b>Moderate intensity*</b>

\* **Intensity:** Light = < 3 METs  
 Moderate = 3-6 METs ✓  
 Vigorous = > 6 METs

Adapted from Ainsworth *et al.* (2000:S498).

The application of information on the energy cost of exercise, for the needs and goals of overweight or obese individuals, or people who want to lose weight and manage their weight, must be individually matched with proper exercise programme prescription, to achieve long-term weight management. For overweight people desiring to use exercise for weight loss, weight bearing exercise generates a considerable caloric expenditure (McArdle, *et al.*, 2001:196). Large muscle group aerobic exercise and activities should be the primary mode of physical activity for such a group (Whaley, 2006:218).

## **CHAPTER 3**

# **RESEARCH METHODS AND PROCEDURES**

### **3.1 INTRODUCTION**

The university-aged student is at a high risk of making unhealthy lifestyle choices. The newfound freedom, interaction with peers and popular cultures encountered on campuses contribute to these risky behaviours. Uninformed university and college students formulate inaccurate and incomplete notions regarding lifestyle, physical activity and fitness, and they practice non-recommended methods for weight loss (NASPE, 2007:1).

This study aimed to investigate some of the lifestyle choices and behaviours among young female students in a specific university setting. The patterns of participation in physical activity as well as the exercise preferences of these students were of special interest. The offering of various exercise options by the local university gymnasium would have had an influence on their motivation to exercise, as well as their choice of exercise mode. It was important to determine their reasons for choice of exercise mode, as well as their perceptions about what the benefits would be as a result of such choices and participation. The indication of weight management and weight loss outcomes of physical activity participation among this group was important. Additional aims of the research were to establish the motivators for this group to exercise regularly, the importance of the exercise environment, as well as the barriers to exercise they experienced in the university setting which could influence their health status and physical activity goals negatively. It was also important to establish their general health status, as well as the prevalence of supplementation and medication use among the group. Smoking, as a health-risk behaviour factor that could substantially affect the physical activity and health status of the young females was also a relevant factor.

A research theory was formulated that the choice of exercise mode among this group would be random and not necessarily focused on or directed to meet specific expected outcomes from participation. As increasing numbers of students on university and college campuses are overweight or obese (CDC, 2006:1) and large numbers of these students are attempting to lose weight (NASPE, 2007:1), it was proposed that weight management and weight loss goals would be the most important expectation for their choice of exercise.

Institutions of higher education, such as universities and colleges, should assist students with educational programmes and intervention strategies that will teach them empirically supported behaviour change methods that are needed to succeed in self-directed activity (NASPE, 2007:2). The development of an intervention strategy or basic informational tool is proposed (using information from results of this study) to advise student members of the Stellenbosch University Gymnasium on choice of exercise mode in order to achieve more specific exercise outcomes in the time they have available to spend on physical activity in an academic environment.

The research design, methods and instrument used to capture the research data will now be discussed.

## **3.2 STUDY DESIGN**

### **3.2.1 Research and testing environment**

The entire study was conducted at the Stellenbosch University Gymnasium on the campus of Stellenbosch University (SU) in the Western Cape, South Africa (figure 3.1).



*Figure 3.1:* The Stellenbosch University Gymnasium adjacent to the Department of Sport Science

A letter (Appendix A:2003, B:2004 and C:2005) was presented to the manager of the Stellenbosch University Gymnasium to obtain permission to conduct the study on site, explaining the importance, purpose and timeline. The longitudinal research study was completed over a period of three years in this environment and was conducted at the same time of each year, during September and October. The total membership of the gymnasium during the research period was 5 428 members in 2003, 5 721 in 2004 and 5 964 in 2005 (Tourell, 2007:1).

Clients (students and members of the public) at the SU Gymnasium had a choice of participating in a range of 15 group aerobic exercise modes during 2003 and 32 in 2004 and 2005. These group exercise modes were offered by the aerobic section. The aerobic exercise modes the gymnasium offered during the research period included:

- Aerobics (beginner and intermediate level)
- Aero-step
- Aquafitness
- Aqua: Sport-aqua
- Ball & all
- Body dynamics
- Body toning
- Bosu ball
- Callanetics
- Cardio workout
- Core stability
- Indoor cycling (beginner and intermediate level)
- Dance dynamics
- Pilates – Group
- Punch & ball
- Punchline (Beginner, intermediate and advanced level)
- Slide (beginner level)
- Slide & tone
- Slide: Sport-slide
- Step (beginner and intermediate level)
- Step combo
- Step & tone
- Tai chi
- Weight workout
- Weights: Free weights
- Yoga
- Yoga: Power yoga

Another five exercise options were presented in the rest of the gymnasium and the adjacent facilities. These included walking indoors on the walking circuit of the gymnasium, power walk in and around the natural environment surrounding the gymnasium, swimming in a heated indoor pool or in the standard outdoor pool, playing squash or exercising on the gymnasium floor using a variety of circuits, such as the family circuit, cardio circuit, strength circuit, rowing area and weight training area.

The weekly time table of the aerobic section at the SU Gymnasium reflects a wide variety of exercise modes offered to clients. This extensive timetable is presented from a Monday to Friday and makes provision for clients to attend classes from 06:00 in the morning right through the day until 20:00. Exercise classes are offered in different venues, ranging from an indoor heated swimming pool, outdoor swimming pool, squash courts, four exercise halls, an indoor cycling studio, a large open-plan gymnasium floor, several circuits on the different levels of the gymnasium floor, a special weight training area (machines and loose-weight area), a walking indoor circuit and an outdoor area for walking.

The venues of the gymnasium are spread over an extensive area, due to the number of exercise halls belonging to the Department of Sport Science adjacent to the SU Gymnasium. These venues are used by the SU Gymnasium after formal academic hours as part of the gymnasium facilities. Special logistical planning for effective data capturing for the study was therefore essential. Time slots and the different exercise areas had to be carefully checked on a daily basis in order to inform the research assistants of the exact locations where the data capturing would take place. Research material and staff had to be ready at all the venues at specific hours during each day of the entire research period. Table 3.1 provides information on a typical weekly SU Gymnasium timetable, indicating time slots and the different exercise venues that were used during the research period.

Table 3.1: SU Gymnasium aerobic section: Example of a weekly timetable presented from 06:00 to 20:00, Monday to Friday



**TIMETABLE: SEPTEMBER 2005**

Day Time	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
<b>EARLY BIRDS</b> 06:00 - 07:00	<b>Cycle</b> (Cycling studio)		<b>Cycle</b> (Cycling studio)		<b>Cycle</b> (Cycling studio)
	<b>Callanetics</b> (Blousaal)*		<b>Callanetics</b> (Blousaal)		<b>Pilates</b> (Blousaal)
					<b>07:15 - 08:15</b>
06:30 - 07:15					<b>Cardio w/o</b> <b>4 Men Only</b> (Blousaal)
08:15 - 09:15	<b>Aerobics</b> (Blousaal)	<b>Slide &amp; tone</b> (Blousaal)	<b>Step</b> (Blousaal)	<b>Body toning</b> (Blousaal)	<b>Ball &amp; all</b> (Blousaal)
		<b>Yoga</b> (Danssaal)*	<b>Tai chi</b> (Danssaal)	<b>Yoga</b> (Danssaal)	
	<b>Cycle</b> (Cycling studio)				<b>Cycle</b> (Cycling studio)
	<b>08:15 - 09:15</b> <b>Aquafitness</b> (Binneswembad)		<b>08:00 - 09:00</b> <b>Aquafitness</b> (Binneswembad)		<b>08:15 - 9:00</b> <b>Aquafitness</b> (Binneswembad)*
09:15 - 10:15		<b>Body dynamics</b> (Blousaal)		<b>Body dynamics</b> (Blousaal)	
<b>LUNCH TIME</b> 13:10 - 13:50	<b>Dance dynamics</b> (Blousaal)	<b>Body toning</b> (Blousaal)	<b>Slide &amp; tone</b> (Blousaal)	<b>Weight workout</b> (Blousaal)	<b>Bosu</b> (Blousaal)
			<b>Cycle</b> (Cycling studio)		
16:00 - 17:00	<b>Dance dynamics</b> (Blousaal)	<b>Weight w/o</b> (Blousaal)	<b>Slide</b> (Blousaal)	<b>Step &amp; tone</b> (Blousaal)	
16:00 - 17:00	<b>Cycle</b> (Blousaal)	<b>Cycle</b> (Cycling studio)	<b>Beginner cycle</b> (Cycling studio)	<b>Cycle</b> (Cycling studio)	

17:00 - 18:00	<b>Intermediate step</b> (Bloussaal)	<b>Weight workout</b> (Bloussaal)	<b>Body toning</b> (Bloussaal)	<b>Slide &amp; tone</b> (Bloussaal)	
17:00 - 18:00	<b>Punchline</b> (Sportsaal)*	<b>Punchline choreog.</b> (Sportsaal)	<b>Punchline tech.</b> (Sportsaal)	<b>Intermediate aerobics</b> (Sportsaal)	
17:00 - 18:00	<b>Begginer aerobics</b> (Spelesaal)	<b>Bosu</b> (Spelesaal)	<b>Intermediate step</b> (Spelesaal)	<b>Bosu</b> (Spelesaal)	
17:00 - 18:00	<b>Body toning</b> (Danssaal)	<b>Core stability</b> (Danssaal)	<b>Power yoga</b> (Danssaal)	<b>Cardio workout</b> (Danssaal)	
17:00 - 18:00	<b>Cycle</b> (Cycling studio)	<b>Cycle</b> (Cycling studio)	<b>Cycle</b> (Cycling studio)	<b>Cycle</b> (Cycling Studio)	
17:30 - 18:30					<b>Body toning</b> (Danssaal)
					<b>Aero-step</b> (Bloussaal)
					<b>Cycle</b> (Cycling studio)
18:00 - 19:00	<b>Cardio workout</b> (Bloussaal)	<b>Slide &amp; tone</b> (Bloussaal)	<b>Beginner slide</b> (Bloussaal)	<b>Dance dynamics</b> (Bloussaal)	
18:00 - 19:00	<b>Body toning</b> (Danssaal)	<b>Yoga</b> (Danssaal)	<b>Body toning</b> (Danssaal)	<b>Yoga</b> (Danssaal)	
18:00 - 19:00	<b>Beginner punchline</b> (Sportsaal)	<b>Intermediate aerobics</b> (Sportsaal)	<b>Advanced punchline</b> (Sportsaal)	<b>Cardio workout</b> (Sportsaal)	
18:00 - 19:00	<b>Beginner step</b> (Spelesaal)	<b>Cardio workout</b> (Spelesaal)	<b>Beginner step</b> (Spelesaal)	<b>Bosu</b> (Spelesaal)	
18:00 - 19:00	<b>Cycle</b> (Cycling studio)	<b>Cycle</b> (Cycling studio)	<b>Beginner cycle</b> (Cycling studio)	<b>Cycle</b> (Cycling studio)	
19:00 - 20:00	<b>Aquafitness</b> (Binneswembad)		<b>Sport aquafitness</b> 18:00 - 19:00 (Binneswembad)		<b>Aquafitness</b> 18:00 - 19:00 (Binneswembad)

\* Names of venues for exercise classes are in Afrikaans as used by the SU Gymnasium (SU Gymnasium Management, 2005)

### **3.3 SUBJECTS**

Young, apparently healthy, female, undergraduate university/college students, between the ages of 17 and 25 years, were recruited for the study. The study population all frequented the SU Gymnasium and regularly attended structured group aerobic exercise sessions. They all completed an informed consent and waiver form as part of their membership when they joined the gymnasium. Their participation in the research was voluntary and only female students were recruited during their attendance of aerobic classes. The study population consisted of volunteers who were interested in taking part in this health-related research study. The initial study population consisted of 210 participants (n=210) in 2003, 337 (n=337) in 2004 and 394 (n=394) in 2005. The final total over a period of three years was 985 (N=985). Incomplete information on the research questionnaire excluded 44 participants from the initial study population. Results for 941 (N=941) research participants are reported. The average age of the participants was 20.6 ( $\pm 2.5$ ) years. They were generally healthy, with an average BMI of 23.46 ( $\pm 3.8$ ). The groups reported exercising for an average of 40 to 60 minutes per day, for three or four days of the week.

### **3.4 MEASUREMENT PROCEDURE**

Permission to conduct the research was given by the manager of the SU Gymnasium prior to the commencement of the study. Random convenience sampling was used in an effort to avoid low participation rates. The research commenced in 2003, with follow-up data capturing in 2004 and 2005. Collection of follow-up data is a preferred strategy in research over a long period of time (O'Brien & LeBow, 2006:208). The research surveys were conducted at the same time each year, in September and October. The time of year was chosen on information provided by the SU Gymnasium management, indicating it to be one of the busiest times of the year with regard to new enrolments and participation rates at this gymnasium.

The only exclusion factors for the research sample were age and gender, as the definition of “young university or college women” includes the ages of 17 to 25 years (ERIC Thesaurus, 2001:1) associated with this phase of life-cycle. A pilot study was conducted in 2003, with a sample of 210 (n=210) participants. The original questionnaire, especially designed for this research, was slightly adapted after this initial phase to rectify interpretative problems that occurred with regard to the first question. As the correct comprehension and completion of this particular question was of vital importance to the study, changes to minimise possible misinterpretations had to be addressed. In 2004 (n=337) the same research survey procedure was followed. Question one of this questionnaire was slightly adapted to include the new exercise modes the gymnasium offered in that year. In 2004 further research questions regarding barriers to exercise as well as the smoking habit were included. These factors were deemed important in the context of the research. The same research procedure was followed in 2005 (n=394). The only change made to the questionnaire at that stage was to include the two new exercise modes the gymnasium offered in that year. The SU Gymnasium continually updates the exercise options offered to members and keeps up to date with global trends regarding exercise modes offered in a structured aerobic exercise section.

Permission was obtained from the gymnasium management to conduct the research during the normal scheduled operational hours. Notices about the research were put up at strategic points in various areas of the gymnasium. An announcement about the research survey was made in all exercise classes presented in the aerobic section a week prior to the commencement of the research survey.

As soon as the formal research period commenced, clients were informed that permission for the research was granted and that the practical session for all structured aerobic exercise sessions would commence 10 minutes later than the usual time slots. This was necessary to provide time for the research questionnaire to be completed before each class started. Clients still had the opportunity to participate in a full 45 minute practical exercise class.

All participants in each exercise session were briefly informed about the purpose of the research at the beginning of each class. Questionnaires and pencils were handed out to all participants by several gymnasium assistants in each class to save time and ensure that all participants received questionnaires as fast as possible. Verbal instructions and an explanation of the questionnaire were given by the researcher and her research assistants prior to beginning of each class. After all the participants received a questionnaire, the questionnaire was explained step by step, giving detail about the content and method to be followed for completing each question. This was necessary to minimise interpretative faults and maximise the use of the 10 minutes allocated for the completion of the questionnaire. Participants were able to ask the researcher and assistants questions and any uncertainties about comprehension, interpretation and completion were immediately addressed.

Through observations of staff and management at the SU Gymnasium, it was reported that weight management and weight loss goals became more important to the members of this gymnasium after the winter holiday season. July and August are very busy academic months, when academic semester tests commence. Young female students are more aware of the fact that summer is approaching and that something has to be done about their physical appearance during the spring months leading up to summer. As previously stated, September and October were chosen for the research, as attendance and enrolment figures tend to be high during these months.

### **3.5 RESEARCH INSTRUMENT: SURVEY QUESTIONNAIRE**

A self-constructed original questionnaire (Appendix D/E:2003 and F/G:2004 & 2005) was designed to capture information relevant to the purpose of the study. Information required from the research population was self-reported. Physical activity patterns and lifestyle choices in whole populations and in subgroups are typically assessed using structured self-report interviews or surveys (Leslie *et al.*, 2001:118).

The research questionnaire was available in the two primary languages spoken at the SU, namely Afrikaans and English.

The structured self-report content of the research questionnaire contained seven sections which presented questions to the participants in the following order: general demographics (university/college attended, academic year); personal information of the subject (contact phone numbers, email address, age, body weight, body height); choice of exercise mode; expectations from participation for choice of exercise mode; frequency of attendance of the particular exercise modes; duration of these classes; regularity of participation in physical activity; motivators to exercise and reasons for choice of exercise environment; barriers to exercise; current use of medication and supplementation; health status and current health problems; as well as smoking habit. Most questions were closed-ended (i.e. requiring yes or no answers or ranked choices). The questionnaire was tested and retested for validity, accuracy and reliability by using final year BA and BSc Sport Science graduate student groups at the Department of Sport Science at Stellenbosch University who were also members of the SU Gymnasium.

The design of the questionnaire for this descriptive study had to capture the exercise preferences and expectations of young female students, while providing other relevant information on health-related issues to contextualise the exercise choice and reasons for participation. The exercise expectations and outcomes were of the utmost importance.

The following content was included in the original self-designed questionnaire:

**a) *General information***

The research group was asked to complete this general information section as truthfully and accurately as possible (figure 2.2). The questionnaire was confidential. This was explained during the initial contact with the groups. No names were required, in order to keep information anonymous and increase levels of objectivity and honesty.

Extensive contact details made it possible to follow up any information. This first section of the questionnaire included telephonic contact details, computerised email address, date and time of data capturing, age (years), body height, body weight (self-reported height and weight were used to calculate BMI kg/m<sup>2</sup>), gender, registration at Stellenbosch University; student registration at other tertiary/higher academic institutions, academic year and also an indication for young females with other occupational status, if they were not a student at a tertiary academic institution.

---

**Contact details: Tel: Code** (\_\_\_\_\_) (\_\_\_\_\_)

**Email:** (\_\_\_\_\_)

**Age:** \_\_\_\_\_ **Date:** \_\_\_\_\_ **Time:** \_\_\_\_\_

**Body height (m):** \_\_\_\_\_ **Body weight (kg):** \_\_\_\_\_

**Gender: Male:**  / **Female:**

**Registered student – Stellenbosch University: Yes:**  / **No:**

**Academic year:**

**Other student?**

**Other client: Occupation?**

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*Figure 3.2: Research questionnaire content: General information*

**b) Exercise mode, exercise preference and expected outcomes of participation in the different exercise modes**

This following section of the research questionnaire (question one) included a complex table for the data capturing of various aspects regarding choice of exercise mode. In the first column, information was provided on the various exercise modes offered by the gymnasium in a particular year.

In the second adjacent column, the subjects had to indicate their exercise preference by ranking (at least four options). The reasons or expectations from participation in a particular exercise mode were to be indicated in column three and also by ranking. Variables of possible expectations from participation in an exercise mode were provided in a “key” on the right hand side of the first page of the questionnaire. Numbers indicated an expectation in column three. Column four captured data on the frequency of participation in a particular exercise mode and in column five the time spent per exercise session was indicated.

Question one was very important for the research and great care was taken to ensure accurate interpretation and completion of this section. The study population received a detailed explanation on what to do for each completion of a column, before and during completion of this section. Time was allocated to allow for questions and uncertainties on the interpretation of the different columns of this question and any requests were immediately addressed. This section of the research questionnaire is provided in table 3.2.

*Table 3.2: Research questionnaire: Exercise preferences and expectations*

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***Questions in the following tables:***

***Please take time to complete this questionnaire as comprehensively and accurately as possible.***

***1. List your answers for each question in the different columns of the following table according to importance (e.g. Ranking and indicating **1st** choice = **1**; **2nd** choice = **2**; **3rd** choice = **3**, etc.)***

*Your preference with regards to the exercise session must be indicated by a number 1, 2, 3 , etc. by ranking, in the adjacent column next to an exercise mode.*

Indicate **what type of exercise session** you prefer (preference) at this gymnasium. Next to this choice of exercise mode, indicate what you expect to achieve (\*expectations) with this type of exercise session. (See possible reasons and expectations on the list next to the table and indicate the reason by using the corresponding number). Also indicate the number of **times per week** (frequency) that you spend on the type of session and **how long** (time) **you exercise every time.**

Type of exercise session that you prefer (mark at least 4 modes) →	Preference 1, 2, 3, 4	*Expectations e.g.: 1, 3 & 4	Frequency (per week)	Time (min)
Aerobics				
Aerobics: Beginner class				
Aerobics: Intermediate class				
Aero-step				
Aquafitness				
Aqua: Sport aqua				
Body dynamics				
Body toning				
Callanetics				
Cardio workout				
Core stability				
Dance dynamics				
Circuit training on gymnasium floor				
Weight area on gymnasium floor				
Cycle				
Cycle: Beginner class				
Freestyle circuit on gymnasium floor				
Power walk				
Pilates				
Punchline				
Punchline: Beginner class				
Punchline: Choreography class				
Punchline: Technical class				
Slide				
Slide: Beginner class				
Slide & tone				
Slide: Sport slide				
Step				
Step combo				
Step: Beginner class				
Step: Intermediate class				
Step: Advanced class				
Weight workout				
Yoga				
Yoga – Power yoga				
Other?				

\* **Expectations** of the exercise programme that you are following. Provide at least **three** reasons for each choice

1. Exercise for health reasons
2. Improvement of general fitness (cardiovascular, strength, endurance, flexibility)
3. Improvement of sport participation
4. Improvement of muscle definition
5. Weight increase
6. Muscle hypertrophy (increased muscle mass)
7. Weight loss
8. Weight management
9. Exercise for stress release
10. Other reasons (specify and name)

Column one of question one provides all the exercise modes presented at the SU Gymnasium during a particular year. In column two the subjects were asked to indicate their preference of exercise mode by using a number 1 for their first choice, a number 2 for their second choice, a number 3 for their third choice,

etc. In the third column the expectations or outcomes for participation in a particular exercise mode had to be indicated. To guide the participants about possible exercise expectations and clarify uncertainties, a key of possible expectations was provided on the right hand side of the questionnaire. The reasons for participation were to be indicated by numerics as found in bold numbers, next to each possible reason. At least three expectations were requested for each exercise mode. In column three and four, answers on the frequency of participation in a particular exercise mode and the duration of the particular exercise session were requested for each exercise mode.

**c) Exercise habit**

Regular participation in physical activity is an important component of a healthy lifestyle (Leenders *et al.*, 2000:1320). According to the Surgeon General's Report (1994) and the American College for Sport Medicine (2007c:1), it is indicated that exercising for at least three, or most, days a week, for approximately 30 minutes per day, uninterrupted, will have health benefits for any individual. It was therefore important to establish the regularity of exercise participation of the target group, in question two (table 3.3).

*Table 3.3: Research questionnaire: Exercise habit*

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**2. Do you exercise regularly?**  
(3 or more times per week, for at least 30 minutes per session)

<b>YES</b>		<b>NO</b>	
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**d) Motivators to exercise and the exercise environment**

The importance of motivators to exercise is widely reported (Burrows *et al.*, 1999:61; ACSM, 2000:2; Weis & Gill, 2005:S73). In question three of the research questionnaire the subjects were asked to indicate their motivators for participating in exercise. Reference to the particular exercise environment is indicated in this question. An indication of the motivators and reasons to exercise had to be given by ranking, by numbers (table 3.4).

Table 3.4: Research questionnaire: Motivation or reasons to exercise

**3. Why do you exercise at this particular gymnasium? Motivation?**

Motivation for exercising at this gymnasium? Indicate by ranking, e.g. 1, 2, 3	Mark & indicate with 1, 2, 3
Environment – convenient	
Safe environment	
Time of day – many options to train at different times	
Instructor: Well-presented class	
Instructor: Male – personality	
Instructor: Female – personality	
Classes are easy to follow	
Music that is used	
Fun aspect of exercising	
Exercise sessions: variety presented	
Types of classes	
Accessability of the venue	
Husband	
Friend	
Gymnasium fees on student account	
Health reasons	
Group classes	
Exercising with a friend/colleague	
The social aspect of the gymnasium environment	
Other (specify)	

**e) Barriers to exercise**

Barriers to exercise are common and found in all population groups across the world (Chao *et al.*, 2000:2; Eyler *et al.*, 2003:12; Weiss, 2005:75; Heath, 2006:52). A number of physical and environmental factors can affect physical activity behaviour (Ransdell *et al.*, 2004:12; Heath, 2006:75), and women are more likely to report barriers to exercise (Segar *et al.*, 2002:339). It was important to establish the particular barriers to exercise the target group experienced (table 3.5). Knowledge of possible barriers to exercise could assist university authorities, gymnasium management or individuals to better plan for a possible exercise relapse.

*Table 3.5: Research questionnaire: Barriers to exercise*

**4. What or who prevents you from exercising regularly?**  
(at least 3 times per week?)

<b>Reasons why you do not exercise regularly Indicate by ranking, e.g. 1, 2, 3</b>	<b>Mark &amp; indicate with 1, 2, 3</b>
Working circumstances	
Self image (weak self image – cannot exercise)	
Time: Too little time to exercise	
Distance to training venue	
Husband	
Family keeps me busy	
A full social programme	
Health condition: cannot exercise	
Environment: not appropriate for exercising	
None / no reason	
Other (specify):	

**f) Medication and supplementation**

In order to establish the health status of the target group, it was important to capture their use of medication and supplementation (table 3.6).

Information from this section of the questionnaire could be relevant to the gymnasium management, as well as for student health centres. It could further be explored for more specific future research and follow-up strategies. The participants were asked to indicate their current use of any medication, as well as general supplementation to normal dietary requirements.

Table 3.6: Research questionnaire: Medication and supplementation

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**5. Are you currently taking any medication?**  
(Mark if applicable)

<b>Medication and supplementation</b>	<b>Mark ✓</b>
Asthma medication	
Hormone replacement treatment	
Oral contraceptives	
Medication for regular pain	
Weight loss supplements	
Anti-depressants	
Supplements: Vitamins	
Supplements: Other	
Medication for specific condition (specify):	
Other (specify):	

---

**g) Health status**

The general health status of young students is an area of concern (Calfas *et al.*, 1994:324; USDHHS, 1991:np; Senekal, 2005:np; Cilliers *et al.*, 2006:234). It was deemed valuable to capture the health status of university female students, to provide a better understanding of the typical health conditions they experience.

The use of the information from this section could be of value to the gymnasium management, student health centres and university authorities to better plan and address specific needs of clients in this age group. Programmes with a preventative or rehabilitative nature could be introduced at the local gymnasium. Members could be advised on a more client centred programme prescription to meet the needs of their health status. This could be a valuable tool for improved client service delivery. The research participants were asked to indicate their current health status in question six (table 3.7).

Table 3.7: Research questionnaire: Health status

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**6. Indicate what medical condition or affliction you are currently experiencing: (Mark if applicable)**

<b>Health staus</b>	<b>Mark ✓</b>
Cholesterol	
Diabetes	
Asthma	
Surgery (operations) Specify:	
Osteoporosis	
Hypertension (high blood pressure)	
Heart condition: Cardiovascular disease Specify:	
Stroke	
Lower back problems	
Other (specify):	

---

**h) Smoking habit**

In question seven of the research questionnaire, the purpose was to establish the status of the smoking habit among the target group. Factors such as peer pressure and the new freedom experienced during the transition from adolescence to adulthood influence the lifestyle choices of the young adult (Mackay, 1998:411; Crisp, *et al.*, 1999:658; Warren, 2002:252; Knuttgen, 2003:34).

Information on any indicators of a threat to the health of these young women could be of great value. The subjects were asked to indicate their current smoking habit, as well as to indicate a positive change in this habit (table 3.8).

*Table 3.8: Research questionnaire: Smoking habit*

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**7. Do you smoke ?**

YES	NO
<i>If you have stopped smoking, how long have you been "clean"?</i>	

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All research questionnaires that were completed during a particular exercise class on a specific day were gathered by the researcher and assistants. Each group of questionnaires was filed according to date, time and exercise mode. A specially designed cover sheet for these class questionnaires provided information on date, time, type of class, venue, instructor, proficiency level, weather, temperature, number of participants, gender and age groups of participants. This additional information capturing on the cover sheet was included and planned for future research purposes or for additional analyses.

### **3.6 ASSISTANTS**

The logistics of effective data capturing for the research at the SU Gymnasium in five venues at the exact same time on a daily basis during the research period (eight weeks for each year) presented a great challenge. The use of well-trained gymnasium and research assistants to assist the researcher with the data capturing was essential.

These gymnasium assistants were all experienced full-time employees of the SU Gymnasium aerobic section. To ensure complete accuracy and reliability of the data capturing, the same assistants were used during a specific period of time, where possible. At the beginning of each research period, the researcher briefed all assistants fully about procedures and requirements of the research questionnaire and data capturing. Assistants were prepared to answer questions and solve possible problems that could occur about the comprehension and completion of different sections of the questionnaire. The group was briefed on their task on a daily basis, as these staff members work according to a rotational time table.

Five female students from the BSc Sport Science graduate programme in the Department of Sport Science at Stellenbosch University were used as test administrators. This group assisted with the data capturing from the research questionnaires on specially designed Microsoft Excel spreadsheets. The researcher thoroughly trained these students for the accuracy of their task. A number of complex variables from the research questionnaire had to be captured in a particular way on each spreadsheet and repeated in the follow-up years to ensure consistency and the accuracy of entering research data throughout the study.

### 3.7 DATA ANALYSIS

The data analysis was guided by the primary and secondary research questions of the study. All questionnaires were numbered and the data for each question was extrapolated and captured by the research administrators according to the allocated number on a specially designed Microsoft Excel spreadsheet. This administration was done on a daily basis whenever possible, directly after the daily completion and gathering of research questionnaires.

The data analysis for the research had the following aims:

- to determine the average age of the subjects
- to establish the body mass index (BMI) of the subjects and compare this to global norms
- to determine the exercise preferences of young women in a university environment
- to determine whether these exercise preferences changed over the period of three years (the average time for most undergraduate programmes at universities)
- to determine the reasons and expectations of exercise choice
- to determine the relevance of body image (weight loss and/or weight management) as a reason for exercising
- to establish an exercise habit among this age group
- to determine the motivators for participation in regular physical activity
- to determine barriers to exercise
- to establish the health status of the subjects
- to determine the typical use of medication and supplementation among young female students
- to establish the incidence of smoking among young female students
- to determine whether there was a correlation between the choice of exercise mode and the expected outcomes of the exercise programme

A statistician from the Centre of Statistical Consultation at Stellenbosch University, Prof Martin Kidd, was responsible for the design of the Microsoft

Excel spreadsheet, where the data for each research question was captured. Results from the sections of the research questionnaire were processed on a separate spreadsheet, in a column for each question, to reflect specific self-reported information, specific responses by ranking, averages and correlations. Professor Kidd also assisted with the final analyses of the collected and processed data for this study.

The StatSoft Statistica Version 8 programme on the Stellenbosch University campus network was used to analyse the data. The following statistical data analysis procedures and methods were used (Vincent, 2005: 20-34):

- *Descriptive statistics*: These are primarily aimed at describing the data captured. The mean ( $M$ ) and standard deviation ( $sd$ ) were used.
- *Rank order distribution*: An ordered listing of a number of data points ( $N$ ), displayed in single column, displaying the spread or variability in a group. The range ( $R$ ) is the distance in numerical value from the highest ( $H$ ) to the lowest ( $L$ ) score.
- *Simple frequency distribution*: Displaying large data sets of a variable ( $X$ ), with a frequency column ( $f$ ) that indicates the number of cases at a given value of  $X$ .
- *Grouped frequency distribution*: An ordered listing of a variable ( $X$ ) into groups of scores in one column with a listing in a second column, the frequency column ( $f$ ) of the numbers scored by people in a group.
- *Table*: Tables present data in a row-and-column format. This format is used to present multivariate data.
- *Graphs: Histogram*: Information displayed from a simple or grouped frequency distribution.

Descriptive statistics methods were used to summarise and present the data on tables and graphs (question 1, 2, 4 and 5), using cumulative frequency.

## **CHAPTER 4**

# **RESULTS AND DISCUSSION**

### **4.1 INTRODUCTION**

University-aged students have a high risk of making unhealthy lifestyle choices that could affect their health and wellbeing. This is a result of the influence of a variety of popular cultures among young adults, the newfound freedom they experience and the typical peer pressure encountered during these years. Several authorities worldwide (NASPE, 2007; ACSM, 2007c; CUPEC, 2007) are of the opinion that all universities and colleges should provide and uphold programmes for students that promote healthy lifestyle choices and include access to physical activity programmes as a strong and integral part of the academic environment.

With the abovementioned responsibilities of a university in mind, this study was concerned with establishing some of the lifestyle choices and behaviours among young female students in a specific university setting. A pattern of participation in group aerobic exercise modes presented at the local university gymnasium was established over a period of three years and linked to exercise preference. The relevance of the choice of these self-selected exercise modes, the post-exercise effect and perceived outcomes of these choices were further explored. The indication of weight management and weight loss outcomes of physical activity participation among this group were of special interest.

Additional aims of the research were to establish the exercise modes young female students prefer to participate in, as well as the barriers to exercise they experienced in the university setting that could negatively influence their health status and physical activity goals.

## **4.2 METHOD**

The statistical analysis was done by Prof Martin Kidd of the Centre for Statistical Consultation at Stellenbosch University. The research questionnaire data and variables were coded on Microsoft Excel spreadsheets and statistically analysed. Quantitative data was extrapolated and analysed using the Statistica data analysis software system (StatSoft, 2008). For descriptive purposes, frequencies and corresponding percentages were calculated and reported. Relationships between ordinal variables were investigated using Spearman correlations. Average frequency of exercise and corresponding comparisons between different exercise modes were analysed using the non-parametric bootstrap method. This was done due to the non-normal nature of the responses. Exercise modes and corresponding exercise outcomes were analysed using corresponding analysis. Physical characteristics were compared over three years using one-way analysis of variance (ANOVA).

## **4.3 RESULTS**

### **4.3.1 Subjects**

A total of 985 participants were initially involved in the research. Exclusion factors and insufficient self-reported data on the research questionnaire excluded 44 of the initial participants and made it possible to use data of the remaining 941 participants. The final sample of the study population (N=941) were young female students who regularly participated in group aerobic exercise classes presented at the Stellenbosch University (SU) Gymnasium. In 2003 the number of participants were 210 (n=210), in 2004 a total of 337 (n=337) participated and in 2005 it was 394 (n=394). This study population represented three point eight six percent (3.86%), five point eight five percent (5.85%) and six point five seven percent (6.57%) of the total membership of the SU Gymnasium during the respective research years.

The majority of the respective research groups indicated that they were students at Stellenbosch University – 80% in 2003, 92% in 2004 and 90% in 2005. The study population only represented one point six seven percent (1.67%) of the total SU student enrolment in 2003. In 2004 they represented two point five two percent (2.52%) and in 2005, only two point eight nine percent (2.89%) of the total student SU population (Grobbelaar, 2008). These attendance percentages reflect under-utilisation of exercise opportunities and use of fitness facilities provided by the university. The results support the findings of several organisations (ACHA 2007; ACSM, 2007c; CUPEC, 2007; NASPE, 2007), as reported in literature, that students participate in physical activity and exercise classes at local health and fitness organisations in their university setting, but that physical activity participation is on the decline among this group.

The average age of the participants in 2003 (n=210) was 21.3 (sd  $\pm$ 1.81) years, 20.5 (sd  $\pm$  1.62) years for 2004 (n=337) and 20.9 (sd  $\pm$  1.83) years for 2005 (n=394). The average mean age of the total target group (N=941) was 20.9 (sd  $\pm$ 1.87) years.

The socio-demographic and health indicators characterise the study population as a healthy group of young females, exercising regularly, with a low prevalence of chronic conditions of lifestyle (hypokinetic conditions/diseases that could develop as result of lifestyle choices and especially a lack of physical activity, e.g. type two diabetes or hypertension), a low use of chronic medication and low percentages of substance (tobacco) use.

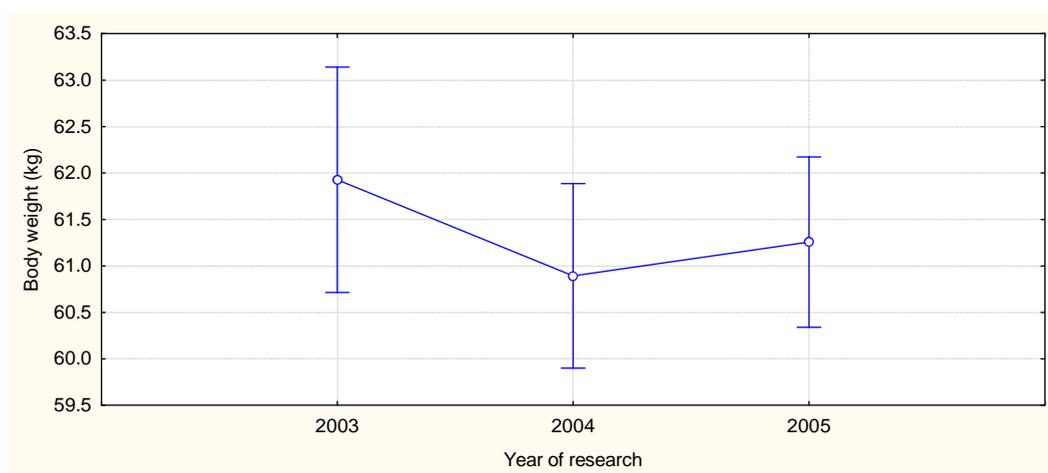
#### **4.3.2 Physical characteristics of the research population**

Table 4.1 indicates the morphological characteristics of the study cohort by age (years), body weight (kilogrammes), body height (meters) and body mass index (BMI). The mean score and standard deviation ( $\pm$ sd) were calculated for age, body weight, body height and BMI (kg/m<sup>2</sup>).

*Table 4.1: Morphological characteristics of the participants (N=941) by age (years), body weight (kg), body height (m) and BMI (kg/m<sup>2</sup>)*

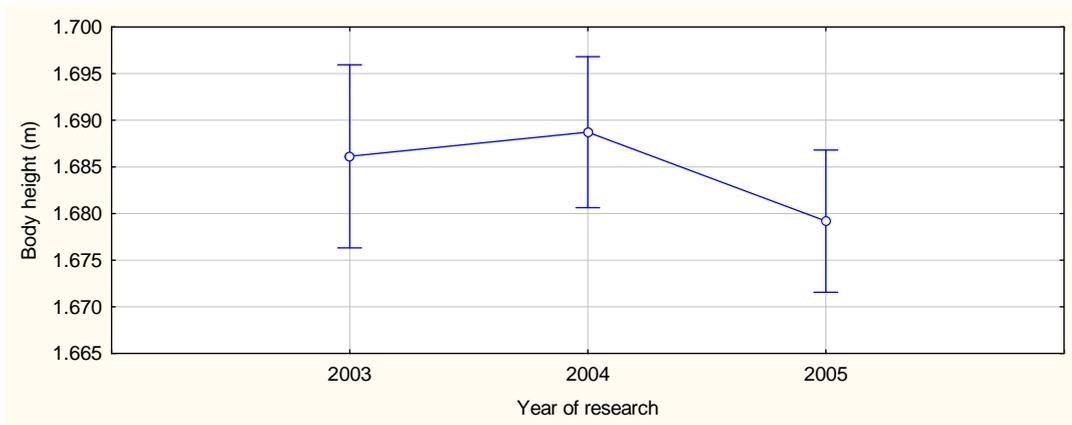
Variable	Mean Standard deviation (sd)		
	2003 (n=210)	2004 (n=337)	2005 (n=394)
Age (years)	21.3 (±1.81)	20.5 (±1.62)	20.9 (±1.83)
Body weight (kg)	61.9 (±8.80)	61.2 (±10.3)	61.3 (±8.70)
Body height (m)	1.69 (±0.07)	1.69 (±0.07)	1.68 (± 0.07)
BMI (kg/m <sup>2</sup> )	21.8 (±2.62)	21.5 (±3.29)	21.7(±2.82)

The data presented in figure 4.1 indicates the results and comparison of average body weight in kilograms (kg) of the study cohort per research year. No significant difference ( $p=0.43$ ) was found for the average body weight of 61.3 kg ( $\pm 8.70$ ) between the three years (table 4.1).



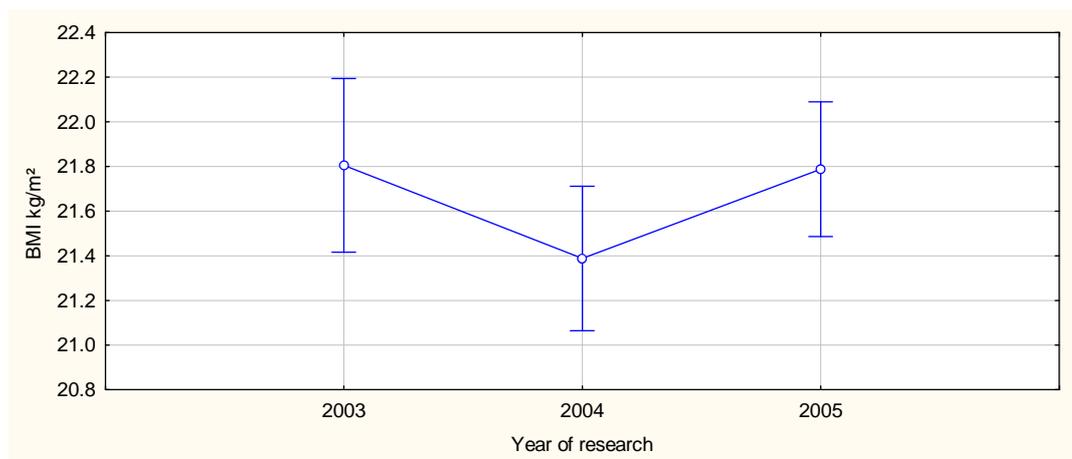
*Figure 4.1: Comparison of body weight (kg) between the 2003, 2004 and 2005 study cohort (N=941). Averages and 95% confidence intervals are depicted on the graph*

Figure 4.2 displays comparative data of differences in body height in metres (m) of the study cohort (N=941) between the research years. No significant difference ( $p=0.22$ ) was found for the average body height of 1.68 m ( $\pm 0.07$ ) between the years.



*Figure 4.2:* Comparison of body height (m) between the 2003, 2004 and 2005 study cohort (N=941). Averages and 95% confidence intervals are depicted on the graph

Data on the comparison between the BMI  $\text{kg/m}^2$  of the study cohort and the year of research is indicated in figure 4.3. No significant difference ( $p=0.14$ ) for the average BMI of 21.7  $\text{kg/m}^2$  ( $\pm 2.82$ ) between the groups was observed.



*Figure 4.3:* Comparison of BMI between the 2003, 2004 and 2005 study cohort (N=941). Averages and 95% confidence intervals are depicted on the graph

The total sample (N=941) of participants had a mean BMI score of 21.7 kg/m<sup>2</sup>. This average BMI kg/m<sup>2</sup> score indicates that the group was within the normal range of BMI (table 4.2) of 18.5 kg/m<sup>2</sup> to 24.9 kg/m<sup>2</sup> for adults.

Table 4.2: Classification of disease risk-based body mass index (BMI)

Classification	BMI kg/m <sup>2</sup>	Disease risk relative to normal body weight
Underweight	< 18.5	
Normal	18.5 – 24.9	
Overweight	25.0 – 29.9	Increased
Obesity, class I	30.0 – 34.9	High
Obesity, class II	35.0 – 39.9	Very high
Obesity, class III	≥ 40.0	Extremely high

(Adapted from Whaley, 2006:58)

Figure 4.4 presents the comparison of BMI kg/m<sup>2</sup> of the study cohort over three years. Indications of outliers (○) (○ data points that are far away from the bulk of the data) above and below the normal ranges are presented.

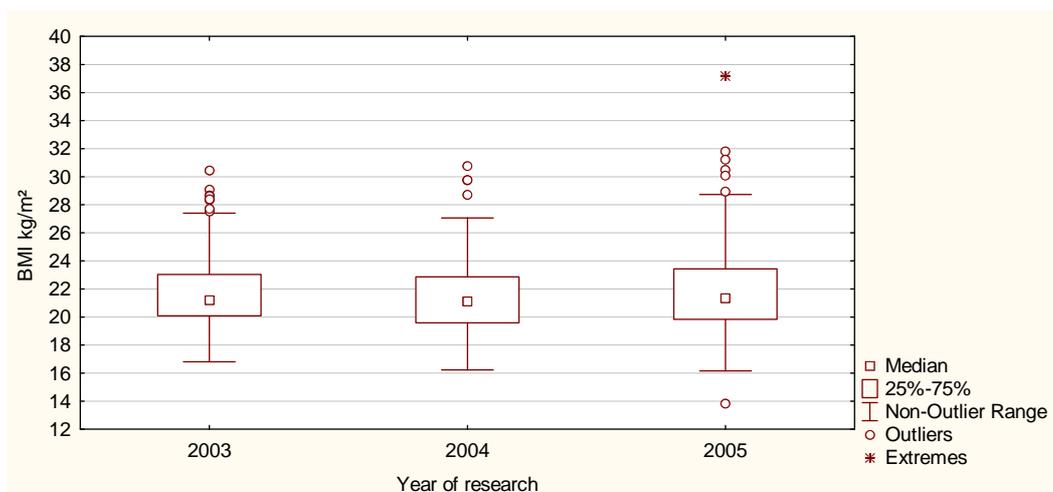


Figure 4.4: A comparison of the BMI kg/m<sup>2</sup> of the total (N=941) study cohort per academic year

Tracking the average profile of the BMI of the study cohort per academic year, it is interesting to note that there is only a two (2%) to three percent (3%) difference between the total BMI averages for the groups. There is however a tendency of an increase in the BMI towards the third and fourth academic year.

In figures 4.5, 4.6 and 4.7 this tendency is indicated. More participants present with a BMI >24.0 kg/m<sup>2</sup> as the academic years increase. The same tendency is reported by Hivert *et al.* (2007:1264), where they state that the first few years at university or college are associated with significant weight gain, ranging from one to two (1 kg to 2 kg) kilograms per year on average.

Figures 4.5, 4.6 and 4.7 indicate the correlation, or lack thereof, between the reported BMI and academic year for the study cohort in 2003, 2004 and 2005 respectively.

No significant correlation was found between academic year and BMI for any of the three years ( $r = 0.08$  for 2003,  $r = 0.05$  for 2004 and  $r = 0.15$  for 2005).

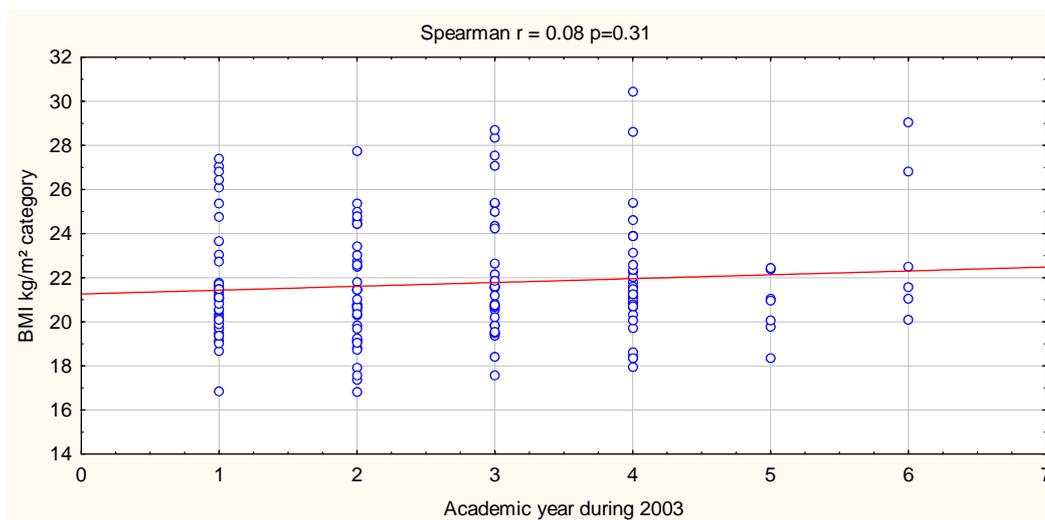


Figure 4.5: BMI and academic year correlation – 2003 (n=210), with the Spearman correlation indicated on the graph

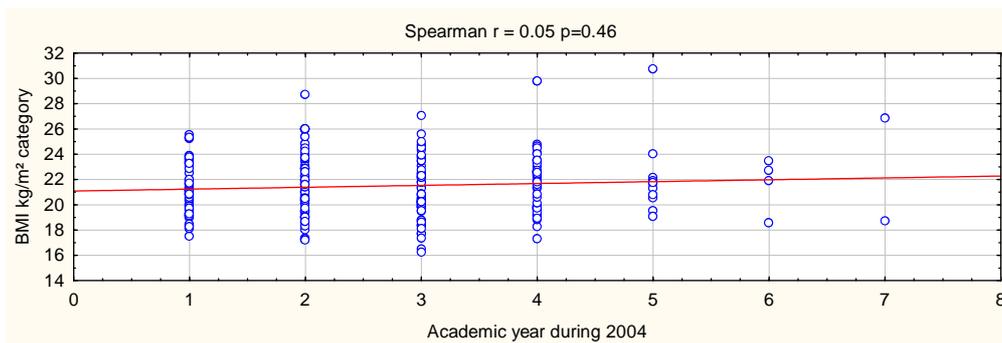


Figure 4.6: BMI and academic year correlation – 2004 (n=337), with the Spearman correlation indicated on the graph

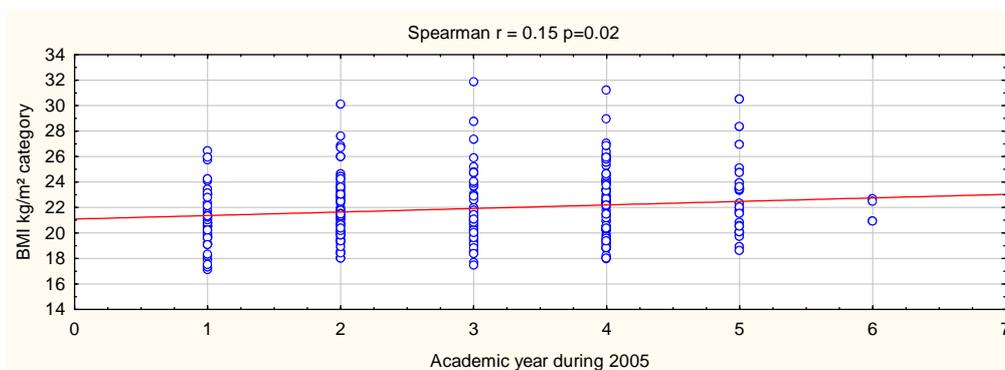


Figure 4.7: BMI and academic year correlation – 2005 (n=394), with the Spearman correlation indicated on the graph

A small percentage of the female students in the study cohort had a BMI of  $\leq 18.5$  kg/m<sup>2</sup>. This is less than the reported average BMI kg/m<sup>2</sup> (table 4.2). Body image dissatisfaction is common and very apparent among young female adults, especially within the subgroup (university students), with westernised lifestyles (Strelan *et al.*, 2003:89; Skemp-Arlt, 2006:50).

Overweight individuals fall in a BMI ratio of  $\geq 25.0$  to  $< 30.0$  kg/m<sup>2</sup> and obese individuals in a BMI of  $\geq 30.0$  kg/m<sup>2</sup> (table 4.2) (Lowry *et al.*, 2002:18). Figures 4.5, 4.6 and 4.7 show some participants in this category, an indication of levels above the normal range of BMI of 18.5 kg/m<sup>2</sup> to 24.9 kg/m<sup>2</sup> for adults. These students present with possible health problems and should be monitored.

Overweight is a health hazard and obesity has been declared a global health epidemic. According to the World Health Organisation (WHO) an estimated 35% of the adult population in industrialised nations are obese (Hoeger & Hoeger, 2009:128).

No significant correlation was found between academic year – 2003 ( $p=0.31$ ), 2004 ( $p=0.46$ ), 2005 ( $p=0.02$ ) – and BMI  $\text{kg/m}^2$  for the study cohort. However a recent report from the American College Health Association (ACHA, 2006:1) states that, on average, 35% of students on college campuses are overweight or obese, confirming the tendency of weight increase among young adults during the first few years at university (NASPE, 2007:1).

#### **4.3.3 Exercise preferences**

In figures 4.8, 4.10 and 4.12 the overall results of exercise preferences (aerobic exercise modes) of the total research sample ( $N=941$ ) are indicated. The graphic presentations in these figures are only for the first choice of exercise mode, by ranking. The results were extrapolated from question one of the research questionnaire (Appendix D/E:2003; F/G:2004 and 2005). Statistics for the four most popular exercise modes are reported here, as the other choices of exercise modes have not produced high enough percentages considered for statistical purposes.

In 2003, the SU Gymnasium presented 15 aerobic exercise modes as group exercise options to its members. Punchline (a combination of boxing and a martial arts style workout), also known as boxing aerobics, kata box or boxercise, was the most popular exercise mode among 51% of the participants. Body toning and aerobics was a second choice, being the preference of with nine percent (9%) of the study cohort, step classes a third choice with seven percent (7%) and indoor cycling a fourth choice with six percent (6%).

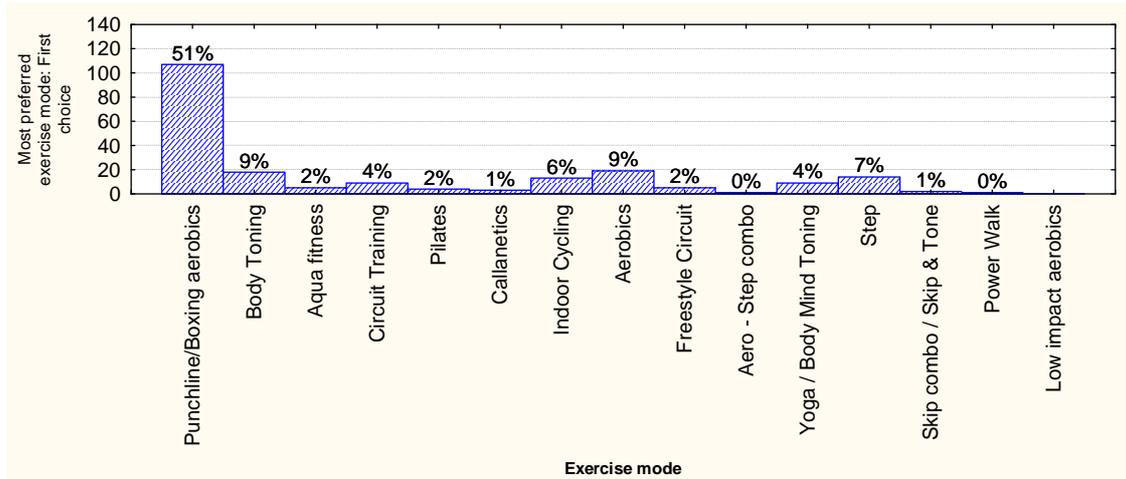


Figure 4.8: Most preferred aerobic exercise modes indicated in 2003 (n=210)

Bootstrap means (this method is described on page 149) as a preferred exercise mode as well as the frequency of attendance per week are indicated in figure 4.9.

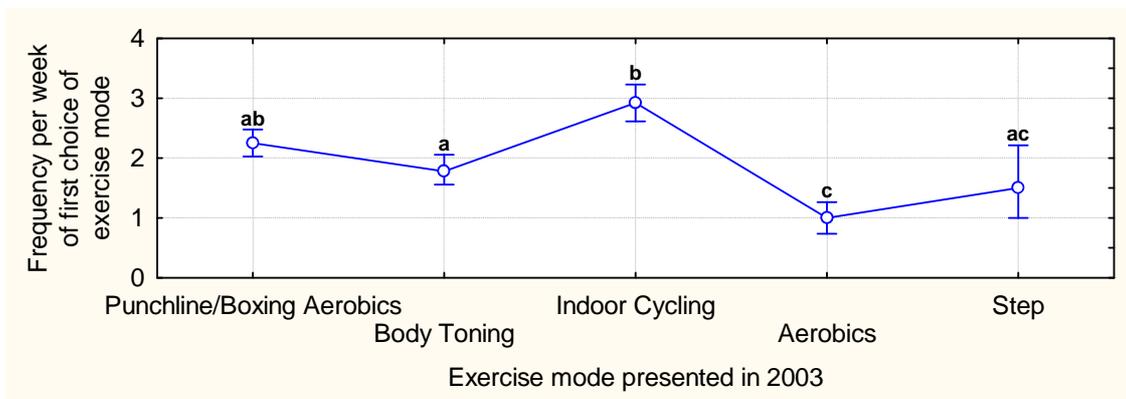


Figure 4.9: Frequency of attendance of first choice of exercise mode in 2003 (n=210). Means and 95% confidence intervals as determined by non-parametric bootstrap method are depicted on the graph. Letters indicate significant differences on a 5% level.

The attendance of indoor cycling by the study cohort was the most frequent, at an average of three times per week, compared to aerobics, that was attended only once a week.

The most preferred exercise mode, punchline, was on average attended at least twice a week and consisted of the largest group. The step classes had the least participants. Body toning classes were on average attended at least once a week.

The aerobic section of the SU Gymnasium experienced a rapid growth period from 2003 to 2004. The total membership of 5 428 in 2003 increased to 5 721 in 2004. This made it essential for the aerobic section of the SU Gymnasium to expand the group exercise options from 15 to 35 modes, as reflected in figure 4.10. Global trends influenced the decision of the gymnasium management to include the additional exercise modes members could choose from (LIFE, 2000:1; Stevens, 2000:1; IDEA Fitness Trends, 2005:1).

The punchline/boxing aerobics classes were restructured at the beginning of 2004 to include different content-focus classes, as well as cater for the different competency levels of participants in this modality. The change was brought about because of the popularity of the exercise mode in 2003. The numbers of members attending these classes were becoming so large that the venue for punchline/boxing aerobics became too crowded and was often a “full house”, necessitating the diversification of class type. The large numbers per class made it difficult for instructors to monitor the technique of the clients during execution of movements. The gymnasium management also had to address other factors related to these large groups, such as safety issues, the quality of presentation and member satisfaction during group aerobic classes.

Figure 4.10 indicates the diversification of the original format of punchline/boxing aerobics, as presented in 2003, to punchline: beginners, punchline: choreography and punchline technical classes, presented from 2004. This provided an additional three choices of punchline-type exercise options to members. Other additions to the aerobic exercise mode *repertoire* of the SU Gymnasium in 2004 are also indicated on figure 4.10.

The indication of exercise preference by the study cohort in 2004 was that punchline in all its forms was still the most popular exercise mode. The sum of all clients who preferred the punchline options was 29.7%. This indicated a decline from the previous year. Indoor cycling and indoor cycling: beginner class, with a combined total of 16.3%, was the second most preferred choice and body toning was in third place, with seven point six percent (7.6%). Aerobics, at six point seven percent (6.7%) and yoga, at six point four percent (6.4%), were the fourth and fifth choices of the participants. Yoga at six point four percent (6.4%) and sport/power yoga at three point five percent (3.5%), was presented for the first time in 2004, indicating a total of nine point nine percent (9.9%) of the study cohort preferring these exercise modes.

The decline in percentages reported above (indicated for most preferred exercise modes) between 2003 and 2004 can be due to the fact that clients had a larger number of exercise modes to choose from in 2004. This does not necessarily indicate a decline in the popularity of the mentioned exercise modes. The wider variety of choices made it possible for clients to diversify their exercise programme format and attendance according to their needs and preferences.

Slide board aerobic preference was indicated at a total of a three percent (3%) level in 2004. This is worthy of mentioning, as the SU Gymnasium is known as one of the only fitness facilities in South Africa where this format of group exercise presentation has been implemented successfully for more than four years (Van Niekerk, 2008a:25).

All exercise modes presented at the SU Gymnasium in 2004 are shown in figure 4.10 and indications are of first choice of exercise mode, by ranking.

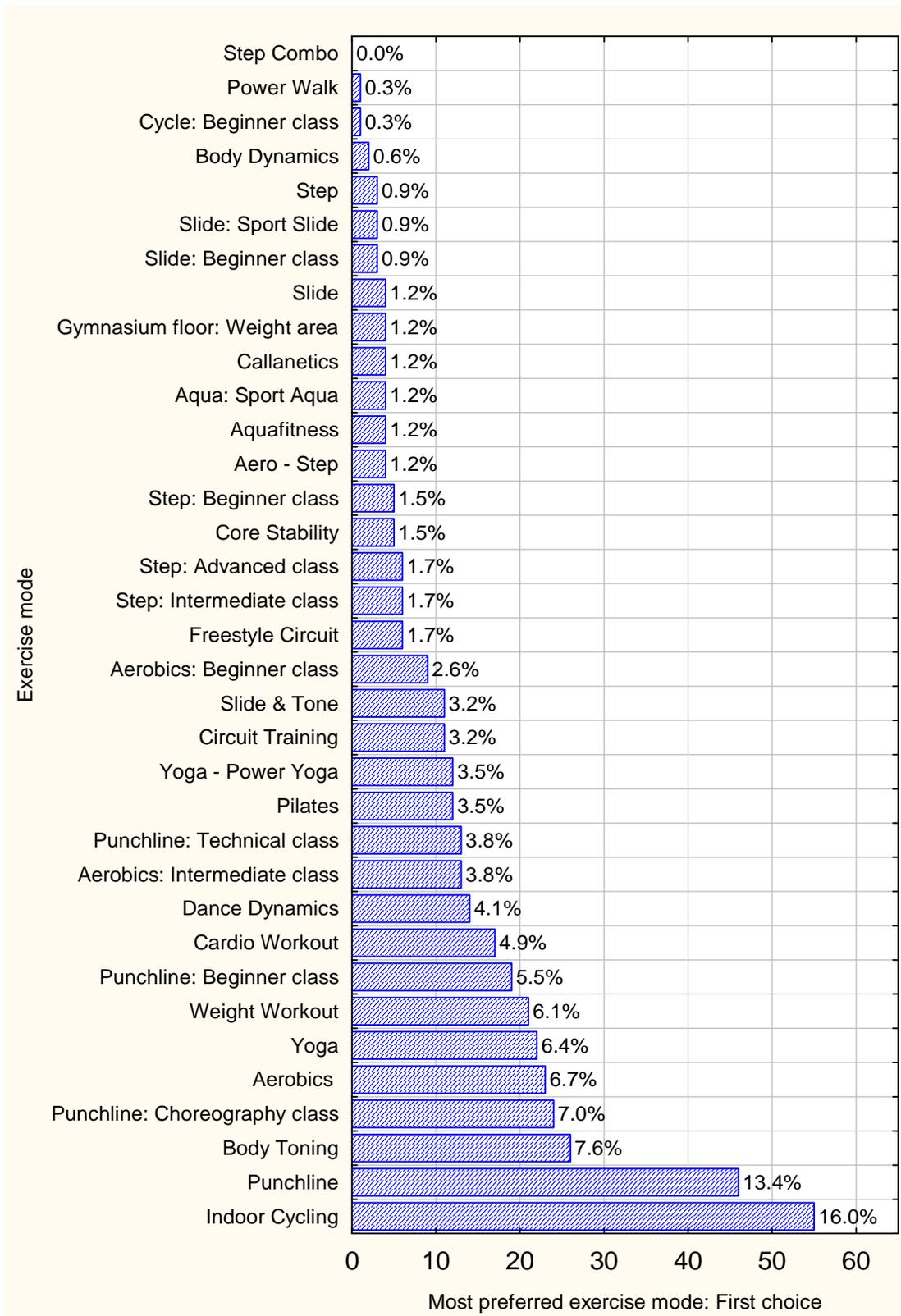
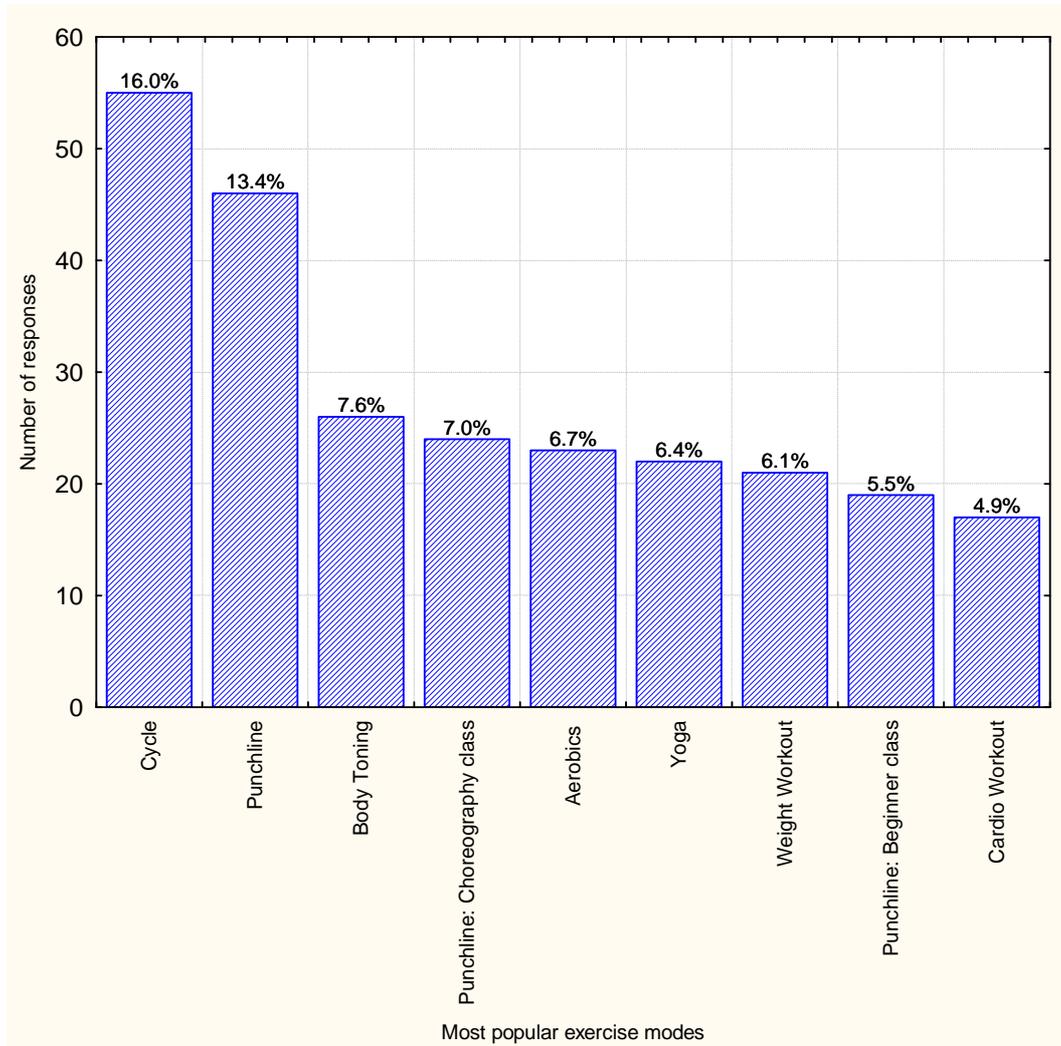


Figure 4.10: Total presentation of exercise modes at the SU Gymnasium in 2004 (n=337), indicating exercise preferences by ranking

Figure 4.11 indicates the first nine most preferred exercise choices made by the study cohort in 2004.



*Figure 4.11: Most preferred exercise modes at the SU Gymnasium indicated in 2004 (n=337)*

Two new modes of exercise were added to the aerobic group exercise repertoire for 2005. Figure 4.12 indicates all 37 of the exercise modes presented by the SU Gymnasium in 2005. The following graphic presentation is of first choice, by ranking.

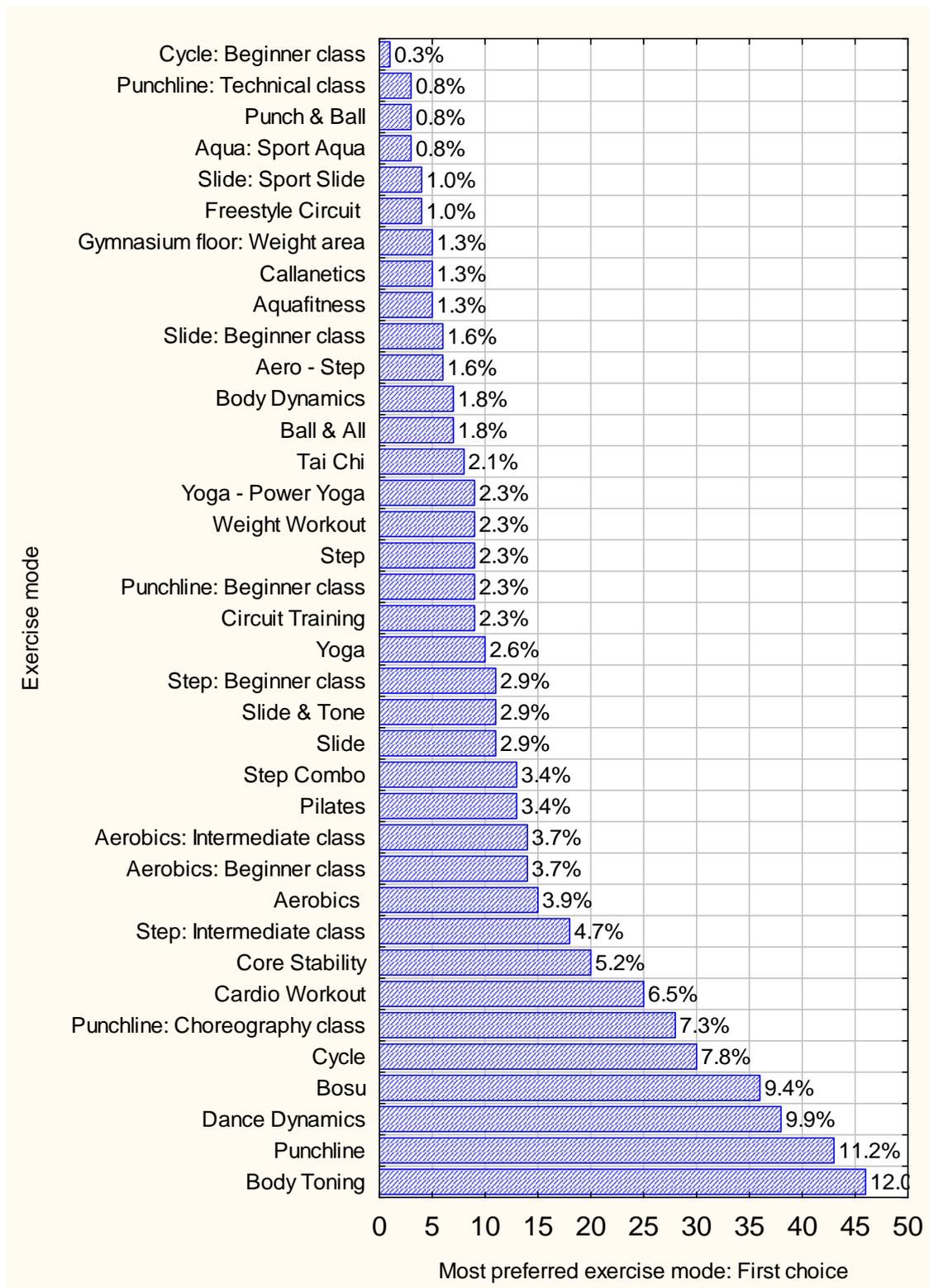
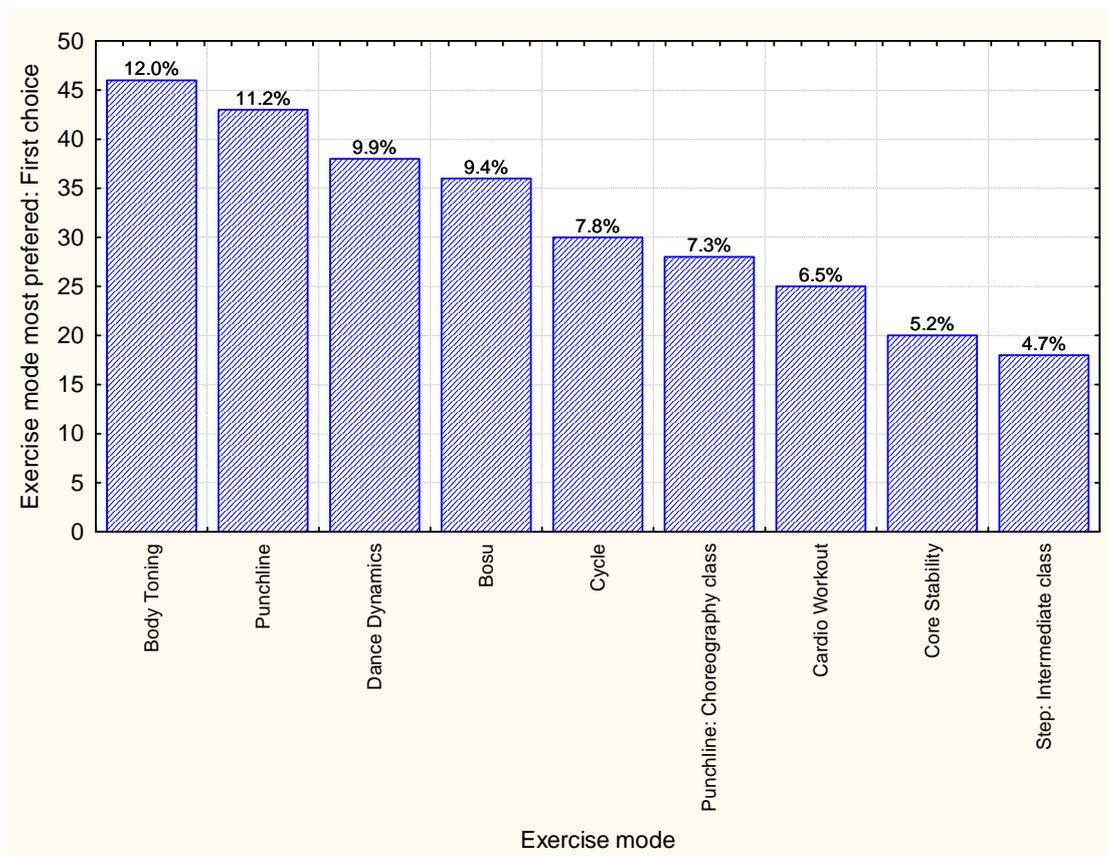


Figure 4.12: Total presentation of exercise modes at the SU Gymnasium in 2005 (n=394), indicating exercise preferences by ranking

The indoor cycling studio at the SU Gymnasium was enlarged in 2004 and relocated to a more modern venue in the gymnasium. This was necessary to meet the need of the growing number of members attending this mode of exercise. Diversifications in these classes were also necessary to accommodate client needs and numbers.

Figure 4.13 indicates the nine most preferred modes of exercise among the study cohort in 2005.



*Figure 4.13: Most preferred exercise modes at the SU Gymnasium indicated in 2005 (n=394)*

The results for 2005 indicate that the choice of some of the most preferred exercise modes for the previous years changed during this year. Combined, the formats that included punchline or boxing aerobics were still the most preferred exercise mode, with a total of 21.6% indicating it as a first choice.

At 12% body toning was the second choice, with dance dynamics a third choice at nine point nine percent (9.9%) a third choice and bosu ball fourth with nine point four percent (9.4%). The exercise preferences of the study cohort indicate that the gentler modes of exercise (body toning, Pilates, yoga, body dynamics and callanetics: a total of 21.3%), as well as some new exercise modes, such as dance dynamics with nine point nine percent (9.9%), bosu ball with nine point four percent (9.4%), core stability with five point two percent (5.2%) and with a combined total of 24.5%, were being chosen above some of the older basic exercise modes. This supports the sentiment noted in the literature (Carney, 2003:1; Bouchez & Chang, 2005:1; IHRSA, 2006:1; Rediff News 2006:1; Yara, 2006:1) of clubs and fitness facilities blending different types of exercise modes to create new workouts in order to counteract boredom among members. The emergence of new, more appealing exercise modes, targeted towards niche audiences, was also predicted to become a growing trend (Miller, 2000:1) that influenced the choice of participation in exercise modes.

The wider variety of exercise modes presented by the aerobic section of the SU Gymnasium from 2003 to 2005 had a significant influence on the total numbers and percentages for exercise preference, reported for each exercise mode and indicated in figures 4.8, 4.10 and 4.12. According to average figures, 34.1% indicated punchline as their first choice of exercise mode. A new addition, cardio workout, was not presented in 2003, but was the second most preferred exercise mode (by 11.4% of the study cohort) over a period of two years. Aerobics, a more traditional exercise mode, was third most preferred mode over three years with an 11.1% choice by the study cohort. Indoor cycling, body toning and step were presented throughout the research period and were the choice of 10.1%, nine point seven percent (9.7%) and nine point six percent (9.6%) respectively, on an overall average.

The pattern of exercise mode choice among the study cohort and averages over a period of three years are indicated in table 4.3.

*Table 4.3: Percentages of first choice (most preferred by ranking) of exercise modes indicated by the study cohort (N=941) over the research period*

<b>Exercise mode</b>	<b>First choice % in 2003 (n=210)</b>	<b>First choice % in 2004 (n=337)</b>	<b>First choice % in 2005 (n=394)</b>
Punchline (punchline original; beginner; choreography; technical)	51.0	29.7 *	21.6 *
Body toning	9.0	7.6	12.0
Indoor cycling (cycle original; beginner)	6.0	16.3 *	8.1 *
Dance dynamics	0	4.1	9.9
Bosu ball	0	0	9.4
Aerobics (aerobics original; beginner; intermediate)	9.0	13.1 *	11.3 *
Step (step original; beginner; intermediate; advanced; combo; aero-step)	7.0	7.0 *	14.9 *
Yoga (sport/power yoga)	4.0	9.9 *	4.9 *
Cardio workout	0	4.9	6.5
Pilates	2.0	3.5	3.4
Aquafitness (aquafitness original; sport aqua)	2.0	2.4 *	2.1 *
Slide board (slide original; beginner; sport slide; slide & tone)	0	6.2	8.4
Cardio workout	0	4.9	6.5
Weight workout	0	6.1	2.3

*\* Diversification of the original format as presented in 2003.*

*New, additional exercise mode formats presented in 2004 and 2005.*

A distinct relationship is found between global trends of exercise modes and the preferred modes indicated by the study cohort. In the literature, Miller (2000:1) predicted a wider variety of aerobic classes by mid-2003, to provide more innovative group programming options that would relieve boredom and respond to consumer demand. Stevens (2000:1) indicated the growing popularity of aerobic kickboxing as well as body toning, which are both trends that were preferred by the study group in 2003.

The American College on Exercise (ACE), with Davis (2003:1) as their spokesperson, predicted that yoga and other body-mind focused exercise modes would become more popular in 2004. The IDEA (2005:1) fitness trends indicated the emergence of new equipment and exercise devices, such as bosu ball, becoming popular in 2005. In tracking global trends of exercise modes and their emergence in South African fitness facilities, it is noted that it takes approximately a year to two years for these trends (that usually originate in the USA and Europe) to reach South Africa and influence the compilation of the exercise modes that are presented in the aerobic sections of most gymnasiums. The training of instructors responsible for the presentation of these modes, as well as qualifying these instructors to be able present the new exercise modes, could contribute to this delay.

Health and fitness information is freely available to consumers in most modern societies. The anticipation of members and their requests to introduce new exercise trends, as seen and reported in the media, provide a challenge to fitness facility management to satisfy their members' needs and stay updated and ahead of these trends.

#### 4.3.4 Reasons for choice of exercise mode

Several results are reported on the reasons and expectations of the study cohort choosing a particular exercise mode. These reasons for participation in an exercise mode and the expected outcomes the participants had from this choice are indicated in figures 4.14, 4.15 and 4.16, for the years 2003, 2004 and 2005 respectively. The statistical method of correspondence analysis (CA), group the most preferred exercise mode (•) to the expected outcome (□) and is indicated in these figures.

In figure 4.14, results from 2003 indicate that “weight loss” was reported as the most important expectation (first reason by ranking) from participating in punchline. The “weight loss” intention was indicated by 47% of the participants, while “general fitness” and “health benefits” were the second and third expectations, chosen by 23% and 16% respectively. Other reasons for participation were indicated as the improvement of “muscle definition”, chosen by eight percent (8%), and “relief of stress”, by five percent (5 %). The vigorous nature and more sporting style and focus of punchline aerobics (where certain movements and the conditioning expertise of boxing are applied in a rhythmic nature) develop strength and considerable cardiovascular endurance (Bishop, 2002:70). These benefits contribute to the expectation of the grouping of punchline with the improvement of health, the development of general fitness and “weight loss”, as indicated by the study cohort in 2003. Punchline is also clustered closer to “stress relief” than the other modes. Stress can lead to many risky behaviours in the context of university life, and for many people the emotional and physiological consequences that often accompany acute stress responses seem to be alleviated after a bout of exercise (Anderson & Sutherland, 2002:19).

Figure 4.14 also indicates that aerobics as exercise mode has the closest grouping to the “weight loss” expectation, with punchline and step clustered second. Research shows that exercise seems to be the best predictor of long-term maintenance of weight loss (Hoeger & Hoeger, 2009:143).

Aerobic exercise five to six times per week, for 30 to 60 minutes per session, at an intensity of about 70% of the maximum heart rate, is recommended for weight loss purposes (Bishop, 2002:127; Hoeger & Hoeger, 2009:144). To prevent weight gain, 60 minutes of daily activity is recommended, while 90 minutes may be required to maintain substantial weight loss (Hoeger & Hoeger, 2009:144).

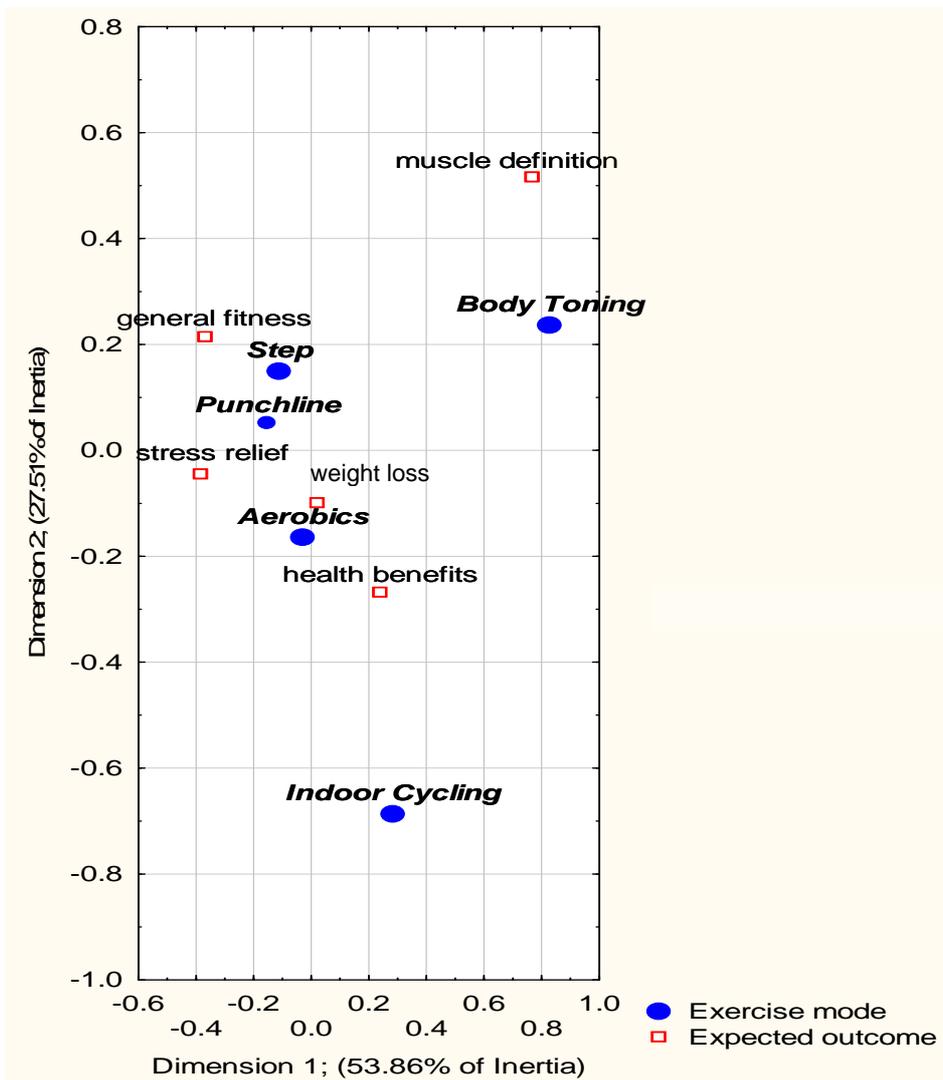


Figure 4.14: Expected outcomes from participation in the most preferred exercise modes in 2003 (n=210)

These results, as discussed and indicated in figure 4.14, show a relationship with similar results reported by Engels *et al.* (2002:73) and Jameson (Jameson, 2007:1) for these exercise outcomes. The clustering of body toning with a “muscle definition” expectation from exercise is realistic and is also reported by the ACSM (2007a:1).

In figure 4.15 and 4.16, the expected outcomes from participating in a particular exercise mode, as indicated by the study cohort in 2004 and 2005, are reported. With larger numbers of exercise modes presented in 2004 (35 modes) and 2005 (37 modes), it was necessary to use symbols on these graphic presentations to indicate the most preferred exercise modes and the reasons/expected outcomes from participation in a particular mode more clearly. For clarity, full descriptive terms of exercise modes and expected outcomes were not possible on these graphs. Tables 4.4 and 4.5 provide a key for the symbols used in the graphic representation of the 2004 results. Figure 4.15 indicates the full spectrum of exercise modes and expected exercise outcomes. This is the result from the 2004 study cohort.

*Table 4.4:* Numbers used in figure 4.15 to indicate the most preferred exercise modes presented in 2004 (n=337)

<b>Number</b>	<b>Exercise mode</b>
1	Body toning
2	Slide & tone
3	Step: Beginner class
4	Yoga
5	Aerobics
6	Aero-step
7	Dance dynamics
8	Step: Intermediate class
9	Step: Advanced class
10	Punchline: Choreography class
11	Weight workout
12	Aerobics: Intermediate class
13	Step

(continued from previous page)

<b>Number</b>	<b>Exercise mode</b>
14	Circuit training
15	Cycle
16	Punchline
17	Freestyle circuit
18	Pilates
19	Yoga - Power yoga
20	Slide
21	Aqua: Sport aqua
22	Callanetics
23	Punchline: Beginner class
24	Punchline: Technical class
25	Weight area
26	Slide: Sport slide
27	Aerobics: Beginner class
28	Aquafitness
29	Core stability
30	Cardio workout
31	Cycle: Beginner class
32	Step combo
33	Slide: Beginner class
34	Body dynamics
35	Power walk

*Table 4.5:* Symbols used in Figure 4.15 indicating the expected exercise outcomes for an exercise mode for 2004 (n=337)

<b>Symbol</b>	<b>Expected outcome</b>
<b>a</b>	Health benefits
<b>b</b>	Muscle definition
<b>c</b>	Stress relief
<b>d</b>	General fitness
<b>e</b>	Sport specific improvement
<b>f</b>	Weight management
<b>g</b>	Weight loss
<b>h</b>	Other reasons
<b>i</b>	Weight gain
<b>j</b>	Muscle hypertrophy

Punchline (16) was the most preferred exercise mode in 2004 and is grouped closest with a “general fitness” (**d**) outcome at 21.7% and with a “weight loss” (**g**) expectation at 20.7% of the study cohort. Additional outcomes, such as the improvement of health and the development of muscle definition, were indicated at a level of 13.7% for both exercise participation expectations. A total of 26.7% of the participants indicated the reasons and expectations for choosing body toning (1) as the development of “muscle definition” (**b**), the improvement of “general fitness” (**d**) at 22.7%, the improvement and maintenance of “health benefits” (**a**) at 20.1%. The “weight management” (**f**) outcome for this exercise mode was indicated by 13.7% of the study cohort. For indoor cycling (15), the development of “general fitness” (**d**) was indicated as the most often cited expectation from 24.5% of the participants. Other expected outcomes were “weight loss” (**g**) at 21.7% and maintenance of “health benefits” (**a**) at 17.5%. For both body toning and indoor cycling the expectations from participation in these exercise modes, as indicated by the study cohort, show a strong relationship with expectations reported in literature for these modes (ACSM, 2007:1; Kravitz & Vella, 2002:4; Sapat, 2006:2).

Aerobics (5), the fourth most popular exercise mode in 2004, was grouped closest to the improvement of “general fitness” (**d**) by 12.1%, “weight loss” (**g**) expectation by 11.8% and for “health benefits” (**a**) by 10.7% of the study cohort. “Weight management” (**f**) and “stress relief” (**c**) were further expectations from participation in this exercise mode. General fitness and health benefits indicated as expectations from participation in aerobics confirm the perception of this mode of exercise being a good cardiovascular workout with improvement of muscular strength and endurance (Bishop, 2002:1). The expectation and experience of “stress relief” (**c**) as a result of attending yoga sessions was also indicated. Literature confirms that participating in yoga has stress relief benefits (ACE, 2007:1; Scott, 2007:1). Most reasons and expected outcomes the study cohort had from particular exercise modes in 2004 relate well with the known and reported benefits of these modes and are confirmed in the literature as mentioned above.

In figure 4.15, the symbol (□) and numbers (1, 2, 3, etc.) are used to indicate an exercise mode, while the symbol (○) with an alphabetical (a, b, c, etc.) indication represent the expected outcome from the exercise mode. An 82.2% variance (46.54% X-axis + 35.66% Y-axis) is reported on the correspondence analyses grouping for 2004 as indicated in figure 4.15.

The results of the exercise expectations indicate that most of the research participants were informed about the focus of a particular exercise mode. The SU Gymnasium provide brief descriptors of exercise class content on notice boards and a printed version is available to members on request. This could have contributed to the participants being informed about a class focus-outcome and reported by them in the research questionnaire. Other more popular information provided in the media that is freely available today in numerous health and fitness publications and programmes could have contributed and influenced these perceptions of exercise outcomes from a particular exercise mode. It is however not specific enough and scientifically verified to influence or educate participants on choice of exercise mode and the linking thereof with specific desired outcomes.

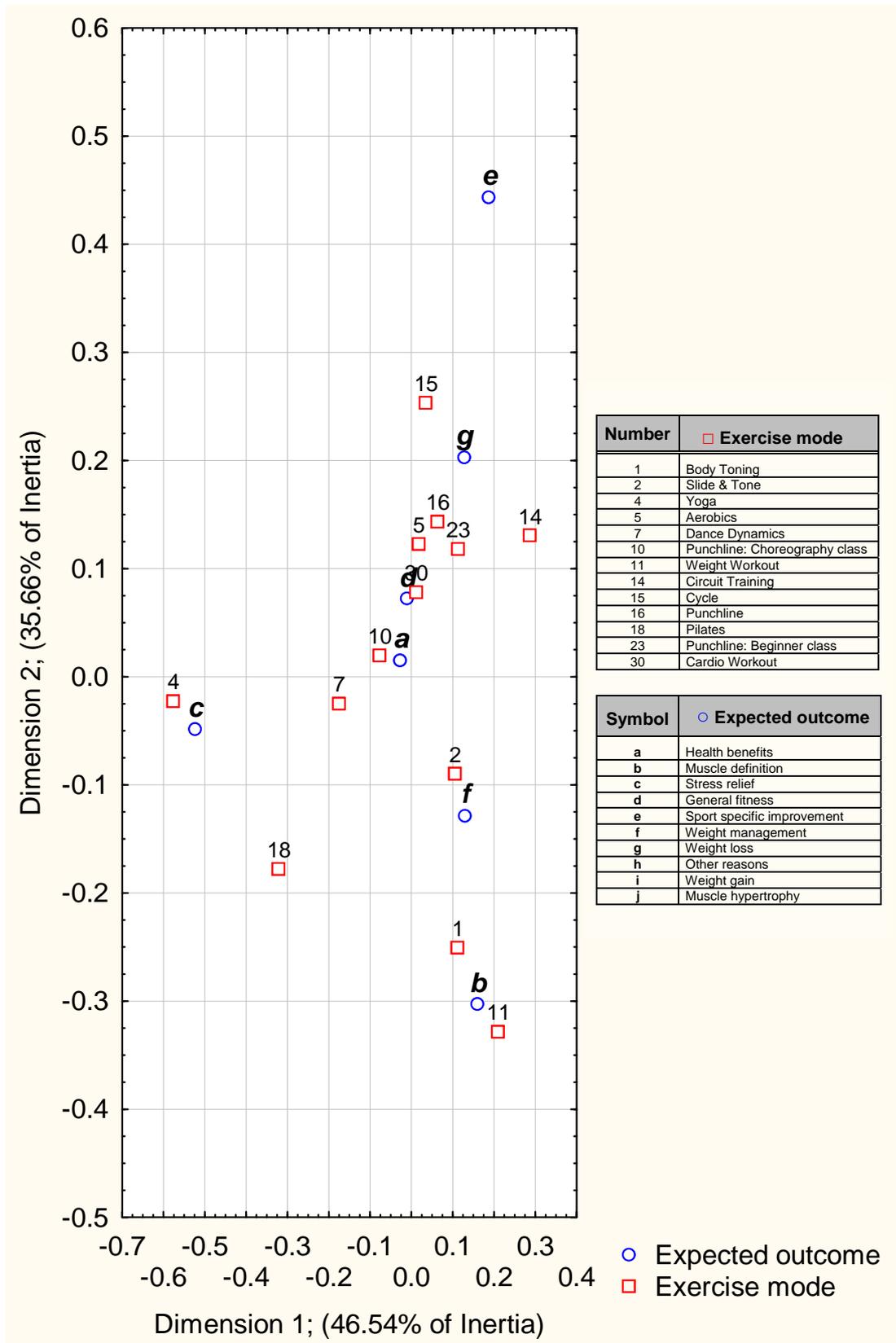


Figure 4.15: Expected outcomes from participation in the most preferred exercise modes as indicated in 2004 (n=337)

In 2005, two new exercise modes were added to the aerobic section of the SU Gymnasium (37 modes), as indicated in figure 4.16. Tables 4.6 and 4.7 provide a key for the symbols used in the correspondence analyses graph (figure 4.16) and indicate the full spectrum of exercise modes and expected exercise outcomes. The reported results in figure 4.16 are from the 2005 study cohort.

*Table 4.6:* Numbers used in figure 4.16 to indicate the most preferred exercise modes presented in 2005 (n=394)

<b>Exercise mode</b>	<b>Number</b>
Callanetics	1
Cardio workout	2
Pilates	3
Punchline: Beginner class	4
Body toning	5
Aerobics	6
Body dynamics	7
Core stability	8
Cycle: Beginner class	9
Freestyle circuit	10
Yoga - Power yoga	11
Aerobics: Intermediate class	12
Step combo	13
Step: Beginner class	14
Circuit training	15
Yoga	16
Punchline	17
Ball & all	18
Punch & ball	19
Slide & tone	20
Aerobics: Beginner class	21
Weight workout	22
Bosu ball	23
Aero-step	24
Aquafitness	25

(continued from previous page)

<b>Exercise mode</b>	<b>Number</b>
Aqua: Sport aqua	26
Cycle	27
Dance dynamics	28
Punchline: Choreography	29
Punchline: Technical class	30
Slide	31
Step	32
Step: Intermediate class	33
Tai chi	34
Gymnasium floor	35
Slide: Beginner class	36
Slide: Sport slide	37

*Table 4.7:* Symbols indicating the expected exercise outcomes for an exercise mode as indicated in figure 4.16 for 2005 (n=337)

<b>Exercise mode</b>	<b>Symbol</b>
Stress relief	<b>a</b>
General fitness	<b>b</b>
Muscle definition	<b>c</b>
Weight loss	<b>d</b>
Weight management	<b>e</b>
Health benefits	<b>f</b>
Sport specific improvement	<b>g</b>
Muscle hypertrophy	<b>h</b>
Other	<b>i</b>
Weight gain	<b>j</b>

The most preferred exercise mode indicated by the study cohort in 2005 was punchline and its diversified classes, with 21.6%. Punchline (17) is grouped with “weight management” (**e**) expectations with an 11.2% indication and an expectation to improve “general fitness” (**b**) as well as “sport specific improvement” (**g**) with a combined 17.2% indication.

Expectations of “weight loss” (**d**) from participation in this mode were indicated by 11.2% of the participants. The reported results are similar to those of the 2004 study cohort. This indicates a relation with and perception by the participants that the more vigorously intensive exercise modes (punchline etc.) will “burn calories” and enhance cardiovascular fitness that will contribute to the improvement of general health, as well as assist with weight loss goals. The study cohort indicated participating in punchline for at least 240 minutes per week (5 sessions per week).

According to literature, when the exercise component of a weight loss programme is designed, the balance between intensity and duration of exercise should be manipulated to promote a high total caloric expenditure (300 to 500 kcal per day and 1 000 to 2 000 kcal per week for adults) (ACSM, 2000:216; Hoeger & Hoeger, 2009:144). For weight control, the ACSM (1990:266; Hoeger & Hoeger, 2009:144) recommends a minimum energy expenditure of 300 kcal per session, three times per week, or 200 kcal per session, four times per week. Since the control of body weight responds to calories consumed as well as the number of calories expended during activity, both intake and expenditure have to be considered by the individual trying to prevent unhealthy weight gain or achieve weight loss (ACSM, 2007c:3).

In the figure 4.16, the symbol (□) is used to indicate an exercise mode with a corresponding number. The symbol (○) indicates the expected outcome from the exercise mode with a corresponding alphabetical symbol. An 86.4% variance (64.33% X-axis + 22.10% Y-axis) is reported on the correspondence analyses grouping for 2005, as indicated in figure 4.16.

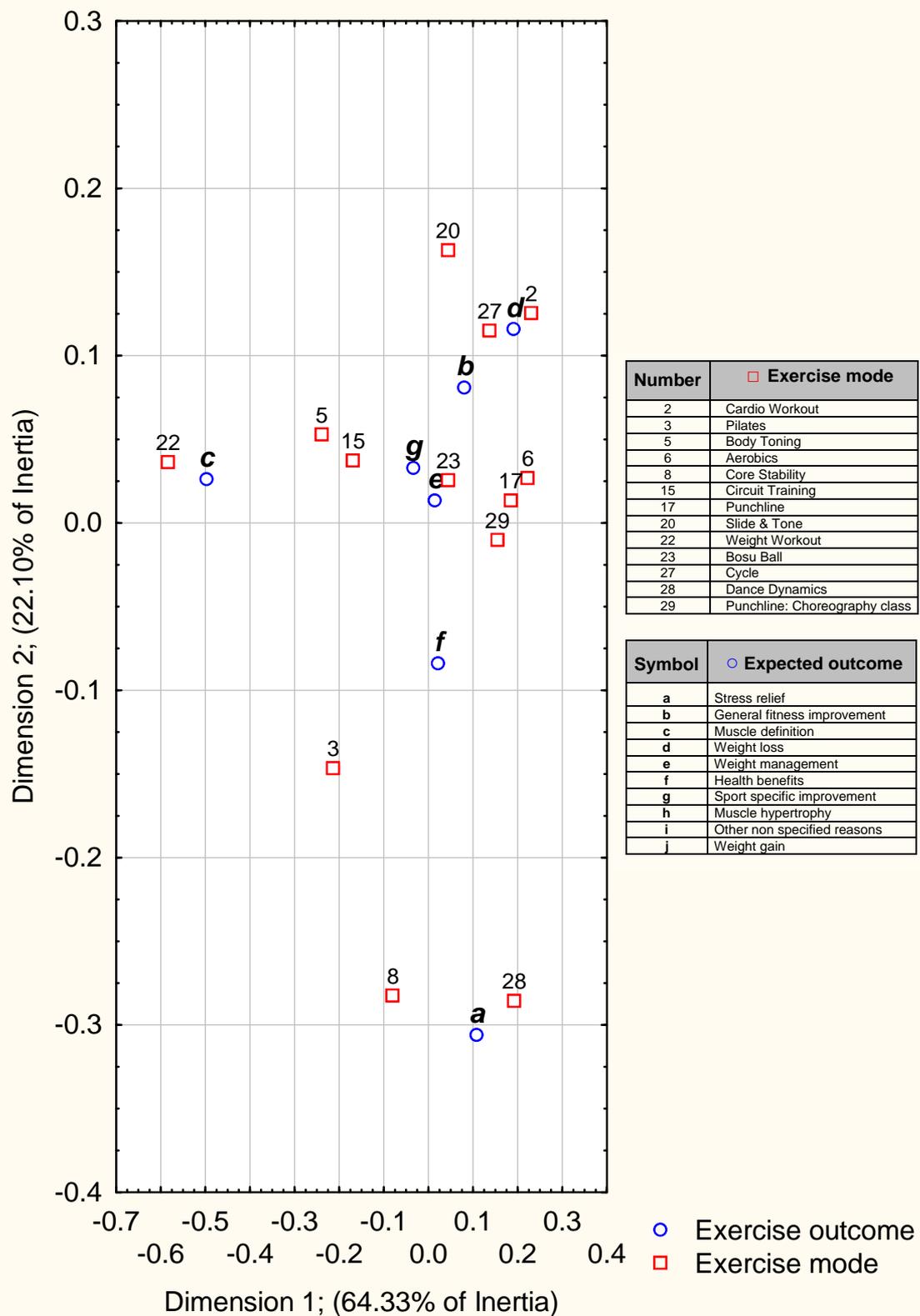


Figure 4.16: Expected outcomes from participation in the most preferred exercise modes as indicated in 2005 (n=394)

Body toning (5), the second most preferred exercise mode with a 12% indication in 2005, is linked to the expectations and outcomes of improvement of (c) “muscle definition” with a 19.7% indication by the study cohort, as well as the maintenance of (b) “general fitness” and “health benefits” (f), with 21.7% and 14.7% respectively. The expectations of “weight management” (e) and “weight loss” (d) outcomes from participation in this exercise mode were indicated at 13.6% as a combined total. The goal of weight management is to achieve a healthy weight and then maintain it.

Bishop (2002:128) confirms that research evidence indicates that a higher percentage of fat is burned in the lower end of the aerobic target zone. The study cohort reported participating in Body Toning for at least 135 minutes (at least three classes) per week. Exercising at both low and moderate intensities for about 20 minutes, the total number of calories burned would be greater at the moderate intensity. Increasing the amount of time a person exercises at low/moderate intensity brings about the change. Very high intensity workouts burn a lot of calories per minute, but most people find it difficult and uncomfortable to sustain this high intensity exercise (Bishop, 2002:128). The grouping of (g) “sport specific improvement”, with body toning (5), as presented in the correspondence analyses tabulation of the 2005 results, indicated in figure 4.16, is somewhat confusing. Original raw data show only 10 (n=10) participants indicating this outcome for body toning. This figure is not a significant percentage in comparison with the number of 85 (n=85) and 78 (n=78) participants indicating the general fitness and muscle definition expectations. The impression of body toning being a good general physical conditioning exercise option and the value it has for the individual could have contributed to this impression by the respondents. Bishop (2002:73) mentions that some of the advantages of participating in body toning are the improvement of good upper body strength, an ideal exercise format for people who are overweight, who suffer from incontinence, have large breasts (it is a less bouncy type of workout), who suffer from chronic impact stress injuries, who are beginners or who are returning to exercise after injury.

It is also a good way for people with asthma and diabetes to start exercising, since they can increase the intensity of the workout gradually. Good general health and fitness benefits are perceived as important outcomes for this exercise mode, as indicated by the study cohort for 2005.

The dance dynamics (28) exercise mode was chosen by 10% of the participants as their third most preferred exercise mode. The study cohort indicated participation in dance dynamics for 240 minutes per week (at least five classes). They expected a “stress release” (a) outcome from participation in dance dynamics classes at an eight point four percent (8.4%) indication. According to Kavanaugh (1995:5), dance and associated movement has proven to be very effective in achieving a wide variety of therapeutic goals, such as activation of the physical body (general fitness), expanding of imagination of the participant (creativity), release of tension, improved coordination and assisting in developing a positive self-image. The expectations reported in these study results relate well with the abovementioned literature outcomes for this type of exercise mode.

Bosu ball (23) classes were chosen by nine percent (9%) of the participants, with “general fitness” (b) improvement in mind. This was indicated by 16.7% of the study cohort. The group indicated participating in bosu ball classes for 240 minutes per week (at least five classes). Other expectations were “weight management” (e) indicated at 12.1%, with improvement of general “health benefits” (f) by 11.4% of the participants. The expectation of the bosu ball classes contributing to the improvement of “general fitness” and “sport specific” (g) improvements were indicated by a combined total of 18.7%. Participants had realistic outcomes envisaged with participation in bosu ball classes. Literature (Sapat, 2006:3) confirms that these classes strengthen the core muscles as well as their stabilisers, the muscles that keep the ankles, knees, hips and torso upright. Balance is a key skill in all sporting codes. All the bosu exercises presented in classes, from sit-ups to one-legged squats to push-ups, strengthen the joint muscles that keep the body stable and contribute to good physical conditioning (Bodywork: Fitness Report 2004:1).

The weight management and weight loss expectations (indicated by the total study cohort during the three year research period) from participating in exercise modes were important indicators for this research. The initial research theory of the importance of weight management and weight loss goals as reasons for exercise participation among this age group of young females is confirmed with the following results. In total, this exercise outcome was indicated by 47%, 44% and 44% of the participants in 2003, 2004 and 2005 respectively. The prevalence of overweight and obesity is rising to epidemic proportions at an alarming rate in developed as well as developing countries around the world (Brown, 2003:1; Hoeger & Hoeger, 2009:128).

Research from the past decade (ACSM, 2000:137; Gappmaier *et al.*, 2006:564; Powers & Howley, 2007:7; Hoeger & Hoeger, 2009:144) has proven the importance of exercise participation in weight management and weight loss programmes. The main effect of physical activity is thought to be related to its contribution to the total caloric deficit. The caloric cost of training is dependent on the intensity, duration and frequency of the activity. Therefore it is assumed that training results are independent of the mode of aerobic activity, as long as the parameters are kept equal (Gappmaier *et al.*, 2006:564). The results from the study for 2004 and 2005 indicate that participants exercised for at least 240 minutes per week on average, for four to five exercise classes of at least 45 to 50 minutes each in punchline, indoor cycling, body dynamics and aqua sport. The duration, frequency and intensity of the punchline and indoor cycling classes relate well to reported weight loss outcomes (Hoeger & Hoeger, 2009:144) and confirm that exercise enhances the rate of weight loss and is vital in maintaining the lost weight.

General fitness was also an important outcome and expectation from exercise participation. This outcome was indicated by 25% of the study cohort in 2003, 23% in 2004 and 25% in 2005. The improvement of muscle definition was reported at eight percent (8%), 17% and 14% in 2003, 2004 and 2005 respectively. Relief of stress through participation in these exercise modes were indicated at seven percent (7%) for 2003, 11% for 2004 and 12% for 2005.

This is the only exercise expectation where an increase in average percentages is noted over the research period. Results on only the four most preferred exercise modes by ranking were reported and linked with the expected outcomes of study cohort over the three years. Overall, the expectations of the cohort were realistic, except for one noted unexpected perception observed in the 2005 results. Studies show that people often have misperceptions about the health-related behaviours they engage in (Bolman, Lechner & Van Dijke, 2007:1). This could be due to more general information that is available through media coverage of fitness related issues. The socialisation of young women on a university campus, the resulting discussion with peers and sharing of knowledge and experiences could also have contributed to the impressions on perception of the value of certain exercise modes. A strong argument can be made that a positive perception of the value of an exercise mode, whether it is perceived mastery, effort or enjoyment, is required to maximise the increase in positive affect (Bartholomew & Miller, 2002:308). Exercise preferences are also an extremely important aspect to be considered when promoting the benefits of exercise (Daley & Maynard, 2002:3).

A number of challenges are associated with promoting physical activity among young adults. According to literature, consistent influences on physical activity patterns among young adults include confidence in the ability to engage in regular physical activity (e.g. self-efficacy), enjoyment of physical activity, support from others, positive beliefs concerning the benefits of physical activity and lack of perceived barriers to being physically active (SGR, 1994:8; Strelan *et al.*, 2003:90; Hoeger & Hoeger, 2009:35). Other commonly cited reasons or expectations from participation in physical activity include “the need to feel in shape”, “to look good” and “to improve or maintain health”. Factors such as “to feel a sense of achievement” and “to get outdoors” are also mentioned. The exercise environment in which people are physically active and the social interaction during this time contribute to how they perceive and respond to the various physical demands encountered during exercise participation (Turner *et al.*, 1997:119; Hoeger & Hoeger, 2009:155).

It would be important to consider these influences and expectations among young female students when a lifestyle change with regard to exercise is to be developed through educational institutions. Regularity of exercise participation is an important lifestyle choice. According to the WHO and other accredited international organisations (ACSM, 2006; ACE, 2007), physical activity guidelines recommend that all young adults should perform physical activity for three or more sessions per week at moderate to vigorous intensity for 30 to 60 minutes or more in order to achieve health benefits (Cheng, Cheng, Mask, Wong & Yeung, 2003:525; Hoeger & Hoeger, 2009:144). It was therefore important to establish the pattern of exercise participation among the study cohort.

#### **4.3.5 Exercise habit**

The study cohort reported regular participation in physical activity three times per week for at least 30 minutes in uninterrupted exercise bouts. In 2003, 80% reported this attendance rate, while 95% and 90% of the participants in 2004 and 2005 respectively indicated that they exercised regularly at the recommended frequency, duration and intensity. Strelan *et al.* (2003:91) also report high attendance figures of an 80% regular exercise participation rate for six months or more and a 77% attendance rate of three or more times per week among young women in Australian fitness centres. This is significantly higher than the figures reported by Lowry *et al.* (2002:22) of 37.6% for a representative sample of undergraduate students on American campuses, who participated in vigorous physical activity  $\geq 3$  days/week. Organisations such as NASPE (2007) and ACHA (2006) reported a prevalence of 36% and 50% respectively for physical activity participation of students on university campuses in Australia and the USA. The positive results and higher reported percentages from the current study and the study conducted by Strelan *et al.* (2003:91) could be due to the study population that was recruited from members of the local university gymnasium, indicating that these students had an interest in their health and therefore exercised regularly.

It is reported in several studies (Leslie *et al.*, 2001:116; Bell & Lee, 2005:227; ACHA, 2006:1) that the exercise behaviour of university and college students is at risk. In these studies, between 40% and 50% of young adults do not regularly participate in structured exercise programmes. Some of the reasons for being inactive are indicated as the lack of self-efficacy, a lack of support from others, an inability to enjoy exercise and not believing there are benefits from being physically active (Shankar *et al.*, 2004:161). The 1995 National College Health Risk Behaviour Survey showed that the majority of students in the USA were not involved in regular exercise at all (Lowry *et al.*, 2002:22). Other previously mentioned reports in literature (Lowry *et al.*, 2002; Shankar *et al.*, 2004; NASPE, 2007) also refer to the lack of participation in physical activity among young adults in a university environment. Results for exercise participation and regularity of exercise participation of the current study cohort are in contrast with other reported percentages of university students' physical activity participation. The reasons and motivators that this group of students had to exercise are now reported.

#### 4.3.6 Motivators to exercise

In figure 4.17 the reasons mostly cited as motivators to exercise at the SU Gymnasium are indicated for the 2003 study cohort.

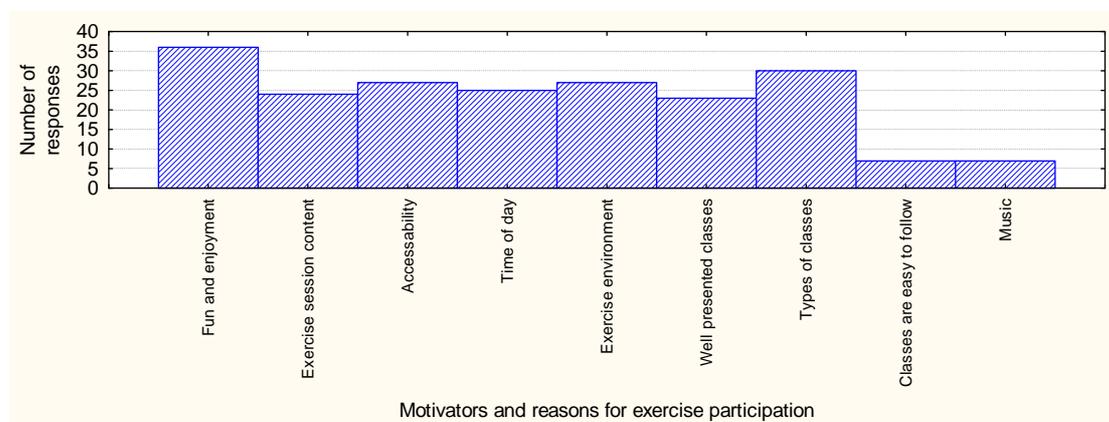


Figure 4.17: Motivators and reason for exercising indicated in 2003 (n=210)

The enjoyment factor of participating in exercise and having fun during exercise sessions was indicated by 17.7% of the study cohort as the most important motivator to exercise during 2003. Literature supports this motivator. Burrows *et al.* (1999:61) mention that many people perceive that participation in a bout of exercise makes them “feel good” and that it is “fun”. Women report on these perceptions more often than men. Research further supports the affective benefits of socially enriched exercise environments and group cohesion in an exercise environment. These are powerful motivators to exercise in a specific environment where interaction with peers contributes to the enjoyment factor (Bartholomew & Miller, 2002:308; Hoeger & Hoeger 2009:155). The range and types of exercise modes presented at the SU Gymnasium were chosen by 14.7% of the study cohort as a motivator to exercise in that environment. The accessibility and exercise environment followed at 12.7%. The operating hours of the gymnasium and the compilation of the aerobic timetable were indicated as motivators to exercise at 11.9 %. Class content and the presentation of the classes at 11.1% and 10.7% respectively were also important reasons for this group to participate in exercise.

With regard to motivators to exercise, literature (Burrows, *et al.*, 1999:61; Kowalski *et al.*, 2001:55; Karoly *et al.*, 2005; Sabiston *et al.*, 2005:69; Hoeger & Hoeger, 2009:43) provides information on several links between choice, effort and success (motivational factors) which would suggest that most participants attributed their exercise performances to internal controllable motivational factors. Limited information exists about the needs of population subgroups and how determinants of physical activity participation may change over the lifespan because of puberty, the normal aging process, health conditions, types of occupation and other biological, social and environmental influences (SGR, 1994:248). However, Strelan *et al.* (2003:93) report that reasons for exercise were significantly related to young women’s levels of body satisfaction and self-esteem.

In table 4.8, the motivators to participate in exercise and the reasons for attending exercise sessions at the SU Gymnasium are given for 2004, and are reported by ranking.

*Table 4.8: Motivators to exercise and reasons for participation in exercise sessions at the SU Gymnasium in 2004 (n=337)*

1. Convenient exercise environment
2. Gymnasium membership on student account
3. Appropriate time of the day: A variety of times available to exercise
4. Types of classes presented at the gymnasium
5. Exercising with a friend
6. Accessibility of the exercise environment: Gymnasium hours
7. Fun experienced during participation in exercise sessions
8. Instructors: Good presentation of classes
9. Exercise session content: Classes provide a variety of exercises for body conditioning
10. Safe exercise environment
11. Improvement of health status
12. Group exercise classes presented: Enjoy group classes
13. Classes are easy to follow
14. Music used during classes: Motivational factor and enjoyment
15. Friend motivates me
16. Socialisation opportunity: Environment provides an opportunity to meet other people
17. Instructor: Female – personality traits important
18. Instructor: Male – personality traits important
19. Spouse motivates me

The convenient environment in which the young female students could exercise was chosen by 43% of the cohort as the main motivator to participate regularly in physical activity on campus in 2004. This was followed by a 34% indication of the fact that the gymnasium membership fee could be charged to their student account.

Husén and Postlethwaite (1994:6548) and Leslie *et al.* (2001:116) also refer to the importance of the university environment in the life of young adults and confirm the relevance of the abovementioned motivator to exercise. Further convenience factors, such as the SU Gymnasium aerobic timetable, the times the gymnasium was accessible to students and the variety of classes presented there (also reported in 2003), were the third and fourth most important motivators to exercise, at 20% and 19% respectively. Research supports the benefits of exercise environments on opportunities to engage in physical activity (Wallace, 2001:2; Bartholomew & Miller, 2002:306).

The following motivators to exercise were reported in 2005 and are indicated by ranking in table 4.9.

*Table 4.9: Motivators to exercise and reasons for participation in exercise sessions at the SU Gymnasium in 2005 (n=394)*

1. Gymnasium membership on student account
2. Accessibility of the exercise environment: Gymnasium hours
3. Convenient exercise environment
4. Types of classes presented at the gymnasium
5. Exercising with a friend or colleague
6. Appropriate time of the day: A variety of times available to exercise
7. Improvement of health status
8. Group exercise classes presented: Enjoy group classes
9. Classes are easy to follow
10. Safe exercise environment
11. Exercise session content: Classes provide a variety of exercises for body conditioning
12. Instructors: Good presentation of classes
13. Fun experienced during participation in exercise sessions
14. Music used during classes: Motivational factor and enjoyment
15. Socialisation opportunity: Environment provides an opportunity to meet other people
16. Instructor: Female – personality traits important
17. Instructor: Male – personality traits important
18. Friend motivates me
19. Spouse motivates me

In 2005, the payment of the membership fee at the SU Gymnasium through a university student account made the gymnasium more accessible to the students and was a strong motivational factor. A 21% indication by the study cohort for that year cited this as the most important reason or motivator to exercise. The accessibility at 19% and the convenient environment at 14% were second and third most important motivators. Leslie *et al.* (2001:119; Hoeger & Hoeger, 2009:35) also report that environmental factors are likely to interact and influence the physical activity patterns of students on a university campus. A dynamic and interesting exercise environment, with a wide variety of exercise options which would stimulate young adults, is clearly an important motivator to be physically active, as indicated by 12% of the study cohort in 2005. Exercise preferences are an extremely important aspect to be considered when promoting the benefits of exercise, as stated by Daley and Maynard (2002:4). Individuals differ in their preferences of type or mode of exercise, the exercise environment and related motivational factors. The reported facts from previously mentioned literature relate well with policy decisions by the SU Gymnasium management to stay up to date with global health and fitness trends.

The motivation to exercise for health benefits, indicated by 14% in 2005 and ranked as the seventh most important reason in that year, became much more important than in 2004, when this motivator was ranked 11<sup>th</sup>. Recent research (Karoly *et al.*, 2005: 431; Hoeger & Hoeger, 2009:44) points to specific motivational deficits for irregular exercisers and suggests that instead of altering academic, social, vocational or family-centred priorities, sedentary individuals might be encouraged to rescript or reorganise their goal systems mentally. They further state that rescripting would require enhanced attention to the individual's hierarchy of goals across multiple life domains. Linking these goals and means to the emotional consequences of pursuing diverse and sometimes incompatible strivings is important when motivational considerations for behaviour are made.

Researchers (Balady *et al.*, 2000:237; Wallace, 2001:1; Eyler *et al.*, 2003:6; Heath, 2006:75; Hoeger & Hoeger, 2009:43) contend that any motivational intervention aimed at encouraging physically inactive individuals to exercise more regularly would do well to consider the role of their other life goals.

Typical barriers to exercise that could prevent regular exercise participation were explored among the study cohort and are reported in the following results.

#### **4.3.7 Barriers to exercise**

A number of physical and environmental factors can affect physical activity behaviour, such as an injury, negative experiences in school physical education, personal safety issues, lack of time and intimidating exercise environments. Young adult women in a university setting are faced with several unique barriers to exercise participation (NASPE, 2007:3). Being a student presents more specific barriers that prevent the adoption of a healthy lifestyle and regular participation in exercise. It was important to establish the specific barriers to exercise the study cohort experienced. (The 2003 research questionnaire did not include a question on the barriers to exercise. It was deemed an important factor to establish in the follow-up research in 2004 and 2005.)

The study cohort reported the following barriers to exercise that they experienced in 2004. Results are reported by ranking. Lack of time was the most important barrier the study cohort experienced. This is supported by literature, where time is indicated as a significant barrier to participation in physical activity (Booth *et al.*, 1997:132; IHRSA, 2005:4; Heath, 2006:75). Academic and working responsibilities as second most cited barrier keep students from regular participation in a chosen exercise pattern.

The transition period from high school to a tertiary institution is known to be an especially problematic stage in adult development and implies that students have to adapt to a new academic environment with additional responsibilities (Cilliers *et al.*, 2006:234). A full social programme and having no reason for not participating in regular physical activity were the third and fourth ranked reasons the study cohort provided as barriers. Booth *et al.* (1997:132) report similar tendencies of having no reason to exercise up to 13% from a group of 1 232 (N=1,232) research participants. The environment often presents significant barriers to participation in physical activity (e.g. the lack of a bicycle, walkways away from vehicular traffic, inclement weather and unsafe neighbourhoods) as reported by Heath (2006:75) as well as Hoeger and Hoeger (2009:37). Women are faced with several unique barriers to exercise participation (ACSM, 2000:249) that could explain the fact of family responsibilities being a barrier.

Figure 4.18 indicates barriers to exercise reported for 2004 by the sum of the ranking score.

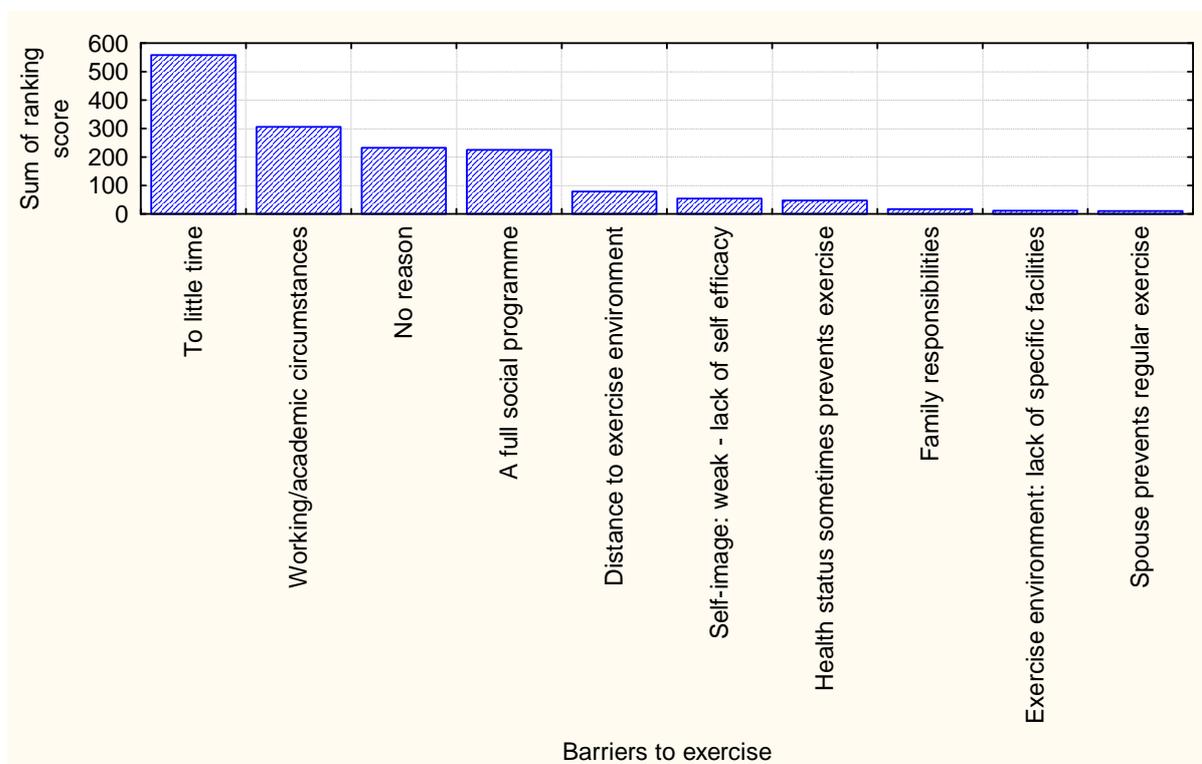


Figure 4.18: Barriers to exercise experienced in 2004 (n=337)

The study cohort of 2005 reported interesting reasons that influenced their exercise intention, as indicated in figure 4.19.

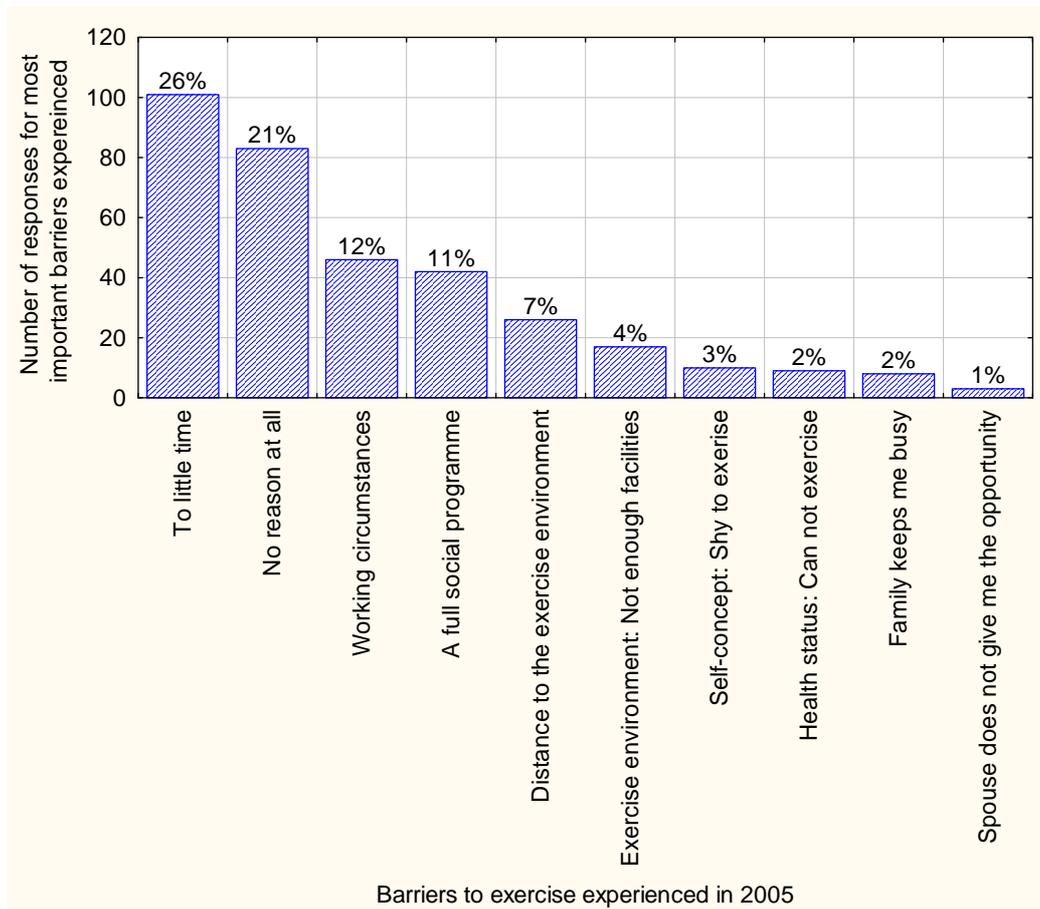


Figure 4.19: Barriers to exercise experienced in 2005 (n=394)

The study cohort also experienced time constraints (26%), working circumstances (12%) and a full social programme (11%) as important barriers that often prevented them from participating in physical activity. Having no reason to avoid exercise was indicated at 21%. The distance to the exercise environment, logistical location of residences on campus and safety factors, implied in the distance to the exercise environment, were also important barriers at a seven percent (7%) indication.

Identifying the barriers to exercise among students on tertiary campuses should not be neglected. They offer a wide array of excuses (Hoeger & Hoeger, 2009:34). These could be key determinants to address if more active lifestyles are to be advocated among this group. Tertiary education campuses are settings where there are important, yet partially neglected, opportunities to influence the physical activity habits of young adults (Leslie *et al.*, 2001:116). Understanding the young adult is of vital importance if effective strategies are to be developed that will affect their health and lifestyle choices positively.

#### **4.3.8 Medication and supplementation**

The use of contraceptives was indicated by 20% of the study cohort in 2003 in comparison with the four percent (4%) and eight percent (8%) of use of oral contraceptives in 2004 and 2005 respectively. The higher reported percentage in 2003 compared to the following years could be due to the difference in wording used in the questionnaire for the type of contraceptive in this question. The sensitivity of this question and possible under-reporting of the use of types of contraceptives among the different research group of students could also have contributed to this tendency.

Vitamin and mineral supplementation was more prominent in 2004, with a 6% indication and a 10% indication in 2005. The percentage was much lower in 2003, at 3%. Similar figures have been reported for other university student populations (Driskell, 1999:100; Dundas & Keller, 2003:50). Hemilä (2004:920) reports a 45% reduction in common cold incidence with Vitamin C supplementation among young adults from widely dispersed geographic areas. Branch (2002:55) also reports on the use of various nutritional supplements, pharmacologic substances and practices by individuals in university settings, which have shown to enhance exercise performance and improved wellbeing. The use of anti-depressants is prevalent in the groups in all three years of the study.

This relates well with similar reports by Bartholomew and Miller (2002:304), Brown (2003:2), Rozmus *et al.* (2005:26) and Balkin *et al.* (2007:32), stating that young adults experience the university environment as stressful, for various reasons. Added responsibilities during the transition years into adulthood are possible contributing factors to the experience of “being stressed”. Mechanisms or choice of strategy to be able to cope in this environment often include the use of some form of medication or supplementation (Cranford *et al.*, 2008:10).

In figures 4.20, 4.21 and 4.22 the use of medication and supplementation is reported for 2003, 2004 and 2005 respectively.

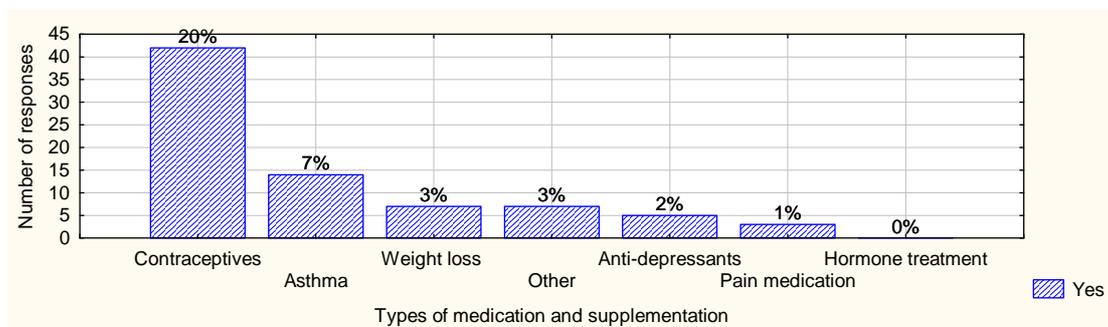


Figure 4.20: Use of types of medication and supplementation in 2003 (n=210)

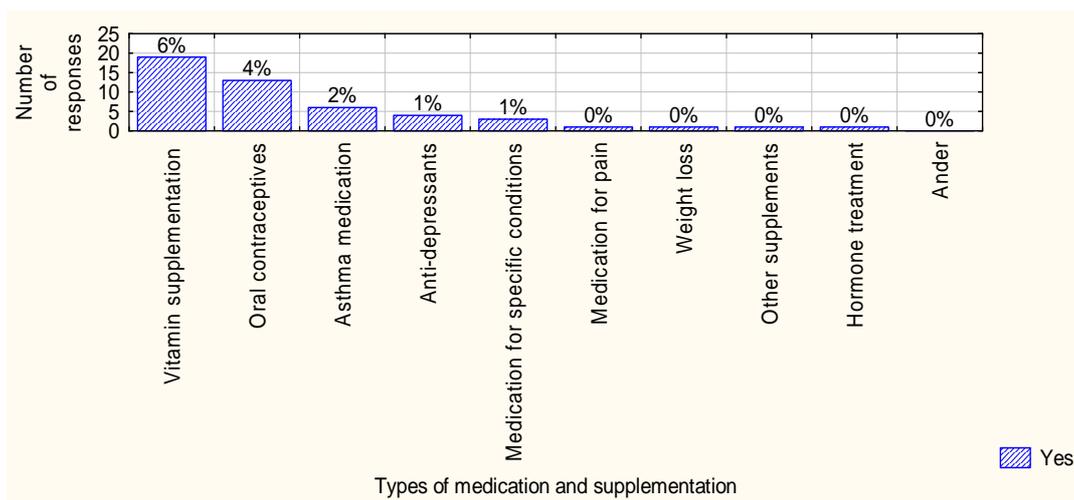


Figure 4.21: Use of types of medication and supplementation in 2004 (n=337)

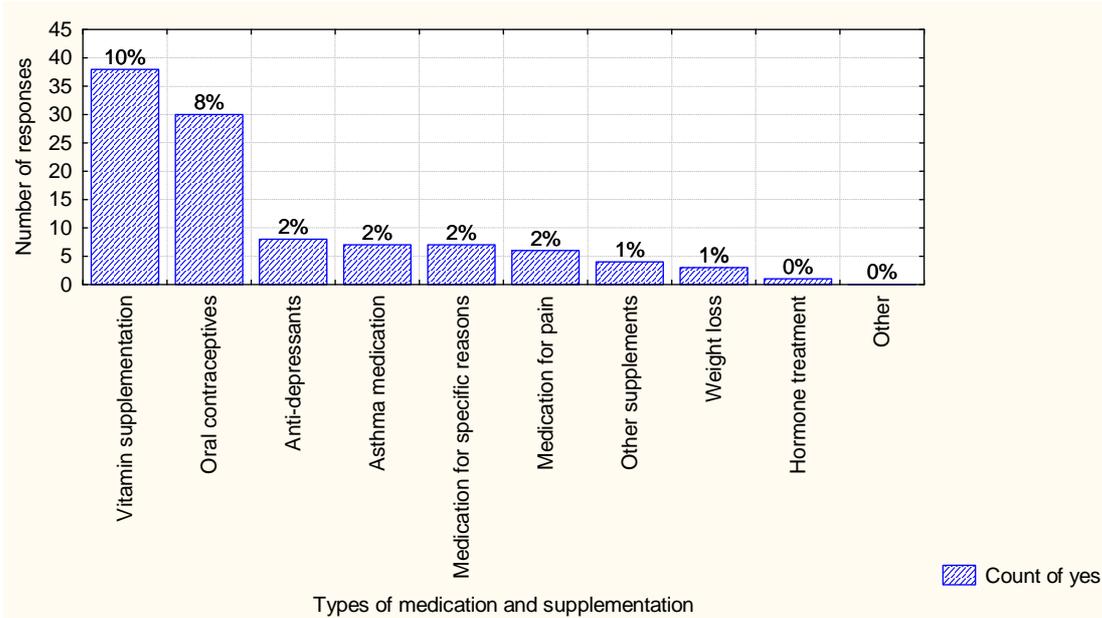


Figure 4.22: Use of types of medication and supplementation in 2005 (n=394)

The above results on the typical use of medication and supplementation among young female students in a university setting are important. Women are frequent users of complementary and alternative medicine. Many consumers are turning to complementary and alternative medicine in search of answers to their health problems (Fugh-Berman & Kronenberg, 2003:137; Hoeger & Hoeger, 2009:464). Health care providers and consumers should be aware that, despite the potential usefulness of many complementary and alternative medicine therapies and products, scientific research to date is still limited on the benefits of these products and practices (Fugh-Berman & Kronenberg, 2003:137). The current overwhelming product advertising far exceeds scientific knowledge and the scientific evaluation of these products (Deakin, 2000:1; Fugh-Berman & Kronenberg, 2003:137; Hoeger & Hoeger, 2009:469).

The university environment provides unique opportunities for campus staff to impact positively on educating students about their health and to enable them to make more informed choices about treatments that are available in modern societies.

### 4.3.9 Health status

The 2003 research questionnaire did not include a question on health status. It was deemed an important factor to establish in the follow-up research during 2004 and 2005.

The most common health problems reported by the study cohort during the latter part of the research period were lower back problems with a total of five percent (5%) for the two years, asthma at four percent (4%), cholesterol at four percent (4%) and only one percent (1%) reporting cardiovascular-related symptoms in the 2005 group.

Figure 4.23 reports the health-related problems encountered by the 2004 study cohort.

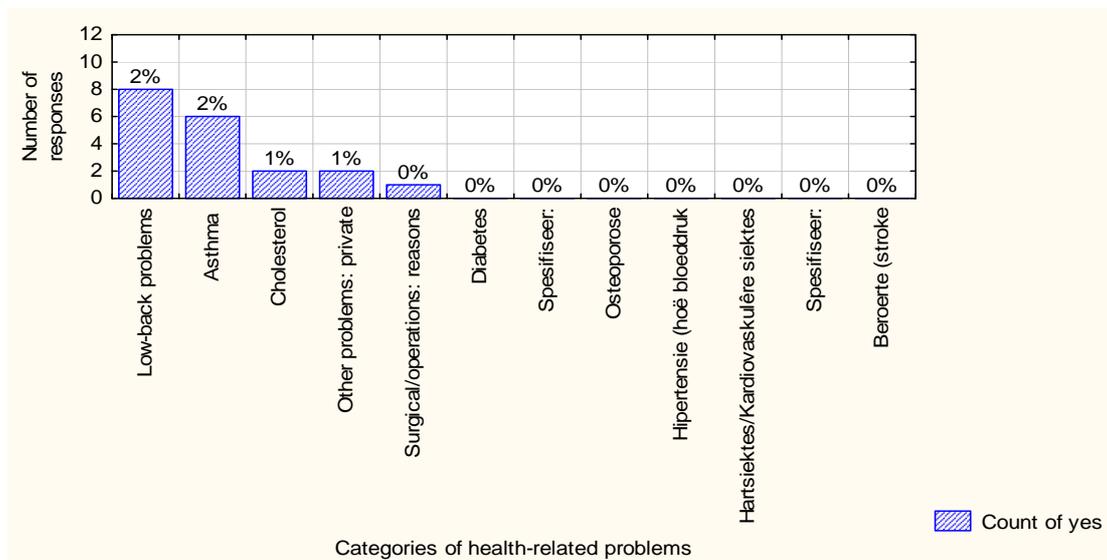


Figure 4.23: Health-related problems reported in 2004 (n=337)

Lower back problems can be associated with the typical lifestyle of students in university settings. They spend great amounts of time in a sitting position, during academic lectures, in front of computers and studying at desks.

According to Crespo & Williams (2006:93), back or spine problems are among the most commonly cited reasons for impaired movement among people aged 18 years or older. Babalola, Awolola & Hamzat (2008:188) concur with this finding when they report that 80% of all lumbar and lower back problems are muscular in origin and people with lower back pain were often found to have weak lumbar muscle strength. It is regarded as one of the most costly medical problems in industrialised societies. Many people lose considerable time at work, experience chronic discomfort and spend large amounts attempting to alleviate their lower back pain (Dionne, 2005:714; Babalola *et al.*, 2008:189).

Various combinations of flexibility and strengthening exercises have been successful in relieving pain and the symptoms of lower back problems in many people whose problems are associated with muscular weakness and lack of flexibility (Babalola *et al.*, 2008:189). Lahad, Malter, Berg and Deyo, (1994:1288) described three mechanisms by which exercise can prevent or alleviate lower back pain: (1) exercise strengthens the back and core muscles and improves the muscle balance in the trunk area and increases flexibility, preventing injury; (2) exercise increases the blood supply to the muscles in the spine and abdominal region, as well as to the joints and inter-vertebral discs, minimising the risk of injury and enhancing the body's natural healing process; (3) exercise improves the perception of pain and mood.

Several reasons could be responsible for the five percent (5%) of the study cohort reporting the use of asthma medication. According to several researchers (Howley & Franks, 2003:57 ; Cook, 2005:17; Hoeger & Hoeger, 2009:291), causes for asthma include allergic reactions to antigens, smoke, air pollution as well as non-specific factors such as emotional stress, exercise and viral infections of the bronchi, sinuses or tonsils. The air ducts in the lungs react to specific irritants, such as house dust, pollens, animals, nervous tension or smog and fumes. Asthma can also be brought about by vigorous exercise (Egger *et al.*, 2006:161; Hoeger & Hoeger, 2009:291).

Large numbers of individuals suffer from some form of pulmonary obstruction where the exchange of gases between the ambient air and the pulmonary capillary blood is restricted. An estimated 14.6 million people in the USA have asthma, with 36% experiencing symptoms at the age of 18 (Howley & Franks, 2003:331). Current figures provided by the Medical Research Council (MRC) of South Africa indicate a prevalence of three point six percent to four point four percent (3.6% to 4.4%) among women between the ages of 17 and 30 years (Loubser, 2008). Exercise is a key component of pulmonary rehabilitation programmes (Hoeger & Hoeger, 2009:291). The benefits include increased functional status, exercise capacity (endurance) and quality of life (Balady *et al.*, 2000:200). Asthma is a chronic condition that, if it is managed well, can allow participation in most activities. Modern medication has made participation in exercise possible for most people with asthma (Cook, 2005:19; Egger *et al.*, 2006:162).

Figure 4.24 indicates the health-related problems the 2005 study cohort experienced.

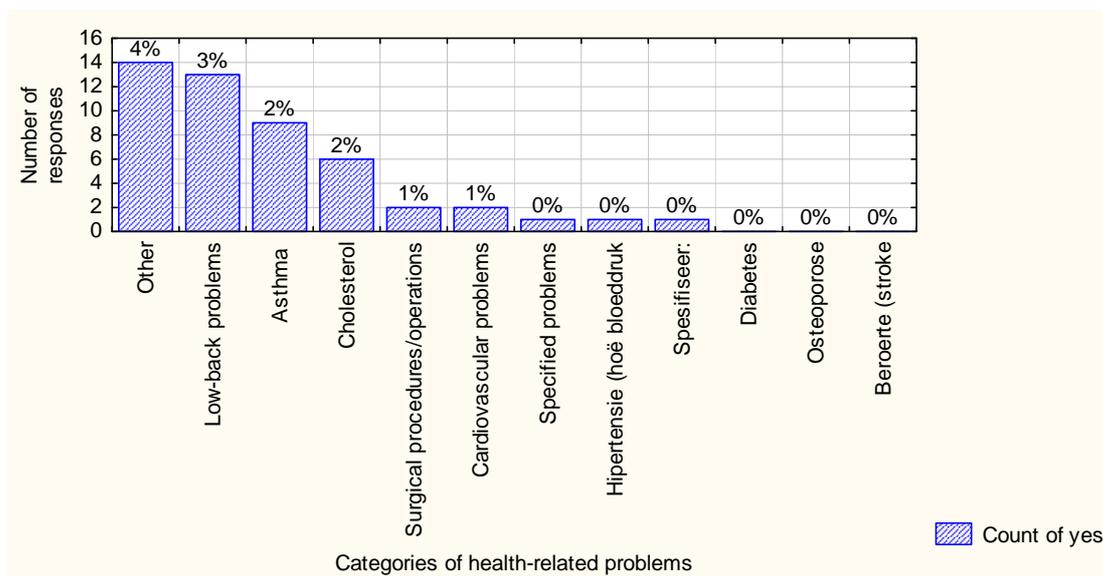


Figure 4.24: Health-related problems reported in 2005 (n=394)

Cholesterol levels receive a lot of attention because of the direct relationship to heart disease (Loria, Liu, Lewis, Hulley, Sidney, Schreiner, Williams, Bild & Detrano, 2007:2013; Hoeger & Hoeger, 2009:328). The use of medication for cholesterol at a young age is therefore concerning (Loria *et al.*, 2007:2013).

An increased blood cholesterol level, specifically a high concentration of low-density lipoprotein (LDL or “bad” cholesterol) or a low concentration of high-density lipoprotein (HDL) cholesterol, increases the risk of CAD (ACSM, 2000:39; Loria *et al.*, 2007:2014). The primary goal of lipid management is to lower LDL cholesterol below 100 mg/dL (Hoeger & Hoeger, 2009:329). Loria *et al.* (2007:2013) report that few, but all, studies on young adults concur that established risk factors in early adulthood, such as serum total cholesterol, blood pressure and cigarette smoking, predict subsequent cardiovascular disease. LDL cholesterol levels that are higher than the desired level can be lowered through dietary changes, losing body fat, taking medication and, more importantly, by participating in a regular aerobic exercise programme (Hoeger & Hoeger, 2009:332). Lifestyle choices, eating habits and the decline in physical activity behaviours contribute to health risks, such as elevated cholesterol levels. Increased physical activity, coupled with other forms of non-pharmacological therapy (e.g. weight loss), is recommended for most reported minor health-related problems. Medical treatment should only be considered when non-pharmacologic approaches fail to lower serum triglycerides (Balady *et al.*, 2000:40).

#### **4.3.10 Smoking habit**

The only health-risk variable included in the research questionnaire was the smoking habit (it was not used in the 2003 questionnaire). Cigarette smoking is the largest preventable cause of illness and premature death in many countries (Hoeger & Hoeger, 2009:23). The prevalence of tobacco use among college/university youth is increasing (Nichter *et al.*, 2004b:415).

Cranford *et al.* (2008:2) report that prior smoking, occasional smoking and daily smoking were significantly related to depression and stress-related symptoms in college students and the associations were stronger for women than men. Nichter *et al.* (2004a:305) reveal that smoking is commonly used as a conscious and sustained weight control strategy. It was therefore important to include a question on the smoking habit in the 2004 and 2005 research questionnaire.

The smoking habit among young female students was reported at 16% in 2004 and 14% in 2005. These figures relate with other reported studies (Knuttgen, 2003; Potter *et al.*, 2004) and especially the study Cilliers (2006) conducted on the SU campus in 2002. In this report 13% of the female students indicated that they smoked. These reported figures are however lower than those on the campus of the University of KwaZulu-Natal in Durban, where 26.8% of males and 24.3 % of females reported smoking (Kamanzi & Adejumo, 2005:87). Despite many health trends, a larger portion of young women use tobacco more than ever before (Knuttgen, 2003:31). They now have more freedom to smoke (Crisp *et al.*, 1999:658). The importance of these trends should be seen in the context of the fact that many young women consciously start smoking as a means of controlling their weight, as reported by Potter *et al.* (2004: 399) and Nichter *et al.* (2004a:306) and that this is not a healthy weight management practice. Nichter *et al.* (2004a:307) further report that results from two longitudinal studies show little evidence that regular smoking leads to weight loss, nor are smokers thinner than their non-smoking counterparts.

Lifestyles and health beliefs appear to be established early in life, setting a pattern for later years (Steptoe *et al.*, 2002:97). It is therefore important to monitor the trends in health behaviour among young people and to understand the factors that might impact and contribute to the uptake of health-risk behaviours among this group of young female students.

## 4.4 CONCLUSION

A research theory (Vincent, 2005:14) formulated for this study was that of weight management and weight loss goals being the main motivators for young female students to participate in exercise modes presented at the local SU Gymnasium.

This theory implied that these young female students do not necessarily select a combination of exercise modes to achieve this goal optimally. They base their choices on the popularity of an exercise mode, basic information provided in the media and the exercise environment, as well as the availability and accessibility of exercise modes, rather than on more specific scientifically proven information. According to Weiss and Gill (2005:76), research on investigating attitudes towards physical activity and the reasons why individuals show interest in and choose to participate in a particular activity are varied. Self-presentational concerns may be a major source of motivation for participating in physical activity, especially among young female students.

Hausenblas and Fallion (2006:35) and Strelan *et al.* (2003:89) also refer to the pressure on young women to achieve the aesthetic standard of a lean and toned body. The reward for appearing attractive, healthy and generally physically fit (perceived benefits associated with a normal to underweight body), has resulted in people's attempts to alter their body size and shape. Modelling healthy and active lifestyles, rejecting the cultural messages regarding body shape perfection and emulating a positive body image can assist with shaping more realistic health behaviours among all populations (Skemp-Arlt, 2006:50).

The results from the study indicate that young female students in this particular university setting and who are members at the local gymnasium, exercised regularly, desired general fitness improvement and had weight management and weight loss goals as the most important expectations from their exercise choice.

Stress release benefits, socialisation and especially environmental convenience factors were important motivators to participate in exercise classes. The results from this research could provide university administrators, educators, health care providers and partners in this university setting with information to improve their understanding of the circumstances and needs of this particular group of students. It could provide facts for the development of educational strategies to address gender-related and need-specific exercise prescription in this environment more accurately.

Reports from students (NASPE, 2007:1) and researchers alike (Cilliers *et al.*, 2006:241) confirm the lack of scientifically structured education on choice of exercise for specific outcomes. As mentioned previously, only a third of students on several university campuses in the USA reported receiving any education from their college or university regarding physical activity and healthy weight management guidelines (NASPE, 2007:2).

Research evidence from this study could further serve as basic information for developing a niche-market focus to address the young female student's desire for effective weight management and weight loss practices. As stated previously, the American College Health Association (ACHA, 2006:1) (NASPE, 2007:1) reports that on average 35% of students on college campuses are overweight or obese. A further 46% of students are attempting to lose weight, suggesting false perceptions regarding personal weight and body image. This indicates and supports the notion that university/college students' exercise behaviour is at risk (Shankar *et al.*, 2004:161). Cilliers *et al.*, (2004:241) reports that very little improvement has occurred at the Stellenbosch University in this regard, emphasising a need for some form of intervention tool to assist young female students with weight management skills.

## **CHAPTER 5**

# **SUMMARY AND RECOMMENDATIONS**

### **5.1 SUMMARY INTRODUCTION**

The research was conducted as a longitudinal qualitative survey, over a period of three years. This is the average timeline for most university undergraduate programmes at Stellenbosch University (SU). The focus of the research was, firstly, to establish the exercise preferences of young female students in a specific university setting and, secondly, to determine the expectations these students had from participating in a chosen exercise mode. Tracking the pattern of exercise preferences and expectations over the time of an undergraduate programme was of particular interest. The results of these two focus areas are reported as averages of the most preferred exercise modes by ranking and the most often indicated expectations from a particular exercise mode. It was of primary importance to establish the research theory, namely that young female students participated in exercise classes and randomly chose these exercise modes as a mean to manage their weight or to lose weight.

Other related research questions were establishing the regularity of exercise participation among this group, the motivators or reasons that prompted them to exercise in this environment, the barriers they experienced with regard to exercise participation, the typical health status reported among these young female students, their use of medication and supplementation and their smoking habit. The inquiry on smoking was included to establish the incidence of this health-risk behaviour among female students.

A summary of the results, followed by brief but specific recommendations on each of the research questions are provided in the next section.

## 5.2 RESULTS AND SPECIFIC RELATED RECOMMENDATIONS

The average age of the study cohort was 20.9 ( $SD \pm 1.75$ ) years, indicating a normal distribution of typical young adults at university, as reported in literature.

The physical characteristics (body weight and body height) of the group, using the BMI method, indicated a normal distribution among the 941 participants. They had a mean BMI of 21.6 kg/m<sup>2</sup> ( $\pm 2.91$ ). This average BMI score indicates that the group was within the normal range of BMI of 18.5-24.9 kg/m<sup>2</sup> for adults. There are however some indications of both higher and lower BMI scores than the average recommendation for this group. These figures should not be ignored by the health and fitness professionals in the immediate exercise environment of the SU Gymnasium.

An adapted or new policy about general screening of SU Gymnasium members is advised. To aid the development of safe and effective exercise prescription and optimise safety during exercise participation, it is becoming increasingly important to screen potential members/participants for risk factors of various metabolic, cardiovascular and pulmonary diseases, as well as conditions that may be aggravated by exercise. Members who regularly exercise in the group aerobic exercise classes could be observed more critically by SU Gymnasium staff to provide information on or to detect abnormality of an exercise pattern, indicating an obsessive-compulsive need for weight loss through exercise.

The screening of clients should become a priority service at the SU Gymnasium and the Student Health Service section. A more client-centred advisory service, programme prescription and exercise programme compilation by well-trained and accredited fitness professionals who inform students on healthy weight loss practices could be adopted by the gymnasium to address the specific needs of these individuals. Muscle balance and realistic body weight for young women are important health indicators.

Students with signs of overweight or obesity problems should also be assured that there is a service available at the SU Gymnasium that will discreetly assist them with advice on the correct exercise programme to follow that will address their specific needs.

Initial positive exercise experiences will be an important motivator for this group. Empirically supported advice and exercise prescription provided by qualified health and fitness professionals, employed by the SU Gymnasium, should promote regular exercise participation and exercise adherence that, over time, will have the necessary weight loss or weight management outcomes for young female students.

The socio-demographic and health indicators characterise the study population as a healthy group of young females, exercising regularly, with a low prevalence of chronic /hypokinetic disease and low use of chronic medication.

After the three years of tracking the exercise habits among young female students in a university setting, it was found that the study cohort reported participating regularly in physical activity at least three times per week, at no less than 30 minutes of uninterrupted aerobic activity per session. The prevalence rates for exercise regularity on this research question were 80%, 95% and 90% for 2003, 2004 and 2005 respectively. These figures are high in comparison with the average percentages reported in literature among other university and college students. In the mentioned literature, the percentages relating to the regularity of exercise participation among other university students were representative of a normal distribution of students on campuses in Europe, Canada, the USA and Australia. They were not gymnasium members in a specific university setting.

The high percentages reported for regularity of exercise among the study population on the SU campus could be due to the research sample for this study that were all members of the local university gymnasium. This reflects a group of young female students who care about their health.

The reasons for being a member at the university gymnasium and actively participating in physical activity could also be contrary to the health-continuum. Other non-health related reasons for participating in exercise, indicated by the respective research groups, are reported in a later research result in this chapter.

The general health status of the study cohort was that of healthy young female adults. Small average percentages of health-related issues were reported for lower back problems, asthma and cholesterol-related symptoms. Lower back problems could incapacitate the mobility of an individual and influence functionality. Basic exercises and activities could address this problem effectively, if detected at an early stage. Attention to basic health-related symptoms among gymnasium members by the health and fitness professionals employed on the premises could effectively address this condition. As mentioned previously, it would be beneficial if more specific screening methods for all gymnasium members could be introduced by the SU Gymnasium, firstly with initial enrolment as a member and later as needs and problems are reported with regard to health-related or physical problems. Referral of clients in need of more specific medical or clinical conditions should also be considered and implemented by the SU Gymnasium. Facilities such as the Sports Medicine and Rehabilitation Centre of the SU, adjacent to the SU Gymnasium, where physiotherapists, medical doctors and biokineticians are on duty, could assist with this specialised service in order to provide an interactive/amalgamated multidisciplinary assistance service to students on campus.

Health indicators of diabetes, osteoporoses, hypertension, cardiovascular disease and stroke were excluded from the data analysis for this study because of the low incidence compared to the other indicators.

Conservative use of medication and supplementation were reported among the study cohort. The most common medication used was oral contraceptives, indicating responsible sexual health-risk behaviour management among the group.

There was however a decline in the percentages reported for the use of contraceptives from the first to the last year of research. This is due to a change of wording (contraceptives/oral contraceptives), in categorising the use of types of contraceptives in this question in the latter years. This had an influence of lower reported percentages in the last two years of the research compared to the initial results.

Early risk assessment of cardiovascular disease at this young age is encouraged, as a small percentage of students indicated taking medication for the management of cholesterol. Risk factor levels in 18 to 30 year old young adults predict calcification of plaque in coronary arteries at ages 33 to 45 years (Loria *et al.*, 2007:2019). The study cohort therefore reflects a group of young female students who present with one or more health-risk factors (overweight, cholesterol, etc.). This information could be of value to all staff members at the SU Gymnasium and Sports Medicine and Rehabilitation Centre, to consider new pre-participation screening policies at these facilities for effectively monitoring increasing percentages of clients and members that present with health-risk factors at a young age.

Health management practices, such as the use of vitamin and mineral supplementation, to the diet of students on university campuses are common and reported in literature. The use of vitamin and minerals was reported as the second most common supplementation that indicates an awareness of good health practices to compensate for irregular eating patterns and the tendency to consume less nutritious fast food as part of a student lifestyle. Sound information, supported by the latest research, should however be provided in health and fitness settings to indicate when, what and how much supplementation use is required for health benefits (Deakin, 2000:16). Scientific evaluation of both the safety and efficacy of these therapies is important to public health (Fugh-Berman & Kronenberg, 2003:150).

There was a high prevalence of asthma medication among the study cohort. The Western Cape is notorious for the prevalence of pulmonary diseases in

South Africa (Foden, 2003) and the contribution of other allergens such as dust, pollen, grass, physical activity and psychological triggers (stress) in this environment could also be reasons that contributed to the reported percentage. Psychological stress is also reported in literature and contributes to the prevalence of asthma.

As different levels of stress are experienced by most students at some or other time during their academic years, it can be directly or indirectly responsible for a negative effect on the immune system, which makes these young female students more susceptible to bad health.

The benefits of physical activity in reducing the physiological and psychological responses to stress are well-established (Hoeger & Hoeger, 2009:394). The positive effect of exercise as a stress release and long-term stress management method is not marketed or advocated enough among students on the SU campus. The study cohort represented a very small percentage of the total student population of the SU (5.42% on average) and therefore leaves a large underutilised student population that could benefit from the services provided by the SU Gymnasium and the Sports Medical and Rehabilitation Centre to assist with the stressors of university life.

A convenient environment (SU Gymnasium on campus) in which young female students could exercise was one of the main motivating factors among the study population to participate regularly in physical activity on campus. Safety, group cohesion and convenience influence the decision to include exercise in a daily/weekly programme in a positive way. Other convenience factors, such as the accessibility of the gymnasium and its operating hours, make it possible for students to attend classes or exercise sessions at all hours of the day. This has proven to be a great asset to this exercise environment, as the often demanding academic schedule that most students follow, as well as a lack of time, create a need for flexible accessibility of a facility providing opportunities to participate in physical activity.

The large variety of group aerobic classes presented at the SU Gymnasium made membership a lucrative motivator and was a prominent reason for attending exercise sessions. This particular exercise environment, especially the aerobic section (which is primarily responsible for the development and presentation of all aerobic group exercise classes), is known for being at the forefront of the latest trends in the health and fitness industry. Innovative teaching methods, new exercise formats, the continuous introduction of new equipment and exercise devices are all supported by the contribution of a multidisciplinary team of academics, medical staff and fitness professionals working side by side at this facility.

The popularity of the interesting exercise modes creates a favourable social exercise environment for students to interact and regularly attend the latest and trendiest exercise classes. However, the provision of the latest exercise trends by the SU Gymnasium should be carefully considered and monitored to provide a balance of exercise modes that will have specific health benefits for participants, as well as offering some of the trendier and commercially viable exercise options.

The financial responsibility of paying a gymnasium membership fee could be a burden. The solution the SU offers for registered students to be able to pay the SU Gymnasium membership through a student account, makes it possible for many students to use the facilities and the exercise options provided by the gymnasium. This has proven to be a strong motivator among students to adopt a more regular physical activity habit, without the added financial stressors. This SU Gymnasium membership payment method has also been indicated to play a strong supporting role to the sporting fraternity and sport codes on campus.

Barriers to exercise are a reality for the young adult in a university environment. The results indicate time constraints, working circumstances (academic responsibilities) and a full social programme, as important barriers to exercise participation for the study cohort. For many of the students, the distance to the exercise environment prevented them to exercise.

The additional effort, especially during bad weather conditions, to reach the exercise environment of the SU Gymnasium and limited transport options could have contributed to this reported barrier.

Smoking, a health-risk factor, was prevalent among 15% of the study cohort. It is commonly reported in literature that cigarette smoking is one of the principal factors related to long-term exercise non-compliance. The reported percentages are similar to a previous study conducted in 2002 by Senekal and show no significant improvement of this health-risk habit since the previous captured data among young adults on the SU campus.

Besides the known negative health outcomes of smoking in young women, it has also been associated with concerns about weight gain and used as a method of dieting behaviour. Young women consciously start smoking as a means of controlling their weight (ACSM, 1998:1867; Potter *et al.*, 2004:399). Educational information should be available to young female students about this health-risk behaviour. Alternative choices should be provided to enable them to manage their weight more responsibly. Sound educational information on the misperception of smoking being an effective weight loss practice could be strongly advocated among this group. The researcher agrees with recently reported literature (Cranford *et al.*, 2008:9) that effective initiatives designed to improve knowledge and address substance use behaviours and associated stress, panic and mental health problems among university/college students may be enhanced if health and wellness professionals recognise that there are substantial unmet needs for treatment thereof in the university environment.

Findings of the study indicate that punchline (with its various diversification formats) was the most popular exercise mode among the group exercise classes at the gymnasium throughout the research period. The dynamic, vibrant and challenging content, music and presentation associated with this exercise mode contributed to the popularity. Another factor that could have had an influence on the popularity of this mode could be the instructors presenting these classes.

The technical precision during presentation of activities and the type of exercises included in a class made it essential for the gymnasium to assign some of the best instructors available for this exercise mode. Attending a well-presented exercise class that is worthwhile at all levels is a strong motivator to return to such classes.

The predictions (trend watch organisations) of gentler exercise modes becoming more popular, such as the body-mind exercise sessions, were observed. This was supported by the study cohort with the indication of attendance in these exercise modes. These modes include body conditioning, callanetics, Pilates, yoga and body toning. The need to exercise at moderate intensities on a regular basis seems to be a need in this group. Other more recently introduced trends of exercise modes, such as indoor cycling, dance dynamics and bosu ball, were the preferred exercise mode choices in the latter part of the research among the study cohort. This is a further indication of the importance of keeping up with global exercise trends and the offering thereof at the SU Gymnasium. These efforts have proven to be successful for this local gymnasium, and in keeping with client satisfaction.

The reasons provided for attending a particular exercise mode were wide and varied. Overall the study population indicated weight loss at an average of 26% and general fitness at an average of 20% as the most important outcomes of participating in punchline, the most preferred exercise mode. Weight loss as exercise participation outcome was significantly more cited than other reasons. Body toning attendance was linked to weight management and muscle definition. Indoor cycling was associated with improving general fitness and contributing to weight loss. Dance dynamics, another of the more popular exercise modes, was chosen for stress release purposes.

The choice of exercise mode (self-selected) is influenced by a perception of the value the mode could have for an individual. This perception is influenced by information gained by the participant over a period of time.

The importance of providing correct information to participants and gymnasium members in order to make more informed choices and decisions when selecting an exercise mode for a specific reason, could add value in a gymnasium environment.

Descriptors of exercise modes should be extensive, formulated with relevant titles, with substantial information on a class focus for the mode, indication of intensity, duration of sections of class content, types of conditioning content and exercises, recommended participation levels and general outcomes for the specific exercise mode.

To the researcher's knowledge, there are not enough comprehensive descriptions of group aerobic exercise modes generally available to members in commercial gymnasiums. Literature surveyed for this study only provided brief and popular descriptions of these modes. No relevant exercise scientific knowledge content on the modes is provided for interested participants. The more popular information in the media, found in the health and fitness industry, provides information to members and could have been responsible for the current knowledge base that the study population had on the exercise modes when choosing a specific exercise mode.

Any gymnasium will benefit from keeping track of the latest group exercise trends, as well as the available equipment trends, to present their clients with the latest exercise formats. The choice of exercise mode in an exercise environment is often random and influenced by popular and current available information. Sound advisory and informative practices (visual, verbal, electronic and printed) could be conducive to guide clients in this environment. This information could serve to guide members more specifically regarding choice and design of an exercise programme that could meet their individual needs and targeted exercise outcomes.

Weight loss and weight management outcomes are important motivators for young adults to exercise.

Results from this study indicate the importance of the development of more specific educational intervention programmes and information on healthy weight loss and weight management practices on university campuses. Registered dietitians should develop nutrition education material and design nutritional intervention programmes in conjunction with fitness professionals that could assist with the development of balanced exercise prescription and lifestyle adjustments in order to target energy expenditure goals to assist with healthy weight loss practices in a university environment.

The barriers to exercise young adults experience in the university setting are a unique set of lifestyle circumstances and could provide valuable information to university authorities and programme directors. Information on the most cited barriers the study cohort experienced demonstrates a need for a coordinated effort by all role players in a university setting to make regular exercise more attainable for students, alleviate exercise barriers if possible and educate young adults on positive health behaviours and lifestyle choices.

By adopting a multidisciplinary team advice approach on campus, students could benefit in many ways to address health-related issues effectively, and in a responsible and realistic manner.

### **5.3 GENERAL RECOMMENDATIONS**

This study was designed to examine the outcome of exercise preference of self-selected exercise modes and the expectations of the choice of exercise mode among young female students in a university setting.

Policies and procedures to support physical activity participation among young female students should be strategically developed and promoted, highlighting the promotion of health benefits derived from regular participation in physical activity and the reinforcement of initial intent toward exercise.

Physical activity remains a pressing and important public health issue in the modern industrialised world, whether it is in a developed or developing country.

The technological era and many new emerging economic incentives tend to discourage activity. Technology and convenience devices reduce the energy needed and/or the energy expended by people to perform activities of daily living. Salary structures and popular commercial perceptions contribute to inactivity by paying more for sedentary type of work. If this is the case, the efficient use of leisure time should implicate time to be active and should be promoted in all working environments, including university campuses.

The prevalence of leisure-time physical inactivity, where adults report that no moderately or vigorously intensive leisure-time activities are done, is high in all countries. The lifestyle choices of university students often reflect those of the general population. Literature reports that a low percentage of young adults participate in structured exercise programmes. Various reasons are given for this inactivity. If large populations such as university students could learn healthy behaviours early in life, this would not only have a positive effect on the health of a particular student and their possible family later in life, but could decrease the economic burden on health services.

Results from the study on the exercise related preferences, expectations and barriers of young women should not be seen as constraints or limitations. It should rather help to identify modifiable preferences and perceptions which could be used to provide more relevant and appealing options to be physically active for health benefits. Challenges for the future include identifying key determinants for a healthy lifestyle and patterns of physical activity among specific population groups at various developmental and life transition stages. This information could be disseminated and used to design effective programmes of intervention for health management or health-risk behaviour reduction.

Interventions of any nature must be directed toward individual characteristics, determinants and barriers which have the greatest potential to change physical activity and lifestyle behaviours in population groups effectively.

Social support is an influential variable in predicting adoption, maintenance and relapse of exercise and health-related behaviour. If these interventions are to be successfully implemented, the context in which this activity takes place should be kept in mind. Specific suggestions and strategies regarding health and fitness for a specific target group should be adopted, rather than the provision of more general information.

## **5.4 LIMITATIONS**

This study had several limitations that should be acknowledged and which warrant discussion:

- This was a descriptive study; therefore no causal conclusions may be inferred from the data.
- The sample was a convenience sample of university students at one university and consequently cannot be considered a true representation of general university student populations at South African universities.
- The study population was gender-specific (young females). Valuable information on the exercise preferences and expectations for male students could provide a more holistic picture of typical university student health and fitness behaviours.
- The study population frequented a university gymnasium, indicating a higher probability of regular exercise habit. Comparisons to exercise regularity of other student groups, as reported in literature, were not possible but could be valuable.
- The survey relied on self-reported information concerning body height and body weight. The validity of this data is conditional on subject attitude and honesty.

- Physical activity participation is a multifaceted and complex behaviour. Differences in perception could have contributed to variance in responses to some questions.

## **5.5 RESEARCH CONTRIBUTION:**

### **An applicable and practical contributing recommendation from this research**

Technological advances are making it possible to measure a wide variety of physiological responses more precisely and document training results from participation in physical activity. Weight loss and weight management goals were cited as important exercise outcomes among young female students. The development of a functional, practical and easy-to-follow advisory tool that could assist in establishing or indicating energy expenditure during various aerobic exercise modes could be of value in most gymnasium settings. Determining the most cost effective intervention approaches to advise people on exercise choice effectively is a challenge for the future (SGR, 1994:6). The Hivert *et al.* (2007) study, reported that intervention based on a social cognitive theory can prevent the weight gain that is generally observed in young healthy students.

The development of a simple, yet effective, tool to assist gymnasium members and exercise participants with information that could direct their exercise choice could be beneficial in many exercise environments. The following description provides a background for the development of such an advisory tool or programme. This will enable participants to plan and focus their exercise choice and calculation of energy expenditure as part of a more structured exercise plan.

Estimating caloric expenditure during exercise, especially in large groups, has been problematic for exercise professionals. Direct methods for establishing accurate energy expenditure during participation in physical activity are difficult in groups (as applicable to this research), an indirect method for the calculation

of energy expenditure is therefore advised to calculate approximate energy expenditure levels in  $\text{kcal min}^{-1}$  for activities and exercise modes.

A useful method to approximate the caloric cost of exercise is by using the metabolic equivalent threshold or MET level of an activity (Balady *et al.*, 2000: 151). Factors such as age, gender and fitness level influence the exact calculation of MET intensities and can only be done through direct measures. METs are universally accepted units for expressing energy expenditure relative to an individual's body weight. Published tables of energy cost, such as the Compendium of Physical Activities (CPA) created in the USA (Shephard, 2003:198), serve as a reference for estimating MET levels for activities when direct measures are impractical. The CPA is an internationally accepted compilation of published and unpublished data that classifies an expansive range of physical activities (PAs) by MET intensities (Ainsworth *et al.*, 2000:1). The CPA is widely used (Shephard, 2003:198) and this makes it an ideal reference point for this study as a basis for developing an advisory tool.

The interaction of physical activity intensity, duration and frequency determines the net caloric expenditure from the activity (ACSM, 2000:151). Many health benefits and training adaptations associated with increased physical activity are related to the total amount of work accomplished during a training session. The caloric thresholds necessary to elicit significant improvements in  $\text{VO}_{2\text{max}}$ , weight loss or a reduced risk of premature chronic disease may differ. Therefore individualised exercise prescriptions should be designed with energy expenditure goals in mind. The ACSM recommends a target of 150 to 400 kcal of energy expenditure per day in physical activity and/or exercise (Whaley *et al.*, 2006:148). For weight control, the ACSM (1990) recommends a minimum energy expenditure of 300 kcal per session, three times per week, or 200 kcal per session, four times per week. Physical activity and/or exercise energy expenditure in excess of  $2\,000\ \text{kcal}\cdot\text{wk}^{-1}$  have been successful for short-term as well as long-term weight control (Whaley, 2006:148).

A suggested exercise programme and information booklet that provides easy to follow energy expenditure calculation methods, is envisaged, that could serve as an initial advisory method and tool to provide information to young female students, that will enable them to plan an exercise programme that could assist them with, and make them more aware of, healthy weight management practices.

## **5.6 CONCLUSION AND REMAINING CHALLENGES**

Although research on physical activity and the behavioural aspects linked to it is expanding, some aspects are still not well-represented in studies. Determining correlates relevant in the decision making of young women to be active, and the post-exercise effect of their choices (if they participate), could be useful. This could contribute to knowledge for the planning of intervention strategies and could be implemented in a variety of environments.

This research implies and is supported by recent literature (NASPE, 2007:1), that university administrators, sport and recreation staff, health care and fitness professionals need to develop student health services with specific purposes in mind. These services should include information on the benefits, promotion and maintenance of a healthy lifestyle.

It is important that students have alternatives to circumstances or environments that might promote risk behaviour. Educators, including administration and health services, could ensure and promote programmes and provide accurate information, fostering healthy coping mechanisms and choices for students. Health and healthy living for students are important. Adequate healthcare information and maintenance programmes are essential to the wellbeing of a university community. The provision of learning opportunities with accurate information provided to enhance health and wellbeing should be a goal of the university.

Interventions are more effective among individual groups or subgroups of a population. Data from this study can be used to inform and tailor interventions or advisory programmes at a micro-level in the university setting. This sentiment is shared by Dawson *et al.* (2007:39), which states that programming and advice should adopt an educational approach that is more gender-tailored and focused in a specific context.

Different educational interventions may prevent weight gain and associated health risks in university students (Hivert *et al.*, 2007:1268). These researchers are of the opinion that more research is needed to prevent weight gain in young adults in different settings. The Hivert study (2007) shows the feasibility of preventing weight gain in young adults, as this offers hope in an attempt to improve health and lifestyle choices among young adults.

This research supports the findings of previous reports and recommendations by Dinger (2000:19), Cilliers *et al.* (2006:234) and Prouty, Protinsky & Canady, (2002:354) that universities should provide interdisciplinary teams that work together to confront health-risk behaviours such as eating disorders, body image dissatisfaction, substance use and inactivity, and develop strategies to encourage physical activity participation patterns among this group. Departments and organisations on campus that could offer support to these efforts on a psychological and mental level, as well as in offering medical support services, could be of great value to these new strategies. Cilliers *et al.* (2006:241) report that very little improvement has occurred at Stellenbosch University in this regard, emphasising a need for some form of intervention, also in assisting young female students with healthy weight management skills.

Research strategies that appear promising and that should be the focus for the future include the tailoring of interventions to people's needs, experiences and stages of change. The timing of the interventions is important to reinforce new behaviours and prevent relapse. Peer involvement and social support that engage a whole micro-community, such as a university environment, should be a focus.

The research findings suggest that continued research in this population group is necessary to track changes in choice and health behaviour management. Future research could assist educators and multidisciplinary teams to develop proactive and adequate programmes that are more aligned with actual student needs.

The scope, quality and effectiveness of a wide range of services and supporting policies at a university have the potential to foster more physically active lifestyles in a university population. These efforts could be targeted to meet the needs of population subgroups and could be designed to use as effective strategies (SGR, 1994:8). University and college campus programmes could be more proactive with regard to educational strategies and incentives, in varied formats, to provide and advise students on lifestyle choices that could impact their current and future health. Research attempting to implement intervention or educational programmes should establish a clear target population with specific goals in mind (O'Brien & LeBow 2006:208), as it may be the last time that students can receive education relative to physical activity practices, their health and lifestyle choices before entering the world of work.

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## **APPENDIX A**

### **LETTER TO STELLENBOSCH UNIVERSITY GYMNASIUM MANAGER: 2003**

## LETTER FOR PERMISSION TO CONDUCT RESEARCH IN 2003

15 Mei 2003

**DIE US GIMNASIUM BESTUURDER:  
MEV D TOURELL  
Universiteit Stellenbosch**

**Geagte mev Tourell**

### **NAVORSINGSPROJEK: DEPARTEMENT SPORTWETENSKAP & US GIMNASIUM “Oefenvoorkeure- en verwagtinge van jong damestudente”**

Graag verwys ek na ons informele gesprek gedurende November 2002, rakende toestemming om 'n navorsingsprojek in samewerking met die US Gimnasium aan te pak.

Hierdie navorsingsprojek is 'n gesamentlike projek wat onder leiding van prof J G Barnard plaasvind, in samewerking met mev E van Niekerk en mej M Horsthemke, van die Departement Sportwetenskap, US.

Die projek het betrekking op die Fiksheidsbedryf, en kan waardevolle inligting verskaf ten opsigte van oefenvoorkeure van studente wat lede is van die US Gimnasium, asook die energieverbruik tydens deelname aan hierdie klasse.

Margit Horsthemke sal die datainsameling met betrekking tot die oefenvoorkeure van studente hanteer. 'n Kort vraelys is opgestel wat kliënte net voor die begin van 'n klas moet invul. Dit sal nie langer as 3–5min. neem nie. Honneursstudente van die Biokinetika honneursklas sal help met die uitdeel en insameling van die vraelyste. Ons beoog om die inligting tydens 'n periode van 'n week of twee, tydens elke klas in te samel. Organisasie sal van so 'n aard wees dat daar geen ontwrigting van die normale skedule van die klasse behoort plaas te vind nie.

Die volgende faset van die projek behels die versoek t.o.v. 'n paar lede wat gedurende klasse met 'n POLAR-hartmonitor moet oefen. Dit sal vrywillige deelname wees van die kliënte se kant en mev E van Niekerk sal verantwoordelik wees vir die opstel van hierdie monitors in die klasse. Geen ontwrigting van die aërobiese klasse behoort plaasvind te vind nie.

Bevestiging van finale datums vir implementering sal aan die US Gimnasium deurgestuur word, ten minste een week voor die aanvang van die projek.

Ons vertrou dat hierdie versoek u gunstige oorweging sal geniet. Ons sien daarna uit om hierdie gegewens met die US Gimnasium te deel na afloop van die verwerking daarvan.

Byvoorbaat dankie

Prof J G Barnard  
Studieleier

Mev E van Niekerk  
Projekbestuurder

Mej M Horsthemke  
Navorsingsassistent

## **APPENDIX B**

### **LETTER TO STELLENBOSCH UNIVERSITY GYMNASIUM MANAGER: 2004**

## LETTER FOR PERMISSION TO CONDUCT RESEARCH IN 2004

16 Julie 2004

**DIE US GIMNASIUM BESTUURDER & AËROBIESE BESTUURDER:  
MEV D TOURELL / ME L VISAGIE  
Universiteit Stellenbosch**

**Geagte mev Tourell en me Visagie**

**NAVORSINGSPROJEK: DEPARTEMENT SPORTWETENSKAP & US GIMNASIUM:  
“Oefenvoorkeure- en verwagtinge van jong damestudente”**

Hiermee 'n vriendelike versoek vir toestemming om die bogeneomde navorsingsprojek gedurende September en Oktober 2004 voort te sit vir verdere data-insameling.

Die projek het betrekking op die Fiksheidsbedryf en kan waardevolle inligting verskaf ten opsigte van oefenvoorkeure van studente wat lede is van die US Gimnasium, asook die energieverbruik tydens deelname aan hierdie klasse.

Hierdie fase van die navorsing behels die herhaling van die uitdeel van die bestaande vraelyste met betrekking tot oefenvoorkeure en oefenverwagtinge sowel as die volgende fase van die projek wat behels 'n versoek vir deelname deur US Gimnasiumlede gedurende aërobiese klasse, waar 'n POLAR-hartmonitor gedra moet word tydens die betrokke aërobiese klas. Dit sal vrywillige deelname wees van die kliënte se kant en mev E van Niekerk sal verantwoordelik wees vir die opstel van hierdie monitormonitors in die klasse. Geen ontwrigting van die aërobiese klasse behoort plaasvind te vind nie. Vrywillige deelname sal aan die begin van die klas gevra word, monitormonitors aangesit word en na afloop van die klas sal die betrokke persone se inligting versamel word.

Ons vertrou dat hierdie versoek u gunstige oorweging sal geniet. Ons sien daarna uit om hierdie gegewens met die US Gimnasium te deel na afloop van die verwerking daarvan.

Byvoorbaat dankie

Prof J G Barnard  
Studieleier

Mev E van Niekerk  
Projekleier

## **APPENDIX C**

### **LETTER TO STELLENBOSCH UNIVERSITY GYMNASIUM MANAGER: 2005**

**LETTER FOR PERMISSION TO CONDUCT RESEARCH IN 2005**

**14 Augustus 2005**

**DIE US GIMNASIUM BESTUURDER & AËROBIESE BESTUURDER:  
MEV D TOURELL / ME L VISAGIE  
Universiteit Stellenbosch**

**Geagte mev Tourell en me Visagie**

**NAVORSINGSPROJEK: DEPARTEMENT SPORTWETENSKAP & US GIMNASIUM:  
“Oefenvoorkeure- en verwagtinge van jong damestudente”**

Hiermee 'n vriendelike versoek vir toestemming om die bogeneomde navorsingsprojek gedurende September en Oktober 2004 voort te sit vir verdere data-insameling soos wat dit die afgelope twee jaar gedoen is.

Die projek het betrekking op die Fiksheidsbedryf en kan waardevolle inligting verskaf ten opsigte van oefenvoorkeure van studente wat lede is van die US Gimnasium.

Hierdie fase van die navorsing behels die herhaling van die uitdeel van die bestaande vraelyste met betrekking tot oefenvoorkeure en oefenverwagtinge.

Ons vertrou dat hierdie versoek u gunstige oorweging sal geniet. Ons sien daarna uit om hierdie gegewens met die US Gimnasium te deel na afloop van die verwerking daarvan.

Byvoorbaat dankie

Prof J G Barnard  
Studieleier

Mev E van Niekerk  
Projekleier

## **APPENDIX D**

### **RESEARCH QUESTIONNAIRE: 2003 ENGLISH VERSION**

**DEPARTMENT OF SPORT SCIENCE, STELLENBOSCH UNIVERSITY  
RESEARCH PROJECT:**

**“Exercise preferences and expectations of young female students”**

**CONFIDENTIAL QUESTIONNAIRE**



Please answer the following questions as honestly as possible:

Date of birth: \_\_\_\_\_ Height (cm): \_\_\_\_\_ Weight (kg): \_\_\_\_\_

Registered student - Stellenbosch University:  Academic year:  Other:

Questions below: List in order of preference (eg. 1st choice = 1), according to importance, the choices stated at each question.

**1. Indicate your exercise preferences at this gymnasium.** (Mark as many options as possible)

Classes / Session	<input checked="" type="checkbox"/> Preference at least 1 - 3
Aerobics	
Aero – Step combo	
Low impact aerobics	
Aquafitness	
Body Toning	
Body Mind Toning (Yoga)	
Callanetics	
Circuit Training ( <i>Gymnasium floor</i> )	
Cycle	
Freestyle Circuit	
Pilates	
Power Walk	
Punchline / Boxing aerobics	
Skip combo / Skip & Tone	
Step	

**2. What are your expectations with participating in the above mentioned classes or sessions, with regards to your exercise choices 1 – 3 above? (Rank in order of importance)**

Expectations: (exercise outcomes)	Choice 1	Choice 2	Choice 3
Exercise for health benefits			
Improvement of general fitness ( <i>strength, flexibility and endurance</i> )			
Improvement of muscle definition			
Improvement of sport performance			
Want to loose weight			
Stress release			
Other? (specify)			

**3. Are you exercising regularly?**

(3 or more times a week, at least 30 min per session)

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
-----	--------------------------	----	--------------------------

Next: Indicate (by ticking) how **frequently** you exercise in this Gymnasium, with regards to your first three choices of exercise options, as indicated in question 1.

Day	Choice 1	Choice 2	Choice 3
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
<b>Frequency per week:</b>			

(1)  Next: Indicate (by ticking) the **amount of time** you spend on each of your first three exercise choices during a week with regards to your options as indicated in question 1.

Time	Choice 1	Choice 2	Choice 3
30 min			
45 min			
60 min			
120 min			
More time? (specify)			
<b>Time per week:</b>			

**4. Indicate by ranking why you attend the specific classes or sessions at this gymnasium?** (exercise environment)

Reason?	Choice 1	Choice 2	Choice 3
Accessibility of venue			
Convenient setting			
Easy to follow			
Fun			
Instructor: Well taught class			
Music used			
Session content provides a variety of exercise options			
Convenient time of day			
Type of class			
Other? (specify)			

**5. Are you currently using any medication?**

Yes	No	
<input type="checkbox"/>	<input type="checkbox"/>	Asthma medication
<input type="checkbox"/>	<input type="checkbox"/>	Hormone Replacement Therapy
<input type="checkbox"/>	<input type="checkbox"/>	Oral Contraceptives
<input type="checkbox"/>	<input type="checkbox"/>	Regular pain medication
<input type="checkbox"/>	<input type="checkbox"/>	Weight loss
<input type="checkbox"/>	<input type="checkbox"/>	Anti-depressants
<input type="checkbox"/>	<input type="checkbox"/>	Other? Specify

**Sien keersy vir Afrikaanse vraelys**

## **APPENDIX E**

### **RESEARCH QUESTIONNAIRE: 2003 AFRIKAANS VERSION**

**DEPARTEMENT SPORTWETENSKAP, UNIVERSITEIT STELLENBOSCH**  
**NAVORSINGSPROJEK:**  
**“Oefenvoorkeure en -verwagtinge van jong damesstudente”**

**KONFIDENSIËLE VRAELYS**



Beantwoord die volgende vrae so eerlik as moontlik:

Geboortedatum: \_\_\_\_\_ Lengte (cm): \_\_\_\_\_ Gewig (kg): \_\_\_\_\_

Geregistreerde student – Universiteit Stellenbosch:  Akademiese jaar:  Ander:

**Onderstaande vrae: Lys volgens belangrikheid (bv 1e keuse = 1), u voorkeur met betrekking tot die keuses soos aangedui by elke vraag.**

**1. Dui aan watter oefenvorm u verkies by hierdie gimnasium. (Merk soveel opsies moontlik)**

Klasse / Sessie	<input checked="" type="checkbox"/> Voorkeur ten minste 1 - 3
Aërobiese oefeninge	
Aëro – Step kombinasie	
Lae impak aërobiese oefeninge	
Akwa-fiksheid / Aqua Fitness	
Body Toning	
Yoga / Body Mind Toning	
Callanetics	
Gimnasium vloer / Circuit Training	
Fietsry / Indoor Cycling	
Freestyle Circuit	
Pilates	
Kragstap / Power Walk	
Boks-aërobiese oefeninge / Punchline	
Springtjou kombinasies / Skip & Tone	
Step	

**2. Wat is jou verwagtinge / resultate verwag, met deelname aan bogenoemde klasse of sessies, m.b.t jou oefenkeuses 1 – 3 hierbo aangedui?**

Verwagtinge: (oefenuitkomst)	Keuse 1	Keuse 2	Keuse 3
Oefen vir gesondheidsvoordele			
Verbetering van algemene fiksheid (krag, soepelheid & uithou vermoë)			
Verbetering in sportprestasie			
Verbetering van spierdefinisie			
Wil gewig verloor			
Verligting van stres			
Ander? (spesifiseer)			

**3. Oefen u gereeld ?**

(3 of meer keer per week, ten minste 30 min per sessie)

Ja	<input type="checkbox"/>	Nee	<input type="checkbox"/>
----	--------------------------	-----	--------------------------

Volgende: Dui aan (deur te merk) hoe **gereeld** u per week in hierdie gimnasium oefen m.b.t. u eerste drie oefenkeuses, soos in vraag 1 aangedui.

**Please turn over for an English version**

Dag	Keuse 1	Keuse 2	Keuse 3
Maandag			
Dinsdag			
Woensdag			
Donderdag			
Vrydag			
<b>Frekwensie per week:</b>			

Volgende: Dui aan (deur te merk) hoeveel **tyd** u per week in hierdie gimnasium spandeer, m.b.t u eerste drie oefenkeuses, soos in vraag 1 aangedui.

Tyd	Keuse 1	Keuse 2	Keuse 3
30 min			
45 min			
60 min			
120 min			
Meer tyd? (spesifiseer)			
<b>Tyd per week:</b>			

**4. Dui aan d.m.v. rangorde, waarom u die spesifieke klasse of sessies by hiërdie gimnasium bywoon. (oefenomgewing)**

Rede?	Keuse 1	Keuse 2	Keuse 3
Gerieflike omgewing			
Geskikte tyd van dag			
Instrukteur: Goeie klas aanbieding			
Klasse is maklik om te volg			
Musiek wat gebruik word			
Pret			
Sessieinhoud: bied 'n verskeidenheid van oefeninge			
Tipe klas			
Toeganklikheid van fasiliteit			
Ander? (spesifiseer)			

**5. Gebruik u tans enige medikasie?**

Ja	Nee	
<input type="checkbox"/>	<input type="checkbox"/>	Asma-medikasie
<input type="checkbox"/>	<input type="checkbox"/>	Hormoonvervangingsterapie
<input type="checkbox"/>	<input type="checkbox"/>	Orale voorbehoedmiddels
<input type="checkbox"/>	<input type="checkbox"/>	Medikasie vir gereelde pyn
<input type="checkbox"/>	<input type="checkbox"/>	Gewigsverlies
<input type="checkbox"/>	<input type="checkbox"/>	Anti-depressante
Ander?	Spesifiseer	

## **APPENDIX F**

### **RESEARCH QUESTIONNAIRE: 2004 AND 2005 ENGLISH VERSION**



**CONFIDENTIAL QUESTIONNAIRE**



*Please complete and answer the following questions as honestly and comprehensively as possible:*

Contact details: Tel: Code (\_\_\_\_\_) (\_\_\_\_\_)

E-mail: (\_\_\_\_\_) Age: \_\_\_\_\_

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Height (cm): \_\_\_\_\_ Weight (kg): \_\_\_\_\_

Gender: Male:  Female:

Registered student – Stellenbosch University: Yes:  No:

Academic year:

Other student?

Other client: Occupation?

---

**Questions in the following tables:**

*Please take time to complete this section of the questionnaire as comprehensively and accurately as possible.*

List your answers for each question in the columns of the following table according to importance (eg. 1st choice = 1, 2nd choice = 2, 3rd choice = 3, etc.) Your preference with regards to the choices must be indicated by a number 1, 2, 3 etc.

1. Indicate **what type of exercise session (preference)** you prefer at this gymnasium. Next to this choice indicate what you expect to achieve (**\*expectations**) with this type of exercise session (See possible reasons and expectations on list next to the table and indicate the reason by using the adjacent number ). Also indicate the number of **times per week (frequency)** that you spend on the type of session and **how long (time) you exercise every time.**

Type of exercise session that you prefer (mark at least 4)	Preference 1, 2, 3, 4	* Expectations eg: 1, 3 & 4	Frequency (per week)	Time (min)
<i>Aerobics</i>				
<i>Aerobics: Beginners</i>				
<i>Aerobics: Intermediate</i>				
<i>Aero – Step</i>				
<i>Aqua Fitness</i>				
<i>Aqua: Sport Aqua</i>				
<i>Body Dynamics</i>				
<i>Body Toning</i>				
<i>Callanetics</i>				
<i>Cardio Workout</i>				
<i>Core Stability</i>				
<i>Dance Dynamics</i>				
<i>Circuit Training on gymnasium floor</i>				
<i>Weight area on gymnasium floor</i>				
<i>Cycle</i>				
<i>Cycle: Beginners</i>				
<i>Freestyle Circuit on gymnasium floor</i>				
<i>Power Walk</i>				
<i>Pilates</i>				
<i>Punchline</i>				
<i>Punchline: Beginners</i>				
<i>Punchline: Choreography</i>				
<i>Punchline: Technical</i>				
<i>Slide</i>				
<i>Slide: Beginners</i>				
<i>Slide &amp; Tone</i>				
<i>Slide: Sport Slide</i>				
<i>Step</i>				
<i>Step Combo</i>				
<i>Step: Beginners</i>				
<i>Step: Intermediate</i>				
<i>Step: Advanced</i>				
<i>Weight Workout</i>				
<i>Yoga</i>				
<i>Yoga – Power Yoga</i>				
<i>Other? Specify</i>				

**\* Expectations** that you have of the exercise sessions that you are attending

Provide at least **three (3)** reasons for your participation

---

1. Exercise for health reasons
2. Improvement of general fitness:
  - cardiovascular
  - strength
  - endurance
  - flexibility
3. Improvement of sport participation
4. Improvement of muscle definition
5. Weight increase
6. Muscle hypertrophy (increased muscle mass)
7. Weight loss
8. Weight management
9. Exercise for stress release
10. Other reasons? Specify

**2. Do you exercise regularly?**  
(3 or more times per week, at least 30 min per session)

YES		NO	
-----	--	----	--

**3. Why do you exercise at this particular gymnasium? Motivation?**

Motivation for exercise at this gymnasium? Indicate by ranking, e.g. 1, 2, 3 etc.	Mark 1, 2, 3
Environment - convenient	
Safe environment	
Time of day – many options to train at different times	
Instructor: Good presentation	
Instructor: Male - personality	
Instructor: Female - personality	
Classes are easy to follow	
Music that is used	
Fun aspect of exercising	
Exercise sessions: variety presented	
Types of classes	
Accessibility of the venue	
Husband	
Friend	
Gymnasium fees on student account	
Health reasons	
Group classes	
Exercising with a friend / colleague	
The social aspect of the gymnasium environment	
Other? (specify)	

**4. What or who prevents you from exercising regularly?** (at least 3 x per week)

Reasons why you do not exercise? Indicate by ranking, e.g. 1, 2, 3 etc.	Mark 1, 2, 3
Working circumstances	
Self image (weak self image – can not exercise)	
Time: Too little time to exercise	
Distance to training venue	
Husband	
Family keeps me busy	
A full social programme	
Health condition: cannot exercise	
Environment: not appropriate for exercising	
None / no reason	
Other? Specify:	

**5. Are you currently taking any medication?**  
(Mark if applicable)

Medication & Supplementation	Mark ✓
Asthma-medication	
Hormone replacement treatment	
Oral contraceptives	
Medication for regular pain	
Weight loss supplements	
Anti-depressants	
Supplements: Vitamins	
Supplements: Other	
Medication for specific condition? Specify	
Other? Specify	

**6. Indicate what medical condition or affliction you are currently experiencing:**  
(Mark if applicable)

Medical condition	Mark ✓
Cholesterol	
Diabetes	
Asthma	
Surgery (operations) Specify:	
Osteoporosis	
Hypertension (high blood pressure)	
Heart condition: Cardiovascular disease Specify:	
Stroke	
Lower back problems	
Other? Specify:	

**7. Do you smoke ?**

YES		NO	
-----	--	----	--

*If you have stopped smoking, how long have you been "clean"?*

Would you be interested in participating in other areas of this research project, such as monitoring energy expenditure during classes, heart rate calculations during exercise, etc? May we contact you?

YES: NO:

Name:

\_\_\_\_\_

\_\_\_\_\_

**VRA ASSEBLIEF VIR 'N AFRIKAANSE  
VRAELYS INDIEN U DIT BENODIG**

## **APPENDIX G**

### **RESEACH QUESTIONNAIRE: 2004 AND 2005 AFRIKAANS VERSION**



### VERTROULIKE VRAELYS



Voltooi en beantwoord die volgende vrae so eerlik en volledig  
as moontlik.

Kontakbesonderhede: Tel: Kode ( ) ( )

E-pos: ( )

Ouderdom: \_\_\_\_\_

Datum: \_\_\_\_\_ Tyd: \_\_\_\_\_

Lengte (cm): \_\_\_\_\_ Gewig (kg): \_\_\_\_\_

Geslag: Manlik:  / Vroulik:

Geregistreerde student – Universiteit Stellenbosch: Ja:  / Nee:

Akademiese jaar:

Ander student?

Ander kliënt: Beroep?

---

#### **Vrae in meegaande tabelle:**

**Neem asb u tyd om die volgende vrae soos volledig en  
deeglik moontlik te beantwoord**

Lys u antwoorde en keuses vir elke vraag in die tabelle hieronder volgens belangrikheid (bv 1ste  
keuse = 1; 2 de keuse = 2; 3 de keuse = 3, ens.)

U voorkeur met betrekking tot die keuses by elke vraag, moet dus met  
'n nommer 1, 2, 3 ens. aangedui word.

1. Dui aan **watter tipe oefensessie (voorkeur)** u by hierdie gimnasium verkies. Dui langs hierdie keuse aan **wat jy verwag om te bereik (\*verwagtinge)** met hierdie oefening. (Kyk op lys langs tabel en dui aan met 'n nommer in kolom). Dui ook aan **hoeveel keer per week (frekwensie)** u aan dié betrokke tipe oefening spandeer en **hoe lank (tyd) u elke keer oefen.**

Tipe oefensessies waaraan u graag deelneem (voorkeur) (merk ten minste 4 tipes) →	Voorkeur 1, 2, 3, 4	* Verwagting Bv 1, 3 & 4	Frekwensie (per week)	Tyd (min)
Aerobics / Aërobiese oefeninge				
Aerobics: Beginners				
Aerobics: Intermediate				
Aero – Step				
Aqua Fitness/ Akwa-fiksheid				
Aqua: Sport Aqua				
Body Dynamics				
Body Toning				
Callanetics				
Cardio Workout				
Core Stability				
Dance Dynamics				
Gimnasiumapparate: Circuit Training				
Gimnasiumvloer: Gewigte area				
Cycle				
Cycle: Beginners				
FreestyleCircuit Rondtebaan op die gimnasiumvloer				
Kragstap / Power Walk				
Pilates				
Punchline				
Punchline: Beginners				
Punchline: Choreography				
Punchline: Technical				
Slide				
Slide: Beginners				
Slide & Tone				
Slide: Sport Slide				
Step				
Step Combo				
Step: Beginners				
Step: Intermediate				
Step: Advanced				
Weight Workout				
Yoga				
Yoga – Power Yoga				
Ander? Spesifiseer				

\* Verwagtinge van die oefenprogram/ deelname wat u volg

Drie (3) redes of verwagtinge van deelname

1. Oefen vir gesondheids voordele
2. Verbetering van algemene fiksheid
  - spierkrag
  - uithouvermoë
  - soepelheid
3. Verbetering van deelname in sport
4. Verbetering van spierdefinisie
5. Gewigstoename
6. Spier-hipertrofie: spiere vergroot (meer spiermassa opbou)
7. Wil gewig verloor
8. Wil gewig beheer
9. Oefen vir die verligting van stres
10. Ander redes? Spesifiseer

## 2. Oefen u gereeld?

(3 of meer X per week, ten minste 30 min. per oefensessie)

JA		NEE	
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## 3. Waarom oefen u by hierdie spesifieke gimnasium? Motivering?

Motivering vir oefening? Dui aan in rangorde, bv. 1, 2, 3 ens	Merk 1, 2, 3
Gerieflike omgewing	
Veilige omgewing	
Geskikte tyd van dag: – verskeidenheid tye om te oefen	
Instrukteur: Goeie klasaanbieding	
Instrukteur: Manlik - persoonlikheid	
Instrukteur: Vroulik - persoonlikheid	
Klasse is maklik om te volg	
Musiek wat gebruik word	
Pret	
Sessie-inhoud: bied 'n verskeidenheid van oefeninge	
Tipe klasse	
Toeganklikheid van fasiliteit	
Eggenoot	
Vriend / vriendin	
Gimnasiumgelde op studente- rekening	
Gesondheidstoestand	
Groepklasse	
Oefening saam met 'n maat	
Sosialiseringsgeleentheid	
Ander? (spesifiseer)	

## 4. Wat ontmoedig of weerhou u daarvan om gereeld te oefen? (ten minste 3 x per week)

Redes om nie te oefen nie? Dui aan in rangorde, bv. 1, 2, 3 ens	Merk 1, 2, 3
Werkomstandighede	
Selfbeeld: sien nie kans om te oefen	
Het te min tyd	
Afstand na oefeningsomgewing te ver	
Eggenoot gee my nie kans	
Gesin hou my te besig	
Te vol sosiale program	
Gesondheidstoestand: kan nie oefen	
Omgewing: Nie die regte fasiliteite nie	
Geen rede	
Ander?	
Spesifiseer:	

## 5. Gebruik u tans enige medikasie?

(merk indien van toepassing)

Medikasie & suplemente	Merk ✓
Asma-medikasie	
Orale voorbehoedmiddels	
Medikasie vir gereelde pyn	
Gewigsverliesmiddels	
Anti-depressante	
Supplemente / vitamiene aanvullings	
Supplemente / ander middels	
Hormoonaanvullings	
Medikasie vir spesifieke toestande	
Ander?	

## 6. Dui aan watter een van die volgende mediese/gesondheids toestande is tans op u van toepassing: (merk indien van toepassing)

Mediese toestand	Merk ✓
Cholesterol	
Diabetes	
Asma	
Chirurgiese ingreep (operasies) Spesifiseer:	
Osteoporose	
Hipertensie (hoë bloeddruk)	
Hartsiektes/Kardiovaskulêre siektes Spesifiseer:	
Beroerte ( <i>stroke</i> )	
Lae-rug probleme	
Ander?	
Spesifiseer:	

## 7. Rook u tans ?

Ja	Neer

Indien u ophou rook het, hoe lank is u nou al "skoon"?

Sou u belangstel om aan bykomende aspekte van hierdie navorsingsprojek deel te neem, soos byvoorbeeld, energieverbruik in klasse monitor; hart-tempo tydens oefensessies bepaal ens?  
Kan ons u kontak?

JA: \_\_\_\_\_ NEE: \_\_\_\_\_

Naam & kontak nr:  
\_\_\_\_\_

PLEASE ASK FOR AN ENGLISH VERSION OF THIS QUESTIONNAIRE IF NEEDED.