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Self-reported constraints to physical activity participation among university students

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Abstract

Engagement in physical activity is recognised as an important factor contributing to positive health benefits. Despite the benefits associated with regular physical activity and its ability to improve health, there is little evidence to suggest that the prevalence of physical inactivity among university students is increasing. The objective of this study was to investigate students' participation in and constraints to participation in physical activity. The secondary objective of the study was to ascertain the extent to which university students meet minimum recommended physical activity level. A structured questionnaire relating to participation levels and physical activity constraints was administered to 251 university students. A 22-item scale was developed using factor analysis along six dimensions, namely, personal constraints, academic obligations, safety, fatigue and lack of interest, facilities and lack of company, and knowledge and skills necessary to participate in physical activity. Lack of facilities, proper gear and equipment, time and the pressures of a university schedule were cited as the most important constraints students face in engaging in physical activity. Through the provision of proper facilities at a university level and by inculcating positive attitudes about physical activity participation, students' experiences of physical activity constraints may be curtailed. From a university perspective, probing the sources of non-participation in physical activity may ultimately assist to better organise and promote physical activity among students.

Key words: Physical activity, participation, constraints, health, sedentary lifestyles, barriers.

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Introduction

In the past ten years physical activity, health and fitness, and the so-called 'obesity epidemic' has received increased prominence (Drewnowski & Evans, 2001; Gard & Wright, 2001; van der Merwe, Wilders, du Plessis & Strydom, 2006; Mashego, Burnett, 2008) due to the prevalence of physical inactivity amongst the populations of many western, industrialized and developing nations (Almeida, 2008). As a consequence health promotion and human movement science research has been dominated by concerns surrounding the amount and type of physical activity participation especially among the younger generation (Wright, MacDonald & Groom, 2003). This scenario was coupled with the view

that the younger generation is more sedentary as new technologies become widely available to them (Wang & Biddle, 2001; Andersen, Crepso, Bartlett, Cheskin & Pratt, 1998). Engagement in physical activity is recognised as an important factor contributing to positive health benefits (Brownson, Hoehner, Brennan, Cook, Elliot & McMullen, 2004). Despite its benefits, a large percentage of a country's population remains inactive (Centers for Disease Control and Prevention, 2001; Gerbel, Bauman & Petticrew, 2007). It has also been reported that increased physical activity has been associated with decreased risks for premature mortality and a number of chronic conditions, including cardiovascular diseases, cancer, diabetes, obesity and hypertension (Prochaska, 2009). Further, increased physical activity has been associated with improved mental health and decreases the odds of developing depression (Biddle, Sallis & Cavill, 1998). These revelations suggest the need for further studies on youth and adolescent physical and health activities to understand their current profiles with the view to safeguarding their future health.

A review of literature indicates that physical activity contributes enormously to the functional status and improved quality of life of individuals (Bouchard, Shephard & Stephens, 1994; Daskapn, Tuzen & Eker, 2006). A study by the American College Health Association (2007) revealed that approximately 68.7 percent of high school learners reported engaging in regular vigorous activity compared to 44.2 percent of college students and 23 percent of older adults (Eaton, Kann, Kinchen, Ross, Hawkins, Harris, Lowry, McManus, Chyen, Shanklin, Lim, Grunbaum & Wechsler 2006). A plausible reason for high rates of physical activity amongst learners at school is that "an individual's perception and attitude are challenged, reshaped and firmly fixed during the schooling years" (Amusa, Toriola, Onyewadume & Dhaliwal, 2008:117). During the period of studies in high school, physical activities are fairly structured and organised. When learners are at school, the motivation and encouragement to participate in sport and physical activity is initiated by educators, parents and peers which greatly assists in "changing or modifying an individual's perception and attitude towards sport and physical activity" (Amusa *et al*. 2008:117). Hence, it seems that the motivational factors that enhance physical activity participation can be partially attributed to mentorship at home and at school, which is lacking within a university context where students are on their own to balance leisure and academic life. Cooper and Theriault (2008) presented factors that may contribute to non-participation in physical activity beyond the schooling context. These factors are categorised as social (to be with friends), physical (to stay healthy) or intrapersonal (to feel better about oneself).

Jackson (1993) identified six dimensions of constraints that appear to be common across settings: (a) social isolation, i.e. characteristics that involve interaction between or among people, (b) accessibility i.e. lack of or limited access to transportation, (c) personal reasons, i.e. individual's abilities or

motivations, (d) cost, i.e. experience cost or cost of equipment, (e) time i.e. referring to levels and intensity of participation and (f) facilities, i.e. crowding and maintenance. The model proposed by Crawford and Godbey (1987) suggests that intrapersonal barriers are proximal constraints; they are encountered first and then followed by interpersonal and structural constraints. This categorisation was adopted by the majority of researchers in the area of constraints to physical activity participation. Intrapersonal constraints are internal in nature, which is related to individual psychological states and attributes. Such constraints may include lack of perceived skill levels, low fitness levels, lack of confidence, stress, anxiety, fatigue, depression, and lack of prior socialization into specific leisure activities. These constraints are based on emotions and tend to change over time (Goodale & Godbey, 1988). As a consequence of their emotional nature, these types of constraints are perhaps difficult to overcome. Often the barrier is not the result of a belief but rather psychological in nature. For example, an elderly person may experience an undue amount of stress while engaging in an activity that focuses attention of onlookers. Interpersonal constraints are related to lack of social interaction and social isolation. Such constraints may include the inability to find partners to participate with which may arise out of the absence of interaction with others such as family members, friends, coworkers and neighbours (Chick & Dong, 2003). Structural constraints are external to an individual. Structural constraints represent blocks or obstacles to participation, which intervenes between personal preferences, and participation (Goodale & Godbey, 1988). These constraints are related to the unavailability or lack of resources to participate in leisure activities. Such constraints may include lack of money, problems related to facilities, service accessibility issues and the cost of the facility usage (Jackson, 2005).

Literature on youth and student surveys frequently point out that young people and particularly adolescents are not as active as they should be (Almeida, 2008). Despite the benefits associated with regular physical activity and its ability to improve health, there is little evidence to suggest that the prevalence of physical activity among university students is increasing. More alarming is the reality that engagement in physical activity declines with age (Caspersen, Pereria & Curran, 2000). Physical activity among university students is particularly important because this age group (18-25) represents a critical developmental transition period in which lifestyle choices often become relatively stable (Almeida, 2008) and lead to more permanent patterns in later adulthood (Hultsman & Kaufman, 1990). Cooper and Theriault (2008) are of the view that whilst physical activity behaviours may be established in early childhood and adolescence, university experiences of students (18-25 years) is an opportunity to affirm positive physical activity or redirect negative behaviours towards more positive directions. In addition, early prevention and healthy lifestyles may be the least expensive and the best way to combat the growing prevalence of avoidable diseases such as diabetic and cardiovascular disease, especially among university

students. A study by Sparling and Snow (2002) on a sample of high-school learners affirmed that the majority of those learners who were active in terms of physical activity at school were still physically active 5 or 10 years later into their lives and those who were not physically active still maintained sedentary lifestyles during the same period.

The study investigates the salient constraints to participation in physical activity among university students. The secondary objective of the study is to ascertain the extent to which university students meet minimum recommended daily physical activity levels. The Centre for Disease Control and Prevention (2001) recommends that adults engage in a minimum of 30 minutes of moderate physical activity most days of the week (with most days measured as five or more days per week) or vigorous physical activity for 20 minutes at least 3 days per week.

Methodology

A quantitative approach involving statistical techniques (Malhotra & Birks, 2003) was used in the study.

Population and sample selection

The Vaal University of Technology was chosen on the basis that its facilities are well positioned in the region and are easily accessible in terms of recreation opportunities to students, staff and the community. The university is situated in Southern Gauteng. The population comprised undergraduate and postgraduate university students. Respondents were randomly selected from various faculties within the university. Participation of the students was voluntary. Only full-time university students (not in any form of employment) were included in the sample. Where a prospective student declined to participate, the next eligible student was approached to participate in the study. The study was not extended to part-time students because surveying part-time students might be problematic due to work pressures and their inclusion would contaminate the sample in terms of availability of for recreation and physical activity pursuits.

For university students this period in their lives represents an opportune time to promote health- enhancing behaviour by participating in various forms of physical activity. University students are an important cohort because they are future leaders of our society and their physical activity behavior will not only affect their own health, but will serve as a role model for the wider society. Therefore, developing healthy behaviours at this point in their lives may have a long-lasting impact not only on their health, but also on the health of the nation. Finally, university students are a relatively understudied population in terms of their physical activity behaviours (Almeida, 2008).

Instrumentation and data collection

A survey design was used and data were collected through a self-report questionnaire.. This instrument was chosen, as it is cost effective and convenient to administer in large groups as part of a formative assessment on physical activity (Mciza, Goedecke & Lambert, 2007). For the physical activity aspects, the adapted Godin Leisure-Time Exercise Questionnaire, which incorporated the International Physical Activity Questionnaire (Long last 7 days self-administered format), was used. The scale examined within a 7-day period the number of times and on days per week (30 minutes or more, all at once or in 10 or 15 minutes blocks) strenuous exercise, moderate exercise, mild exercise and walking was undertaken. In addition, in each category (strenuous, moderate, mild exercise and walking) common examples of activities were provided to respondents in order to avoid confusion on the activity under consideration.

In terms of the constraints to physical activity involvement questionnaire, the questions were drawn primarily from the studies undertaken by Crawford, Jackson and Godbey (1991), Engstrom (1998) and Walker, Jackson and Deng (2007). Where necessary, the questions were modified and assembled to suit university students within a South African context. The questionnaire comprised 29 evaluative statements. These statements were based on a Likert scale format anchored with 5 indicating strongly agree and 1 indicating strongly disagree. A value of 3 indicated a moderate agreement with the statements. Demographic variables, including age, gender, type of residence and self-reported body mass index (BMI) were also requested from respondents.

Thus BMI is a confirmatory mechanism for determining obesity and infers that higher BMIs are associated with chronic diseases, especially coronary heart disease (Kruger, Venter, Vorster & Margetts, 2002). BMI is defined as the ratio of body mass to stature squared, expressed in kilogram^2 (Plowman & Smith, 2003). The formula is expressed as follows:

$$BMI = \frac{Mass}{Height(m^2)}$$

Interviews were conducted by trained fieldworkers who were enrolled in a research methodology course at the post-graduate level. A total of 251 usable questionnaires were analysed in the main survey after eliminating 15 incomplete questionnaires.

Reliability and validity

A preliminary version of the questionnaire was administered to a sample of 10 undergraduate students at the Vaal University of Technology. After the preliminary interview, some questions were modified in terms of ambiguity,

wording and relevance. In addition, groups of 50 students were then sampled in order to establish the initial reliability of the scale in a pilot study before the main survey.The internal consistency of the sub-scales (personal constraints, academic obligations, safety, fatigue and lack of interest, facilities and lack of company, lack of knowledge and skills) is reported in Table 1.

Table 1: Scale reliability

Dimension description	Number of items	Cronbach alpha
Personal constraints	7	0.832
Academic obligation	4	0.829
Safety	4	0.717
Fatigue and lack of interest	4	0.752
Facilities and lack of company	3	0.737
Lack of knowledge and skills	2	0.824
Overall scale reliability	0.896	

The Cronbach α for the individual sub-scales ranged from 0.717 to 0.832 and were all above the acceptable benchmark of 0.70 (Malhotra, 2004). In addition, the standardised Cronbach alpha reliability for the entire scale was 0.896.

Content validity is the representativeness of the content of the measurement instrument. The following steps were taken to ensure content validity. The questionnaire was pre-tested using 10 respondents. Some academics in the marketing and sport management disciplines were also consulted during the development stages of the questionnaire. The measuring instrument was further tested during pilot studies where further refinement of the questionnaire was undertaken. In addition, high levels of alpha values were achieved in the reliability tests for the various sub-scales thus indicating a satisfactory level of construct validity. Convergent validity reflects the degree of correlation among different measures that purport to measure the same construct. Convergent validity was assessed through the computation of Pearson correlation coefficients *(r*). Table 2 reports on the correlations among the perceived barriers to physical activity participation. The correlations ranged from r=0.188 to r=0.629 at $p<0.01$, demonstrating adequate levels of convergence among the six dimensions.

Table 2: Correlations-barriers to physical activity participation

	F1	F2	F3	F4	F5	F6
Personal constraints	1	.310**	.629**	.608**	.283**	.486**
Academic obligation	.310**	1	.222**	.488**	.194**	.188**
Safety	.629**	.222**	1	.507**	.308**	.458**
Fatigue and lack of interest	.608**	.488**	.507**	1	.283**	.413**
Facilities and lack of company	.283**	.194**	.308**	.283**	1	.389**
Lack of knowledge and skills	.486**	.188**	.458**	.413**	.389**	1

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

Data analysis

Data analyses were approached in three distinct stages. The descriptive analysis of the composition of the sample is initially reported, followed by the perceived intensity of the specific types of physical activity participation. Mean ranking of the constraints to physical activity participation was then computed. Finally, factor analysis was then undertaken to establish the constraints to physical activity participation.

Results

Descriptive composition of the sample

Of the 250[a] useable responses, there was a fairly even gender representation across the sample, with 121 (48.6 %) male respondents and 128 (51.4 %) female respondents. Respondents' ages ranged from 17-32 years, but with the majority (n = 197 or 80.4 %) belonged in the age group (19-24) with a mean age of 21.59 years. Most of the respondents were undergraduates (n = 195 or 78.0 %) while a few were postgraduate students (n = 44 or 17.6 %).

Most respondents lived either at the university residence (n= 121 or 48.4 %), or at an off-campus private residence (n = 114 or 45.6 %). Only a few lived at home (n = 8 or 3.2 %) or boarded with relatives (n = 5 or 2.0 %).

The self-reported mean BMI of respondents was 26.58 (25.66 for male sample and 27.58 for female sample), meaning that the BMI of the respondents is categorsied above the healthy or normal average, as reported by the World Health Organisation (2011), which listed the following BMI categories as typifying international levels of obesity: a BMI of < 18.5 is considered to be underweight; the normal range is between 18.5-24.99; overweight is ≥ 25.00; the pre-obese range is 25.00-29.99 and persons with a BMI of ≥ 30.00 are considered obese. This is further classified into typologies of obesity, namely: Class I obesity, BMI range 30.00-34.99; Class II obesity, BMI range 35.00-39.99 and Class III obesity BMI range is ≥ 40.00.

A further analysis of the respondents' BMIs reveals that while a moderate number reflect healthy BMIs of between 18.5-24.99 (n = 78 or 31.2 %), an alarming number (n = 114 or 45.6 %) fall into the at-risk categories, with 21.6 % (n = 54) being classified as overweight or pre-obese, i.e having a BMI ≥ 25 and 24.0 % (n = 60) and classified as obese, with a BMI ≥ 30. Further analysis indicates that of the obese respondents, 60 % (n = 36) are classified as being Class I obese (BMI of 30-34.99), 15% (n = 9) are classified as being Class II

[a] Where the analysis of frequencies do not tally to 251, this was due to missing data or non-completion of items.

obese, (BMI of 35-39.99) and 25% (n = 15) are classified as being class III obese (BMI of ≥ 40).

It is alarming that the majority of respondents are classified as overweight or obese and this is compounded by the fact that the majority of the respondents' perceive their own level of health to be good-to-excellent. Only 4.8 percent (n = 12) of the respondents rated their own health as poor, 25.6 percent (n = 64) rated their health as fair, and a large majority rated their health as good (n = 120 or 48 %) or even excellent (n = 53 or 21.2 %). The respondent's perceptions contradict their BMI measures, which reflect that they are at risk of experiencing problems.

Perceived intensity of physical activity participation

Respondents were requested to rate the extent to which they participated in physical activity in terms of time and number of days of the week they participated. This was classified into a strenuous, moderate and mild category. In the strenuous category, the mean time spent was 130.62 minutes per week (n = 127); in the moderate category, mean time spent was 86.11 minutes per week (n = 137) and in the mild category, mean time spent was 80.29 minutes per week (n = 108). Respondents completed more than one category if applicable. These times indicate that a fair number of respondents are engaged in some form of physical activity within a one-week period. However, 45.2 percent (n = 113) of the respondents reported no physical activity and were classified as sedentary. Furthermore, as a control question, participants were also asked to rate the extent to which they engaged in physical activity on a four-point scale ranging from *often* to *almost never*. Of the 213 respondents that answered this question only 14.0 percent of the participants (n = 35) reported that they participated often in physical activity, with the majority (n = 92 or 36.8 %) of the participants reporting that they rarely engaged in physical activity (n = 45 or 18.0 %) or almost never (n = 47 or 18.8 %) and 34.4 %t (n = 86) indicated they participated in physical activity occasionally/sometimes. This supports the central tenet of the study, i.e. many of the respondents are sedentary and at risk for future health problems.

Mean ranking of physical activity participation

The variables relating to constraints were ranked in terms of the summated means of each variable and arranged in descending order of importance by respondents. Table 3 reports on the mean ranking of the constraints to physical activity participation.

Table 3: Mean ranking of constraints to physical activity participation

Constraint statements	Mean ranking	Mean	Std Dev
Because of my physical disability	24	1.51	1.118
Too shy to participate in physical activity	23	1.72	1.208
Physical activity is boring for me	22	1.76	1.210
I have too many family obligations	21	1.77	1.215
Because of limited health reasons	20	1.82	1.281
Physical activity makes me sore	19	1.85	1.254
I experience discomfort	18	1.88	1.198
Because of bad weather	17	1.95	1.320
Because of my lack of knowledge	16	1.99	1.358
Most of the time I feel that I am down	15	2.01	1.242
Fear of injury	14	2.02	1.362
Safety concerns such as crime	13	2.04	1.380
Lack of skill	12	2.05	1.409
Lack of interest	11	2.08	1.370
Too lazy to participate	10	2.12	1.374
Rather inconvenient for me	9	2.21	1.319
I am too fatigued	8	2.22	1.409
Interferes with my university work	7	2.61	1.529
Lack of company	6	2.71	1.575
Interferes with my university schedule	5	2.84	1.511
Too busy to participate	4	2.85	1.525
Not enough time	3	2.95	1.595
Lack of proper gear/equipment	2	2.99	1.612
Lack of facilities	1	3.05	1.631

Factor analysis on constraints to physical activity participation

Owing to the large number of variables used to solicit respondents views on constraints to physical activity participation, exploratory factor analysis (with a principal components factoring procedure, with varimax rotation) was used in order reduce the variables into appropriate dimensions (Malhotra & Birks, 2003). Variable loading of 0.45 and above were retained. Item reduction and scale purification was then undertaken whereby items with low factor loadings, communalities and low-item-to-total correlations were investigated (Chandon, Leo & Philippe, 1997; Aldlaigan & Buttle, 2002). The iterative process was re-run several times until a clear factor structure emerged. This procedure resulted in the removal of seven items from the scale. The final factor structure and eigenvalues are reported in Table 4. The eigenvalues in respect of the six barriers to physical activity participation ranged from 1.045 to 7.500. Together, these factors accounted for 62 percent of the variance which according to Malhotra (2004) is considered “satisfactory”.

Table 4: Factor loading matrix

Variable Description	F1	F2	F3	F4	F5	F6
Bad weather	**.617**	.124	.178	.216	.244	-.238
Physical activity is boring	**.607**	.087	.105	.339	.101	.120
Many family obligations	**.569**	.079	.105	.246	.090	.317
Limited health reasons	**.702**	.180	.245	-.061	.037	.093
My physical disability	**.691**	.011	-.020	.240	-.036	.204
Physical activity makes me sore	**.608**	.164	.260	.156	.026	.181
Too shy to participate	**.573**	.061	.420	.010	-.008	.250
Too busy to participate	.009	**.692**	.150	.256	.134	-.090
Not enough time to participate	-.004	**.801**	.111	.151	.009	.186
Interferes with my university schedule	.184	**.843**	.000	.104	.053	.020
Interferes with my university work	.221	**.802**	-.028	.053	.015	.052
Fear of injury	.296	.032	**.551**	.197	.113	.237
Safety concerns	.366	.035	**.588**	.010	.152	-.139
Most of the time I am down	.052	.074	**.789**	.192	.021	.141
Experience discomfort	.364	.107	**.532**	.250	.027	.244
Too lazy to participate	.121	.204	.058	**.796**	-.031	.188
Inconvenient for me	.335	.355	.238	**.481**	.046	-.102
Too fatigued	.210	.210	.231	**.526**	.241	.012
Lack of interest	.354	.144	.209	**.666**	.077	.222
Lack of facilities	.061	.018	-.103	.131	**.814**	.066
Lack of proper gear	.068	.050	.156	-.006	**.866**	.143
Lack of company	.067	.178	.388	.034	**.576**	.268
Lack of knowledge	.242	.013	.219	.178	.223	**.727**
Lack of skill	.253	.104	.123	.115	.193	**.799**
Eigenvalue	7.500	2.280	1.804	1.196	1.105	1.045
% of variance explained	31.25	9.453	7.515	4.985	4.604	4.351
Cumulative % of variance	31.25	40.79	48.30	53.29	57.89	62.25

Rotation: Varimax with Kaiser normalisation. Loading > 0.45 were considered significant loadings.

Discussion

Physical activity participation and BMI

Concomitant with the increasing trend of other international research findings (Pratt, Macera & Blanton, 1999; Wright et al., 2003; Smith & Green, 2005), these young respondents generally lead sedentary lifestyles. This findings coupled with the fact that the greater part of the respondents can be categorized as overweight (pre-obese) or even fully obese, gives cause for concern, and indicates that these respondents are at risk of developing serious health complications later in life. This is reflected similarly in the findings of Kruger et al. (2002), who found high obesity levels among African women.

Factor structure and ranking of constraints

Factor one**, personal constraints** comprised seven variables and accounted for 31 percent of the variance explained. Respondents cited bad weather, family

obligations, shyness, health reasons and discomfort as barriers to physical activity participation. However, "bad weather" and "physical activity is boring" was ranked 17th and 23rd, respectively as constraints. A number of studies have revealed that extroverted students were more likely to choose social activities and enjoy these activities more than introverts who preferred solitary activities (Kircaldy, 1990; Barnett, 2006).

Factor two, **academic obligation** comprised four variables and accounted for 9.4 percent of the variance explained. Students reported that time constraints and the university schedule prohibited them from physical activity participation. Previous studies among university students cited the lack of time due to university studies as a barrier by students in physical activity participation (Daskapan et al., 2006). However, "not enough time" was ranked as the third most important constraint to physical activity and could be one of the main reasons why some of them were not participating in physical activity. Students tend to face difficulties in allocating their time among competing priorities and thus allocate their time among various activities according to the importance they place on specific responsibilities (Nomaguchi & Bianchi, 2004). Buckworth and Nigg (2004:30) commented that: "although college students have specific time constraints related to their academic schedules, they also have considerable discretionary time. It is the choices they make about how to spend this time which influences their level of physical activity and various factors influence these choices". Students generally have more free time compared to those adults who are in the labour market (Drakou et al., 2009).

Factor three, **safety** comprised four variables and accounted for 7.5 percent of the variance explained. Respondents reported that safety and injury concerns were reasons for non- participation in various forms of physical activity. Safety and crime-related issues were ranked 13th by the respondents. This dimension in part encapsulates the structural and interpersonal constraints espoused by Crawford and Godbey (1987). The fear of crime is not new as the study of Scott and Jackson (1996) revealed that people were more likely to be constrained in their park or open spaces use due to the fear of crime. Perceptions of fear and crime have also been found to be an obstacle for physical activity in a study by Amesty (2003).

Factor four, **fatigue and lack of interest** comprised four variables and accounted for 4.98 percent of the variance. Previous research also reported lack of motivation, lack of interest, and fatigue as inhibitors of students' physical activity participation (Allison, Dwyer & Makin, 1999). Research evidence affirms that the lack of social support in the form of motivation is an important determinant of leisure activity and may present a barrier to leisure participation (Orsega-Smith, Payne, Mowen, Ho & Godbey, 2007). Although students reported that they lack the company of others to participate in physical activity,

previous studies affirm that young people prefer other kinds of activities in their free time, despite declaring that they would participate in physical activity if accompanied by a companion (Drakou, et al., 2009). Lack of interest and fatigue were ranked 8th and 11th by students, respectively. Lack of interest and fatigue are more personal constraints than a reflection of environmental influences which students have to deal with (Nizeyimana & Phillips, 2006).

Factor five, **facilities** and lack of company comprised three variables and accounted for 4.6 percent of the variance explained. Lack of equipment, proper gear and the cost thereof were cited as reasons for non-participation in physical activity. Similar to the findings of the present study, Barrows (2003) also reported lack of facilities as a constraint to physical activity participation. Lack of facilities, lack of equipment and lack of company were ranked 1st, 2nd and 6th respectively by students which prohibited them from participation in physical activity. Studies undertaken by Searle and Jackson (1984) within a Canadian setting revealed among others, that money, economic barriers such as equipment cost, admission fees and cost of transport to where they could learn about an activity were some of the key barriers to non-participation in leisure activities. Cost-related constraints were ranked among the most frequent constraints generally in a previous study by Jackson (2005). The findings regarding lack of facilities may reflect the low quality and availability of some of the campus sport and leisure facilities and may be a contributor to non-participation by students.

Factor six, **knowledge and skills** comprised two variables and accounted for 4.3 percent of the variance. Lack of necessary skills and the lack of knowledge were ranked 12th and 16th in terms of barriers. Although not considered as a significant barrier by respondents, a person's motivation to participate in an activity may be reduced when they have low perceived confidence due to the lack of skills or knowledge regarding that activity; so this may only further contribute to the low levels of participation in certain types of physical activities (Wang & Biddle, 2001).

These barriers partially align with the constraints model advocated by Crawford and Godbey (1987) thus supporting the presence of interpersonal, intrapersonal and structural constraints.

Conclusion

This study which examined the constraints to physical activity participation among university students indicate that personal constraints, academic obligation, safety, fatigue and lack of interest, facilities and lack of company and skills and knowledge in physical activity are key reasons for students' non-participation in physical activity. The acceptable reliabilities for the six dimensions indicate that the identified factors do in essence capture the barriers

to physical activity participation among university students. Identifying constraints to physical activity participation among university students remains an important goal in planning university physical activities and sport programmes (Nizeyimana & Phillips, 2006). The results of the study provide an understanding of the constraints to participation in physical activity among university students. By providing facilities needed to engage in physical activities and fostering positive attitudes towards healthy lifestyles, the university could enhance the total positive student experience and increase the rate of future physical activity participation among students.

Recommendations

The findings of this research provide information that may be of value to university policy makers involved in planning physical activities for students within the campus. Lack of motivation, the perception that exercise is boring, and exercise is tiring was identified as the dominant constraints in the study. It is, therefore, important for university recreational and physical activity planners to place more emphasis on individual behavior modifications before tackling environmental factors as constraints to physical activity. The wellness centre of the university is urgently called upon to develop physical activity programmes for university students. In addition, the wellness centre needs to schedule regular workshops or information sessions to sensitise students on the health benefits of physical activity participation.

Whilst the majority of the students perceived themselves to be physically active, 45.2 percent of the sample did not participate in moderate to vigorous physical activities and were classified as sedentary. There is clearly a need for physical activity promotion among students at a university level especially on how to use their free time in a healthy way. This would promote a healthy utilization of leisure.

The issue of bad weather as a barrier to being physically active could be addressed through the provision of standard indoor facilities, as well as facilities in general as lack of equipment and other resources were cited as important constraints. There is an urgent need for the university health promoters to invest in sport equipment for students' benefit. University management should pinpoint students' physical activity needs and preferences and redirect these needs through the provision of proper facilities for students to engage in various forms of wholesome physical activity. The fact that most students reside either at university residences or at a private off-campus residence may lend credence to the notion that their participation in physical activity is restricted due to the limited facilities available on offer by the university, as well as their restricted proximity to any facilities the university could offer, by the virtue of being resident off-campus. The promotion of on campus physical activities should be

encouraged as part of the strategic marketing plan within the framework of the total student experience at the university.
The lack of time was cited as a barrier as it conflicts with students' academic schedule. Students should try to achieve role balance by finding ways to organise multiple tasks and activities in a balanced, non-hierarchical fashion without compromising need for physical activity participation (Marks & MacDermid, 1996).

Limitations and implications for further research

This research was carried out in one university. Socio-cultural and economic profiles of the students who participated in the study may be different from those of students who attend other universities in the country. Due to the case-study approach used and the size of the sample, the results may not be generalized to all South African university students. The result on time spent on exercise and BMI may not be reliable because the study relied on respondents' self-reports. Respondents tend to overestimate the time they spend on certain activities and may inflate estimates of time spent exercising in order to present themselves in a socially desirable light and thus open to potential response bias (Nomaguchi & Bianchi, 2004).

Demographic variables such as gender and cultural differences were not part of the study. Future studies should include these variables in order to ascertain their influences on students' physical activity participation. Further studies are also needed to refine the perceived constraints scale to physical activity participation among university students.

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