STAGES OF CHANGE IN PHYSICAL ACTIVITY, SELF EFFICACY AND DECISIONAL BALANCE AMONG SAUDI UNIVERSITY STUDENTS

Ensaf S.A. Gawwad, DrPH
Community Health Sciences Department, Applied Medical Sciences College, King Saud University, Riyadh, Saudi Arabia

Background: Determining the stages of change in physical activity (PA) helps to determine effective promotion of PA interventions. The aim of the study was to assess the readiness of students of King Saud University (KSU) to be more physically active and relate this to their self-efficacy, perceived benefits and perceived barriers to PA.

Method: A cross-sectional descriptive study was conducted at KSU, Riyadh, between March and May 2007, using a self-administered questionnaire. The total sample size was 302 randomly chosen male and female students.

Results: More than half of the students (55.3%) reported that they participated in PA in the action (for <6 months) and maintenance (for >6 months) stages. The remaining students did not engage in PA as they were in precontemplation, contemplation, preparation and relapse stages. More males were found in the maintenance stage, but more females were found in the inactive stages (precontemplation, contemplation and preparation). Only 24.4% of the students were engaged in PA as much as three times or more/week and 9.9% engaged in PA regularly throughout the year. About 39% of which, significantly, more were males did vigorous PA for 20 minutes or more. However, 4.6% described themselves as hyperactive. More females used the stairs, did house work and considered themselves moderately active. Near ly 50% had a low total score of perceived barriers while 85% had high perceived benefits and 63.6% had moderate self-efficacy of PA. The main barriers perceived were time and resources. The score relating to barriers decreased significantly across stages of change, but the pattern was reversed with regard to the perceived benefits and self-efficacy (p<0.05).

Correspondence to:
Dr. Ensaf S.A. Gawwad, P.O. Box 10219, Riyadh 11433, Saudi Arabia - E-mail: ensafabdel@hotmail.com
Conclusion: Physical inactivity is common among KSU students. A considerable proportion of them was not ready to become more physically active. The study highlights the need to adapt PA promotion programs to states of readiness for PA. University and public policies as well as environmental changes are necessary to encourage active living within the context of Islamic rules and Saudi culture.

Key Words: Stages of Change, Self Efficacy, Benefits and Barriers, Physical Activity, University Students

INTRODUCTION

Sedentary lifestyles are associated with marked increased morbidity and mortality. Regular PA has a beneficial effect on the overall health of all ages and is important for combatting the escalating problems of obesity and type II diabetes among the youth. The evidence linking adequate amounts of PA to numerous physical, psychological and mental health improvements is both overwhelming. Despite the immense health benefits, PA decreases with age and the youth in many Western countries also have little PA. The majority of the Saudi population are not active enough to get any health benefits. Physical inactivity has remained relatively constant and uninfluenced by health promotion efforts over the last decade, therefore, the promotion of PA remains an important public health issue.

However, a lot of progress has been made in the understanding of PA. Many techniques based on theoretical framework have been developed to intervene with PA behavior and the design of programs. Several research studies indicate that PA interventions using the Stages of Change Model (SOC) increase PA behavior among sedentary adults. The SOC Model was originally developed in the late 1970’s and early 1980’s by James Prochaska and Carlo DiClemente when they were studying how smokers gave up their habit. The model has been applied to a broad range of behaviors including weight loss, injury prevention, alcoholism, and drug problems. According to the SOC model, individuals move through a series of stages as they adopt and maintain a new habit. Specifically, the stages include Precontemplation, Contemplation, Preparation, Action, Maintenance and Relapse. For PA, Precontemplators are inactive and not thinking of becoming active. Contemplators are inactive but are thinking about becoming active. Preparers intend to be physically active in the next month or have unsuccessfully taken action in the past year (not at the recommended levels). Individuals in the Action Stage are physically active at the recommended levels but have been active for less than six months. Individuals in the Maintenance Stage are physically active at the recommended levels and have been for six or more months. Given that it often takes many attempts before individuals succeed in adopting and maintaining PA, movement across the stages is thought to be cyclical rather than linear.

Some intermediate concepts – self-efficacy and decisional balance are often used in conjunction with the SOC. Self-efficacy refers to a person's beliefs or confidence in his ability to adopt PA consistently even in difficult circumstances. Bandura maintains that individuals with high confidence in their ability to perform a given task will be more likely to engage in that task. Research indicates that self-efficacy for PA increases as individuals progress through the stages of change and that self-efficacy scores correlate highly with stages of change. Decisional balance measures the individual’s evaluation of the pros (perceived benefits) and cons (perceived barriers) relating to behavior. Results have shown an association between a person’s relative view of the pros and cons and readiness for PA adoption. Health promotion efforts need to identify barriers to PA that specific population groups are faced with and continue to improve and develop interventions that help eliminate these barriers.

Determining the stage of change assesses both intention and perception of behavior and, therefore, may help to improve the effectiveness of intervention when the proposed intervention is tailored to suit the current stage of readiness rather than generic messaging. It is, therefore, quite clear that there is a need to design effective programs for PA promotion for the entire Saudi population. The design of these programs should be based on the study of groups of target population and to understand their characteristics.
and other factors in order to make it acceptable and effective. With the dearth of research on the determinants of PA in the different segments of Saudi population, the aim of this study was to assess the readiness of King Saud University (KSU) students for change towards engaging in more physical activity and relating this to their self-efficacy, perceived benefits and barriers.

SUBJECTS AND METHODS

Study design and setting
A cross-sectional descriptive study was conducted at KSU, Riyadh, from March to May 2007.

Study population
The target population of the study was KSU male and female students. A stratified random technique was used to chose one undergraduate program from both the male and female sections of the five randomly chosen colleges (Administrative Sciences, Pharmacy, Education, Computer Sciences, and Applied Medical Sciences). Approval for the conduct of the study was obtained from the heads of the programs by personal contact. All pre-final students of the chosen programs were included in the study. Out of 511 questionnaires distributed, only 302 were filled completely giving a response rate 59.1%.

Tool of the study
After a thorough literature review, a self-administered structured questionnaire was developed and assessed for face validity by two judges in health education and behavioral sciences. It included data about:
1) Socio-demographic characteristics, history of chronic illnesses, and information on weight and height.
2) Student's PA stages towards change: According to SOC model,23 the students were classified into different categories according to their responses to the questions on behavior. They were asked to select one of six statements describing their PA behavior: a) I am physically inactive, and I don't want to change (Precontemplation); b) I am physically inactive, but I am thinking of becoming more active in the next six months (Contemplation); c) I am physically inactive, but I am thinking of becoming more active in the next month (Preparation); d) I have been physically active for less than six months (Action); e) I have been physically active for more than six months (Maintenance); f) I used to be physically active (Relapse).
3) Physical activity practices: Current students’ activities were explored to find out the type of PA engaged in (walking, jogging, swimming, aerobics), frequency (number of times a week), duration (minutes spent each time), regularity (throughout the year, occasional or during vacations), doing housework, use of stairs, and perceived level of usual day activity (sedentary, moderate, active, hyperactive).
4) Perceived benefits and barriers to PA (Decisional Balance): Perceived benefits was measured in terms of 11 statements, while perceived barriers were sought by means of five categories of 33 statements including: a) Body related barriers: such as worry about her/his looks, concern for body, health, and people to perception of his/her body; b) Convenience related barriers comprising time and weather related factors; c) Social related barriers: such as lack of support from friends and family, social norms, and cultural factors; d) Resource and safety related barriers: including environmental factors, access to health club, cost, and design of the house; e) Skills related barriers: including the most suitable exercise, performance skills, time needed to achieve fitness, and making PA more interesting. The measurements of perceived benefits and barriers were constructed as a 4-point Likert scale which scored from 1 to 4 for each statement with higher scores for higher levels of benefit and barriers.
5) PA self-efficacy beliefs: This scale was adapted from a published self-efficacy scale.”24 It included 14 common/difficult situations (e.g. negative emotion, lack of social support or resources, physical discomfort, Ramadan) to assess students’ confidence in their ability to participate in PA in such difficult situations (e.g., I think I can be free for ½ h. daily to do PA). Each item was rated on a 4-point Likert scale ranging from 1 (not at all confident) to 4 (very confident).

Statistical analysis
Data was processed and analyzed by SPSS, version 15. AVOVA test and Chi-squared test were used as tests of significance. P value used as a level of significance was <0.05.

RESULTS
The age range of the sample was 20-26 years with a mean of 21.38 ± 1.84 years. Percentages of
Table 1: Physical activity stages of change among King Saud University students

| PA stages of change      | Males (150) No. (%) | Females (152) No. (%) | Total No. (%) | p-value (X² test) |
|--------------------------|---------------------|-----------------------|---------------|------------------|
| Precontemplation         | 8 (5.3)             | 15 (9.9)              | 22 (7.3)      | 0.007            |
| Contemplation            | 12 (8.0)            | 23 (15.1)             | 35 (11.6)     |                  |
| Preparation              | 4 (2.7)             | 10 (6.6)              | 14 (4.6)      |                  |
| Action                   | 63 (42.0)           | 68 (44.7)             | 131 (43.4)    |                  |
| Maintenance              | 24 (16.0)           | 12 (7.8)              | 36 (11.9)     |                  |
| Relapse                  | 39 (26.0)           | 24 (15.9)             | 64 (21.2)     |                  |
| Total                    | 150 (100)           | 152 (100)             | 302 (100)     |                  |

Table 2: Physical activity practices among King Saud University students

| Variables                                      | Total (302) No. (%) | Males (%) | Females (%) | p-value (X² test) |
|------------------------------------------------|---------------------|-----------|-------------|------------------|
| In normal week, how many times do you exercise? |                     |           |             |                  |
| I don't exercise                               | 114 (37.7)          | 36.7      | 38.8        | 0.329            |
| 1-2 times                                       | 114 (37.7)          | 35.3      | 40.1        |                  |
| 3-4 times                                       | 50 (16.5)           | 17.3      | 15.8        |                  |
| Everyday                                        | 24 (7.9)            | 10.7      | 5.3         |                  |
| How much time do you spend when you exercise?  |                     |           |             | 0.000            |
| 0-5 minutes                                     | 85 (28.1)           | 25.3      | 30.9        |                  |
| 5 minutes                                       | 39 (12.9)           | 7.3       | 18.4        |                  |
| 10 minutes                                      | 28 (9.2)            | 4.7       | 13.8        |                  |
| 15 minutes                                      | 32 (10.5)           | 8.0       | 13.2        |                  |
| 20 minutes or more                              | 118 (39.0)          | 54.7      | 23.7        |                  |
| Regularity of physical exercise?               |                     |           |             | 0.462            |
| I don't do PA                                   | 63 (20.8)           | 22.0      | 21.7        |                  |
| Irregular                                       | 178 (58.9)          | 57.3      | 60.5        |                  |
| On vacation                                     | 28 (9.2)            | 10.0      | 8.6         |                  |
| Regular all the year                            | 30 (9.9)            | 10.7      | 9.2         |                  |
| How many times did you use the stairs today?   |                     |           |             | 0.002            |
| I didn't                                        | 18 (5.9)            | 8.7       | 3.3         |                  |
| 1-2 times                                       | 84 (27.8)           | 35.3      | 20.4        |                  |
| 3-4 times                                       | 61 (20.1)           | 18.0      | 22.4        |                  |
| More than 4 times                               | 139 (46.0)          | 38.0      | 53.9        |                  |
| Who does the work at home?                     |                     |           |             | 0.000            |
| Housekeeper                                     | 106 (35.0)          | 52.7      | 17.8        |                  |
| Both                                            | 84 (27.8)           | 14.3      | 41.1        |                  |
| You                                             | 112 (37.0)          | 33.0      | 41.1        |                  |
| Perceived usual day activity:                  |                     |           |             | 0.004            |
| Sedentary                                       | 51 (16.8)           | 22.7      | 11.2        |                  |
| Minimally active                                | 99 (32.7)           | 36.7      | 28.9        |                  |
| Moderately active                               | 138 (45.6)          | 36.0      | 55.3        |                  |
| Hyperactive                                     | 14 (4.6)            | 4.6       | 4.6         |                  |

Table 3: Levels of University students' total scores of perceived barriers, perceived benefits and self efficacy of physical activities

| Variables                                      | Low No. (%) | Moderate (%) | High (%) | Males vs. Females p-value (X² test) |
|------------------------------------------------|-------------|--------------|----------|-----------------------------------|
| Perceived barriers**                          |             |              |          |                                   |
| Body related                                   | 264 (87.4)  | 24 (7.9)     | 5 (1.7)  | 0.054                             |
| Time related                                   | 74 (24.5)   | 138 (46.4)   | 88 (29.1)| 0.537                             |
| Weather related                               | 117 (38.7)  | 109 (36.1)   | 75 (24.8)| 0.728                             |
| Socially related                              | 205 (67.9)  | 85 (28.1)    | 11 (3.6) | 0.285                             |
| Resources related                             | 138 (45.7)  | 96 (31.8)    | 66 (21.9)| 0.286                             |
| Skills related                                | 116 (38.4)  | 89 (29.5)    | 96 (31.8)| 0.225                             |
| Total barriers score                         | 152 (50.3)  | 90 (29.8)    | 60 (19.9)| 0.273                             |
| Perceived benefits**                         | 0           | 42 (13.9)    | 257 (85.1)| 0.709                             |
| Self-efficacy**                               | 54 (17.9)   | 192 (63.6)   | 51 (16.9)| 0.476                             |

**X² was performed to test the significance of the differences between male and female students for different levels of perceived barriers, perceived benefits and self efficacy.

The range of the total items score was classified equally into three levels; high, moderate and low.
males (49.7%) and females (50.3%) participating in the study were nearly equal. A large majority of participants were single (92.4%). Those whose fathers had university education constituted 43.7% and only 17.5% had mothers who had university education. More than half of the sample (55%) considered themselves as hyperactive, while 45.6% expressed low perceived body-related and socially-related barriers. Also about half of the sample perceived low level of resource-related and moderate level of time-related barriers.

Table 1 shows that a considerable percentage of the students (55.3%) participated in PA (categorized either in the action or maintenance stage), and less than half of the sample did not engage in PA as they were in precontemplation, contemplation, preparation and relapse stages. Gender differences were evident as more males than females were found at the maintenance stage, while more females were found at the inactive stages (precontemplation, contemplation and preparation). These differences were statistically significant (p=0.007).

Looking at the level of PA recommended for cardiovascular physical fitness, Table 2 shows that only 24.4% of the sample practised PA three times or more per week with a higher proportion (39%) engaging in vigorous activity for 20 minutes or more. However, only 9.9% reported that they engaged in PA regularly throughout the year. About 46% mentioned that they used the stairs four times or more a day and 37% did housework by themselves. Only 4.6% labelled themselves as hyperactive, while 45.6% considered themselves as moderately active. Statistical differences were found between males and females, as more males than females were engaged for 20 minutes or more each time exercising. More females used the stairs and did chores at home. Also more females considered themselves moderately active.

With regard to types of PA, 151 female students out of 152 responded to this open-ended question as compared to 49 out of 150 male students. The most frequent PA reported by the females was walking (45.4%). Other activities reported included jogging (9.2%), swimming (4.6%), aerobics (8.6%) and others (8.6%). In comparison, the main PA reported by males was walking (12%), followed by weight bearing/gymnasium (9.1%), football (8%), swimming (8%), jogging (6.7%), aerobics (4%), and others (27.7%).

Table 3 indicates that 50.3% had a low total perceived barriers score, 29.8% and 19.9% had moderate and high levels. Most of the students expressed low perceived body-related and socially-related barriers. Also about half of the students perceived low level of resource-related barriers and moderate level of time-related barriers. Approximately one third of the students

| Variables                      | Precont. Mean (SD) | Contem. Mean (SD) | Prep. Mean (SD) | Action Mean (SD) | Maint. Mean (SD) | Relapse Mean (SD) | F value | p-value |
|-------------------------------|--------------------|-------------------|----------------|-----------------|-----------------|------------------|---------|---------|
| Body related barriers (TS 10-40) | 18.73 (8.51)       | 15.72 (4.82)      | 12.69 (1.97)   | 14.89 (3.97)    | 12.00 (2.40)    | 13.37 (2.74)     | 9.281   |        |
| Weather related barriers (TS 3-12) | 7.18 (4.51)        | 7.35 (2.72)       | 5.57 (2.38)    | 6.81 (4.23)     | 5.03 (2.43)     | 6.65 (2.78)      |        |        |
| Social related barriers (TS 4-32) | 15.45 (6.30)       | 14.54 (4.53)      | 13.86 (3.90)   | 14.32 (4.75)    | 10.67 (3.59)    | 14.08 (3.89)     | 4.565   |        |
| Time related barriers (TS 5-20) | 16.18 (3.21)       | 12.03 (3.29)      | 12.7 (2.78)    | 12.85 (3.54)    | 7.94 (2.15)     | 12.52 (3.59)     | 18.705  |        |
| Resources related barriers (TS 6-24) | 11.57 (5.15)      | 14.00 (5.01)      | 13.21 (6.27)   | 13.25 (4.81)    | 10.19 (4.41)    | 12.71 (5.25)     |        |        |
| Skills related barriers (TS 3-12) | 7.77 (3.32)        | 8.06 (2.87)       | 6.71 (2.64)    | 7.54 (2.89)     | 4.31 (2.17)     | 5.54 (2.37)      | 12.643  |        |
| Perceived benefits (TS 11-44) | 34.59 (5.72)       | 38.09 (4.62)      | 37.57 (4.48)   | 37.70 (4.42)    | 40.26 (3.63)    | 37.48 (4.33)     | 4.496   |        |
| Self efficacy (TS 13-52)       | 29.55 (7.64)       | 33.96 (8.03)      | 36.46 (7.59)   | 31.74 (6.09)    | 43.17 (6.40)    | 34.38 (7.07)     |        |        |

TS = total score, contem. = contemplation, precont. = precontemplation, maint. = maintenance, prep. = preparation
expressed low, moderate or high levels of skill-related barriers. There was no significant difference between males and females regarding all categories of perceived barriers. The majority (85.1%) had high perceived benefits of PA while 63.6% had a moderate level of self-efficacy.

Table 4 indicates that the mean total barrier score for the different categories was more or less higher in precontemplation and contemplation stages than the preparation stage which slightly rose in the consequent action stage, then decreased markedly in the next stage (maintenance) again increasing in the relapse stage. The reverse pattern was found in the total score of perceived benefits and self-efficacy beliefs where scores among precontemplators was the least and the highest among those in maintenance stage, somewhat declining in the relapse stage. These differences were statistically significant (p<0.05) in total barrier score for all categories, total perceived benefits and self-efficacy among students groups in different stages of change.

DISCUSSION

Previous PA assessment conducted in Saudi Arabia indicated that physical inactivity is becoming more prevalent in the Saudi population.25 Our results are in agreement with these findings. The main finding was that not many university students were sufficiently active, as only 9.9% of them regularly engaged in PA throughout the year, 24.4% engaged in PA three times per week or more, 39% did for 20 minutes or more each time, walking being the most reported activity (28.8%). Different surveys conducted in Saudi Arabia got similar results with some variations in the percentages as a result of the different instruments used to assess PA. Al-Hazzaa (2004) estimated that the prevalence of inactivity in Saudi Arabia ranged from 43.3% to as high as 99%.10 Al-Hazzaa (2007) reported that the prevalence of inactivity among both sexes averaged 40.6%, while the proportion of people meeting "health-enhancing" physical activity levels was only 25.1%.25

Based on that estimage, only 4.6% of the students in the present study considered themselves hyperactive, 45.6% as moderately active, 32.7% as minimally active and 16.8% had a sedentary lifestyle. Al-Hazzaa (2007) reported that nearly half of the Saudi population was moderately active, since they engaged in moderate PA such as walking for at least 30 minutes or more per time, five or more days per week.25

**Frequency of physical activity according to gender**

Most previous studies have shown that men are more active than women.26,27 Statistical differences were found between males and females in the present study, as more males engaged in vigorous activity for 20 minutes or more, while more females engaged in moderate activity such as using the stairs, and doing housework. More females perceived themselves as moderately active while more males saw themselves as minimally active or inactive. This is supported by the responses to the open-ended questions about type of exercise the respondents did. The top activity reported by both females and males was walking, 45.7% of the females and 12% of the males respectively. Al-Hazzaa found that when moderate exercise such as walking and vigorous physical activities were combined, Saudi females were found to be more active than males.25 However, the findings of the present study indicate that a greater variety of physical activity is engaged in by the males than females. These include weight bearing exercises, workout in the gymnasium, basketball, archery, volleyball, cycling, and buggy riding. The participation of the females in higher moderate activity was unexpected because of the restrictive cultural norms for Saudi females. This difference can be attributed to cultural difference of the gender roles in Saudi community where males usually drive, are involved in recreational activities other than exercising and don’t do any housework. Another possible explanation is that the females might have over-reported their PA. Another recent study in Belgium found some over-reporting of moderate physical activity among females.28

**Stages of change of PA adoption**

Prochaska’s10 model has been successfully applied to the study of behavioral change towards exercise.17,29 Individuals go through a series of six stages in order to successfully change behavior. The positive finding in the present study is that about half of the students were in the action and maintenance stages. These groups require interventions based on giving assistance with feedback, problem solving, social support, and reinforcement. Those in the earlier stages of change need different types of intervention to help them progress to the next stage. Specifically, for
the precontemplators (7.3%), increasing awareness of the need for exercise, personalizing information on risks and benefits can help them. For the contemplators (11.6%), motivation and encouragement are very important. The preparers (4.6%) need assistance in developing concrete action plans and setting gradual goals. The SOC model suggests that behavioral change toward exercising is not an all or nothing phenomenon and that those individuals who stop performing a particular act tend to start again. The present findings showed that 21.2% of the students were in the relapse stage. Intervention here should reassure those who have relapsed that slips were normal learning experiences. Discouragement should be avoided but confidence rekindled successful strategies and barriers should be identified, and incentives provided.30

Perceived benefits, perceived barriers and self efficacy of PA
Perceived benefits and barriers are two cognitive variables which account for PA levels.31 Many studies have evaluated perceived benefits and barriers to PA among young people.32-34 In the current study, most of the students had low level of perceived body- and socially-related barriers. However, a considerable proportion had moderate to high levels of perceived barriers with regard to time, weather, resources and skill. This finding is in agreement with previous research results that found that the most commonly reported barriers faced by adults when trying to increase PA levels were the lack of time, access to convenient facilities, and safe environments.35 In addition, Iranian girls whose culture is similar to that of Saudi girls also face many barriers, including the lack of resources, cultural limitations, and the low value they place on exercising as compared to activities such as housework.36 The results of many studies have been promising in changing behaviour towards PA when changes are made in the school environment to facilitate PA.37 The positive finding in the present study is the increased recognition of the benefits of PA. The great majority (85.1%) of the students perceived that PA would help them improve their mental capability, self-concepts, reduce stress, make them feel healthier, and increase their energy levels. It was illustrated that before individuals would change a behavior, their perceived benefits must outweigh the perceived barriers to that behavior.33

Identifying stages of change, Self-efficacy, Decisional balance of PA
The present findings indicate that there is stage specificity for perceived benefits (pros) and barriers (cons) to PA. The total mean scores of perceived benefits were positively related to the middle and higher stages of change (from contemplation to maintenance). However, mean scores for perceived barriers (body-, socially-, skill-, resources-, time-, and weather-related) were negatively associated with higher stages of change for PA. Similar results were reported in other research.38,39 These results indicate that it is best to increase the perceived benefits of exercise in the earlier stages of change, while decreasing the perceived barriers of exercise. Precontemplators and contemplators would benefit the most from education on the advantages of intervention with PA designed for those who have never exercised. Emphasizing the short term benefits (e.g. feeling better, gaining more energy, sleeping better, and stress relieving) rather than long term benefits may encourage these young people to become physically active.

Bandura’s31 self efficacy theory, states that as the stage of change advances, confidence levels in the ability to engage in behavior during specific situations also increases. In line with this, the self efficacy scores of the students in the present study varied at each SOC of adoption of PA and significantly differentiated subjects at most stages of change of adoption of PA. Students identified in the earliest stages of PA change (precontemplation and contemplation) had low confidence in their ability to engage in PA when they were faced with certain constraints including the lack of support, vacation, or even Ramadan. Self-efficacy scores increased among preparers but decreased among those in the action stage. This drop could be explained by the barriers encountered at the beginning of PA adoption. Again, the students identified in the maintenance stage, expressed the highest levels of self-efficacy in specific situations. Fortunately, students in the relapse stage still had higher scores than those in the action and contemplation stages. This indicates that motivating such individuals to move to the next stage of change requires less effort than other groups.

Finally, the present study is subject to the following limitations. The first is that our sample was taken from students in the pre-final level, and thus was not representative of KSU University students. However, the results provide idea on the
approach to be used in the promotion of PA in this group. Second, as in any self-reported questionnaire, there could have been a recall as well as social desirability bias on the part of the respondents. However, self-report PA questionnaires remain the method of choice for this type of assessment, since it is inexpensive, requires little time, and is less likely to influence behavior. Finally, although the tools used in the present study to measure stages of change, self efficacy, decisional balance and physical activity were assessed for their face validity, this as well as internal consistency and suitability to the Saudi community have to properly tested.

CONCLUSION AND RECOMMENDATION

The current study has demonstrated that the prevalence of physical inactivity among KSU students is relatively high, but a high proportion of them were not ready to be more physically active. Therefore, there is a need to design different strategies suited to the stages of PA adoption and supported by university and public policies and environmental changes, to encourage active living and discourage sedentary habits, taking into account the Islamic rules and Saudi cultural context. Further studies are recommended to replicate this study with more representative sample to address the issue of physical inactivity among Saudi youth.

ACKNOWLEDGMENT

We appreciate the tremendous support given by the Health Educator, Zahra Bessari in data collection.

REFERENCES

1. Pate RR, Pratt M, Bair SN, Haskell WL, Macera CA, Bouchard C, Buchner D, et al. Physical activity and public health: a recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. JAMA 1995; 273:402-7.
2. Strong WB, Malina RM, Blimkie CJ, Daniels SR, Dishman RK, Gutin B, Hergenroeder AC, et al: Evidence based physical activity for school-age youth. J Pediatr 2005, 146:732-7.
3. Kujala UM, Kaprio J, Sara S, Koakenvuo M. Relationships of leisure-time physical activity and mortality: the Finnish twin cohort. JAMA 1996; 276:340-4.
4. Healthy People 2010. Healthy people 2010-Conference. Edition 22 physical activity and fitness. Available at: http://www.health.gov/healthypeople/Document/HTML/Volume2/22Physical.htm.
5. Kaufman FR: Type 2 diabetes in children and youth. Rev Endocr Metab Disord 2003, 4(1): 33-42.
6. Blair SN, Powel KE, Bazzarre TL, Early JL, Epstein LH, Lawrence GW, Harris SS, et al. Physical inactivity. Workshop V. AHA Prevention Conference III. Behavior change and compliance: keys to improving cardiovascular health. Circulation 1993; 88:1402-5.
7. Jago R, Baranowski T. Non-curricular approaches for increasing physical activity in youth: A review. Prev Med 2004, 39:157-63.
8. Sallis JF. Age-related decline in physical activity: a synthesis of human and animal studies. Med Sci Sports Exerc 2000, 32:1598-603.
9. Al-Refaee S, Al-Hazzaa H. Physical activity profile of adult males in Riyadh city. Saudi Medical Journal 2001; 22: 784-9.
10. Al-Hazzaa H. Prevalence of physical inactivity in Saudi Arabia: a brief review, East Mediterranean Health Journal 2004; 10: 663–70.
11. WHO. Physical activity prevalence. Available from: www.who.int/infobase/reportviewer.aspx?
12. Hp2000 U.S. Department of Health and Human Services. Healthy People 2000- National Health Promotion and Disease Prevention Objectives. Washington DC: U.S. Government Printing Office, 1990; DEHS publication NO. (PHS) 91-50212.
13. Marcus BH, Bock BC, Pinto BM, Forsyth LH, Roberts LH, Traficante RM. Efficacy of an individualized motivationally tailored physical activity intervention. Ann Beh Med 1998;20:174-180.
14. Marcus BH, Owen N. Motivational readiness, self-efficacy and decision-making for exercise. J Appl Soc Psychol 1992; 22: 3-16.
15. Prochaska JO, DiClemente CC, Norcross J. In search of how people change. American Psychologist 1992, 47, 1102-14.
16. Prochaska JO, DiClemente CC. Stages and processes of self-change of smoking: toward an integrative model of change. J Consulting Clinical Psychol 1983;51:390-5.
17. Sparling PB, Owen N, Lambert EV, Haskell WL. Promoting physical activity: the new imperative for public health. Health Education Research 2000; 15 (3):367-76.
18. Marcus BH, Rakowski W, Rossi JS. Assessing motivational readiness and decision making for exercise. Health Psychol. 1992; 11: 257-61.
19. Marcus BH, Simkin LR. The stages of exercise behavior. J Sports Med Phys Fitness 1993; 33: 83-8.
20. Marcus BH, Selby VC, Niaura RS, Rossi JS. Self-efficacy and the stages of exercise behavior change. RJES 1992; 63: 60-6.
21. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. Psychol Rev 1977; 84:191-215.
22. Herrick AB, Stone WJ, Mettler MM. Stages of change, decisional balance, and self efficacy across four health behaviors in a worksite environment. Am J Health Promot 1997;12:49-56.
23. Prochaska JO, Redding CA, Evers KA. The transtheoretical model and stage of change. In: Glanz E, Rimer BK, Lewis FM (eds.). Health behavior and health education: Theory, research, and practice. 3rd ed. San Francisco, CA: Jossey –Bass 2002;99-120.
24. Plotnikoff RC, Hotz SB, Birkett NJ, Courneya KS: Exercise and the Transtheoretical Model: A Longitudinal Test of a Population Sample. Preventive Medicine 2001; 33:441-52.
25. Al-Hazzaa HM. Health-enhancing physical activity among Saudi adults using the International Physical Activity Questionnaire (IPAQ). Public Health Nutrition 2007; 10(1): 59–64.
26. Centers for Disease Control and Prevention. Prevalence of no leisure-time physical activity– 35 states and district of Columbia, 1988–2002. Morbidity & Mortality Weekly Report 2004; 53: 82–6.
27. Hallal P, Vector C, Wells J, Lima R. Physical inactivity: prevalence and associated variables in Brazilian adults. Medicine and Science in Sports and Exercise 2003; 35: 1894–900.
28. Rzewnicki R, Aweele Y, DeBourdeaudhuij I. Addressing overreporting on the International Physical Activity Questionnaire (IPAQ) telephone survey with a population sample. Public Health Nutrition 2003; 6: 299–305.
29. Marcus BH, Forsyth LH, Stone EJ, Dubbert PM, McKenzie TL, Dunn AL, Blair SN. Physical activity behavior change:
issues in adoption and maintenance. Health Psychol 2000; 19: 32-41.

30. Marcus BH, Lewis BA. Physical activity and the stages of motivational readiness for change model. Research Digest 2003; 4(1):1-8.

31. Buckworth J, Dishman RK. Determinants of physical activity: research to application. In: Rippe J, Malden MA eds. Lifestyle medicine. Williston Blackwell Science 1999; 1016-27.

32. Kenneth RA, Dwyer JM, Goldenberg E, Fein A, Yoshida KK, Boutilier M. Male adolescents' reasons for participating in physical activity, barriers to participation and suggestions for increasing participation. Adolescence 2005; 40:155-70.

33. Gyurcsik NC, Bray SR, Brittain DR. Coping with barriers to vigorous physical activity during transition to university. Family & Community Health 2004; 27(2): 130-42.

34. Healthy People 2010. Healthy people 2010- Conference Edition—22 physical activity and fitness. Available at: http://web.health.gov/healthypeople/Document/HTML/Volume2/22Physical.htm.

35. Haerens L, DE Bourdeaudhuij I, Maes L. School-Based Randomized Controlled Trial of a Physical Activity Intervention among Adolescents. J Adolesc Health 2007; 40: 258-65.

36. Taymoori P, Berry TR, Niknami S, Lubans D, Ghofranipour F. A school-based randomized controlled trial to improve physical activity among Iranian high school girls. International Journal of Behavioral Nutrition and Physical Activity 2008; 5:18

37. Ward DS, Saunders R, Felton G.M. Implementation of a school environment intervention physical activity in high school girls. Health Educ Res 2006; 21(6): 896-910.

38. Kimm SY, Glynn NW, Memahon P, Voorhees CC, Striegel-Moore RH, Daniels SR. Self-Perceived barriers to activity participation among sedentary adolescent girls. Medicine Science & Sports Exercise 2006; 38: 534-40.

39. Brown SA. Measuring perceived benefits and perceived barriers for physical activity. American Journal of Health Behavior 2005;29(2):107-16.