Annals of Agricultural and Environmental Medicine 2015, Vol 22, No 2, 344–348
www.aaem.pl

ORIGINAL ARTICLE

Gender differences in leisure-time versus non-leisure-time physical activity among Saudi adolescents

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Al-Sobayel H, Al-Hazzaa HM, Abahussain NA, Qahwaji DM, Musaiger AO. Gender differences in leisure-time versus non-leisure-time physical activity among Saudi adolescents. Ann Agric Environ Med. 2015; 22(2): 344–348. doi: 10.5604/12321966.1152091

Abstract

Objectives. The aim of the study was to examine the gender differences and predictors of leisure versus non-leisure time physical activities among Saudi adolescents aged 14–19 years.

Materials and method. The multistage stratified cluster random sampling technique was used. A sample of 1,388 males and 1,500 females enrolled in secondary schools in three major cities in Saudi Arabia was included. Anthropometric measurements were performed and Body Mass Index was calculated. Physical activity, sedentary behaviours and dietary habits were measured using a self-reported validated questionnaire.

Results. The total time spent in leisure and non-leisure physical activity per week was 90 and 77 minutes, respectively. The males spent more time per week in leisure-time physical activities than females. Females in private schools spent more time during the week in leisure-time physical activities, compared to females in Stateschools. There was a significant difference between genders by obesity status interaction in leisure-time physical activity. Gender, and other factors, predicted total duration spent in leisure-time and non-leisure-time physical activity.

Conclusions. The study showed that female adolescents are much less active than males, especially in leisure-time physical activities. Programmes to promote physical activity among adolescents are urgently needed, with consideration of gender differences.

Key words

physical activity, leisure time, gender, adolescents

INTRODUCTION

Physical activity is an important contributor to the prevention of overweight and obesity in childhood and adolescence [1]. Physical activity guidelines recommend that adolescents should engage in 60 minutes of moderate to vigorous-intensity daily physical activity [2].

To accurately estimate the level of physical activity, all types of activities should be considered, including leisure time and non-leisure time physical activity [3]. Focusing on only one type of activity may underestimate the level of physical activity within a population. This may explain the differences documented among different groups of adolescents. Measuring non-leisure time activity is not only important for an accurate estimation of the total physical activity, but also for its importance for general health. Using the first National Health and Nutrition Examination Survey and its Epidemiologic Follow-up Study, Arrieta and Russell were able to show an association between non-leisure physical activity and a substantial reduction in all-cause mortality [4]. Contrary to the cardiorespiratory and other health benefits that are attributed to moderate and vigorous physical activity, maintaining a healthy body weight and avoiding excess body fat is a function of the total energy expenditure [5], including non-leisure-time activities which are considered to be low-to-moderate intensity physical activities, such as household chores, transportation, and everyday activities that most people carry out most of the time.

By looking into the total activity level among adolescents, previous research has shown that girls, especially in late childhood and adolescence, have a lower total activity level when compared with boys [6]. Adolescent girls were reported to participate in organized sports at a lower rate than boys [7]. This gender difference was found to be greatest in the strenuous forms of sports and physical activities [8]. However, research into gender differences relative to the leisure time versus non-leisure time in adolescents is scarce, especially in developing countries that are experiencing rapid lifestyle transitions. Therefore, the presented study examines the gender differences and predictors of leisure versus non-leisure time physical activities among Saudi adolescents, using representative samples aged 14–19 years who were drawn from three major cities in Saudi Arabia.

MATERIALS AND METHOD

The present study is part of the Arab Teens Lifestyle Study (ATLS), a school-based multicentre cross-sectional study; detailed descriptions of the ATLS study are to be found in the

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Received: 19 October 2013; accepted: 19 March 2014

literature [9]. The research sample was drawn from adolescent males and females enrolled in secondary schools in three major cities in Saudi Arabia: Riyadh, Jeddah, and Al-Khobar, which are located in the central, western, and eastern parts of Saudi Arabia, respectively. A multistage, stratified, cluster random sampling technique was used to select the sample. At the first stage, a systematic random-sampling procedure was used to select the schools. The schools were stratified into boys' and girls' secondary schools, with further stratification into State and private schools. The selection of the private and State schools was proportional to the population size. Four schools (two each from the boys' and girls' schools) were selected from each of the four geographic areas (east, north, south, and west). At the second stage, classes were selected in each grade (level) using a simple random-sampling design. In this way, one class was randomly selected in each of the three grades (grades 10, 11, and 12) in each secondary school. Thus, there was a total selection of at least 24 classes in each city (12 each from the boys' and girls' schools). All students in the selected classes who were free of any physical health problems, were invited to participate in the study. The data were collected during October and November of the school year 2009–2010.

The study protocol and procedures were approved by the Research Centre at the King Saud University, as well as by the General Directorate of School Education in each of the respective cities. In addition, the schools' approval and students' consent for conducting the survey were all obtained. The total sample size included in the presented study consisted of 2,888 adolescents – 1,388 males and 1,500 females, aged between 14 – 19 years.

Anthropometric measurements included body weight, height, and waist circumference (WC), and were performed in the morning by a trained researcher according to written, standardized procedures. Body weight was measured to the nearest 100 g using calibrated portable scales, with minimal clothing and without shoes. Height was measured to the nearest centimeter using a calibrated measuring rod while the subject was in a full standing position, without shoes. Body mass index (BMI) was calculated as the ratio of weight in kilograms by the height squared in meters. The International Obesity Task Force (IOTF) age and gender specific BMI cut-off reference standards were used to identify overweight and obese adolescents between the ages of 14 and 17 years [10]. For participants aged 18 years and over, the adults' cut-off points of 25–29.9 kg/m^2 for overweight and 30 kg/m^2 and higher for obesity were used. WC was measured horizontally to the nearest 0.1 cm using a non-stretchable measuring tape at the level of the umbilicus, and at the end of a gentle exhalation.

Assessment of physical activity. A self-reported questionnaire was used to assess the levels of physical activity of the young participants.The adolescents completed the questionnaire in their classrooms under the supervision of the research assistants and in the presence of their teacher. In order to ensure accurate and consistent measurements throughout this multicentre project, a standardized measurement protocol was employed in all the participating data-collection centres. The questionnaire was previously shown to have a high reliability (ICC=0.85; 95% CI=0.70–0.93) and acceptable validity (r=0.37, $p < 0.001$) [11] against pedometer measurements. The questionnaire used in the ATLS study collected information on the frequency, duration and intensity of a variety of light, moderate and vigorous-intensity physical activities during a typical week. The physical-activity questionnaire covered such domains as transport, household, fitness and individual, and team sports activities. All types of physical activity were classified into either leisure-time or non-leisure-time physical activities. Leisure-time physical activities included jogging, bicycling, swimming, martial art sports, weight training, and sport-related activities such as soccer, basketball, volleyball, handball, and tennis. Non-leisure-time physical activities included walking (including to and from school), stair stepping (at home, at school, at malls, etc.), and all types of household physical activities, such as dishwashing, mopping floors, cooking, ironing, vacuuming, car washing, and gardening. The total time in minutes spent at all leisure and non-leisure physical activity was recorded.

Assessment of sedentary behaviours and dietary habits. Along with the physical activity questionnaire, the participants were asked to provide the average number of daily hours spent on sedentary activities, including time spent watching television (TV), playing video games, computer and Internet use, as well as dietary habits. Dietary habit items included those related to how many times in a typical week the participants consumed breakfast, sugar-sweetened drinks, including soft drinks, vegetables (cooked and uncooked), fruit, milk and dairy products, doughnuts and cake, sweets and chocolate, energy drinks, and fast food. The students had a choice of answers, ranging from zero intake (never) to a maximum intake of seven days per week (every day).

Statistical analysis. Data was checked and entered into a computer using standardized entry codes written on an SPSS (SPSS Inc., Chicago, IL) data file. The data was also checked for outliers and incorrect entries. To avoid over-reporting, the physical activity scores were cleaned and truncated at reasonable and realistic levels. Data was then analyzed using the SPSS, version 15. The descriptive statistics were presented as means, standard deviations (or standard error) and proportions. Because the physical activity data was not normally distributed, non-parametric tests were used to analyze the physical activity data, or the data was log-transformed before performing parametric statistical analyses. Differences in anthropometric measurements between males and females were tested using an independent-sample t-test. The Mann-Whitney test was used to test the gender differences in leisure and non-leisure physical activities. In addition, multiple regression analyses, with stepwise procedures, were performed to predict the total duration (minutes/week) spent in either leisure or non-leisure physical activities as a function of age, gender, BMI, waist to height ratio (WtHR), television viewing time, computer games/internet use, and intakes of breakfast, milk, fruit, vegetables, and fast food. The level of significance was set at a p value of 0.05, or less.

RESULTS

Table 1 presents the anthropometric characteristics of the participants stratified by gender and type of activity. The females were slightly younger than the males. The males were taller, heavier, and had significantly higher mean BMI values

Table 1. Descriptive characteristics of participants

Variable	Male	Female	*p*-value
No. of subjects	1388	1500	-
Age (years)	16.7 ± 0.03	16.5 ± 0.03	< 0.001
Weight (kg)	69.9 ± 0.55	57.9 ± 0.40	< 0.001
Height (cm)	168.3 ± 0.19	156.6 ± 0.15	< 0.001
BMI (kg/m²)	24.6 ± 0.18	23.6 ± 0.16	< 0.001
Leisure-time physical activity (min/week)	359.5 ± 10.3	101.3 ± 4.5	< 0.001
Non-leisure-time physical activity (min/week)	139.1 ± 4.3	145.0 ± 0.4.9	0.444

Data are means and standard errors. PA = Physical activity. Leisure and non-leisure PA data tested using Mann-Whitney tests. Anthropometric data tested using independent sample t-tests

than the females. The median values of the whole sample in leisure and non-leisure physical activities were 90.0 and 77.0 minutes per week, respectively. The males, however, spent more time per week in leisure-time physical activities than the females. There was no significant difference between males and females in the amount of time they spent in non-leisure-time physical activities.

Table 2 shows the time in minutes spent per week in different types of physical activities relative to gender and type of school, whether State or private. A two-way ANCOVA test, controlling for the effects of age, showed no significant effect of gender or school type on leisure-time physical activity, but significant gender by school type interaction (p=0.003). Females in private schools spent more time during the week in leisure-time physical activities when compared to females in State schools. As for non-leisure-time physical activity, the effects of age, gender, school type, and gender by school type interaction were not significant. Figure 1 presents the total time in minutes spent per week in all physical activity by males and females, relative to age. Two-way analysis of variance resulted in significant effects of age (p=0.011) and gender (p<0.001), but not age by gender interaction (p=0.108).

Table 2. Total time in leisure-time (LTPA) and non-leisure-time (N-LTPA) physical activity in minutes per week among Saudi adolescents relative to gender and school type (N = 2888)

Variable	Male			Female		
	Public	Private	All	Public	Private	All
Leisure-time physical activity	363.7 ± 12.3	347.9 ± 18.1	359.6 ± 10.3	85.5 ± 4.6	141.7 ± 10.6	101.3 ± 4.5
Non-leisure-time physical activity	143.6 ± 5.2	126.6 ± 7.9	139.1 ± 4.35	152.0 ± 6.1	127.2 ± 8.2	145.0 ± 5.0
Total physical activity	507.3 ± 15.0	474.4 ± 22.0	498.7 ± 12.5	237.5 ± 8.3	268.8 ± 15.2	246.3 ± 7.3

Data are means and standard errors.
Two-way ANCOVA tests controlling for the effect of age: $p < 0.001$ for the effect of age, 0.095 for the effect of gender, 0.722 for the effect of school type, and 0.003 for the gender by school type interaction in LTPA and $p < 0.727$ for the effect of age, 0.438 for the effect of gender, 0.115 for the effect of school type, and 0.597 for the gender by school type interaction in N-LTPA

The total time in minutes spent per week in leisure-time and non-leisure-time physical activities relative to gender and obesity status are shown in Table 3. There is a significant (p<0.05) gender difference by obesity status interaction in leisure-time physical activity. Males who are obese spent less time in leisure-time physical activity per week than non-obese males, whereas obese females spent more time than non-obese females per week in leisure-time physical activity.

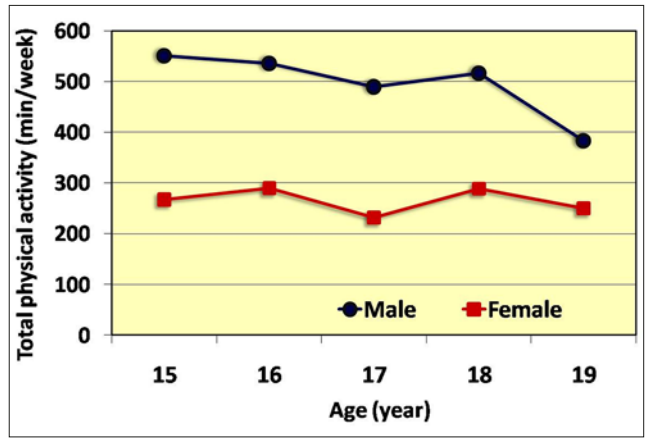

Figure 1. Total physical activity duration (minutes/week) spent by Saudi males and females relative to age. Two-way ANOVA results: *p* values for age = 0.011, gender = 0.000 and age by gender interaction = 0.108

Table 3. Total time in leisure-time (LTPA) and non-leisure-time (N-LTPA) physical activity in minutes per week among Saudi adolescents relative to gender and obesity status

Obesity Status	Gender	N (2881)	Leisure-time physical activity	Non-leisure-time physical activity
Obese	Male	602	330.5 ± 14.7	139.2 ± 6.5
	Female	521	104.6 ± 7.9	152.7 ± 8.1
	All	1123	225.7 ± 9.3	145.5 ± 5.1
Non-obese	Male	782	382.2 ± 14.3	139.3 ± 5.9
	Female	976	99.8 ± 5.5	141.2 ± 6.2
	All	1758	225.4 ± 7.8	140.4 ± 4.4

Data are means and standard errors.
Two-way ANCOVA tests controlling for the effect of age: $p = 0.001$ for the effect of age, 0.070 for the effect of gender, 0.560 for the effect of obesity status, and 0.010 for gender by obesity status interaction in LTPA and $p = 0.585$ for the effect of age, 0.392 for the effect of gender, 0.503 for the effect of obesity status, and 0.396 for the gender by obesity status interaction in N-LTPA

Table 4. Results of multiple regression analyses for prediction of leisure-time and non-leisure-time physical activity in minutes per week among Saudi adolescents

Dependent variable	Predictor variables	Standardized Coefficient (Beta)	p-value	R	R2
Leisure-time physical activity	Gender	- 0.370	< 0.001	0.461	0.212
	Fruit intake	0.167	< 0.001		
	Fast foods intake	0.080	< 0.001		
	Milk intake	0.071	< 0.001		
	WC	-0.052	0.002		
	Sleeping hours	-0.055	0.001		
	Age	-0.050	0.003		
Non-leisure-time physical activity	Vegetables	0.088	< 0.001	0.203	0.041
	Milk intake	0.083	< 0.001		
	Computer use	- 0.079	< 0.001		
	Gender	0.060	0.002		
	Fruit intake	0.061	0.006		
	Sleeping hours	- 0.037	0.049		

WC – waist circumference

There was no significant effect of age, gender, obesity status, and gender by obesity status interaction on non-leisure-time physical activity.

The results of the multiple regression analyses for the prediction of the total duration of leisure-time and non-leisure-time physical activity are shown in Table 4. For predicting the total duration spent in leisure-time physical activity, the significant independent predictors were gender, intake of fruit, fast food, and milk, waist circumference, sleeping hours, and age (R=0.461, R^2=0.212). For non-leisure-time physical activity, the significant independent predictors were the intake of vegetables, milk and fruit, computer use, gender, and sleeping hours (R=0.203, R^2=0.041).

DISCUSSION

The presented study reports on the gender differences in the prevalence of leisure and non-leisure time physical activities among Saudi adolescents aged 14–19 years from three major cities in Saudi Arabia. Judging from the total time spent in leisure and non-leisure physical activity, female adolescents showed much lower mean levels of activity when compared with males. These findings corroborated earlier research indicating a low overall level of physical activity among adult Saudi females [12]. The findings of the presented study are in agreement with those of previous studies on adult and adolescent populations from both developed and developing countries, which showed that males were more active than females in leisure-time physical activities [6, 7, 8]. However, when non-leisure time physical activities (household, transportation, occupational) were considered, no gender differences were observed [13]. Such findings were also observed in the current research and this can possibly be explained by the higher level of household physical activities among females in many developing countries.

It is noteworthy that the physical activity levels of Arab females, irrespective of the region, have generally been reported to be much lower than those of males [e. g. 14]. This could be due to the fact that, for cultural reasons, females generally have limited opportunities when compared with males to engage in physical activity, both inside and outside school. In Saudi Arabia, many variables can influence youth inactivity. A factor that may contribute to reduced non-leisure-time physical activity includes more reliance on cars rather than walking for short-distance travel, including trips to and from school [15]. Elsewhere, research indicated that actively commuting to school can significantly increase children's physical activity levels and boost their energy expenditure [16]. In addition, female schools in Saudi Arabia do not offer physical education classes, except in private schools, who also provide a limited choice of sport activities. In the presented study, females from private schools spent more time in leisure-time physical activities when compared with females attending State schools. This is because some physical education classes are offered in private schools, whereas none are provided in State schools. Considering the nature of the Saudi culture, females may have less opportunities exercising in public. In addition, the absence of a State transport system may reduce the chances for females to gain access to exercise or recreational facilities that may be a long distance away. Also, due to cultural beliefs, some families may not encourage females to take part in physical activity [17].

A recent review examined culturally specific issues for Saudi women, and the implications for secondary prevention of cardiovascular disease stated that there are differences between Saudi women and men in the epidemiology and risk factors associated with smoking, obesity, and physical inactivity (the main risks) [18]. The findings of the current study indicate that within the physical activity domains, non-leisure time physical activity among females accounted for a much higher proportion (58.9%) of the total activity than that in males (27.9%). Research on adult Saudi females showed that this difference persists in adulthood [19]. These findings have important implications when designing physical activity promotional programmes for combating non-communicable disease in this region.

Socio-demographic factors, including gender, have been shown to be related to sedentary behaviour more than to physical activity. For example, Brodersen and colleagues [20] showed that boys and girls differ in their behaviours; in boys, none of the socio-demographic factors were associated with physical activity in the multivariate analyses, whereas sedentary behaviours were positively related to age, non-White ethnicity, and studying in a less affluent school. Analyses of girls showed that sedentary behaviours were greater in non-white students from less affluent schools who lived in more deprived areas [20]. Previous research has also indicated that boys were more likely than girls to have physically active friends [8]. Indeed, in the presented study, boys were more likely to exercise with friends, whereas the majority of girls were exercising alone or with relatives.

Several variables have been identified in this study as significant independent predictors of the total duration of both leisure-time and non-leisure-time physical activities, including gender, and several health behaviours (i.e. fruit, milk and vegetable intake, and sleeping hours). Female gender was significantly negatively associated with time spent in leisure-time physical activity. The total physical activity in children and adolescents has been shown to be positively correlated with healthy dietary habits, such as fruit, vegetable, and milk consumption [e.g. 21]. Several other correlations in relation to physical activity have been identified in other populations. A recent study explored multilevel predictors (individual, family, home, and neighbuorhood environment) of moderate-to-vigorous physical activity (MVPA) among 116 African American adolescents aged 12–16). This study found that a decreased daily MVPA was associated with female gender, while the family social support and adolescent self-efficacy for physical activity were positively associated with daily MVPA [22]. By looking at one mode of non-leisure-time physical activity – transportation, a study has shown that the great majority of adolescents do not use active modes of transportation to work or school, and that the use of active modes of transportation was more common among the non-overweight and the physically active [23]. Other variables were identified as being predictors of adolescent physical activity, including gender, family income, maternal education, birth order, and reported physical activity at four years [24].

In comparison to the results of the presented study, agreement was found in some of the predictors of physical activity, such as gender, dietary habits, and obesity. However, other factors, such as family support, environmental factors, or socio-economic factors, were not assessed in the current study. One may anticipate that in Saudi Arabia similar factors may predict leisure and non-leisure physical activities, in addition to factors that are specific to this population, such

as environmental factors (e.g. hot weather, lack of State transportation, and urban designs that limit walkability), social factors (e.g. family support, restrictions on females), and health beliefs. There is enough evidence that such factors may influence and predict the level of activity [25], which warrants investigation.

Limitations. Although the current study's findings were based on a large and representative sample, the results must be interpreted in consideration of the following limitations. One of the limitations of this study was that the information was based on self-reporting, which is based on recall that may reduce the accuracy of the reported information. However, every effort was made to minimize any possible over- or under-reporting by the participants. In addition, because this was a cross-sectional study, the temporality of the associations between different variables and leisure and non-leisure time physical activities cannot be certain.

CONCLUSIONS

The presented study raises a major State health concern, as female adolescents are much less active than males, especially in leisure-time physical activities. Without increasing their levels of leisure-time physical activity, Saudi females, on average, may not be able to attain the recommended level of physical activity for good health. Programmes intended to promote physical activities among adolescents females should also take into consideration the environmental, cultural, and socio-economic factors.

Acknowledgements
The authors acknowledge the cooperation of many male and female research assistants who kindly helped in the data collection in the participating cities. Special thanks go to Nouf A. Alsulaiman, MSc, for supervising the female data collection in Jeddah. Funding for the research was provided by the Educational Research Centre, Deanship of Research at the King Saud University in Riyadh, Saudi Arabia (Research Group No. RGP-VPP-307).

Competing interests
The authors declare that they have no competing interests.

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