

## Physical Activity Behavior Predictors, Reasons and Barriers among Male Adolescents in Riyadh, Saudi Arabia: Evidence for Obesogenic Environment

Ali S. R. Alsubaie <sup>(1)</sup> and Eltigani O.M. Omer <sup>(2)</sup>

Ph. D. in Public Health, Chairman of Environmental Health Department, College of Public Health and Health Informatics, University of Dammam KSA <sup>(1)</sup>

Ph. D. in Public Health, Environmental Health Department, College of Public Health and Health Informatics, University of Dammam KSA <sup>(2)</sup>

### Abstract

**Objective:** This study aimed to assess physical activity, socio-demographic predictors and to determine reasons for practicing and/or not practicing physical activities.

**Methods:** Cross-sectional study was conducted among male high school students in Riyadh, Saudi Arabia. A self-administered questionnaire was used to collect the data using stratified cluster sampling technique (N= 453 students).

**Results:** Although 36.4% of the student reported that they practiced enough exercise during their usual week days, only 15.5% of the students were found to be practicing physical activity at a recommended level ( $\geq 5$  days/week). On the other hand, 20.1% of the students were found to be inactive and not practicing physical activity at any day. Among the factors that associated with adolescents physical activity, logistic regression showed that students age was associated negatively with physical activity behaviour (OR= 0.6,  $P < 0.001$ ). Also, logistic regression showed that students physical activity behaviour was independently associated with students perceived body weight (OR= 27,  $P < 0.001$ ). The main reasons for practicing physical activity were: *to enhance muscle and strength* (70.9%), *to have fun with friend and entertainment* (66%), and *to improve physical appearance* (53.6%), respectively. The main reported barriers inhibiting adolescents from practicing physical activity were: *lack of sports facilities in the community* (74%), *lack of friends and peer support* (59.4%) and *lack of suitable public sport club in the community* (54.6%).

**Conclusion:** This study revealed low prevalence of physical activity among adolescents. National strategies to increase levels of physical activity and minimize obesogenic environmental factors are required.

**Key words:** Saudi Arabia, Physical activity, Obesogenic environment, Adolescents, School Health, Public Health

### Corresponding Author:

**Dr. Ali S. R. Alsubaie,**  
Ph.D in Public Health,  
Chairman of Environmental Health Department,  
College of Public Health and Health Informatics,  
University of Dammam KSA.  
Mobile number: +966544445693  
E-mail: asralsubaie@uod.edu.sa

## Introduction

Physical activity is an important component of general health and major determinant of individuals' health as well. Physical activity is defined as "any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level".<sup>[1]</sup> Examples of physical activity include running, bicycling, swimming, active games such as football and resistance exercises, etc.

Physical activity is recognized to be an important factor in the primordial and primary prevention of non-communicable diseases such as obesity and cardiovascular diseases (CVD) and many other risk factors. Physical inactivity has been identified as the fourth leading risk factor for global mortality causing an estimated 3.2 million deaths globally.<sup>[2]</sup> The risk of causes of mortality is significantly lower in physically active adults relative to sedentary others.<sup>[3]</sup> Evidence from meta-analysis of 23 cohort studies of physical activity or cardio-respiratory fitness and cardiovascular disease showed that combined coronary heart disease and cardiovascular disease risk decreased linearly with increasing percentiles of physical activity.<sup>[4]</sup> Also, there is evidence that overweight and obese persons who are physically active have a lower early mortality risk than normal weight but sedentary individuals.<sup>[5]</sup> Mild to moderate levels of physical activity are protective for coronary heart disease and there is a substantial inverse relation between physical activity and coronary heart disease.<sup>[6]</sup>

Furthermore, regular physical activity can reduce the risk for developing cancers of the breast and colon, and some evidence indicates that physical activity can reduce the risk for developing endometrial and lung cancers,<sup>[1]</sup> also can contribute to cancer prevention by preventing obesity. Moreover, physical activity might contribute to cancer prevention through its role in regulating the production of hormones, boosting the immune system, and reducing insulin resistance.<sup>[1]</sup> However, it has been stated that encouraging participation in physical activity among children and adolescents should influence adult levels of many chronic diseases in the future.<sup>[7]</sup> It has been highlighted by WHO, that regular and adequate levels of physical activity can help to: improve muscular and cardiorespiratory fitness; improve bone and functional health; reduce the

risk of hypertension, coronary heart disease, stroke, diabetes, breast and colon cancer and depression; reduce the risk of falls as well as hip or vertebral fractures; and are fundamental to energy balance and weight control.<sup>[8]</sup>

It has been highlighted that 1 in 4 adults is not active enough and more than 80% of the world's adolescent population is insufficiently physically active.<sup>[8]</sup> Researches focus on the association between physical activity and children and adolescents achievement and development has become more robust. A review by CDC suggests that, 1) physical activity can help improve academic achievement; 2) physical activity can affect cognitive skills and attitudes and academic behavior (including enhanced concentration, attention, and improved classroom behavior); and 3) increasing or maintaining time dedicated to physical education might help and does not appear to adversely affect academic performance.<sup>[9]</sup> WHO recommends that children and adolescents aged 5-17years should do at least 60 minutes of moderate to vigorous-intensity physical activity daily.<sup>[8]</sup>

Research and strategies targeting promoting physical behaviours among male and female children, adolescents, and adults received little awareness in developing countries. Unfortunately, physical activities obtain small awareness from authorities, communities and individuals in Saudi Arabia. Moreover, despite the important influence of social and environmental determinants on physical activity patterns, minimal research has been done to assess the impact of environmental determinants of physical activity. Thus, this study aims to investigate environmental and socio-demographic determinants of physical activity and inactivity patterns among adolescents in Riyadh, Saudi Arabia with the implication that these findings can point toward societal-level intervention strategies for increasing physical activity among adolescents.

## Methodology

This cross-sectional study was conducted in Riyadh, the largest city and the capital of Saudi Arabia. The selected sample represents adolescents aged between 15 and 18 years attending high schools in Riyadh City. The study variable involves adolescent characteristics, physical activity practice, perception and

reasons for practicing or not practicing physical activity. A self-administered questionnaire was designed for the data collection; the questionnaire was tested for validity among similar small population (N=23) before collecting the data for the main study. A stratified sampling procedure was applied to select the students from private and public schools (4 schools in total). In total 453 students were randomly included in the study from 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> grades of schools.

Physical inactivity was assessed using standard 30-days recall questionnaire used to categorize adolescents into high, medium, and low inactivity patterns. Outcome variables were moderate to vigorous physical activity and inactivity, which were broken into categories (physical activity: 0–2 times/week, 3–4 times/week, and  $\geq 5$  times/week. Socio-demographic and environmental determinants of physical activity and inactivity included age, family style, fathers and mothers education,

weight perception, and students' perception regarding reasons and barriers that influences adolescents' physical activity behaviors were investigated.

Descriptive analyses and regression analysis were performed using SPSS (Statistical Package for the Social Sciences). Logistic regression models were used to investigate physical activity in relation with socio-demographic and environmental determinants of factors to generate evidence for physical education and recreation programs use by policy makers, community and school authorities. In the logistic regression model, age was treated as a continuous variable while other independent variables were categorical. The dependent variable, physical activity practice, was dichotomized as recommended physical activity ( $\geq 5$  days/week) and below recommended ( $\leq 5$  days/week). Results were considered significant at a threshold of  $p < 0.05$ .

## Result:

**Table 1. Characteristics of the response regarding Physical activity among male adolescents in Riyadh, Saudi Arabia**

Variable	No.	%
Age (grouped)		
15-16	185	40.8
17-18	203	44.8
19-20	65	14.3
Total	453	100
Father's educational Level		
$\leq 12$ years of education	216	47.9
$> 12$ years of education	235	51.2
Total	451	100
Mother's educational Level		
$\leq 12$ years of education	323	71.3
$> 12$ years of education	130	28.7
Total	453	100
Family style (living with...)		
Both parents	410	91.5
One of them/None of them	38	8.5
Total	448	100
Nationality		
Saudi	390	86.1
Non-Saudi	63	13.9
Total	453	100

Type of Schools		
Public schools	270	60
Private Schools	183	40
Total	453	100
Student's perception of physical actively		
Taking enough exercise	288	63.6
Not taking enough exercise	165	36.4
Total	453	100
Physical Activity Practice		
Not practicing	91	20.1
1-2 days per week	220	48.6
3-4 days per week	72	15.9
5 and more per week	70	15.5
Total	453	100

Table 1 presents the demographic characteristics of the students and the proportion of physical activity among students as well as their perception. Students' age range was 15-20 years. Of all participants, 40.8% of the students were between 15-16 years, 44.8% between 17-18 years and only 14.3% of the students between 19-20 years. More than 51% of the students' fathers had more than high school education. On the other hand, 28.7% of the students' mothers had more than high school education.

Also, Table 1 reveals that a total of 220 (48.6%) of the students reported participation in physical activity for one or two days a week, 72 (15.9%) reported practicing physical activity three to four days during a week, 70 (15.5%) of the students reported participation in physical activity for five days and more per week, and about 91 (20.1%) reported no practicing physical activity during a week. A total of 288 (63.6%) of the students stated that they have not taken enough exercise during the last 30 days preceding the survey.

**Table 2. Logistic Regression of students physical activity behaviour ( $\geq 5$  days/week) among male adolescents in Riyadh, Saudi Arabia**

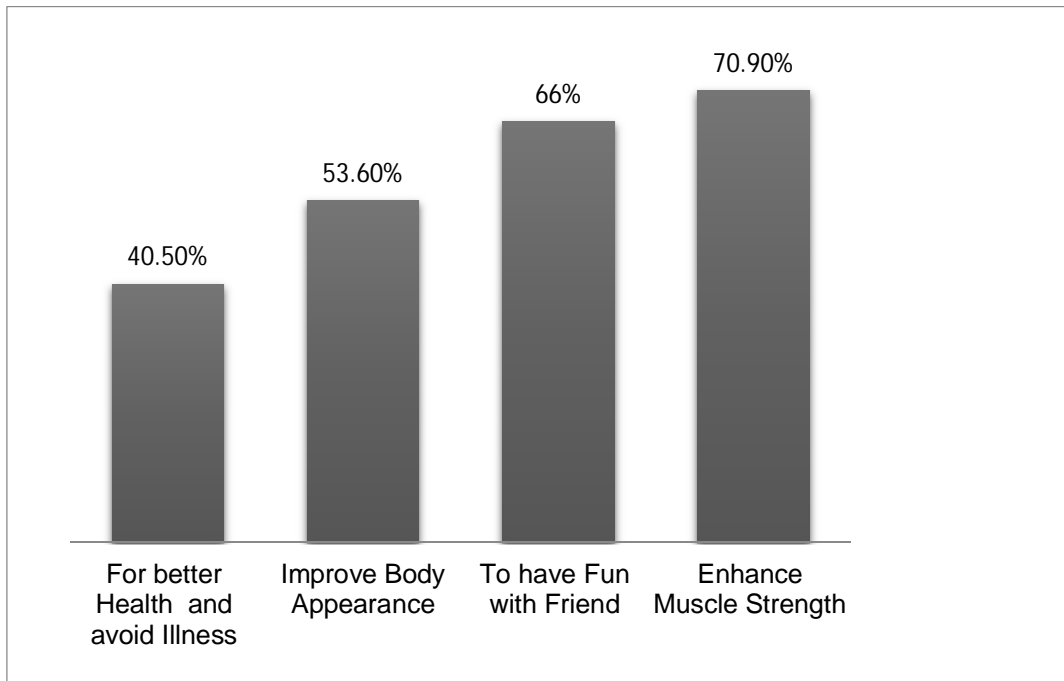
Variables	OR [95%C.I.]	Wald-test P value
Age (years)	0.73 [0.5 – 0.9]	0.01
School Type		
Private School (ref)	-	-
Public School	1.4 [0.8 – 2.5]	0.175
Nationality		
Non-Saudi	-	-
Saudi	1.4 [0.7 – 2.5]	0.342
Fathers' Education		
$\leq 12$ years (ref)	-	-
$> 12$ years	0.9 [0.5 – 1.9]	0.964
Mother's Education		
$\leq 12$ years (ref)	-	-
$> 12$ years	0.9 [0.5 – 1.9]	0.848

Family Style		
Living with both of parent (ref)	-	-
One or none of them	0.7 [0.2 – 2.3]	0.566
Students weight perception		
Overweight and obese (ref)	-	-
Underweight and normal	27 [11.3 – 64.7]	< 0.001

The effects of age, school type, nationality, fathers' education and mother's education on physical activities were investigated. The independent predictors of physical activity as revealed by binary logistic regression analysis are presented in Table 2. The binary logistic regression analysis showed that students' age was independently associated with physical activities (OR= 0.7,  $p \leq 0.01$ ); as age increase

students tend to be less active. Also, the logistic regression analysis showed that students physical activity behaviour was independently associated with students weight (OR= 27,  $P < 0.001$ ); students who practice physical activity at recommended level ( $\geq 5$  days/week) were more likely to be at normal weight and not overweight nor obese.

**Figure 1. Perceived reasons for practicing physical activity among high school adolescents**



As presented in Figure 1, the main important reasons to practice physical activity reported by students were: *To enhance muscle and strength* 70.9%, *To be with friend and have fun* 66%, and *To improve appearance* 53.6%; whereas, *For better health and avoid illness* only rated by 40.5% of the students.

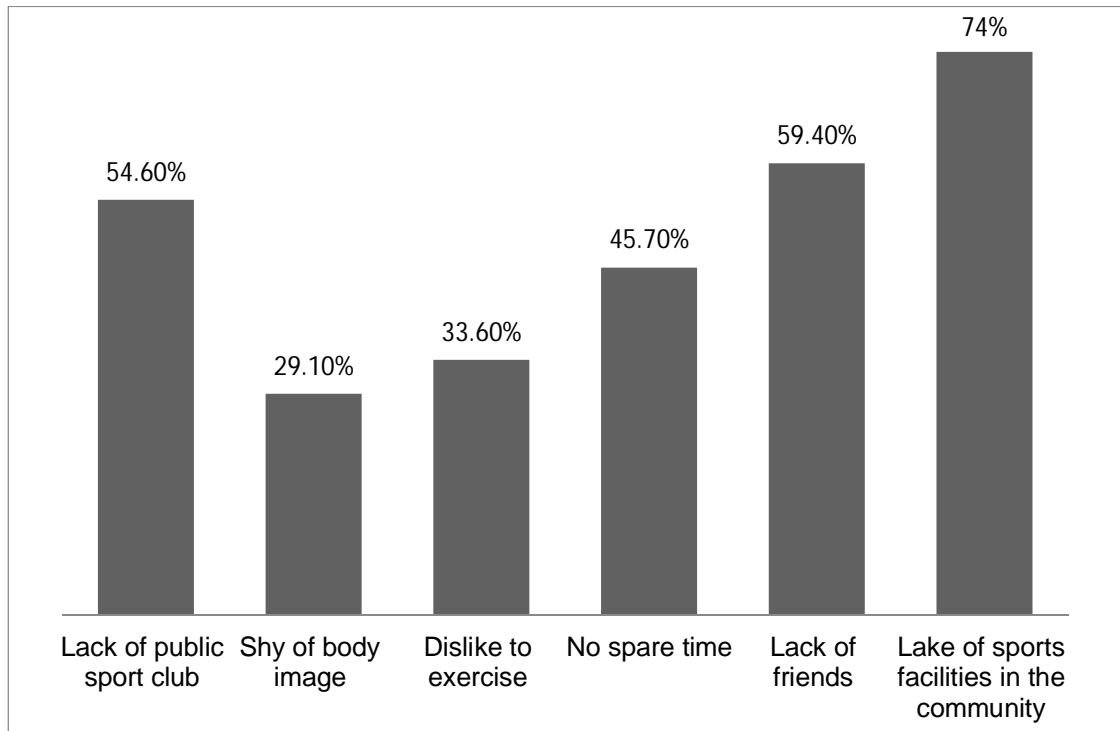
**Figure 2. Perceived barriers for not practicing physical activity among high school adolescents.**

Figure 2, presents the most important barriers inhibiting adolescents from practicing exercise which were: *Lack of available sports facilities in the community* with totalled response rate of 335 (74%) of the surveyed student, followed by *Lack of friends and peer support* (59.4%) and *Lack of Public sport clubs* (54.6%). *No spare time* was considered by (45.7%) of the students as a barriers. *Dislike to exercise* and *Shy of body image* were reported by 33.6% and 29.1% of the adolescents, respectively.

### Discussion

In the presented study only 15.5% of the students reported practicing physical activity at the recommended level (5 and more per week) and 20.1% were totally inactive. Additionally, the majority of the students were adopting low active lifestyle (48.6%). These results reflect the critical situation of the physical activity behaviour among adolescent in Saudi Arabia which is high warring and should be on the top of the country major concerns. In line with that, a study among 1,249 male adolescents indicated that 25.7% did not practice any physical exercise.<sup>[10]</sup> Also, it has been reported from a national data of 1401 Saudi male adolescents that half of them did not meet the daily physical activity guidelines.<sup>[11]</sup> Moreover, result from college students in Saudi Arabia

indicated that 56.3% of students were physically inactive and only 29.6% and 14.1% of the students had moderate and high intensity physical activities, respectively.<sup>[12]</sup> In contract, in United States, YRBS data in 2013 indicated that 15.2% of high school students had not participated physical activity on any day during the week, and 36% of male high school students had practiced physical activity every day.<sup>[13]</sup>

Considering the independent predictors of physical activity, the results of our study revealed that among socio-demographic characteristics, only students' age was found to be independently associated with students' physical activity. As students age increase, students become less active (OR= 0.668,  $p < 0.001$ ) as shown in Table 2. In line with that, it has been concluded that participation in

physical activity declines as young people age increase. [10, 11, 12, 13] Since, high school is very important period in adolescents' life because it is the period for graduation from high schooling and should obtain high grade to join universities, thus students may tend to quit a lot of their activities and become less physically active. Other explanation, is that during this period of life, adolescents interests and lifestyle might shift to other activities due to the significant transition from childhood to adulthood (e.g. socially, emotionally, psychologically and physically) which can be considered sedentary.

Although, as Table 1 presented that more than 51% of the students' fathers and 28.7% of the students' mothers had more than high school education, there were no significant influences upon students' physical activity as shown by logistic regression analysis in Table 2. However, Awadalla *et al* (2014) reported that the effect of parent's education on physical activity level, but they concluded that some contradictions' correlation was observed between degrees of parents' education and levels of physical activity in several studies. [12]

Amongst the reason that lead adolescents to practice physical activity, as explained in Figure (1) the main important reasons to practice physical activity were; *to enhance muscle and strength* 70.9%, *to be with friend and have fun* 66%, and *to improve body appearance* 53.6%. Unfortunately, only 40.5% of the students considered practicing physical activity *for better health and avoid illness* as an important reason to do physical activity. This finding can be seen as a major concern since it may reflect the low awareness of adolescents regarding the benefits of physical activity in promoting health.

The physical environment can be both a benefit and a barrier to being physically active. This study has presented some evidence to support the existence of an obesogenic environment in Saudi Arabia. Understanding the factors that influence physical activity can aid to design more effective interventions. In this study, the results as shown in Figure (2) indicated that the most common reason discouraging the adolescent students from physical activity were '*lack of available facilities in the neighbourhood/community*' (74%), '*lack of public sport/fitness club*' (59.4%), and '*lack of friend and peer support*' was reported by (46.6%), followed by the reason of '*no spare*

*time* (45.7%). In line with that, data from Saudi Arabia cited that; environmental factors such as sports facilities, the public transport system, and climate are considered to be important determinants of physical activity among youths in Saudi Arabia. [12] Also they cited that social support and encouragement, especially from families and friends, are significant contributors to physical activity. Moreover, environmental factors that might pose a barrier to physical activity include low availability of safe locations to be active, perceived lack of access to physical activity equipment, cost of physical activities, and time constraints. [14, 15, 16] WHO reported that several environmental factors which are linked to urbanization can discourage people from becoming more active, such as: fear of violence and crime in outdoor areas, high-density traffic, low air quality, pollution, lack of parks, sidewalks and sports/recreation facilities. [8] Therefore, increasing physical activity is a societal, not just an individual problem. Consequently, it demands a population-based, multi-sectorial, multi-disciplinary, and culturally relevant approach. [17]

Moreover, youth perceptions of neighborhood safety (e.g., traffic, strangers, poorly maintained or unsafe facilities, poor lighting, or negative social influences) also are associated with physical activity participation. [18, 19] With regard to the reasons and barriers for physical activity, we assume that Saudi female are less likely to participate in the required amount of physical activity levels, and the sedentary life style most likely to be higher among them because of social, religion perceptions, environmental factors and cultural reasons. However, it has been reported that Saudi females in particular are at great risk of sedentary behaviors and physical inactivity [9] and found to be significantly less active. [10, 11, 12]

The challenge in education is not about to get children into school now days, but also to improve the overall quality of education system, school environment, school services and address students' needs. School quality must therefore be of central interest to policymakers and public. However, there are some evidences that schools in Saudi Arabia suffer and lack of many health related issues such as poor air quality in class rooms, [20] and noise pollution. [21] Schools can take numerous steps to shape a health-promoting environment for physical

activity. Schools should establish policies that foster and allow full participation in more physical activity behaviours. For example, schools should continue to increase opportunities for physical activity, they can adopt and enforce more physical education classes, provide wide variety of physical activities to encourage students' participation and increase students awareness about the benefit of being active. Schools and education authorities will need to work with a range of organizations including local education authority, sport clubs, leisure and recreation, the Ministry of Health and voluntary groups to develop local strategies to increase levels of physical activity among students.

This study is subjected to some limitations. Adolescent in middle schools were not included in this study. For political and cultural reasons males and females students are separated in different schools, therefore adolescent female students were not included in this study. Unfortunately, important questions regarding students' family's activities and sedentary lifestyle have not been investigated in this study.

### Conclusion

Physical activity prevalence was low and extremely below the recommended level among Saudi adolescents. This study has presented some evidence to suggest the existence of an obesogenic environment in Saudi Arabia. Thus, governmental agencies can play a vital role in the promotion of health-enhancing physical activity. Ministry of Education and local authorities should design programs to provide a broad range of health-enhancing physical activities for children and adolescents and general public. To achieve this, governmental authorities should provide a range of easily accessible, attractive and appropriate environments, including parks, open spaces and playgrounds, in which young people are encouraged to play and exercise safely. Understanding the factors that influence physical activity can aid to design more effective interventions. Therefore, further and extensive research is needed in the field of physical activity behaviors in Saudi Arabia taking in account internal, external and environmental determinants and factors that are associated with physical activity. Moreover, low physical activity among Saudi adolescents might be

seen as an indicator for more risk behaviors; therefore, investigating physical activity in relation to other risk behaviors is important. <sup>[22]</sup>

### Acknowledgment

The authors would like to acknowledge the Ministry of Education (Riyadh) for their approval to conduct this study. Also, we would like to thank the community medicine consultant Dr. Abdullah Aljoody at college of Medicine in University of Dammam for his valuable comments on the preparation of this paper.

### References:

1. US. Department of Health and Human Services. Physical Activity Guidelines Advisory Committee report. Washington, DC: US. Department of Health and Human Services; 2008.
2. WHO. Health Topics, Physical Activity. 2015. Available at: [http://www.who.int/topics/physical\\_activity/en/](http://www.who.int/topics/physical_activity/en/) [Accessed: Jun-2015].
3. Blair S, Cheng Y, Holder S. Is physical activity or physical fitness more important in defining health benefits? *Med Sci Sports Exerc.* 2001; 33(6): 379S-99S.
4. Williams P. Physical fitness and activity as separate heart disease risk factors: a meta-analysis. *Med Sci Sports Exerc.* 2001; 33: 754-61.
5. Blair S, Brodney S. Effects of physical activity and obesity on morbidity and mortality: current evidence and research issues. *Med Sci Sports Exerc.* 1999; 31: 646-62.
6. Kohl H. Physical activity and cardiovascular disease .evidence for a dose response. *Med Sci Sports Exerc.* 2001; 33: 472-83.
7. Trost SG, Pate RR, Ward DS, Saunders R, Riner W. Determinants of Physical Activity in Active and Low-Active, Sixth Grade African-American Youth. *J School Health.* 1999; 69(1): 29-34.
8. WHO, Fact sheet N°385. Physical Activity. 2015. Available at: <http://www.who.int/mediacentre/factsheets/fs385/en> [Accessed: Jun-2015]
9. CDC. The association between school-based physical activity, including physical education, and academic performance. Atlanta, GA: US Department of Health and Human Services 2010. Available at: [http://www.cdc.gov/healthyyouth/health\\_an](http://www.cdc.gov/healthyyouth/health_an)



- d\_academics/pdf/pa-pe\_paper.pdf. [Accessed: March, 2014].
10. Mahfouz AA, Shatoor AS, Khan MY, Daffalla AA, Mostafa OA, Hassanein MA. Nutrition, Physical Activity, and Gender Risks for Adolescent Obesity in Southwestern Saudi Arabia. *Saudi J Gastroenterol.* 2011; 17(5): 318–22.
  11. Al-Hazzaa HM, Abahussain NA, Al-Sobayel HI, Qahwaji DM, and Musaiger AO. Physical activity, sedentary behaviors and dietary habits among Saudi adolescents relative to age, gender and region. *Int J Behav Nutr Phys Act.* 2011; 8: 140.
  12. Awadalla NJ, Aboelyazed AE, Hassanein MA, Khalil SN, Aftab R, Gaballa II, Mahfouz AA. Assessment of physical inactivity and perceived barriers to physical activity among health college students, south-western Saudi Arabia. *East Mediterr Health J.* 2014; 20 (10): 596-604.
  13. CDC. Youth Risk Behavior Surveillance. United States: MMWR 2014; 63(SS-4).
  14. Motl R, Dishman R, Saunders R, Dowda M, Pate R. Perceptions of physical and social environment variables and self-efficacy as correlates of self-reported physical activity among adolescent girls. *J Pediatr Psychol.* 2007; 32: 6–12.
  15. Gomez JE, Johnson BA, Selva M, Sallis JF. Violent crime and outdoor physical activity among inner-city youth. *Prev Med.* 2004; 39: 876–81.
  16. Romero AJ, Robinson, T N, Kraemer, HC, Erickson, SJ, Haydel KF, Mendoza F and Killen JD. Are perceived neighborhood hazards a barrier to physical activity in children? *Arch Pediatr Adolesc Med.* 2001; 155: 1143–8.
  17. WHO, Global Strategy on Diet, Physical Activity and Health, Physical Activity. 2015. Available at: <http://www.who.int/dietphysicalactivity/pa/en/> [Accessed: Jun-2015]
  18. Mota J, Almeida M, Santos R, Ribeiro JC, Santos MP. Association of perceived environmental characteristics and participation in organized and non-organized physical activities in adolescents. *Pediatr Exerc Sci.* 2009; 21: 233–9.
  19. CDC. Barriers to children walking to or from school. United States: 2004. *MMWR*; 2005: 949–52.
  20. Alsubaie ASR. Indoor Air Ventilation Assessment in Primary Schools in Eastern Province, Saudi Arabia. *IJCR.* 2014; 6: 6552-7.
  21. Alsubaie ASR. Indoor Noise Pollution in Elementary Schools of Eastern Province, Saudi Arabia. *J Res Environ Sci Toxicol.* 2014; 3: 25-9.
  22. Alsubaie ASR. The Importance of Investigating Health Risk Behaviours among Adolescents: An Opportunity for Improving Public Health. *IJDR.* 2014; 4: 2014-8