Original Article

Association between physical activity and mental health among high-school adolescents in Boushehr province: A population based study

Ali Reza Soltanian Ph.D[1]
Iraj Nabipour MD[2]
Shahin Akhondzadeh Ph.D[3]
Babak Moeini Ph.D[4]
Fatemeh Bahreini Msc[5]
Majid Barati Msc[6]
Javad Faradmal Ph.D[1]

1 Department of Biostatistics & Epidemiology, School of Public Health; The Research Center for Health Sciences, School of Public Health, Hamadan University of Medical Sciences, Hamadan, I.R. Iran.
2 Professor Haghighi Section of Tropical Medicine, The Persian Gulf Health Research Center, Bushehr University of Medical Science, Bushehr, I.R. Iran.
3 Department of Psychiatry, School of Medicine, Tehran University of Medical Sciences, Tehran, I.R. Iran.
4 Department of Health Education, School of Public Health, Hamadan University of Medical Sciences, Hamadan, I.R. Iran.
5 Research Center for Molecular Medicine, Hamadan University of Medical Sciences, Hamadan, I.R. Iran.
6 School of Public Health, Hamadan University of Medical Sciences, Hamadan, I.R. Iran.

Corresponding author:
Ali Reza Soltanian
Street of Mahdieh, Hamadan University of Medical Sciences, Hamadan City
Tel: 0811-8255963
Fax: 0811-8255963
Email: a_sultanian@yahoo.com

Objective: Mental health is one of the evaluating factors of community indicators, and physical activity is considered an important tool for the importance of public health. Previous studies have demonstrated associations between physical activity and mental health, but these studies did not include those populations in which training children have some traditional and religious aspects.
Methods: Multiple logistic regression analyses were used to compare the prevalence of mental health among those who had inactive, minimally and HEPA activity in a representative sample of adolescents aged 15-19 in South of Iran using data from the Mental Health Survey (n = 2584). The GHQ-28 and IPAQ-short forms were used to evaluate the mental health and physical activity, respectively .
Results: A total of 2584 adolescents (1401 male and 1178 female) participated in the study. The observed odds of psychological symptoms in boys compared to girls is 1.2 times (p=0.018). We observed that HEPA-activity decreases odds of somatic distress and social dysfunction compared with inactivity (p=0.031 and 0.001, respectively); minimally activity decreases odds of anxiety compared with inactivity (p=0.038); but physical activity rate was not affected on odds of adolescents' depression (p>0.05).
Conclusion: Physical activity decreases mental health subscales except for depression among adolescents in Boushehr, southern city of Iran.

Keywords: *Adolescents, Iran, Mental health, Physical activity*

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Mental health is one of evaluating factors of community indicators. Adolescence period is a very important and critical stage in human evolution process. Adolescent physiological changes result from sexual maturation and will lead to aggression and mental disorders (1). Physical activity is considered an important tool for the importance of public health (2), and it offers numerous health benefits and can help individuals maintain some chronic diseases (e.g. cardiovascular disease(3,4), osteoporosis(5), type 2 diabetes(6) and hypertension(7). Recently, psychological issues and psychotherapy have also been considered as people especially adolescents suffer from mental disorders more than any other diseases. Also, awareness of

depression in childhood and adolescence has increased (8, 9). Although in previous decades it was believed that depression did not occur in adolescents, recent prevalence studies have suggested that 2% to 8% of young people experience their first episode of major depression by age 16 (10-12,1). Also, American surgeon general assembly report in 1999 showed that 74 percent of adolescents suffer from mental disorder (13). Despite the increasing burden of common mental disorders (anxiety and depression) in society, few data are available on the relation between physical activity and mental health (14-20). The aim of this paper is to examine the association between physical activity and mental health using a population-based study among adolescents in a city in south of Iran (Boushehr), with a religious community.

Materials and Method

Mental Health Study

We used data from the Mental Health Study (MHS), a population based study of adolescents in Boushehr Province (South of Iran) in 2005. The MHS was conducted on 2697 high-school students aged 15-19 years. Multi-stage random sampling technique was used in the MHS, where number of students was determined by proportion sampling method based on male and female students in counties and schools, and also by student grade. Data were collected by a questionnaire with four sections. Section one included demographic characteristics (e.g. age, sex, educational level, students' field) and some of socio-economic factors (e.g. parent educations, family income, parent job, visit relatives, hours watching TV); section two included 28-item of General Health Questions (GHQ-28); section three included questions of International Physical Activity Questionnaire; and section four included food consumption pattern questionnaire(21). Mental health was measured using the 28-item General Health Questionnaire (GHQ-28) that is a screening instrument for psychiatric disorders(22,23).

The Iranian version of the GHQ-28 (24) was also used to estimate mental health state. GHQ-28 (25) is a 28-item self-rating questionnaire addressing a range of psychological symptoms, including anxiety, depression, somatic symptoms, and social dysfunction. The questionnaire determines whether respondents have experienced a particular symptom or behavior recently. The 28-items GHQ is scored on a four point Likert-type scale according to a 0-1-2-3 system (i.e., less than usual, no more than usual, rather more than usual, or much more than usual). Therefore, minimum and maximum score based on the Likert scale is zero and 84, respectively. In this study, the cut-point was 23 with reliability coefficient of 88 per cent(23). Before use, the GHQ-28 was translated into Persian based on Iranian culture by Tehran Psychiatric Institute. Multi-stage random sampling technique was used in MHS, and trained interviewers conducted face-to-face interviews using a questionnaire. Subjects were selected by proportional stratified sampling method in each stage based on number of students in counties, their sex and educational level. Questioners were educated in 2 three hour sessions. Questionnaires were supplemented by students. The MHS was conducted one month prior to the students' examinations or quizzes, and the 12th graders were excluded because of their final quizzes and examinations.

Assessment of Levels of Physical Activity

The short-form of the Iranian version of the International Physical Activity Questionnaire (IPAQ)(26) was used to estimate levels of physical activity. The IPAQ short form assesses physical activity about three specific types of activity (walking, moderate-intensity activities and vigorous-intensity activities performed for at least 10 minutes per session) undertaken in four domains including: a) leisure time physical activity; b) domestic and gardening activities; c) work related physical activity; d) transport related physical activity(2). Weekly minutes of walking, and moderate-intensity and vigorous intensity activities, were calculated separately by multiplying the number of days per week in which the activity took place by the duration of the activity in an average day. The three levels of physical activity used to classify populations were “inactive,” “minimally active,” and “HEPA-active”. These categories were based on standard scoring, as follows. “Moderate active” is more than the minimum level of activity recommended for adults in current public health recommendations. “HEPA-active” can be computed for people who exceed the minimum public health physical activity recommendations, and are accumulating enough activity for a healthy lifestyle.

Statistical Analysis

Statistical significance was set at 0.05, and the unit of analysis was students. All tests were two-sided. Frequency distributions, percents, confidence intervals and odds ratios were determinate to describe the data. Multiple logistic regression analyses were used to determine the association between physical activity and mental health subscales, adjusting for sex, subjects' educational level, parent education, and family income.

Results

A total of 2584 adolescents (1401 male and 1178 female) participated in the study. The study showed that the prevalence of psychological symptoms among girls was significantly higher than boys. In other words, the odds of psychological symptoms in girls compared to boys is 1.2 times (p=0.018; Table 1). Low, moderate and high physical activity was reported by 58.4%, 23.8% and 17.8% of adolescents aged 15-19 in Boushehr province, respectively (Table1).

About 40 percent of adolescents had a monthly salary of 2000000 Iranian Rial (median of family income was equal to 2000000 Iranian Rial; Table 1).

Table 1: Socio-demographic characteristics associated with psychological symptoms prevalence in south of Iran

Characteristic	N (%)	Psychological symptoms prevalence (%)	Adjusted OR (95% C.I.)	P value
Sex				
Male	1406 (54.4)	37.9	-	
Female	1178 (45.6)	44.1	1.217 (1.034,1.434)	0.018
Educational level				
9th grade	806 (31.2)	37	-	
10th grade	901 (34.8)	40.4	1.162 (0.954,1.416)	0.136
11th grade	877 (34)	44.5	1.384 (1.135,1.687)	0.001
Family income (Iranian Rial)				
< 2,500,000	1775 (68.6)	41.3	-	
2,500,000-5,000,000	684 (26.5)	28.2	0.821 (0.668,1.009)	0.061
>= 5,000,000	125 (4.8)	36.1	0.894 (0.601,1.331)	0.582
Physical activity status				
inactive	1507 (58.4)	42.6	-	
minimally active	616 (23.8)	38.3	0.890 (0.732,1.082)	0.243
HEPA-active	461 (17.8)	37.7	0.740 (0.615,1.012)	0.231
Fathers' education				
< 8th grade	2104 (81.4)	44.1	-	
8th- 11th grade	248 (9.6)	41.1	1.158 (0.894,1.5)	0.267
>= 12th grade	232 (9)	40.3	1.163 (0.912,1.483)	0.224
Mothers' education				
< 8th grade	2001 (77.4)	40	-	
9th- 11th grade	501 (19.4)	39.5	0.794 (0.616,1.024)	0.075
>= 12th grade	482 (18.6)	42	0.826 (0.646,1.058)	0.130

Table2. Distribution of sex ratio in different levels of physical activity and mental health subscales among southern adolescent of Iran

	Male n (%)	Female n (%)	Total n (%)	χ^2, df, P value
Physical Activity:				
inactive	695 (49.4)	812 (68.9)	1507 (58.3)	Chi-square=9.084, df=1, p=0.003
minimally active	398 (28.3)	218 (18.5)	616 (23.8)	Chi-square=52.597, df=1, p<0.001
HEPA-active	313 (22.3)	148 (12.6)	461 (17.8)	Chi-square=59.056, df=1, p<0.001
Mental Health:				
Somatic distress	478 (34)	552 (46.9)	1030 (39.9)	Chi-square=44.233, df=1, p<0.001
Anxiety	648 (46.1)	643 (54.6)	1291 (50)	Chi-square=18.506, df=1, p<0.001
Social dysfunctions	961 (68.3)	739 (62.7)	1700 (65.8)	Chi-square=8.984, df=1, p=0.003
Depression/Suicide	483 (34.4)	397 (33.7)	880 (34.1)	Chi-square=0.121, df=1, p=0.728

Table3. Association between physical activity levels and mental health subscales among southern adolescent of Iran (Logistic regression analysis)

Mental Health Subscales	Physical Activity											
	Inactive				Minimally active				HEPA-active			
	n (%)	O.R.	CI95%	p	n (%)	O.R.	CI95%	p	n (%)	O.R.	CI95%	P
Somatic distress	635 (42.1)	1	-	-	239 (38.8)	0.96	0.79-1.16	0.65	156 (33.8)	0.63	0.63-0.98	0.031
Anxiety	778 (51.6)	1	-	-	278 (45.1)	0.82	0.68-0.99	0.038	235 (51)	0.91	0.85-1.29	0.68
Social dysfunction	1013 (67.2)	1	-	-	410 (66.6)	0.92	0.75-1.12	0.41	277 (60.1)	0.69	0.55-0.86	0.001
Depression/Suicide	527 (35)	1	-	-	208 (33.8)	0.94	0.77-1.15	0.54	145 (31.5)	0.84	0.67-1.06	0.14

Few parents held an education level of high school diploma or higher (9% fathers and 18.6 % mothers; Table1). Table 1 shows that prevalence of psychological symptoms has a positive association with education level of individuals, so that adolescents with 11th grade compared with 9th grade are two times at risk, approximately (OR=1.384, CI95%= (1.135,1.687), p=0.001;Table1). Overall, family income and parent education were not associated with the subjects' mental health (p>0.05; Table 1)

In the population studied, we observed that high physical activity (HEPA-activity) decreases odds of somatic distress and social dysfunction compared with inactivity (p=0.031 and 0.001, respectively; Table3); minimally activity decreases odds of anxiety compared with inactivity (p0.038; Table3).

In this study, inactivity was reported more often by females (p=0.003; Table2). However, proportion of boys was more than girls in the other levels of physical activity (p<0.001; Table2).
The results showed that adolescent boys only in one of the mental health subscales, social dysfunction, had more problem than girls (p=0.003; Table2). Somatic distress and anxiety prevalence in girls were larger than boys (p<0.001; Table2). Depression prevalence in girls and boys was not different (p=0.728; Table2).

Discussion

The results of this study on young people 15 to 19 years was conducted in the city of Boushehr in south of Iran. The fact that they were brought up in religious families, indicate that the proportion of the adolescents with a high GHQ-28 score was high (40.7%), although we applied a highly conservative cut-off point, suggesting the existence of really serious mental problems. Although the percentage of psychological symptoms obtained in this study is less compared with some other studies (12, 27, 28), still it is larger than many studies (29). One of the reasons for the high prevalence of psychological symptoms among young people in this study compared with other studies may be that the subjects completed the questionnaire by themselves. Another reason for these high GHQ-28 scores could be the particular age group of the study sample. Adolescence is a stressful period of life. This period imposes many challenges to adolescents such as finding personality and values, and respect for self and others (29). In addition, the impact of the pressure of university entrance exam should also be considered. Adolescents in Iran are placed under the additional pressure of preparing themselves for the national university entrance exam.
According to the results, young girls are more prone to mental health problems than young boys (OR=1.217, p=0.018; Table1). We observed that distribution of mental health subscales among boys and girls are not the same except for symptoms of depression. The higher risk of mental health problems among girls has been found in many investigations (29 -30). One of the reasons for the gender difference may be varying between societies with different cultures (31). In Iran, more limitations are exerted by society and families on girls compared with boys.
As expected, boys reported higher physical activity than girls in the study. Sex ratios were not similar at different levels of physical activity (Table2), so most adolescent girls had low physical activity level (e.g. walking) in Boushehr. A number of studies have demonstrated similar gender differences in physical activity (32, 33). Female exercising is very important as in menopause age, women could experience osteoporosis and many other diseases; so, it may lead to increased incidence of chronic diseases (e.g. mental disorders, cardiovascular disease, diabetes and Etc.) in the following years.

In this study, we observed that high physical activity (HEPA-activity) only decreases odds of somatic distress and social dysfunction compared with inactivity (p<0.05); and also, minimally activity decreases odds of only anxiety subscale compared with inactivity (p>0.05; Table3). In this study, such as Sadeghian's study (34), it was observed that increased levels of education will cause GHQ-28 score to increase.

Conclusions

This study shows that mental health problems are very serious in adolescents in the religious and traditional southern community/ city of Iran (Boushehr province). This study also indicates that physical activity decreases mental health subscales rates, except for depression. Furthermore, this study reveals that sport programs could help adolescents to improve their problem-solving skills and enhance their coping strategies with mental health problems, and even to prevent the onset of psychological symptoms.

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