

Mental Health Problems and the Associated Family and School Factors in Adolescents: A Multilevel Analysis

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Abstract

Objective: Mental health is one of the most important issues in adolescents' life. Adolescents' health is highly important, because of their role in the future. This study was conducted using multilevel analysis to investigate the risk factors at student and school levels.

Method: This was a cross sectional study for which 1740 students and 53 schools were selected between February and March 2018 in Qazvin, Iran. Multistage stratified cluster sampling was used for data collection. Mental health problems were measured by the Strengths and Difficulties Questionnaire (SDQ). Emotional symptom, conduct problem, hyperactivity, peer relationship problem, and prosocial behavior were the subscales. This study used multilevel analysis to determine the association between each of the questionnaire scales and students and schools variables.

Results: The prevalence of the mental health problems was 16.2%. Conduct problem was more prevalent than others (21.1%). Overall, the score of mental health problems was significantly lower in boys' schools, in adolescents with physical activity, and in families with high socioeconomic status. Hyperactivity and emotional symptoms were significantly higher in girls' schools. While prosocial behavior and peer relationship problems were significantly higher in boys' schools. The association between variables and the scales of mental health problems was different.

Conclusion: Results indicated desirable physical activity and socioeconomic status are effective components in the adolescents' mental health, and, mostly girls' schools were more vulnerable than boys' schools. Therefore, the educational authorities and health policymakers should consider this diversity to design interventional programs and pay more attention to the high-risk adolescents in different schools.

Key words: *Adolescents; Iran; Mental Health; Multilevel Analysis; Students; SDQ*

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Mental health is the ability to rationally face daily pressures of lives, which is determined by improving individual interactions and accepting the realities of life (1). Lifestyle, physical activity, and social interactions are the most important factors affecting mental health (2). Expansion of urbanization along with cultural, economic, and social changes in society can increase mental health disorders of the community (3). The prevalence of mental health disorders in Asian countries was 10%-20% (4); this rate has been reported in the range of 8.6%-40.7% in Iran (2, 3, 5-14), so that from 1999 to 2014, it had increased approximately 1.2 times (15). As regard to children and adolescents, their mental health is an important challenge worldwide (16). Childhood mental health plays an important role in providing individual's health during adulthood (2). Psychiatric disorders in adulthood are rooted in childhood and adolescence disorders (8). Even if not considered in adolescent period, childhood mental health will continue to adulthood (17) and increase vulnerability to smoking and tendency for high-risk behaviors (10). Thus, mental health problems can have destructive effects on social, intellectual, and emotional development of adults and can negatively affect their future (18). Most mental health disorders are multifactorial and are caused by different factors, including family condition, social and environmental factors, etc. (4, 8, 10). One of the important issues is paying attention to the role of school and the sensitivity of the age of adolescents in high school period. Currently, mental health disorders among adolescents have been rising and are a serious concern in the communities (3, 10, 15). In a longitudinal study in Sweden, the importance of the role of school pedagogic environment and individual proficiency of adolescents in their mental health have been emphasized (19). Beyond their comorbidity with psychosomatic problems, mental health problems can affect many adolescents' features such as mindfulness, cognitive function, social competence, and learning process (17, 20, 21). According to the first national epidemiological study in Iran, about one fifth children and adolescents suffer from at least one psychiatric disorder (10). Also, a growing trend has been reported in the prevalence of mental health disorders among Iranian children and adolescents (3, 8, 10). Due to heterogeneity in prevalence studies on mental health disorders in Iran, comparison of the results is difficult (2, 3, 5-15). Since early intervention can prevent the onset of mental health problems and their developing outcomes (16), assessment of risk factors and prevention factors is necessary to design specific prevention programs. In previous studies, the role of different factors on adolescents' mental health problems has been considered. Some of the most important factors are family and school related factors .

The aim of this study was to investigate the association between adolescents' mental health and family and school related factors. Because of the important role of schools in adolescents' life and diversity in school type (public schools, private schools, schools with entrance exams, and girls/boys' schools) in Iran, this study was designed in 2 levels of students and schools in Qazvin in northwest of Iran. In addition to the individual factors, the risk factors of mental health problems were investigated at school level. The association between sex, school type, educational periods of high schools, and the scales of mental health problems was tested at school level. As mental health disorders have different scales such as social, emotional, relationship and conduct problems, we separately considered the scales of mental health problems.

Materials and Methods

This cross sectional study is a part of a research about the association between academic stress and mental health through mediator variables in Iranian adolescents (22). Students were selected using multistage stratified cluster sampling. Students in 7 to 12 grades were invited to the study. About 1740 students were selected from 53 high schools (The cluster participated in the study, randomly). Data were collected during February to March 2018 in Qazvin, northwest of Iran. Questionnaires were self-administrated. Exclusion criteria were unwillingness of the students to participate in the study and inability to answer the questions.

Instruments

We used the self-report version of the Strengths and Difficulties Questionnaire (SDQ) to assess the different domains of mental health problems. SDQ is a brief behavioral screening questionnaire that assesses the strengths and difficulties of adolescents in 5 scales: emotional symptom, conduct problem, hyperactivity, peer relationship problem, and prosocial behavior. Each scale has 5 questions. We asked the students to respond to the questions by selecting one of the 3 options of not true, somewhat true and, certainly true. Based on the scores of the questionnaires, the students fell into one of the groups of healthy (0-15), almost healthy (16-19), and unhealthy (20-40) states (23). In the Persian version of the questionnaire, the internal consistency for mean of the scales was 0.628 (24).

We calculated the socioeconomic status of the adolescents' family using principal component analysis based on their family assets (25-27). Based on this analysis method, the participants were classified into 5 categories (very rich, rich, mild, poor, and very poor).

Ethics' Considerations

First, we explained the purpose of the study to the selected students and obtained written and oral informed consents from the students and their parents. The students were ensured about the confidentiality of their

information. This study was approved by the Ethics Committee of Tehran University of Medical Sciences .

Statistical Analysis

In this study, data were organized in 2 levels. The students and schools’ variables were considered as level 1 and 2, respectively. The units of analysis were students who were nested in schools. Due to the nature of the data, they had to be analyzed using multilevel model analysis. The effect of hierarchical structure of the data was evaluated using ANOVA test. First, ANOVA was used to evaluate the effect of hierarchical structure of the data. Because the mean of group variables for all of the scales of mental health problems was different significantly ($P < 0.001$) except for the scale of conduct problem, the analysis of conduct problem was performed by simple regression. The dependent variables included mental health problems as the total score and the scales were conduct problem, hyperactivity, emotional symptom, peer relationship problem, and prosocial behavior. School type, educational period (first and second year), and sex were independent variables at schools level. Exercise, family economic status, father and mother education level were considered as independent variables at students’ level. First, we tested the determination factors using simple linear regression model (bivariate analysis) for each of mental health scales separately. Then, variables with p value ≤ 0.2 were entered into the multiple regression model (28).

Results

In this study, 53 schools with 1740 students participated. Sixteen of the questionnaires were excluded due to incompleteness. The age range of participants was 12-19 years. The mean age of the students was 15 (SD = 1.7)

years. The student’s demographic information is presented in Table 1.

In this study 16.2% of the adolescents had mental health problems and 19.1% borderline mental health problems. Among scales of mental health problems of the students, the highest and lowest scores were conduct problem (21.1%) and prosocial behavior (8%), respectively. The mental health problems of the students are presented in each of the scales in Table 2.

Tables 3 shows the results of crude and adjusted multilevel linear regression analysis between different scales of mental health problems and some of the variables .

In school-level variables, the boys’ total scores in mental health problems, hyperactivity, and emotional symptoms were significantly lower than those of the girls. However, prosocial behavior and peer relationship problems were significantly lower in the girls. In this level, school type and educational periods (first and second years of high school) did not associate with the scales of mental health problems .

In students-level variables, the economic status of families had significant associations only with the total score of mental health problems and peer relationship problem. The mental health problems in poorest adolescents were higher than the richest. Father and mother’s educations had no association with any of the mental health problems scales. Weekly exercise was associated with all of the scales of the mental health problems except conduct problem. Also, students with physical activity had significantly lower mental health problems.

Table 1. The Demographic Characteristics of the Adolescents in Qazvin, Iran in 2018 (n = 1724)

| | Variable | Number (Percent) | Variable | Number (Percent) | |
|--------------|------------------------------|------------------|--------------|------------------------------|-------------|
| Sex | Female | 864 (51.5) | Grade | 1st | 899 (52.1) |
| | Male | 860 (49.9) | | 2nd | 825 (47.9) |
| | Clerk | 741 (42.6) | | Clerk | 352 (20.2) |
| | Free | 711 (40.9) | | Free | 48 (2.8) |
| Father's job | Doctor/ University professor | 50 (2.9) | Mother's job | Doctor/ University professor | 19 (1.1) |
| | Retired | 181 (10.4) | | Retired | 33 (1.9) |
| | Lost data | 57 (3.4) | | Housewife | 1230 (70.7) |
| | | | Lost data | 56 (3.3) | |

| | | | | | |
|--------------------|-------------------------------|-------------|--------------------|-------------------------------|--------------|
| | Illiterate | 24 (1.4) | | Illiterate | 43 (2.5) |
| Father's education | Primary school/ Middle school | 359 (20.6) | Mother's education | Primary school/ Middle school | 369 (21.2) |
| | High school/ Diploma | 524 (30.1) | | High school/ Diploma | 597 (34.8) |
| | Associate/ Bachelor | 510 (29.3) | | Associate/ Bachelor | 497 (28.6) |
| | Master/ Ph.D | 299 (17.2) | | Master/ Doctoral | 208 (12) |
| | Missing data | 24 (1.4) | | Lost data | 26 (1.5) |
| Economic Status | Poor | 575 (33.35) | School Type | Governmental | 1001 (58.06) |
| | Mild | 575 (33.35) | | Special | 424 (24.59) |
| | Rich | 574 (33.29) | | Non-governmental | 299 (17.34) |
| Daily Exercise | Less than 0.5 hour | 1145 (66.4) | Weekly Exercise | Less than 0.5 hour | 214 (12.4) |
| | 0.6-1 hour | 232 (13.4) | | 0.6-1 hour | 40 (2.3) |
| | 1-2 hour | 290 (16.8) | | 1-2 hour | 444 (25.7) |
| | More than 2 hours | 56 (3.2) | | More than 2 hours | 900 (52.2) |
| | Lost data | 2 (0.1) | | Lost data | 127 (7.4) |

Table 2. The Prevalence of Scales of Mental Health Problems among the Adolescents in Qazvin, Iran in 2018 (n = 1724)

| Variables | Mental health problem (SDQ) | Emotional symptom | Conduct problem | Hyperactivity | Peer relationship problem | Prosocial behavior |
|----------------------|-----------------------------|-------------------|-----------------|---------------|---------------------------|--------------------|
| Mental Health Status | | | | | | |
| Normal | 1115 (64.4) | 1288 (47.7) | 1055 (61.2) | 1382 (80.2) | 1076 (62.4) | 1446 (83.9) |
| Borderline | 329 (19.1) | 168 (9.7) | 306 (17.7) | 186 (10.8) | 483 (28) | 140 (80.1) |
| Patient | 280 (16.2) | 268 (15.5) | 363 (21.1) | 156 (9) | 165 (9.6) | 138 (8) |

Table 3. Multilevel Linear Regression Analysis of Variables Associated with the Scales of Mental Health among Adolescents in Qazvin, Iran

| Variables | Mental health problems | | emotional symptoms | | conduct problems | | hyperactivity | | peer relationship problems | | prosocial behavior | |
|-------------------|--------------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|-------------------------------------|------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|-------------------------------------|
| | Crud | Adjusted | Crud | Adjusted | Crud | Adjusted | Crud | Adjusted | Crud | Adjusted | Crud | Adjusted |
| Random effect | | | | | | | | | | | | |
| Sex | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Female | | | | | | | | | | | | |
| Male | -0.18 (-0.27--0.08) P<0.001*** | -0.15 (-0.12- -0.04) P=0.001** | -0.37 (-0.44- -0.3) P<0.001*** | -0.35 (-0.42- -0.28) P<0.001*** | -0.04 (-0.08- 0.006) P=0.091* | | -0.11 (-0.18- -0.05) P=0.001** | -0.1 (-0.1- -0.03) P=0.004** | 0.09 (0.02- 0.17) P=0.013* | 0.12 (0.04- 0.19) P=0.002** | 0.09 (0.03- 0.15) P=0.005** | 0.1 (0.4-0.16) P=0.002** |
| Fixed effect | | | | | | | | | | | | |
| Physical activity | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| No | | | | | | | | | | | | |
| Yes | -0.09 (-0.14--0.05) P<0.001*** | -0.08 (-0.12- 0.04) P<0.001*** | -0.07 (-0.11- 0.02) P=0.001** | -0.05 (-0.09- 0.01) P=0.007** | -0.01 (-0.09- 0.06) P=0.704 | | -0.07 (-0.1- 0.04) P<0.001*** | -0.07 (-0.10- 0.03) P<0.001*** | -0.08 (-0.12- 0.04) P<0.001*** | -0.08 (-0.12- 0.04) P<0.001*** | -0.04 (-0.07- 0.006) P=0.021* | -0.04 (-0.08- 0.01) P=0.008** |
| Economic status | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Richest | | | | | | | | | | | | |
| Rich | -0.01 (-0.12-0.09) P= 0.827 | -0.02 (-0.13-0.09) P=0.715 | -0.04 (-0.15-0.7) P=0.468 | -0.04 (-0.15- 0.06) P=0.446 | -0.02 (-0.14- 0.1) P=0.702 | | -0.03 (-0.12- 0.06) P=0.477 | | 0.03 (-0.06- 0.13) P=0.484 | 0.03 (-0.07- 0.13) P=0.533 | 0.02 (-0.06- 0.11) P=0.567 | |
| Mild | -0.01 (-0.13-0.1) P=0.791 | -0.03 (-0.15- 0.08) P=0.550 | -0.03 (-0.14- 0.09) P=0.649 | -0.04 (-0.15- 0.06) P=0.409 | 0.04 (-0.08- 0.16) P=0.518 | | -0.05 (-0.14- 0.04) P=0.296 | | 0.04 (-0.05- 0.14) P=0.376 | 0.04 (-0.06- 0.14) P=0.459 | 0.03 (-0.05- 0.12) P=0.436 | |
| Poor | 0.09 (-0.02-0.20) P=0.124 | 0.07 (-0.04- 0.18) P=0.238 | 0.09 (-0.02- 0.20) P=0.105 | 0.08 (-0.03- 0.18) P=0.144 | -0.04 (-0.16- 0.08) P=0.524 | | 0.03 (-0.06- 0.12) P=0.539 | | 0.11 (0.01- 0.21) P=0.027* | 0.1 (0.007- 0.2) P=0.035* | -0.04 (-0.13- 0.05) P=0.355 | |
| Poorest | 0.22 (0.11-0.34) P<0.001*** | 0.18 (0.06-0.3) P=0.003** | 0.12 (0.004- 0.23) P=0.042* | 0.09 (-0.01- 0.2) P=0.103 | 0.04 (-0.08- 0.16) P=0.510 | | 0.06 (-0.03- 0.16) P=0.176 | | 0.16 (0.06- 0.26) P=0.002** | 0.15 (0.05- 0.25) P=0.004** | -0.003 (-0.09- 0.09) P=0.935 | |
| Father education | -0.03 (-0.06--0.002) P=0.035* | -0.02 (-0.05- 0.01) P=0.185 | -0.003 (-0.03- 0.03) p=0.827 | | -0.03 (-0.06- 0.002) P=0.035* | | -0.03 (-0.05- 0.003) P=0.028* | -0.03 (-0.05- 0.001) P=0.035 | -0.01 (-0.04- 0.01) P=0.328 | | 0.01 (-0.01- 0.03) P=0.351 | |
| Mother education | | -0.03 (-0.06- 0.0007) P=0.056 | | -0.02 (-0.05- 0.01) P=0.192 | | -0.03 (-0.07- 0.004) P=0.027 | | -0.007 (-0.03- 0.02) P=0.599 | | -0.001 (-0.03- 0.02) P=0.920 | | 0.008 (-0.01- 0.03) P=0.498 |

***P<0.001
**P<0.01
*P<0.05

Discussion

Mental health is one of the most important factors in the evaluation of society indexes. In this research, 35.3% of adolescents had mental health problems or were in borderline. At the school level, conduct problem was more prevalent than other scales of mental health problems. Mental health problems, emotional symptoms, and hyperactivity scales were significantly higher in girls' schools than in boys' schools; however, the peer relationship problems and prosocial behavior were seen more in boys' schools than in girls' school.

At the students' level, a significant relationship was found between physical activity and mental health problems and all of its scales except conduct problem. Families' economic status had a significant association with adolescents' mental health and peer relationship problems, so that poorer families had more problems than the richer. Similar to this study, in a nationwide study that used SDQ tool, 17.8% of girl adolescents had mental health problems, and behavioral problems were more than other scales (6). Although mental health problems, such as depression and anxiety, are strong predictors in adolescents' antisocial behaviors (eg, having smoker friends and suicide ideation), it was estimated that only 5%-10% of these adolescents used clinical services. Thus, it is necessary to pay more attention to mental health of adolescents (29).

In this study, although sex had a significant association with adolescents' mental health problems, its role was different in different scales. In Iran, girl adolescents are under pressure and control from the society and their parents, so they reported high level of mental health problems than boys. The evidence suggests to pay attention to the mental health of the girl adolescents, especially in maturity period, because of their effect on promoting the public health of the society (2, 6, 30-34). Indeed, in some studies the rate of mental health problems was reported high in boys (9). This study showed that prosocial behavior and the role of friends were more effective in the boys' mental health than in girls. Due to the role of sex difference in adolescents' mental health, this factor should be considered when designing interventional programs .

In this study, 66.5% of adolescents had less than 30 minutes of physical activity per day, despite recommendation of 30-minute moderate-intensity activity for the health of low active people (35). Many of the adolescents had less physical activity than international standard. In the study of Iran (Kermanshah), the students' physical activity was 298 minutes per week, especially low activity was common in the girl adolescents (36). Also, the adolescents with physical activity had significantly less mental health problems than others, as physical activity and exercise can become an effective intervention to eliminate adolescents' mental health problems and depression and stress (33, 37-40). Physical activity can help

improve adolescents' mental health and life satisfaction (41, 42).

Despite recommendation of 30-minute moderate-intensity activity for healthy life style (43), in this study, 66.5% of adolescents had less than 30-minute physical activity per day.

Different studies had indicated the role of socioeconomic status in adolescents and children's mental health problems (44, 45). However, among different scales of mental health problems, socioeconomic status had a significant association with peer relationship problem. This result shows the importance of paying attention to the role of socioeconomic status on the quality of peers' relationships in adolescence period. Therefore, socioeconomic status during adolescence and childhood can even affect mental health status of the next periods of life (43). Despite the positive effect of economic status on mental health, in Iran, some studies had not the same result (31, 33).

The results of multilevel analysis revealed no significant association between parents' education and any scales of adolescents' mental health. This might be due to inadequate knowledge of most parents (31, 33). In some studies, children of mothers with lower education level had high level of social performance disorders and depression than others (45).

Limitation

Due to the cross sectional design of the study, it was not possible to assess temporality of variables. Information bias can be expected because of the self-administrated method for data collection and because the answers depended on the students' perception. Also, the data were collected at schools; thus, it was likely that students with severe psychiatric disorders had not attended school and this could cause selection bias.

Conclusion

This study was conducted at 2 levels of students and schools and showed a considerable percentage of adolescents suffer from mental health problems. Physical activity and socioeconomic status of the adolescents' families can play a key role in their mental health. Due to the low activity among most adolescents and the important role of physical activity on all aspects of adolescents' mental health, more attention should be paid to designing physical activity programs for adolescents .

Although mental health problems were significantly lower in boys' school than in girls', in social scales, mental health problems were found to be more in boys' school than in girls'. Therefore, the promotion planning of adolescents' mental health should be done according to their demands and characteristics of each school. Because children and adolescents' mental health demands have been neglected especially in low and middle income countries (2), appropriate interventions

are essential to reduce the burden of mental health problems in the society to improve the quality of life in future generation.

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Conflict of Interest

None.

References

- Bhatia BD, Craig M. Elements of psychology and mental hygiene for nurses in India. Bombay: Orient Longmans; 1958:40-53.
- Soltanian AR, Amiri M, Namazi S, Qaedi H, Kohan GR. Mental Health Changes and Its Predictors in Adolescents using the Path Analytic Model: A 7-Year Observational Study. *Iran J Psychiatry*. 2014;9(1):1-7.
- Khaleghi A, Mohammadi MR, Zandifar A, Ahmadi N, Alavi SS, Ahmadi A, et al. Epidemiology of psychiatric disorders in children and adolescents; in Tehran, 2017. *Asian J Psychiatr*. 2018;37:146-53.
- Srinath S, Kandasamy P, Golhar TS. Epidemiology of child and adolescent mental health disorders in Asia. *Curr Opin Psychiatry*. 2010;23(4):330-6.
- Mohammadi MR, Ahmadi N, Salmanian M, Asadian-Koohestani F, Ghanizadeh A, Alavi A, et al. Psychiatric Disorders in Iranian Children and Adolescents. *Iran J Psychiatry*. 2016;11(2):87-98.
- Rabbani A, Mahmoudi-Gharaei J, Mohammadi MR, Motlagh ME, Mohammad K, Ardalan G, et al. Mental health problems of Iranian female adolescents and its association with pubertal development: a nationwide study. *Acta Med Iran*. 2012;50(3):169-76.
- Sharifi V, Mojtabai R, Shahrivar Z, Alagband-Rad J, Zarafshan H, Wissow L. Child and Adolescent Mental Health Care in Iran: Current Status and Future Directions. *Arch Iran Med*. 2016;19(11):797-804.
- Bakhteyar K, Bastami F, Ebrahimzadeh F, Almasian M, Hosseinabadi R, Farhadi A. Factors associated with mental health of high-school students in the Islamic Republic of Iran. *East Mediterr Health J*. 2018;24(4):368-76.
- Ahmadpanah M, Nazaribadie M, Mohammadi MR, Hooshyari Z, Alavi SS, Ghaleiha A, et al. The Prevalence of Psychiatric Disorders in Children and Adolescents in Hamadan Province, West of Iran. *J Res Health Sci*. 2018;18(4):e00432.
- Mohammadi MR, Ahmadi N, Khaleghi A, Mostafavi SA, Kamali K, Rahgozar M, et al. Prevalence and Correlates of Psychiatric Disorders in a National Survey of Iranian Children and Adolescents. *Iran J Psychiatry*. 2019;14(1):1-15.
- Mehrdadi A, Sadeghian S, Direkvand-Moghadam A, Hashemian A. The prevalence and risk factors of mental disorders among students in Ilam: A cross-sectional study. *International Journal of Epidemiologic Research*. 2017;4(1):31-6.
- Hassanzadeh J, Rezaei F, Khazaei Z, Noroozi M, Jahangiry L. The Prevalence of Mental Health Problems and the Associated Familial Factors in Adolescents in the South of Iran. *International Journal of Pediatrics*. 2019;7(4):9317-25.
- Amiri S, Mohammadi MR, Ahmadi N, Khaleghi A, Nourouzi S, Asl Rahimi V, et al. Prevalence of Psychiatric Disorders Among Children and Adolescents in the East Azerbaijan Province, Tabriz, Iran in 2017. *Iranian Journal of Psychiatry and Behavioral Sciences*. 2019;13(4).
- Moharreri F, Habrani P, Heidari Yazdi A. Epidemiological survey of psychiatric disorders in children and adolescents of Mashhad in 2009. *Journal of Fundamentals of Mental Health*. 2015;17(5):247-53.
- Noorbala AA, Bagheri Yazdi SA, Faghihzadeh S, Kamali K, Faghihzadeh E, Hajebi A, et al. Trends of Mental Health Status in Iranian Population Aged 15 and above between 1999 and 2015. *Arch Iran Med*. 2017;20(11 Suppl. 1):S2-s6.
- Kieling C, Baker-Henningham H, Belfer M, Conti G, Ertem I, Omigbodun O, et al. Child and adolescent mental health worldwide: evidence for action. *Lancet*. 2011;378(9801):1515-25.
- Caqueo-Urizar A, Flores J, Escobar C, Urzua A, Irrarazaval M. Psychiatric disorders in children and adolescents in a middle-income Latin American country. *BMC Psychiatry*. 2020;20(1):104.
- Stengård E, Appelqvist-Schmidlechner K. Mental health promotion in young people—an investment for the future. WHO Regional Office for Europe, Copenhagen, Denmark. 2010: 1-10.
- Galanti MR, Hultin H, Dalman C, Engstrom K, Ferrer-Wreder L, Forsell Y, et al. School environment and mental health in early adolescence - a longitudinal study in Sweden (KUPOL). *BMC Psychiatry*. 2016;16:243.
- Merikangas KR, Nakamura EF, Kessler RC. Epidemiology of mental disorders in children and adolescents. *Dialogues Clin Neurosci*. 2009;11(1):7-20.
- Long E, Gardani M, McCann M, Sweeting H, Tranmer M, Moore L. Mental health disorders and adolescent peer relationships. *Soc Sci Med*. 2020;253:112973.
- Hosseinkhani Z, Hassanabadi H, Parsaeian M, Karimi M, Nedjat S. Academic Stress and Adolescents Mental Health: A Multilevel Structural Equation Modeling (MSEM) Study in Northwest of Iran. *J Res Health Sci*. 2020;20(4): e00496.

23. Goodman R, Meltzer H, Bailey V. The Strengths and Difficulties Questionnaire: a pilot study on the validity of the self-report version. *Eur Child Adolesc Psychiatry*. 1998;7: 125-30.
24. Ghanizadeh A, Izadpanah A. Scale validation of the strengths and difficulties questionnaire in Iranian children. *Iran J Psychiatry*. 2007; 2(2):65-71.
25. Gwatkin DR, Rutstein S, Johnson K, Suliman E, Wagstaff A, Amouzou A. Socio-economic differences in health, nutrition, and population within developing countries: an overview. *Niger J Clin Pract*. 2007;10(4):272-82.
26. Filmer D, Pritchett LH. Estimating wealth effects without expenditure data--or tears: an application to educational enrollments in states of India. *Demography*. 2001;38(1):115-32.
27. Van de Poel E, Hosseinpoor AR, Speybroeck N, Van Ourti T, Vega J. Socioeconomic inequality in malnutrition in developing countries. *Bull World Health Organ*. 2008;86(4):282-91.
28. Jewell NP. *Statistics for epidemiology*. 1st ed. Chapman and Hall/CRC, 2003:121-35.
29. Soleimani MA, Pahlevan Sharif S, Bahrami N, Yaghoobzadeh A, Allen KA, Mohammadi S. The relationship between anxiety, depression and risk behaviors in adolescents. *Int J Adolesc Med Health*. 2017;31(2).
30. Emami H, Ghazinour M, Rezaeishiraz H, Richter J. Mental health of adolescents in Tehran, Iran. *J Adolesc Health*. 2007;41(6):571-6.
31. Ganjali M, Saravani S, Jalalinejad R, Davoodi M. Mental health status of Zabol city high school students and the factors influencing it during the academic year 2014-2015. *Int J Pharm Technol*. 2016;8(3):19086-93.
32. Hajloo N. The Study of Counselling Services Effect on Iranian Adolescence's Mental Health. *Procedia Soc Behav Sci*. 2011;30:312-5.
33. Soltanian AR, Nabipour I, Akhondzadeh S, Moeini B, Bahreini F, Barati M, et al. Association between physical activity and mental health among high-school adolescents in Boushehr province: A population based study. *Iran J Psychiatry*. 2011;6(3):112-6.
34. Zahedi H, Kelishadi R, Heshmat R, Motlagh ME, Ranjbar SH, Ardalan G, et al. Association between junk food consumption and mental health in a national sample of Iranian children and adolescents: the CASPIAN-IV study. *Nutrition*. 2014;30(11-12):1391-7.
35. Blair SN, LaMonte MJ, Nichaman MZ. The evolution of physical activity recommendations: how much is enough? *Am J Clin Nutr*. 2004;79(5):913S-20S.
36. Alidosti M, Baneshi M, Gharlipour Z. The Determination of Physical Activity among Girl Adolescents based on Trans-theoretical model (TTM). *Int J Pediatr*. 2017;5(7):5315-26.
37. Dunn AL, Weintraub P. Exercise in the prevention and treatment of adolescent depression: a promising but little researched intervention. *Am J Lifestyle Med*. 2008;2(6):507-18.
38. Kleppang AL, Hartz I, Thurston M, Hagquist C. The association between physical activity and symptoms of depression in different contexts - a cross-sectional study of Norwegian adolescents. *BMC Public Health*. 2018;18(1):1368.
39. Mikkelsen K, Stojanovska L, Polenakovic M, Bosevski M, Apostolopoulos V. Exercise and mental health. *Maturitas*. 2017;106:48-56.
40. Turner D, Carter T, Sach T, Guo B, Callaghan P. Cost-effectiveness of a preferred intensity exercise programme for young people with depression compared with treatment as usual: an economic evaluation alongside a clinical trial in the UK. *BMJ Open*. 2017;7(11):e016211.
41. Eddolls WTB, McNarry MA, Lester L, Winn CON, Stratton G, Mackintosh KA. The association between physical activity, fitness and body mass index on mental well-being and quality of life in adolescents. *Qual Life Res*. 2018;27(9):2313-20.
42. Jalali-Farahani S, Amiri P, Chin YS. Are physical activity, sedentary behaviors and sleep duration associated with body mass index-for-age and health-related quality of life among high school boys and girls? *Health Qual Life Outcomes*. 2016;14(1):30.
43. Angelini V, Howdon DDH, Mierau JO. Childhood Socioeconomic Status and Late-Adulthood Mental Health: Results From the Survey on Health, Ageing and Retirement in Europe. *J Gerontol B Psychol Sci Soc Sci*. 2019;74(1):95-104.
44. Reiss F. Socioeconomic inequalities and mental health problems in children and adolescents: a systematic review. *Soc Sci Med*. 2013;90:24-31.
45. Reiss F, Meyrose AK, Otto C, Lampert T, Klasen F, Ravens-Sieberer U. Socioeconomic status, stressful life situations and mental health problems in children and adolescents: Results of the German BELLA cohort-study. *PLoS One*. 2019;14(3):e021370.