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Original Article

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*

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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 confidentially 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)
Father's job	Clerk	741 (42.6)	Mother's job	Clerk	352 (20.2)
	Free	711 (40.9)		Free	48 (2.8)
	Doctor/ University professor	50 (2.9)		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)

Father's education	Illiterate	24 (1.4)	Mother's education	Illiterate	43 (2.5)
	Primary school/ Middle school	359 (20.6)		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 Status**	**Mental health problem (SDQ)**	**Emotional symptom**	**Conduct problem**	**Hyperactivity**	**Peer relationship problem**	**Prosocial behavior**
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	Female	1	1	1	1	1		1	1	1	1	1	1
	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	No	1	1	1	1	1		1	1	1	1	1	1
	Yes	-0.09 (-0.14--0.05) P<0.001***	-0.08 (-0.12-0.04) P<0.001***	-0.07 (-0.11-00.02) 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	Richest	1	1	1	1		1	1	1	1	1	1	1
	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 sings (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.

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