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The association of resilience with health-related quality of life (HRQoL) in adolescent students

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Abstract:

Objectives: Identifying the factors associated with HRQoL in adolescents is a prerequisite of interventions aimed at improving the overall quality of life and health status among them. Studies have identified many factors associated with HRQoL in different populations; however, very little is known about the role of resilience on HRQoL in adolescent students.

Subjects: This cross-sectional study was conducted on 1500 high school students (750 boys and 750 girls) in Tehran. The subjects were selected through the cluster and multistage sampling methods.

Methods: The data collection tool included three questionnaires; a demographic information questionnaire, the Health-Related Quality of Life Questionnaire (KIDSCREEN-27), and the Children and Youth Resilience Measurement (CYRM-28). Data were analyzed with SPSS 23 software. Regression analysis was performed to determine the association of resilience with HRQoL.

Results: The mean score of overall health-related quality of life and overall resilience were 57.51 ± 15.03 and 98.35 ± 16.48 , respectively. Individual sub-scale ($\beta = 0.402$, $p < 0.001$), caregiver sub-scale ($\beta = 0.279$, $p < 0.001$) and context sub-scale ($\beta = 0.122$, $p < 0.001$) of resilience were, respectively, the positive and significant predictors of HRQoL in students. The resilience sub-scales explained 49% of the total variance of HRQoL, and the individual sub-scale was the strongest predictive factor for HRQoL in students.

Conclusion: It is recommended to incorporate resilience training programs into the regular school education in order to improve the quality of life and health of students in all high schools and educational centers of the country.

Keywords: adolescent, quality of life, resilience, student

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Introduction

Adolescence is defined as the age range of 10–19 years old and about one of every six persons in the world is an adolescent [1]. The world population of adolescents is 1.2 billion [1], and the figure in Iran is 12 million [2]. Throughout this age range, children experience a transfer from the social and economic dependence of childhood to relative independence, which is coincident with entering high school. They experience a variety of biological, physical, psychological and social changes and encounter many problems and unhealthy behaviors (such as alcohol consumption, smoking, substance use and overeating) that might influence different aspects of their lives, health and mental health in particular [3], [4]. Adolescents are the future of societies and making sure that their health is guaranteed has been one of the concerns of all societies.

According to the World Health Organization (WHO), being healthy is not limited to physical indices, but it also covers one's feelings from physical and psychological points of view and the way an individual handles his or her daily life. Today, this perception of health is known as health-related quality of life (HRQoL) [5]. HRQoL is a multidimensional concept and a key indicator for evaluating different domains related to physical, mental, emotional and social functioning [6]. It has to do with individuals' subjective assessment of their current health condition, healthcare and health-promoting activities that entail a specific level of activity and enables the individuals to achieve their valuable life goals [7].

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The attention paid to adults' quality of life has overshadowed adolescents' quality of life. Indeed, HRQoL in adolescents is a relatively new concept and a new concern of the providers of health services; so that researchers have recently shown their interest in this issue. Some experts argue that the adolescent's quality of life is a subjective and variable feeling about one's health. They believe that this feeling is a reflection of the wants, hopes and expectations with regard to the current situation and future of their lives. This feeling is affected by different factors like gender, age, personal/family characteristics, economic and social status, and the like [8]. Determining the factors associated with HRQoL in adolescents is the first step towards improving HRQoL in adolescents. Through this, the modifiable factors can be identified, and then, the interventional programs can be developed and implemented to promote HRQoL in this population.

Studies show that resilience is one of the factors that influence HRQoL [9], [10]. The concept of resilience has been introduced to the health sciences literature over recent years. A review of the resilience literature revealed that although there is no consensus regarding the comprehensive definition of resilience, the majority of the available definitions describe resilience as an ability to successfully adapt to threatening conditions and stressors of life [11]. Moreover, resilience is defined as skills and traits that enable an individual to adapt to hardship, stressful life situations and challenges [12]. The ecosystem approach to resilience recognizes resilience factors at three levels; individual, family and social, environmental levels [13]. "Individual factors entail temperament, learning strengths, self-concept, emotions, ways of thinking, adaptive skills and social skills" [11]. "Family factors entail attachment, communication, parent relations, parenting style and support outside the family" [11]. Social environmental factors entail social justice, mutual respect through respecting laws and policies, social participation, access to facilities, and so on [11].

Although some of the features of resilience are the functions of biology and genetics, resilience skills can be acquired and improved over time [12]. Resilience is a multidimensional concept, and it has been recently recognized as a potentially modifiable factor [14] that may be improved through interventions [15]. Resilience capabilities help children and youth to maintain and promote their mental health [16]. With adequate resilience skills, adolescents have more chance to graduate, preserve their health, enjoy the social benefits of peer groups, and avoid delinquent and risky behaviors [17].

To the best of our knowledge, only a few studies have investigated the association between resilience and HRQoL such as studies on university students [9], patients with diabetes [10] and children with chronic diseases [18]. However, there are very limited studies investigating the association of resilience with HRQoL in adolescent students. In light of this, the present study is an attempt to survey the association of resilience on HRQoL among high school students in Tehran City. The results, if the influence of resilience on HRQoL of adolescent students is supported, can help design and implement resilience training programs aimed at improving HRQoL and overall well-being of adolescent students.

Materials and methods

Setting and participants

This study was a cross-sectional, descriptive-analytic survey. The study population included 16–18-year-old students from 20 high schools in district four of the Tehran municipality. The rationale for choosing this district as a study area was the dense population of the district, its breadth, condensed urban texture, social-economic diversity and the low average age of the young population in the district. In addition, the 22 urban districts of Tehran City are categorized into five economic-social classes, and district four is classified as a medium-class district [19]. Based on the sample size formula, 1400 participants were required. Considering the possible loss during the survey, the sample size was fixed at 1500 adolescent students (750 boys and 750 girls). The subjects were selected through a multi-stage cluster sampling technique. Initially, 10 girls' high schools and 10 boys' high schools were selected randomly. Then, three classes were selected from each school. Finally, 25 students in each class were selected through convenience sampling.

Measurements

Participants filled out three questionnaires. The demographic questionnaire was used to collect demographic information including age, gender, father's occupation, mother's occupation, father's education, mother's education, family structure, family size, participants' preferred family to live with, parental status and number of house moves during the past 5 years.

The Health-Related Quality of Life Questionnaire "KIDSCREEN-27" is a well-established 27-item self-rating questionnaire that assesses adolescents' perceptions of their current health and well-being [20], [21]. The Per-

sian version of the questionnaire was used in this study. The validity and reliability of the Persian version have been confirmed by Nik-Azin et al. in Iran [22]. The questionnaire covers five dimensions of HRQoL; physical well-being, psychological well-being, autonomy and parent relation, peers and social support and school environment.

The physical well-being dimension includes five items and explores the level of physical activity, energy and fitness in an adolescent. The psychological well-being dimension includes seven items and examines the level of positive feelings and emotions and life satisfaction in an adolescent. The autonomy and parent relation dimension includes seven items and explores whether the adolescent feels loved and supported by his/her family. It also explores the perceived quality of financial resources and the quality of interaction between the adolescent and his/her parents. The peers and social support dimension includes four items and covers the social relations of adolescent and explores the level and quality of interaction between adolescent and his/her peers and friends. The school environment dimension includes four items and explores the adolescent's perceived conception regarding his/her cognitive capacity, concentration and learning. It also covers the adolescent's feelings and perceptions about the school environment and their teachers [20], [21].

All items are answered on a five-point Likert-scale from 1 = never to 5 = always or from 1 = not at all to 5 = extremely. The responses mirror the frequency of a behavior or a particular feeling or intensity of an attitude. The time frame for responses refers to the last week. The overall scores of each dimension and overall HRQoL are converted to the values from 0 to 100, with 0 representing the worst HRQoL and 100 the best possible HRQoL [22]. The quality of life of a participant is assumed at an average level if the overall score and the score of each dimension is at 25–75 [23].

The Child and Youth Resilience Measure-28 (CYRM-28) is a well-validated scale that measures individuals' access to the sources that enhance their adaptation and resilience in the face of hardships and adversities [24], [25], [26]. The Persian version of the questionnaire was used in this study. The validity and reliability of the Persian version of the questionnaire have been tested and confirmed by Amirsardari et al. in Iran [12]. CYRM-28 covers three sources of resilience; individual capacities/resources, relationships with primary caregivers and contextual factors that facilitate a sense of belonging. The individual sub-scale includes 11 items about personal characteristics (e.g. I try to finish what I have begun). The caregiver sub-scale includes seven items about family, parents and primary caregivers (e.g. my family supports me during hardships). The context sub-scale includes ten items about social communications (e.g. I participate in religious activities in my neighborhood). Responses to items on this scale are graded based on a five-point Likert scale from 1 = not at all to 5 = very much. The possible range of scores is from 28 to 140 and receipts of a higher score in any of the sub-scales indicate higher access to resilience sources [24].

Statistical analysis

Data were analyzed with SPSS statistics 23.0 (SPSS Inc., IL, USA) using descriptive statistics (mean, standard deviation, frequency and percentage), and inferential statistics [Kolmogorov-Smirnov test, independent t-test, and one-way analysis of variance (ANOVA)]. The multiple linear regression analysis was used to determine the association of resilience and its sub-scales (independent variables) with HRQoL and its sub-scales (dependent variables). The results were considered statistically significant if $p < 0.05$.

Ethical considerations

The study protocol was approved by the Ethics Committee of Tehran University of Medical Sciences (Ref. IR.TUMS.REC-1394-830). All students signed informed consent before participating in the study. In addition, the required permissions were obtained from the Tehran Department of Education. Further, arrangements were made with the school principals, and they and the students were ensured about the confidentiality of the information and that only general results will be published.

Results

The mean age of the participants was 16.7 years. Most of the fathers of the participants were self-employed (53.3%) while most of the mothers were housewives (82.1%). The majority of fathers and mothers had a diploma education; 38.8%, and 46.8%, respectively. Most of the participants had both parents alive and were living with them (93.9%). The majority of the participants had a family size of four (56%), preferred their current family

to live with (80%), and did not have house moves during the past 5 years (42.6%). Details of demographic characteristics are indicated in Table 1.

Table 1: Demographic characteristics of the participants (n = 1500).

Characteristic	Categories	n (%)
Gender	Female	750 (50)
	Male	750 (50)
Father's occupation	Unemployed	67 (4.7)
	Public servant	417 (29.4)
	Self-employed	756 (53.3)
	Retired/other	179 (12.6)
Mother's occupation	Housewife	1184 (82.1)
	Public servant	187 (13.0)
	Self-employed	56 (3.9)
Father's education	Retired/other	15 (1.0)
	Illiterate	18 (1.3)
	Primary/high school degree	394 (27.9)
	High school diploma degree	547 (38.8)
Mother's education	Undergraduate degree	332 (23.5)
	Master's/PhD degree	120 (8.5)
	Illiterate	26 (1.8)
	Primary/high school degree	372 (26.0)
Family structure	High school diploma degree	669 (46.8)
	Undergraduate degree	296 (20.7)
	Master's/PhD degree	66 (4.6)
	Two parents family+siblings	1079 (72.3)
	Two parents family+one child	322 (21.6)
Family size	Single-parent family	34 (2.3)
	Non-parent family	57 (3.8)
	Three or less	217 (14.8)
	Four	822 (56.0)
Preferred family	Five	332 (22.6)
	Six and more	97 (6.6)
	Current family	1190 (80.0)
	Nuclear family	135 (9.1)
	Single-parent family	29 (2.0)
House moves in past 5 years	Others	133 (8.9)
	No	635 (42.6)
	One time	407 (27.3)
Parental status	Two times and more	448 (30.1)
	Both alive	1425 (95.8)
	Death of one or both parents	63 (4.2)

Table 2 presents the mean score of HRQoL and its dimensions in participants according to the demographic characteristics. The autonomy and parent relation dimension received the highest mean score while the physical well-being dimension received the lowest mean score from respondents. The mean scores of overall HRQoL, physical well-being and psychological well-being were significantly higher in boys than in girls while the mean score of peers and social support was significantly higher in girls than in boys. The mean score of autonomy and parent relation in students with unemployed fathers was significantly lower than those with self-employed, public servant and retired fathers; it was also higher in students whose fathers were a public servant than those with self-employed fathers. The mean scores of peers and social support in students with unemployed fathers were significantly lower than those students whose fathers were a public servant or self-employed; the mean scores were significantly higher in students whose fathers were retired than those with public servant and self-employed fathers. Furthermore, students whose mothers were retired obtained significantly higher scores in peers and social support compared to students whose mothers were a housewife, public servant and self-employed.

Table 2: The mean scores and standard deviations of HRQoL and its dimensions in participants according to the demographic characteristics (n = 1500).

HRQoL dimensions	Categories	Physical well-being		Psychological well-being		Autonomy and parent relation		Peers and social support		School environment		Overall HRQoL	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Gender	Female	49.51	17.81	50.73	20.77	62.58	19.60	62.29	19.32	56.97	20.31	56.41	13.74
	Male	57.70	17.31	56.75	21.10	64.01	21.46	59.58	24.18	54.95	24.44	58.60	16.15
Father's occupation	P-value ^a	<0.001 ^c		<0.001 ^c		0.18		0.02 ^d		0.08		0.005 ^e	
	Unemployed	52.16	16.83	51.99	19.31	56.23	22.69	53.91	20.90	56.52	21.98	54.16	14.80
	Public servant	54.76	17.18	54.69	20.37	65.60	19.59	61.40	20.77	57.01	21.97	58.69	14.55
	Self-employed	53.49	18.38	53.53	21.49	62.71	20.19	60.66	22.38	56.40	22.26	57.36	14.90
	Retired/other	52.52	17.90	54.31	21.66	64.85	20.33	65.25	19.34	54.22	23.72	58.23	15.04
Mother's occupation	P-value ^b	0.42		0.70		<0.001 ^c		<0.002 ^c		0.57		0.10	
	Housewife	53.40	18.05	53.69	20.87	63.42	20.41	61.09	21.62	56.49	22.19	57.67	14.90
	Public servant	55.86	17.15	56.06	21.44	65.64	19.51	62.03	21.28	56.15	23.83	59.14	14.76
	Self-employed	55.36	16.18	49.55	20.35	62.70	17.03	61.27	21.23	55.02	17.33	56.78	11.99
	Retired/other	48.67	19.50	53.81	28.65	67.14	27.80	76.67	15.75	50.42	26.46	59.34	16.36
Father's education	P-value ^b	0.20		0.23		0.47		0.04 ^d		0.72		0.56	
	Illiterate	50.56	18.93	57.11	23.77	68.45	19.76	62.85	28.32	57.64	27.16	59.32	18.28
	Primary/high school degree	54.73	18.28	53.72	21.41	60.43	21.06	57.67	22.05	56.44	22.60	56.59	15.16
	High school diploma degree	53.04	17.70	53.80	21.39	63.55	20.54	61.94	22.03	56.84	21.96	57.83	15.08
	Undergraduate degree	53.17	17.86	53.64	19.91	64.77	18.42	61.99	20.03	54.86	22.05	57.68	13.85
Mother's education	Master's/PhD degree	55.77	17.67	56.50	21.23	70.67	19.20	65.31	20.99	57.14	23.22	61.07	14.47
	P-value ^b	0.35		0.68		<0.001 ^c		<0.001 ^c		0.74		0.07	
	Illiterate	53.46	19.74	49.57	21.91	58.65	23.76	54.57	23.29	52.64	23.53	53.77	17.55
	Primary/high school degree	53.30	18.47	54.05	21.43	60.49	21.29	57.71	21.91	56.94	23.09	56.49	15.37
	High school diploma degree	53.34	17.48	53.66	21.00	64.16	19.89	62.08	21.37	55.91	21.44	57.83	14.51
Family structure	Undergraduate degree	54.82	17.63	55.38	20.21	66.44	18.38	63.47	21.37	57.56	22.111	59.53	13.86
	Master's/PhD degree	55.80	19.81	54.33	22.37	68.31	21.51	66.57	19.29	53.79	25.228	59.75	15.71
	P-value ^b	0.65		0.63		<0.001 ^c		<0.001 ^c		0.56		0.04 ^d	
	Two parents family+siblings	53.91	17.91	54.33	21.16	63.68	20.02	61.61	21.34	56.76	22.14	58.05	14.68
	Two parents family+one child	52.74	18.82	53.20	20.97	63.78	20.90	59.45	23.64	53.71	23.97	56.57	16.01
Family size	Single-parent family	51.18	19.23	49.79	21.37	58.23	24.33	57.72	21.32	59.56	19.54	55.29	14.31
	Non-parent family	54.47	15.72	50.31	21.06	59.09	23.11	60.09	23.44	52.52	20.96	55.29	15.23
	P-value ^b	0.61		0.30		0.17		0.34		0.08		0.20	
	Three or less	54.24	16.59	53.67	20.51	65.96	20.75	61.53	22.96	54.44	20.95	57.96	14.01
	Four	52.83	18.34	53.43	21.03	64.00	20.02	61.32	21.55	56.36	22.99	57.58	15.00
Preferred family	Five	55.99	17.81	54.51	21.13	61.67	21.10	60.71	21.79	57.74	21.86	58.11	15.11
	Six and more	51.70	17.07	55.99	22.58	58.59	20.43	59.82	22.33	53.35	22.64	55.88	15.77
	P-value ^b	0.04 ^d		0.64		0.008 ^e		0.89		0.21		0.62	
	Current family	54.63	17.61	55.80	20.56	65.60	19.15	61.79	21.37	57.39	21.68	59.04	14.22

		51.55	19.21	51.36	19.81	58.09	20.74	58.43	20.96	56.48	23.96	55.18	15.29
	Nuclear family	46.64	18.95	40.89	21.16	49.26	19.73	52.37	21.93	49.57	21.06	47.74	13.20
	Single-parent family	48.98	18.66	42.35	21.26	53.29	25.02	59.92	25.79	46.05	24.37	50.11	16.95
	Others	<0.001 ^c		<0.001 ^c		<0.001 ^c		0.04 ^d		<0.001 ^c		<0.001 ^c	
	P-value ^b	53.26	18.02	54.83	21.02	64.67	19.50	61.07	21.15	56.80	21.93	58.12	14.32
	No	53.19	17.98	53.40	21.36	63.86	20.47	62.00	21.15	54.98	22.74	14.55	57.48
	One time	54.65	18.07	52.61	21.12	61.12	21.72	60.27	23.42	55.59	22.95	56.86	16.26
	Two times and more	0.37		0.21		0.01 ^d		0.51		0.42		0.40	
	P-value ^b	53.25	16.97	54.20	20.60	60.11	23.21	60.12	20.68	57.34	21.55	57.50	15.10
	Both alive	53.59	18.13	53.74	21.22	63.45	20.48	60.94	22.01	55.84	22.58	57.00	14.09
	Death of one or both parents	0.88		0.86		0.20		0.77		0.60		0.80	
	P-value ^a												

^aP values are based on Independent t-test. ^bP values are based on ANOVA. ^cp < 0.01. ^dp < 0.05. SD, standard deviation.

Students whose fathers had lower levels of education obtained significantly lower scores in the autonomy and parent relation, and peers and social support. The mean score of autonomy and parent relation and peers and social support were significantly lower in students whose mothers were illiterate or had primary/high school degrees compared to students whose mothers had a diploma, undergraduate and Master's/PhD degrees. Finally, the overall mean score of HRQoL in students whose mothers had primary/high school degree was significantly lower than students whose mothers had a diploma, undergraduate and Master's/PhD degrees. The mean scores of physical well-being and autonomy and parent relation of students in families with three or fewer members were significantly higher than those in families with more than three members.

The mean score of physical well-being of students who preferred their current family to live with was significantly higher than those who preferred a nuclear family (i.e. a family that includes two parents and their children living in the same residence), one of the parents and others. Students who preferred their current family to live with also obtained significantly higher scores in peers and social support compared with students who preferred one of the parents. The mean score of overall HRQoL and psychological well-being was significantly higher in students who preferred their current family and a nuclear family to live with compared to students who preferred one of the parents. The mean score of autonomy and parent relation in students living in families who had moved their house twice and more during the past 5 years were significantly lower than those living in families who had not moved their house or had only moved it once during the past 5 years (Table 2).

Table 3 presents the mean score of resilience and its sub-scales in students according to the demographic characteristics. The individual sub-scale received the highest mean score (42.47 out of 100) while the context sub-scale received the lowest mean score (57.59 out of 100) from respondents. Compared to girls, boys obtained significantly higher scores in the context sub-scale. The mean score of the individual sub-scale and overall resilience in students who stated their fathers' occupation as a public servant were significantly higher compared to students who stated their fathers' occupation as self-employed and unemployed. The mean score of the individual sub-scale in students who stated their mothers' occupation as a public servant was significantly higher than those who stated their mothers' occupation as self-employed and a housewife. The mean score of the individual sub-scale in students whose mothers were illiterate or had primary/high school degree was significantly lower than those whose mothers had a high school diploma, undergraduate and Master's/PhD degrees; it was significantly lower in students whose mothers had a high school diploma degree compared with those whose mothers had an undergraduate and Master's/PhD degrees. Students with illiterate mothers had significantly lower scores in caregiver and context sub-scales compared to other students.

The mean score of context sub-scale in participants in families consisting of two parents and siblings was significantly higher than those who had no siblings or lived with one parent. The mean score of overall resilience and caregiver sub-scale in students in families with six members or more were significantly lower than other students. The mean score of context sub-scale in students in families with three members and fewer was significantly lower than other students. The mean score of resilience and all its sub-scales were significantly higher in students who preferred their current family or a nuclear family to live with than those who preferred one of the parents or others. The mean scores of overall resilience and caregiver sub-scale in students living in families who had moved their house two times and more during the past 5 years were significantly lower than those living in families who had not moved their house during the past 5 years (Table 3).

Regression coefficients showed that individual sub-scale ($\beta = 0.402$, $p < 0.001$), caregiver sub-scale ($\beta = 0.279$, $p < 0.001$) and context sub-scale ($\beta = 0.122$, $p < 0.001$) of resilience were, respectively, the significant positive predictors of HRQoL in student and explained 49% of the total variance of HRQoL in students. Among all sub-scales of resilience, the individual sub-scale was the strongest predictor of HRQoL in students so that one unit increase in the standard deviation of the mean score of the individual sub-scale justified $\beta = 0.402$ unit increase in the standard deviation of the mean score of HRQoL.

Moreover, regression coefficients indicated that individual sub-scale ($\beta = 0.337$, $p < 0.001$) and context sub-scale ($\beta = 0.119$, $p < 0.001$) were the predictors of the physical well-being dimension. Individual sub-scale ($\beta = 0.248$, $p < 0.001$), caregiver sub-scale ($\beta = 0.319$, $p < 0.001$) and context sub-scale ($\beta = 0.146$, $p < 0.001$) were the predictors of the psychological well-being dimension. Further, the individual sub-scale ($\beta = 0.168$, $p < 0.001$) and caregiver sub-scale ($\beta = 0.610$, $p < 0.001$) were the predictors of the autonomy and parent relation dimension. The individual sub-scale ($\beta = 0.482$, $p < 0.001$) and context sub-scale ($\beta = -0.082$, $p < 0.01$) were the predictors of the peers and social support dimension. Finally, the individual sub-scale ($\beta = 0.218$, $p < 0.001$), caregiver sub-scale ($\beta = 0.091$, $p < 0.003$), and context sub-scale ($\beta = 0.295$, $p < 0.001$) were the predictors of the school environment dimension in students (Table 4).

Table 3: The mean scores and standard deviations of resilience and its dimensions in participants according to the demographic characteristics (n = 1500).

Resilience sub-scales		Individual		Caregiver		Context		Overall resilience	
Characteristics	Categories	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Gender	Female	37.71	6.42	26.96	4.97	33.13	6.54	97.52	15.08
	Male	38.12	7.25	26.95	5.22	34.44	7.71	99.18	17.73
	P-value ^a	0.26		0.96		<0.001^c		0.06	
Father's occupation	Unemployed	36.95	6.38	26.79	5.09	34.58	6.51	97.83	14.86
	Public servant	38.77	6.42	27.57	4.77	34.52	7.25	100.56	15.75
	Self-employed	37.65	6.88	26.78	5.06	33.67	6.95	97.77	16.28
	Retired/other	38.49	6.17	26.91	5.12	33.67	6.99	98.76	15.81
	P-value ^b	0.02^d		0.07		0.20		0.04^d	
Mother's occupation	Housewife	37.93	6.78	27.11	5.03	34.04	7.00	98.74	16.23
	Public servant	39.54	6.11	27.20	4.65	33.95	7.23	100.45	14.96
	Self-employed	37.00	5.60	26.14	4.61	32.75	6.57	95.85	13.45
	Retired/other	37.06	5.67	26.06	6.46	31.46	7.23	94.60	17.28
Father's education	P-value ^b	0.01^d		0.43		0.29		0.17	
	Illiterate	39.47	6.24	26.00	6.76	34.23	6.95	98.55	18.81
	Primary/high school degree	37.40	6.87	26.83	5.38	34.85	7.32	98.71	17.02
	High school diploma degree	338.26	6.49	27.10	4.79	33.78	6.66	98.84	15.30
	Undergraduate degree	/38.27	6.55	27.16	4.82	33.23	7.02	98.46	15.32
	Master's/PhD degree	39.02	7.16	27.75	4.76	34.90	7.42	101.30	16.04
Mother's education	P-value ^b	0.10		0.42		0.18		0.56	
	Illiterate	35.40	7.64	23.37	5.87	31.12	7.64	89.42	19.18
	Primary/high school degree	37.17	6.92	26.83	5.23	35.03	7.06	98.59	16.80
	High school diploma degree	38.12	6.53	27.21	4.84	33.51	6.82	98.62	15.38
	Undergraduate degree	39.08	6.37	27.46	4.66	33.96	7.04	100.17	15.44
Family structure	Master's/PhD degree	40.07	6.22	27.18	5.49	34.00	7.50	101.26	16.76
	P-value ^b	<0.001^c		0.003^c		0.005^c		0.01^d	
	Two parents family+siblings	38.14	6.54	27.06	4.90	34.18	6.95	99.06	15.85
	Two parents family+one child	37.49	7.71	26.98	5.33	32.88	7.59	97.10	17.90
	Single-parent family	35.23	7.36	26.18	6.12	31.79	8.82	93.14	19.54
	Non-parent family	38.25	6.74	26.21	5.28	33.19	6.95	97.29	15.67
	P-value ^b	0.06		0.49		0.01^d		0.06	
	Family size	Three or less	37.76	6.85	27.42	4.81	32.24	7.15	97.13
Preferred family	Four	38.26	6.85	27.18	4.89	34.07	6.99	99.22	16.00
	Five	37.81	6.48	26.76	5.45	34.54	7.33	89.79	17.09
	Six and more	36.80	7.09	25.44	5.12	33.12	7.23	94.80	17.75
	P-value ^b	0.20		0.006^c		<0.001^c		<0.04^d	
	Current family	38.47	6.53	26.64	4.62	34.59	6.71	100.35	15.33
House moves in past 5 years	Nuclear family	37.39	6.34	26.45	5.05	33.31	7.10	97.12	15.17
	Single-parent family	34.00	5.51	23.42	4.93	30.21	5.36	87.13	12.72
	Others	35.21	8.31	22.80	5.99	28.74	8.22	86.62	19.34
	P-value ^b	<0.001^c		<0.001^c		<0.001^c		<0.001^c	
	No	38.42	6.63	27.33	4.87	34.25	7.08	99.66	15.98
Parental status	One time	37.63	6.89	27.05	5.09	33.21	7.21	97.57	16.54
	Two times and more	37.55	7.05	26.39	5.31	33.71	7.18	97.45	16.90
	P-value ^b	0.08		0.01^d		0.07		0.04^d	
	Both alive	37.95	6.86	26.99	5.10	33.79	7.15	98.43	16.50
Parental status	Death of one or both parents	37.37	6.53	26.47	5.12	33.69	7.60	97.20	15.82
	P-value ^a	0.50		0.43		0.92		0.54	

^aP values are based on Independent t-test. ^bP values are based on ANOVA. ^cp < 0.01. ^dp < 0.05. SD, standard deviation.

Table 4: Multiple linear regression analysis of the association of resilience with HRQoL in participants (1500).

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HRQoL dimensions (dependent variable)	P-value	95% Confidence interval		Standardized beta coefficient	Resilience dimensions (independent variable)
		Maximum	Minimum		
Physical well-being	$<0.001^a$	0.516	0.358	0.337	Individual
	0.94	0.062	-0.066	-0.002	Caregiver
Psychological well-being	$<0.001^a$	0.184	0.056	0.119	Context
	$<0.001^a$	0.456	0.296	0.284	Individual
Autonomy and parent relation	$<0.001^a$	0.436	0.306	0.319	Caregiver
	$<0.001^a$	0.238	0.109	0.146	Context
Peers and social support	$<0.001^a$	0.319	0.177	0.168	Individual
	$<0.001^a$	0.748	0.632	0.610	Caregiver
School environment	0.09	0.008	-0.107	-0.043	Context
	$<0.001^a$	0.855	0.665	0.482	Individual
Overall HRQoL	0.62	0.058	-0.097	-0.016	Caregiver
	0.01 ^b	-0.024	-0.177	-0.082	Context
Overall HRQoL	$<0.001^a$	0.445	0.261	0.218	Individual
	0.003^a	0.187	0.037	0.091	Caregiver
Overall HRQoL	$<0.001^a$	0.445	0.297	0.295	Context
	$<0.001^a$	0.487	0.383	0.402	Individual
Overall HRQoL	$<0.001^a$	0.272	0.188	0.279	Caregiver
	$<0.001^a$	0.144	0.061	0.122	Context

^ap < 0.01. ^bp < 0.05.

Discussion

The findings of this study revealed that the mean score of overall HRQoL and its sub-scales, and the mean score of overall resilience and its sub-scales were at a moderate level in adolescent students in Tehran City. A study in Yazd, Iran also demonstrated that the HRQoL of Iranian students was at a moderate level [22]. Similar results were also reported from another study of Swedish children [23]. In a study by Richardson et al. among children and youth in poor urban areas, subjects obtained the mean score of 119.05 ± 11.08 in overall resilience, 49.43 ± 5.16 in individual sub-scale, 26.43 ± 5.01 in caregiver sub-scale, and 43.19 ± 2.95 in context sub-scale [27], which is somewhat higher than in our study. In a study among adolescent students in New Zealand, subjects obtained the mean score of 108.05 ± 15.52 in overall resilience, 42.40 ± 6.21 in individual sub-scale, 28.80 ± 3.93 in caregiver sub-scale, and 36.82 ± 6.93 in context sub-scale [28]. Thus, the New Zealand adolescents obtained relatively higher scores in resilience and all its sub-scales compared to the participants of this study [27], [28]. From these results; one may conclude that the HRQoL and resilience in the participants in our study are not acceptable and further improvements are needed. Moreover, and to make an improvement in any variable, the factors effective in that variable, which is supposed to be modifiable, need to be identified through health-based interventions. Therefore, in this study, we examined the association between the demographic characteristics of the students with their HRQoL and resilience.

Findings revealed that students whose fathers were illiterate or unemployed were more likely to suffer low HRQoL and resilience. On the other hand, higher occupational status and education were found to have a positive influence on HRQoL and resilience of students. The findings also revealed that the students who were satisfied with living with their current family and those interested in living in a nuclear family had a higher HRQoL and resilience. Thereby, any attempt to improve one's satisfaction with their family and living with two parents can improve resilience and HRQoL in individuals. Moreover, owning a house and no need to move house frequently, which is the case for families who rent their house, is another factor influencing HRQoL and resilience in adolescents. Therefore, having the financial ability to own a house can improve the quality of life of family members and improve the health level of the whole society. Having families with fewer children is another recommendation to improve HRQoL and resilience in adolescents.

In descending order, individual, caregiver and context sub-scales of resilience were the top most effective factors and significant predictors of HRQoL in students. Each one of these sub-scales, independent of the other factors, had a positive and statistically significant association with HRQoL. That is, any increase in the adaptability of the students to threatening situations and stressors improves their HRQoL and vice versa. Rainone et al. also found that individual and caregiver sub-scales of resilience were, respectively, the significant positive predictors of HRQoL [29]. In line with our findings, Bastaminia et al. reported that resilience is a significant

predictive factor for quality of life [9]. Barghi et al. conducted a resilience training program among nurses and observed a significant increase in the score of quality of life in the intervention group following the education program [30]. Findings from other studies have also supported our results [31], [32]. It is recommended therefore to incorporate resilience training programs into the interventions aimed at improving the quality of life of students. To this end, health educators can benefit from sources of health education and promotion to enhance resilience among adolescent students.

Given the limited resources available (time, money, human resources, etc.), health educators and policymakers should pay closer attention to the factors with the most significant influence on resilience in adolescents. Among the sub-scales of resilience, the individual sub-scale was the most influential factor in students' HRQoL. Therefore, priority should be given to the individual sub-scale of resilience (such as mood, learning capability, self-efficacy, feelings and emotions, thinking methods, adaptation techniques, and social skills). Resiliency in schools, developed by Henderson and Milstein, is one of the resilience training programs to enhance resilience in students [33]. Resilience training using active coping strategies triggers self-encouragement and positive thoughts in individuals and discourages passive coping strategies such as passive reactions, and avoidance behaviors [34].

Conclusion

Students are the future of society and guaranteeing their health and quality of life should be a major concern of all societies. Health education programs aimed at improving adolescents' quality of life needs to focus on the factors influencing the quality of life in adolescents. Given that all of the resilience sub-scales influence HRQoL in adolescent students, resilience training programs coupled with appropriate health education methods and techniques might ensure an acceptable quality of life in adolescents.

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