Research Paper
Psychometric Properties of the Short Version of "the Child and Youth Resilience Measure (CYRM-12)" in Persian

Leila Mohammadinia[1, 2*] iD, **Abbas Ebadi**[3] iD, **Alireza Razzaghi**[4] iD -

1. Department of Health Policy and Management, School of Management and Medical Informatics, Tabriz Health Services Management Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.
2. Department of Disaster Public Health, Students' Scientific Research Center, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran.
3. Behavioral Sciences Research Center, Faculty of Nursing, Lifestyle Institute, Baqiyatallah University of Medical Sciences, Tehran, Iran.
4. Children Growth Research Center, Research Institute for Prevention of Non-Communicable Diseases, Qazvin University of Medical Sciences, Qazvin, Iran.

ABSTRACT

Background: The concept of resilience has emerged in recent years in association with disaster risk reduction. In assessing adolescents' resilience, it is important to consider resilience as a multi-factorial construct and context-based issue. Currently, there is a short resilience questionnaire to assess this construct among Iranian adolescents. Given the importance of using a short and valid questionnaire to assess resilience, this study investigates psychometric properties and the underlying structure of the Iranian translation of the child and youth resilience measure 12 (CYRM-12).

Materials and Methods: After obtaining permission, the CYRM-12 was translated into Persian and then back-translated based on the Wild (2005) process. The final version was distributed among 653 high school adolescents in the age range of 14 to 18 years. The reliability scale was evaluated by using the Cronbach α and test re-test reliability among 35 adolescents. Subsequently, the intra-class correlation coefficients were assessed. Confirmatory factor analysis was evaluated as the validity.

Results: The Cronbach α coefficient for the CYRM-12 was 0.71 and the test re-test reliability was excellent (ICC=0.88, 95% confidence interval, 0.78–0.94). Confirmatory factor analysis showed that the root mean square error of approximation was significant (0.043) and all items were indicated with a high correlation with scales, including the comparative fit index (CFI), non-normed fit index (NNFI), normed fit index (NFI), incremental fit index (IFI), and relative fit index (RFI) that were more than 0.9 and only parsimony normed fixed index was 0.7 that would be acceptable as well. Moreover, the correlation between total anxiety and resilience is significant. This is the first study that used the Persian version of the CYRM-12 questionnaire in Iran. In disasters, time is important; therefore, this short version would be more appropriate to help measure children's resilience more quickly. Moreover, the short version of the CYRM-12 questionnaire is suitable for measuring resilience.

Conclusion: This study determined good fitness, reliability, and test re-test reliability of the Persian CYRM-12 for Iranian adolescents.

* Corresponding Author:
Leila Mohammadinia, Assistant Professor.
Address: *Department of Health Policy and Management, School of Management and Medical Informatics, Tabriz Health Services Management Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.*
E-mail: *Dr.mohammadinia1@gmail.com, Mohammadinia1@tbzmed.ac.ir*

Introduction

Resilience was generated in psychology in the 1970s [1, 2]; however, it has changed during the past two decades. Currently, it is considered a multi-dimensional concept with different definitions between various human science fields [3, 4]. Resilience is the individual's ability to overcome, positively adapt, withstand stressful events, and bounce back after adversities. Resilience is the individual's physical and social capacity that directs the existing resources to the health of the family and society, considering the culture of the society and the flexibility approach [5-8]. The researchers agree that resilience is an adaptive process that presents in the face of adversity and disaster [1]. This is known as a personality trait against a negative event [9]. Moreover, they believe that personality traits, such as critical thinking, being talented, and having the ability to learn [10, 11], as well as social behavioral factors, including helping others and being a volunteer for social activities can increase child resilience [12].

Due to the importance of resilience, recently the resilience of adolescents has been regarded more than before by various researchers, such as Brennan in 2008 [13] who pointed out that the resilience of adolescents is their ability to decide, solve problems, and take part in social activities.

To develop programs to foster resilience, health professionals require valid and reliable tools [8]. For measuring resilience, there are three main tools validated in Iran, including the adolescent resilience questionnaire, Connor-Davidson resilience scale, and child and youth resilience measure-28 (CRYM-28). The Connor-Davidson resilience scale [4], which is the oldest tool for resilience and has been used in many studies is not specific to adolescents and usually applies to adults. The other questionnaire is the adolescent resilience questionnaire [14] which has a good validity and reliability in Persian, and its total Cronbach α equals 0.70. It has four domains, including families (α=0.85), peers (α=0.82), schools (α=0.85), and individual domains (α=0.94), although it is related to adolescents, due to the length of these questionnaires, it takes time to complete and can be inconvenient in disaster situations.

One of the instruments that has been specially designed for measuring adolescents' resilience groups is the child and youth resilience measure-12 (CYRM-12) [15]. CYRM-12 is the short form of the CRYM-28 questionnaire [8], which has been developed by Ungar [16] and the Canadian Resilience Center (2013) through conduct-ing a mixed-method study in 11 different countries. It has been validated in all of them. CYRM-28 includes three domains, namely individual, caregiving, and contextual. It has been used to assess resilience among individuals in the age range of 13 to 23 years [8]. The validity and reliability of the long version of CYRM-28 questions in Persian have been done (2013) with Cronbach α of 0.85; however, this is the first assessment of the shorter version. CYRM-12 and CYRM-28 have been considered appropriate tools to measure resilience. CYRM-12 is a one-factor and it evaluates resilience in people in the age range of 10 to 22 years [8]. As CYRM-12 is short and suitable for disasters, it has been focused on in this study.

No studies have been published using the CYRM-12 with Iranian adolescents. Considering the importance of using a short and valid questionnaire to assess resilience, this study creates the first Persian translation of the CYRM-12 and conducts psychometric testing of the validity, reliability, and factor structure in an Iranian context.

Materials and Methods

Study design

This was a cross-sectional study to explore the psychometric properties of CYRM-12 in Persian. This research was carried out in three phases that incorporated pilot testing of the Persian version of CYRM-12, validity, and reliability, and data analysis among high school students in Tehran City, Iran, in 2017.

Study participants

After obtaining permission from the Tehran General Directorate of Education, five different geographical regions of Tehran Province (North, South, East, West, and Center of the city) were selected to consider different socioeconomic factors. A total of 10 high schools were selected randomly. Meanwhile, 653 students (males and females) from only public schools were included. The calculated sample size consisted of students in the age range of 14 to 18 years. In each of the schools, five classes were selected randomly from different majors and age groups. The Persian version of the CYRM-12 questionnaire was given to the participants. In total, 50 questionnaires were collected from each school. After obtaining permission from the students' parents, school principals, and teachers, the main researcher explained the purpose of the research to the students. After obtaining consent from the students, they were asked to complete the questionnaires.

Translation

With permission from the questionnaire developer (the Resilience Research Centre), the CYRM-12 questionnaire was translated based on the Wild et al. principle [17], and two bilingual translators, whose first language was Persian, translated the original questionnaire independently from English to Persian. After translation, all the items were evaluated by the research team and translators chose the best statement for each item based on consensus.

The back translation was then carried out by two other bilingual translators independently. The back translation process was blindly done to the original questionnaire. The two back-translated questionnaires were evaluated by the translators and the research team and the best statements were selected for each item based on consensus. The original and the translated items were compared by the research team and the final back-translated version was sent to the questionnaire developer. The Canadian Center for Resilience then provided feedback on the back-translated version (English) to check the accuracy and equivalence between the back-translated version and the original CYRM-12 items. Item number 10 was not acceptable. According to their message, question 10 reads "Do you behave fairly?" Whereas the original version reads "Are you treated fairly?" The problem was that the translated version asks how the respondent acts toward others, whereas the original version asks the respondent how others act toward them. The team followed to translate and re-translate question No 10. It was changed to "Are you being treated fairly?" This was their acceptable concept. Therefore, the research team had permission to use the Persian version of the questionnaire to assess the cross-cultural equivalence and appropriateness. Finally, the Persian version of the CYRM-12 was prepared to assess its validity and reliability (the Persian version is available in the Appendix).

Validity and reliability testing of the Persian version of child and youth resilience measure-12

To examine the cross-cultural validity and appropriateness of the questionnaire, an expert committee reviewed the Persian version of the CYRM-12. Experts were selected from the professors who were familiar with instrument development, psychology, disaster, and social sciences. The expert committee examined the instruments in terms of semantic and idiomatic equivalence of the items.

Following the cultural adaptation of the instrument, a pilot test was conducted with 15 adolescents from a wide range of socio-economic backgrounds in Tehran. The translated questionnaire was completed by the participants, who were asked to identify ambiguous items and suggest preferred statements. The pilot testing resulted in the rephrasing of one item. At the end of this phase, the translated pre-final version of CYRM-12 was prepared to be used in the next phase to examine the validity and reliability. At the beginning of the questionnaire, nine questions were asked about the socioeconomic information of students, including family members, parent's education, and parental occupation. Moreover, two questions about the previous experience of disasters and the experience of education in disasters were asked. The evaluation of the CYRM-12 was made employing the 3-point Likert scale, namely "yes", "sometimes", and "no".

Reliability

A pilot study was conducted to assess the reliability and internal consistency of the questionnaire among 35 students with an average age of 16 years in Tehran, Iran, with a two-week interval between the pre-tests and posttests to test the reliability at two-time points. For internal consistency, the Cronbach α coefficient was employed and for stability, the interclass correlation (ICC) test was used.

Factor analysis

According to Liebenberg, Ungar, and LeBlanc JC (2013), the CYRM-12 is evaluated as a one-dimensional questionnaire among the youth in eleven countries (Canada, USA, Colombia, China, India, Russia, Palestine, Tanzania, the Gambia, and South Africa). This study then investigated the factor analysis among Iranian adolescents by conducting confirmatory factor analysis using the Lisrel 8.8 [18].

Data analysis

The data were analyzed using the SPSS software, version 22.0. Descriptive statistics were used, including Mean±SD, Pearson correlation, Cronbach α coefficient, ICC, Kaiser-Meyer-Olkin, and confidence interval for the socioeconomic information of the students. The mean age of the two groups and the Mean±SD of the students' resilience in both pilot phases was determined by sex. Resilience was calculated with a 95% confidence interval, and the level of significance was $P<0.05$ for the comparison between resilience and social and economic information of students.

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In addition, Lisrel 8.8 was used for confirmatory factor analysis and assessing the goodness of fit of the 12 scales resilience model by comparative fit index (CFI), non-normed fit index (NNFI), normed fit index (NFI), incremental fit index (IFI), and relative fit index (RFI), and x^2 indices. The values of the root mean square error of approximation below 0.05 indicate a close fit, values between 0.05 and 0.8 show a fair fit, between 0.08 and 0.1 corresponds to a mediocre fit, and over 0.1 shows a poor fit. The cut-off values for the comparative fit index and normed fit index were considered ≥0.95 and for the rot mean square residual was ≥0.08 [19].

Results

Although the CYRM-28 consists of three domains (individual, caregiving, and contextual); however, CYRM-12 includes one domain. To assess the divergent validity, the CYRM-12 and multidimensional anxiety scale for children were completed simultaneously by 653 students, of which 51.60% were female. They were in the age range of 14 to 18 years, with a mean age of 16.13±1.29) years. A total of 16.7% of the students lived with their family

and siblings. Moreover, 35% of the have participated in disaster education programs before the study, and 30% of them had experienced disasters. Moreover, 80% of the mothers of these students were housewives and 7% of their fathers were unemployed. The mean score of resilience was 29.22±3.24) in the pre-test and 28.68±3.60) in the post-test. The mean score of resilience (n=653) was calculated at 27.8±4.1) with a score of 12 as the minimum and 36 as the maximum. The overall calculated ICC was excellent (0.88) (95% CI, 0.78%, 0.94%). More descriptive data is presented in Table 1.

Structural validity indicators were also extracted with confirmatory factor analysis. CFI, NNFI, NFI, IFI, RFI are shown in Table 2 and Figure 1.

The calculation of the Kaiser-Meyer-Olkin test ratio for the correlation matrix was used, which indicates the adequacy of the sample size. The Bartlett test coefficient that indicates the significance of the correlation information matrix was also calculated for the validity of the Persian version of the CYRM-12 questionnaire. Comparative fit index, non-normed fit index, normed

Table 1. Scales' reliabilities in the Persian translated child and youth resilience measure-12, Tehran (2017)

CYRM-12	Cronbach's α Coefficient	Kaiser-Meyer-Olkin Test	Intra-class Correlation Coefficients	Bartlett Test
Translated In Persian	0.70	0.81	0.88 (0.78-0.94)	P<0.05
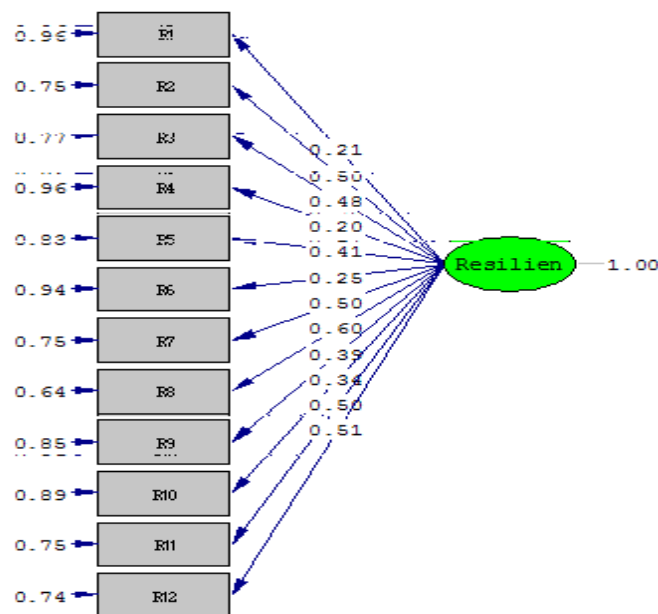
Chi-Square=114.41, df=54, P-value=0.00000, RMSEA=0.043

Figure 1. Confirmatory factor analysis for Persian child and youth resilience measure-12

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Table 2. Fit indices for confirmatory factor analysis of the child and youth resilience measure-12, Tehran, 2017 (n=653)

Indices	Estimated Values	Cut-off Values in the Original Version	Acceptable Threshold Levels [19]
x^2	115.91	255.419	-
df	54	51	-
P	P<0.05	P<0.0001	<0.05
GFI		0.96	>0.9
RMSEA	0.043	0.05	Stringent upper limit of 0.07
95% CI	(0.78-0.94)	-	-
CFI	0.95	0.95	>0.9
NNFI	0.94	-	>0.9
NFI	0.92	-	>0.9
IFI	0.95	-	>0.9
PNFI	0.75	-	>0.5
RFI	0.9	-	>0.9

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Abbreviations: CFI: Comparative fit index; NNFI: Non-normed fit index; NFI: Normed fit index; IFI: Incremental fit index; RFI: Relative fit index; PNFI: Parsimony normed fit index; CI: Confidence interval; Df: Degree of freedom; GFI: Goodness of fit index; RMSEA: Root mean square error of approximation.

Note: Structural validity indicators were also extracted with confirmatory factor analysis.

fit index, incremental fit index, and relative fit index are shown in Table 2.

The mean of the resilience score in both male and female groups is presented in Table 3. The resilience scale was between 12 and 36 and it had a significant relation with age, multiple children, family members, father's education, father's occupation, mother's education, mother's job, and mother's age (P<0.05). However, there was no significant relationship between gender, previous experience, and the age of the father as well as previous education about disasters. More information about descriptive analysis and the factor loading are presented at Table 4.

Discussion

This study determined the factor construct and reliability of the Persian version of CYRM-12 among Iranian adolescents and provided a reliable tool for its use in Iran. The Persian version of this tool has good validity (α=0.70) and is suitable for use among Iranian adolescents. The CYRM-12 can be used in a short time to measure adolescent's resilience. In recent years, disaster risk reduction and emphasis on resilience have attracted the attention of researchers to provide solutions for better preparedness and response for children and their families [1]. Accordingly, the importance of resilient assess-

Table 3. General descriptive data and Cronbach α of translated child and youth resilience measure among students, Tehran, 2017

Resilience Questionnaire	Sex	No.	Mean±SD	Minimum	Maximum	P	Cronbach α
Child and youth resilience measure-12	Female	337	28.0178±3.55	15.00	35.00		
	Male	316	27.5285±4.73	12.00	36.00	0.1	0.71
	Total	653	27.78±4.17	12.00	36.00		

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Table 4. Descriptive analysis and factor loading of the child and youth resilience measure among 12 items

No.	Example Items	No. (%)			Factor Loading
		Not Frequent	To Some Extent Frequent	Yes Frequent	
1	Is there anyone who you look up to?	43(15.2)	90(31.8)	150(53.0)	0.67
2	Is it important to do well at school and be a good student?	14(4.9)	69(24.4)	200(70.7)	0.45
3	Do you think the people who take care of you know a lot about you (for example, what makes you happy or what scares you)?	34(12.0)	130(45.9)	119(42.0)	0.44
4	Do you try to complete the tasks that you have started?	14(4.9)	78(27.6)	190(67.1)	0.50
5	When things do not go well, can we solve them without hurting ourselves and other people?	44(15.5)	145(51.3)	94(33.2)	0.49
6	Do you know where to go when you need help?	38(13.4)	106(37.5)	138(48.8)	0.60
7	Do you think that you get along well with other children?	25(8.8)	102(36.1)	156(55.1)	0.41
8	Do you think your family will take care of you in difficult times (for example, when you are sick or you have done something wrong)?	33(11.7)	34(12.1)	216(76.3)	0.50
9	Do you think your friends will take care of you in difficult times (for example, when you are sick or you have done something wrong)?	90(31.8)	126(44.6)	67(23.7)	0.62
10	Are you being treated fairly?	27(9.5)	144(50.5)	112(39.6)	0.65
11	Do you get the chance to show others that you have grown up and can do things on your own?	20(7.1)	88(31.1)	175(61.8)	0.39
12	Do you like an occasion when your family can celebrate something (such as a holiday or something you know about your culture)?	33(11.7)	66(23.3)	184(65.0)	0.46

ment tools is pronounced. Focusing on cultural aspects, its measurement tool should be considered [14, 16].

To the best of our knowledge, the Persian version of the CYRM-12 questionnaire was not available, and this is the first study to use this questionnaire in Iran. In disasters, time is important; therefore, this short version would be more appropriate to help measure children's resilience more quickly. Moreover, the short version of the CYRM-12 questionnaire is suitable for measuring resilience.

The CYRM-28 questionnaire [8] has three factors, namely individual, caregiver, and context; however, the short version of CYRM-12 [15] has just a single factor with a proper Cronbach α (α=0.75) [15]. There were 12 questions regarding the students, their family, their society, and their relationships with other people. This questionnaire was designed to understand better how they get along with their daily life and what roles people play in how they deal with their everyday challenges.

The pilot study also showed that the overall calculated ICC was excellent (0.88) (95% CI, 0.78%, 0.94%) and indicated high test re-test reliability, which confirms strong agreement in scores over a two-week interval survey.

The Kaiser-Meyer-Olkin ratio for the correlation matrix in the short version of CYRM-12 was high, (0.81) and indicates the adequacy of the sampling. The Bartlett test coefficient, which indicates the significance of the information correlation matrix was also used to test hypothesis zero and also confirms the validity of the Persian version of the CYRM-12. On the other hand, the validity of the questionnaire was determined by the fit indicators of goodness. As the confirmatory factor showed the appropriate fit of the comparative fit index, non-normed fit index, normed fit index, incremental fit index, and relative fit index which were higher than 0.9 and the Parsimony normed fit index 0.7; therefore, the Persian version of the questions could be accepted for Iranian adolescences. According to the defined standard [20], the above indexes are in excellent range. The total

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mean score of resiliency was (27.7810±4.17), and the resilience in females was the same as in males in the moderate range. It showed that age would be affected by criteria on adolescents' resilience because the same group had the same resilience level.

The present study showed that both genders had the same resilience level. Female and male adolescents had moderate and low levels of resilience about (27.7810±4.17) which is consistent with the Japanese study that reported resilient children are considered to be those who are most proud of themselves, less shy, and have better communication with their friends [21]. Researchers discussed resilient children and adolescents [22] in disasters through mental health, spiritual health, physical, and social behavior, ecological, environmental [23-25], self-confidence, and helping aspects [26].

Feeling anxious is more significant in both normal conditions and disasters. The period of youthful maturation is a period of stressful work, and management and helping them to be relaxed can promote teenagers' longevity. This upgrade can have a beneficial effect on their education, as well. Disasters are stressful, and only a high psychological level can cope with these conditions [22, 26, 27]. This issue is possible with resonance, and most resilience studies have been seen alongside adversity [1, 16].

Two scales of fear of separation and avoidance of harm have a direct relationship with radiation [27]; although this relationship is not very strong, the association of signs of physical harm to health is resilient with a direct and strong relationship, which can indicate the importance of paying attention to physical well-being for the rescue of children and teenagers. As a whole, this study determined the evidence of good fitness, reliability, and test re-test reliability of the Persian CYRM-12 for Iranian adolescents but according to the statistical results, the short version may be a suitable device to evaluate resilience in Iran. Based on adolescence resilience in disaster tool-37Q [27] another dimensions should be considered for resilience among subjects under 18 years of age.

Conclusion

This study provides evidence of scale validity and test re-test reliability of the Persian translation of the CYRM-12 among Iranian high school students. It determined the evidence of good validity, reliability, and test re-test reliability of this questionnaire, which is proper for Iranian students with ages ranging from 14 to 18 years.

Strengths and limitations

Gold standard translation approach, pilot testing, random proportional sampling from students, and checking divergent validity, were the strengths of this study. This study faced various limitations, such that students from different cities and different socio-economic classes may have different results; however, this study could evaluate just public high schools, not private schools, and does not aim to generalize for other groups. Further study in other settings and among private school students in different Iranian cities is suggested to access psychometrics of the Persian version of CYRM-12.

Ethical Considerations

Compliance with ethical guidelines

The study was approved by the Ministry of Health and Medical Education, Tehran, Iran. Permission was also obtained from the local educational authorities. Furthermore, this study was approved by the Tehran University of Medical Sciences Research Ethical Committee (Code: IR.TUMS.VCR.REC.1395.881-32024).

Authors' contributions

Conceptualization, study design and supervision: Leila Mohammadinia and Abbas Ebadi; Data analysis: Abbas Ebadi and Alireza Razzaghi; Data interpretation: Abbas Ebadi; Data collection and writing the original draft: Leila Mohammadinia; Critical revision and final approval: All authors.

Conflict of interest

The authors declared no conflict of interest.

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Appendix

English version

Child and youth resilience measure

Below, there are some questions regarding you, your family, your society, and your relationships with other people. This questionnaire is designed to help us better understand how you get along with your daily life and what roles people play in how you deal with your everyday challenges.

There is no right or wrong answer.

1. Is there anyone who you look up to?

2. Is it important to do well at school and be a good student?

3. Do you think the people who take care of you know a lot about you (for example what makes you happy or what scares you)?

4. Do you try to complete the tasks that you have started?

5. When things do not go well, can we solve them without hurting ourselves and other people?

6. Do you know where to go when you need help?

7. Do you think that you get along well with other children?

8. Do you think your family will take care of you in difficult times (for example when you are sick or you have done something wrong)?

9. Do you think your friends will take care of you in difficult times (for example when you are sick or you have done something wrong)?

10. Are you being treated fairly?

11. Do you get the chance to show others that you have grown up and can do things on your own?

12. Do you like an occasion when your family can celebrate something (such as a holiday or something you know about your culture)?

Persian version:

اندازه گیری تاب آوری کودکان و جوانان (CYRM):

در زیر فهرستی از تعدادی از سوالات در مورد شما، خانواده شما، جامعه وروابط شما با مردم مطرح شده است. این پرسش های طراحی شده به ما کمک می کند در راستای درک بهتر اینکه شما چگونه با زندگی روزانه خود کنار می ایید و اینکه مردم اطراف شما چه نقشی را در برخورد شما با چالش های روزانه تان بازی میکنند.هیچ پاسخ درست یا غلطی وجود ندارد.

بلی	تا حدی	خیر	سوالات	ردیف
			آیا کسی هست که شما دوست داشته باشید مانند او باشید؟	۱.
			آیا خوب عمل کردن (یا شاگرد خوب بودن) در مدرسه برای شما مهم است؟	۲.
			آیا شما احساس می کنید که پدر و مادر یاافرادی که از شما مراقبت می‌کنند چیزهای زیادی در مورد شمامیدانند(برای مثال، چه چیزی شما را خوشحال میکند، چه چیزی باعث ترس شما می‌شود)؟	۳.
			آیا شما سعی میکنید که فعالیت هایی را که شروع کرده اید به اتمام برسانید؟	۴.
			وقتی مسائل به خوبی پیش نمی رود، آیا می توانید بدون آسیب زدن به خود و دیگران آن را حل کنید؟ (برای مثال، بدون ضربه زدن به دیگران و یا گفتن چیزهای تند و زننده).	۵.
			آیا می دانید برای دریافت کمک- در زمان بروز مشکل- به کجا بروید- یا به چه کسی مراجعه کنید؟	۶.
			آیا شما احساس می کنید که با دیگر بچه‌های هم سن و سالتان -جور هستید؟	۷.
			آیا فکر می کنید خانواده تان در شرایط سخت از شما مراقبت می‌کنند(برای به عنوان مثال، اگر شما بیمار باشید و یا چیزی رااشتباه انجام دهید)؟	۸.
			آیا فکر می کنید دوستانتان در شرایط سخت از شما مراقبت می‌کنند (برای به عنوان مثال اگر شما مریض باشید و یا چیزی را به اشتباه انجام دهید)؟	۹.
			ایا شما- در مقابل رفتار واکنشی دیگران و عملکردهایشان- منصفانه رفتار می‌کنید؟	۱۰.
			آیا شما این شانس را دارید به دیگران نشان دهیدکه بزرگ شده اید ومی توانید همه چیز را خودتان انجام دهید؟	۱۱.
			(ایا مناسبتی را که خانواده جشن می گیرند دوست دارید؟ (مانند جشن تعطیلات و یا مناسبت های فرهنگی	۱۲.