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Psychometric Properties of International Children and Youth Resilience Measurement (CYRM-28) Scale

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Abstract

Aim: The present study was conducted to validate the international version of the resilience scale (CYRM-28) among adolescent youth students.

Methods: The first original scale was translated into Persian language by two experts. Then an integrated version of the two was translated to the language of the original version again; then it was ensured that the content of the Persian and English versions' was matched. The Persian version scale was filled in by 412 high school students (270 males and 142 females) in Tehran, who were selected as a random cluster. Regarding the clear scale structure to assess the validity, construct validity was used (confirmatory factor analysis) using the LISREL software version 8.8. In addition, scale reliability was examined using the two methods of internal correlation coefficient and test-retest.

Findings: Fit Index confirmed the resilience scales' fit ness in confirmatory factor analysis. In examining the reliability using the internal correlation calculation method (Cranach's alpha), the value of each sub-scale item, as well as that of total questions was higher than the standard value of 0.7 to confirm the tool's reliability. In examining the reliability using test-retest method, correlation coefficient of each sub-scale in two steps was at an acceptable level and significant.

Conclusion: The present study confirmed the three-factor structure of CYRM-28 scale, including the individual sub-scale's relationship with the primary caregiver and contextual factors in the Persian version of the scale. This study showed that the reliability and validity of the Persian version of CYRM-28 was suitable for measuring the resilience of Iranian children and youth.

Keywords: Resilience, Children, Youth, Psychometrics

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Introduction

Resilience is, generally, defined as, "the capacity of a system, community or society, which is potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure [1]. The recent movement of health promotion has shown that resilience is a very important concept in the sciences, especially in the field of children and adolescents [2]. This is determined by the degree to which the social system is capable of organizing itself to increase this capacity for learning from the past disasters for better future protection, and to improve risk reduction measures [1]. Regarding the multi-dimensionality and complexity of the resilience concept, the concept recently found its way to health area where there is no agreement on making a comprehensive definition of it [2]. Walsh suggested that being resilient includes more than merely surviving and being a victim for life; it also encompasses the ability to heal and to be empowered to live life fully [3]. In defining resilience, some studies refer to the individual while others refer to family characteristics or special situations of social life [4]. Resilience causes the individual to use difficult conditions and challenges as an opportunity to empower himself/herself with respect to personal and social capacities [5]. This concept has been defined as a protective factor against mental problems, as well as a dynamic process of adapting to change, especially at undesirable conditions of life [6]. Of course, resilience is not only a stability and passive state in the face of undesirable conditions, but is the individual's active and constructive involvement in his/her surrounding environment. In other words, resilience is the individual's ability to make bio-psychological balance under undesirable conditions [7].

In 2003, a meeting namely *Doing well despite adversity* was designed for creating a single measure (scale) of youth's resilience by the members of the international resilience research team under Michael Ungar. This was a part of the international resilience project that was programmed by the Resilience Research Center affiliated with Dalhousie University. In this meeting, 32 similar domains were identified for search in 14 communities in 11 countries. The 32 domains were divided into four parts: "Individual, relational, community, and cultural". These four parts are resilience aspects. Then each of the research team members focused on two groups of both youth and adults. After collecting comments and interviews, they began to design basic questions of the scale. The questions regarding to each of the areas and community's terms, attitudes and feelings were translated. First, the CYRM-28 had 58 questions that most of them

were eliminated by nonresponse rates and variance on all questions and imposing the communality criterion and exploratory factor analysis (EFA). Then other factors were added in order to have a best question quality. Finally, a version of CYRM having three sub-scales (individual, relational and contextual) was prepared to run on the study group in order to final approval. The comparison and analyses of 1451 quantitative data and 89 qualitative interviews were made for the youth; approved the CYRM-28 as a reliable and valid resilience measure tool [4]. There are a number of questions about you, your family, your community, and your relationship with other people. These questions are designed to better understanding about how you cope with the daily life and which kind of role the people play around you, and how you deal with the daily challenges [5]. Ungar et al. [4] examined CYRM-28's validity in Canadian adolescents. The findings showed that CYRM-28 is reliable and valid as a self-report tool. Three components of the reliability of CYRM-28 were examined using Cronbach's alpha, sample pair t-test and correlation coefficient at times of 2 and 1 and Cronbach's coefficient obtained in the range of 0.65 to 0.9 was acceptable in all cases.

One of the studies conducted in Iran examined the Derek Mowbray's psychometric scale (2011) in the field of resilience reported that a number was selected from school teachers' community as the sample where the reliability coefficient of the test using test-retest and the Cronbach's alpha were 0.94 and 0.65, respectively. In order to determine convergent validity, the correlation between the scores of Mowbray's resilience scale was calculated using the Connor-Davidson's scale (2003), and the value obtained was equal to 0.66 ($p < 0.01$) (8). Most studies related to resilience in Iran either in the field of children and adolescents or in older age groups used the resilience scale of Connor-Davidson (CD-RISC) (2003) [4, 8-12].

Although internal consistency, convergent and divergent validity and reliability for the resilience scale of Connor-Davidson were reported desirable, since the reliability and validity of sub-scales were not clearly determined, currently, only a total score of resilience is considered valid for research purposes [9]. Connor-Davidson resilience scale often focuses on personal characteristics and emphasizes on personal self-efficiency. This is partly because of lack of communication and social skills' elements [10]. Most studies in the field of evaluation resilience have been recorded outside of Iran and have been influenced by social and cultural factors. The main purpose of this study was validation and reliability analysis of the international scale of children and youth resilience measurement

(CYRM-28), and the initial assessment of resilience in children and adolescents will be necessary in order to design interventions and educational proprammes related to target groups because resilience is known as a potential, modifiable and changeable factor that can be improved and promoted through various health-oriented interventions [7]. This study was conducted due the importance of the issue and the lack of a valid, reliable, and compatible local culture tool that can specifically evaluate the resilience status of children and adolescents in Iran.

Materials and Methods

Regarding the central approach of this study to examine the scale's construct validity by doing a confirmatory factor analysis in accordance with scientific resources, it is necessary that a sample size equal to 10-20 samples be considered for each of the items or hidden variables [13].

It is recommended that researchers assess tools with more than three structures, and work with more than 100 to 200 samples [14].

Therefore, in order to further validate the study and take into account the amount of loss (according to the research time and freedom of participation), 17 samples for each item were considered after the collapse of some of the samples, while 412 subjects were enrolled.

Among the three parts like North, Central and South bands of Tehran, which includes nineteen areas covered by the Education Organization of the city, three areas were selected using cluster-random sampling, and from each area, among the schools for girls and boys, six schools (second grade primary schools and first and second grade high schools) were selected. The students were asked to participate in the research willingly and complete scales anonymously, and that in any step of the research, they can decide to quit. All these steps were performed after receiving permission from the university's Education Offices, and consent from the participants and their parents, as well as coordination with the selected schools.

The original version of the CYRM-28 is a 28-item scale including three individual sub-scales (11 items: 2-4-8-11-13-14-15-18-20-21-25), relationship with primary caregiver (7 items: 5-6-7-12-17-24-26), and contextual factors (10 items: 1-3-9-10-16-19-22-23-27-28).

Scoring

High scores indicate high levels of characteristics associated with resilience.

The mean score for each sub-scale will give you a score out of 5. These scores will represent the participant's average response to the questions included on that particular sub-scale.

Confirmatory Factor Analysis conducted on the data gathered in three international sites

has confirmed that the CYRM-28 has three sub-scales: individual, relationships with primary care-givers, and contextual factors that facilitate a sense of belonging. Within each of these sub-scales, there are additional clusters of questions that provide additional insight into these three dimensions. To score each of the clusters or sub-scales, one can simply sum the responses to the relevant questions. The high scores present more resilience components of the participating youth lives.

The answer of all questions was developed on a 5-item Liker scale, and scoring was specified from 1 to 5 based on the answers' alignment to the study purpose.

Phase 1

Localization steps

The original version was translated into Persian by two individuals. Then the two translated versions were integrated and translated to the original language by a specialist fluent in English, and finally, the integrated version was coordinated with the original version in a panel of experts in behavioral sciences, psychology and English as far as the content of the translated version was more adapted to the original version.

To solve possible conceptual problems, the scale was piloted in a pre-intervention before the main test. After ensuring that the content of the Persian and English versions matched, the Persian scale was examined to assess the construct's validity by confirmatory factor analysis using the LISREL software.

Phase 2

Validity and reliability implementation steps

- **Construct's dependent validity:** Regarding the specific tool structure in the original version and its translation with no structural changes, in order to examine the tool's validity, the structure's validity (via confirmatory factor analysis) was determined using the LISREL software (version 8.8).

- **Scale's reliability**: In order to examine the scale's reliability, the two methods of calculating internal correlation (Cronbach`s alpha) and test-retest were performed using the SPSS software (version 18).

Internal reliability of the three components on the original version of CYRM-

28 was a correlation coefficient on Time 1 and Time 2 responses. Cronbach’s alpha ranged from 0/65 to 0/91, and was acceptable in all cases [6].

- **Concurrent validity:** The resilience scale's scores had positive significant correlation with Connor and Davidson`s scores; these results indicate the concurrent validity of this scale.

- Face validity: Translation of the term resilience into Persion was accomplished based on a survey. The high level of consensus among the experts involved confirmed the face validity of the translation.

For Fit Index of the patterns in confirmatory factor analysis (CFA), it should be noted that the degree of freedom less than 3 was preferred for Chi-square ratio index (χ^2/df) though some considered it a good fit sign with the value of 4 and even 5 (Mueller) [14]. Other indexed used in the LISREL program included Normed Fit Index (NFI), Non-Normed Fit Index (NNFI), Comparative Fit Index (CFI), and Goodness of Fit Index (GFI), all of which had values more than 0.9. Bentler and Bonnet values equal to or greater than 0.9 compared with zero as a good indicator of fitness theoretical models have been suggested, while some researchers apply the cut-off point of 0.8 [15]. For Root Mean Square Error of Approximation-(RMSEA), values equal to or less than 0.05 are very good fit signs, and values equal to 0.08 are acceptable though some sources considered values up to 0.11 as acceptable [16,17]. Standardized Root Mean Square Residual (SRMR) is acceptable with values less than 0.08 of fit sign [18].

Results

Among the 476 studied samples, 412 individuals cooperated to the end of the study, and accurately completed the scales (data are shown in Table 1).

Table 1: Demographic characteristics of the subjects (N=412)

Variables	Frequency	Percent	Mean	Std. Deviation
Age	-	-	57.14	79.1
Gender				
Female	142	5.34	-	-
Male	270	5.65		
Grade				
Six grade of primary school	102	75.24	-	-
Seven grade of first period of high school	48	65.11		
Eight grade of first period of high school	116	15.28		
Nine grade of first period of high school	119	9.28		
Ten grade of second period of high school	27	55.6		
Living family members with				
Parents having siblings	310	24.75	-	-
Parents only	73	7.17		
Mother only	3	73.0		
Father only	4	1		
Family & other	12	9.2		
Family without father	7	7.1		
Family without mother	3	73.0		
How many times have you moved during last 5 years	-	-	10.1	24.1

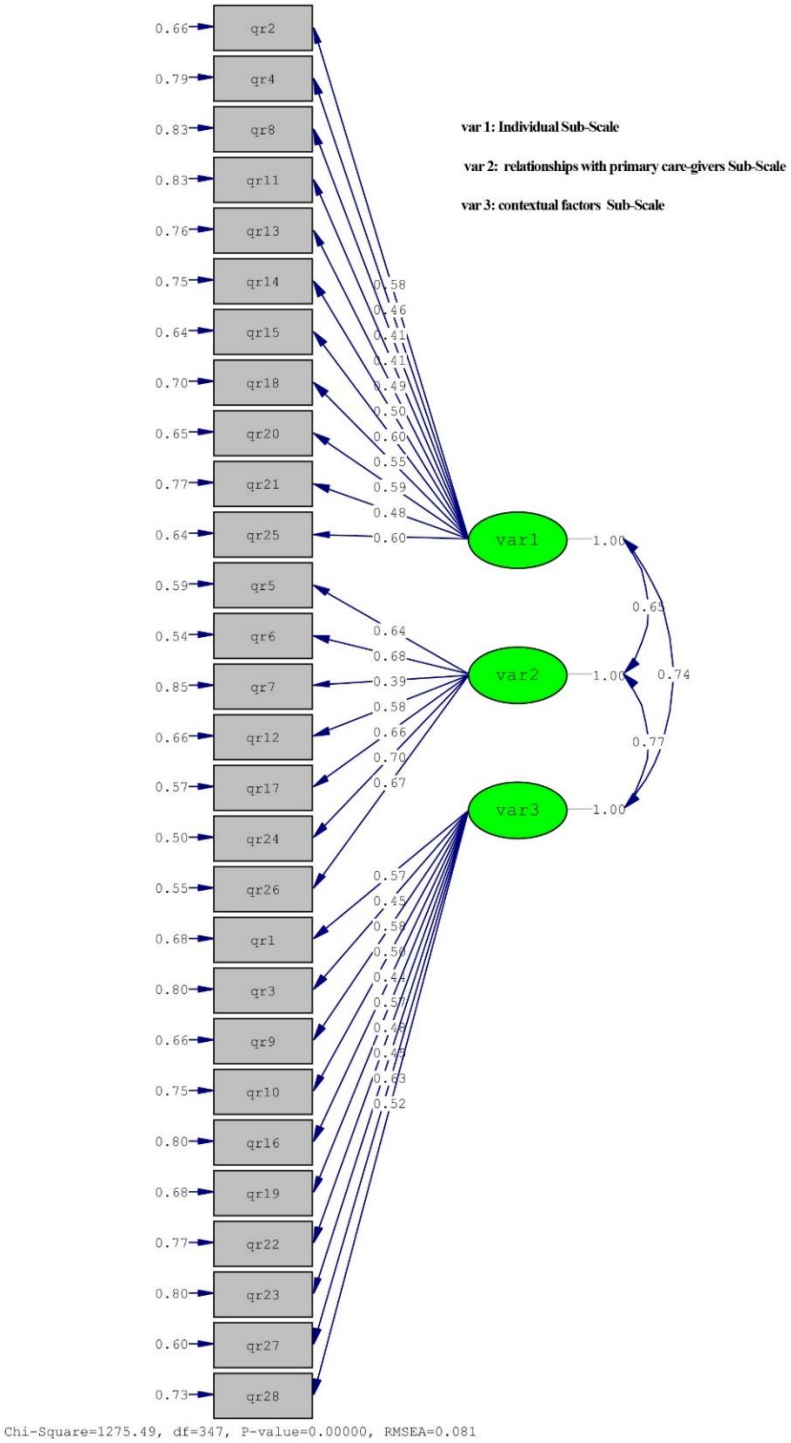

FIGURE 1: The 3-dimensional structure of the P-CYRM-28 in factor analysis

The results of the study showed that the mean and standard deviation of the students' age were 14.57 and 1.79, respectively. Also 310 (75.24%) participants were living with both parents.

The results of construct validity examination (confirmatory factor analysis) were inserted in LISREL software, and the output is shown in Table II and Figure 1.

The report showed that the value less than 4 in $\chi 2/df$, value less than 1 in RMSEA, value less than 0.08 for SRMR, and finally, desirable value for other fit indexes including CFI, GFI, NNFI indicated the obtaining of desirable values confirming the pattern's fitness, and in other words, confirming the construct's validity (Table 2 and Figure 1).

Table 2: Fitness indicators in factor analysis

Fitness indices		
Fit index	**Scores**	**Recommended cut-off value**
χ^2	1275.49	-
df	347	-
χ^2/ **df**	3.67	≤2; ≤3 or 5
ρ–value	0.000	-
RMSEA (Root Mean Square Error of Approximation)	0.081	≤ 0.05 ; ≤0.08 0r <0.1
CFI (Comparative Fit Index)	0.92	≥0.9
NFI (Normed Fit Index)	0.89	≥0.9
GFI (Goodness of Fit Index)	0.82	≥0.90 ; ≥.8
NNFI (Non-Normed Fit Index)	0.91	≥0.9
SRMR (Standardized Root Mean Square Residual)	0.074	<0.08

In examining the reliability by internal correlation calculation method (Cronbach`s alpha), the values of items for each sub-scale, and for the total questions were higher than the standard value of 0.7 to confirm the tool's reliability (Table 3). In examining the reliability by test-retest method, also the correlation coefficient (Pearson's correlation) of each of the sub-scales was acceptable and significant in the two steps (Table 3). In the study of Linda Liebenberg et al., the range of Cronbach's alpha was 0.65 to 0.91.

Table 3: Results of the scale's variables reliability

Sub-scales	**Cronbach`s alpha**	**Test-Retest (Pearson's correlation)**
Individual	0.783	0.891*
Relationship with primary caregiver	0.795	0.953*
Contextual factors	0.77	0.947*
Entire scale	0/85	

***** **P**<0.01

In this study, through examining tool reliability by Cronbach's alpha coefficient calculation method, the results indicated the tool's reliability (Cronbach's alpha: 0.85).

Cronbach's alpha coefficient for individual scales, relationships with primary caregiver and contextual factors were equal to 0.783, 0.795, 0.77. Cronbach's alpha coefficient was higher than the threshold for all sub-scales and related questions, as well as for all questions Cronbach's alpha 0.85; this shows the tool's reliability in terms of internal correlation.

Test-retest results showed that Pearson's correlation coefficient was 0.891, 0.953, and 0.947 for the individual sub-scales, relationship with primary care-giver, and contextual factors, respectively.

All of the three sub-scales are correlated significantly (Table 4).

Table 4: Correlations between the 3 sub-domains

	Individual sub scale	Relationship with primary care-givers subscale	Contextual factors subscale
Individual subscale	1		
Relationship with primary care-givers subscale	0.65	1	
Contextual factors subscale	0.74	0.77	1

Discussion

In 2011, Linda Liebenberg et al., began to validate the CYRM-28 among the two groups of Canadian youth. There were 497 people in the first group that 56.5% of them were males and the rest were females. The mean age and standard deviation of this group were in turn 16.85 and 1.868, respectively. The results further showed that 40% of the first group was living with both parents. The second group participated in the study included 410 people with mean age and standard deviation of 15.96 and 1.785, respectively; 57.3% of them were males [19].

The studies of Linda Liebenberg et al. in 2011 showed that CYRM-28 and its sub-scales have internal consistency and the results of CFA confirm this consistency. Also the Comparative Fit Index (CFI) and Standardized Root Mean Square Residual (RMSEA) were achieved as 0.979 and 0.046, respectively. In our study, the values of CFI 0.92 and RMSEA 0.081 were obtained [19].

This study was conducted to examine the validity and reliability of the Persian version (P_CYRM_28) of the international scale measuring the children and youth resilience (CYRM_28). The scale consists of the three sub-scales of individual, relationship with primary caregiver and contextual factors. The results showed that the Persian version (P_CYRM_28) of CYRM_28 has acceptable

validity and reliability.

Most studies related to resilience in Iran used the resilience scale of Connor-Davidson (CD-RISC). The results of confirmatory factor analysis indicated that this scale includes five sub-scales: sub-scale 1 reflects the notion of personal competence, high standards, and tenacity; sub-scale 2 corresponds to trust in one's instincts, tolerance of negative effect and strengthening effects of stress; sub-scale 3 relates to the positive acceptance of change, and secure relationships; sub-scale 4 is related to control; and sub-scale 5 deals with spiritual influences [20].

Connor and Davidson reported Cronbach's alpha coefficient of the scale (CD- RISC) as equal to 0.83. Psychometric evaluation of this scale has been done by Mohammadi et al. in Iran. They used Cronbach's alpha coefficient (0.89) to determine the scale's reliability (CD-RISC) [20].

In the present study using test-retest method, correlation of questions and structures' between the two steps of examination was desirable and significant, indicating the tool's reliability over time. Also the results of examining the construct validity by confirmatory factor analysis showed desirable Fit Index and tool validity.

In order to determine the scale's validity, first, the correlation between the variables was calculated, and then using confirmatory factor analysis, the correlation of coefficients was obtained in the range of 0.89 – 0.95.

The results of confirmatory factor analysis confirmed the value of the detected variables on high level. Fit Root Mean Square Error of Approximation (RMESA) of 0.081, Comparative Fit Index (CFA) of 0.92, Normed Fit Index (NFI) of 0.89, Goodness of Fit Index (GFI) of 0.82, Non-Normed Fit Index (NNFI) of 0.91 and Standardized Root Mean Square Residual (SRMR) of 0.074 were calculated. These amounts indicate obtaining desirable values to confirm the pattern's fitness.

According to the results of this study, the Persian version (P_CYRM_28) of the international scale, measuring the children's and youth's resilience (CYRM_28) has desirable validity and reliability, and with regard to the cultural and social factors in the community, it is a valid tool for measuring resilience in Iranian children and youth.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

SF: implementation of the research and participating in preparation of paper, GG: managing and guiding the research implementation and supervising upon preparation of the paper; MT: giving

consultation in the research implementation, carrying out the statistical analysis and participating in preparation of the paper; MA: translating the scale, implementation of the research and participating in preparation of the paper; and AM: giving consultation in the research implementation.

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