**ORIGINAL ARTICLE**

# Validation of Persian version of Connor-Davidson's Resilience Scale in Adolescents with cancer

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**ABSTRACT**

*Backgrounds and objective: As a chronic and life-threatening disease, cancer requires strong resilience capacity. Assessment of efficacy of interventions conducted to enhance resilience of adolescents with cancer requires an appropriate tool. This study was conducted to assess psychometric properties of the Persian version of Connor-Davidson's Resilience Scale in adolescent with cancer.Materials and methods: In this methodological study, psychometric properties of the Persian version of Connor-Davidson's Resilience Scale (CD-RISC) were investigated in adolescents with cancer referred to oncology clinics and departments of Pediatrics Medical Center in Tehran, Urmia, Tabriz, and the Cancer Research Center in Isfahan. Content validity index was found according to comments from 10 experts, and construct validity (confirmatory factor analysis) was performed in a sample comprising 200 adolescents with cancer. Cronbach'salpha and correlation coefficient were calculated via test-retest with 3 a week-interval. Data were analyzed using SPSS-20 and AMOS-21 software. Results: Content validity of the tool was examined and no change was implemented in the numbers and contents of statements. In confirmatory factor analysis, a 5-factor scale model was confirmed by eliminating item 2 "There is at least one person close enough to help me at the time of stress or mental pressure". Internal consistency of the whole scale was found (α=0.82), and for every sub-scale, including: personal competence (α=0.75), tolerating negative effects and strength against stress (α=0.72), positive acceptance of change (α=0.74), self-control (α=0.73), spiritual effects (α=0.75). Pearson correlation coefficient for test re-test produced r=0.404 and P<0.05.Conclusion: The Persian version of Connor-Davidson Resilience Scale was approved with 24 items and 5 subscales for adolescents with cancer in Iran, and it can be used to examine resilience of adolescents with cancer in Iran.*
*Keywords: Connor-Davidson Resilience Scale, adolescents, cancer, validity, reliability*

## INTRODUCTION

Cancer is a global health concern in all age groups [1]. Today, with advances in medical sciences, cancer has been transformed from a fatal disease to a chronic one. This disease is considered the second cause of death in children [2].

Of children and adolescents under 15 years in Iran, 0.2% suffers from cancer. It accounts for 4% of deaths in children less than 5 years and 13% of deaths in 5- to 15-year-old children in Iranian population, and with improved socioeconomic status and healthcare in Iran, 70% of this group can survive more than 5 years [3].

Development of cancer diagnostic and treatment technology has led to increased survival rate of patients. Thus, an important point in care of these patients is to improve their quality of life [4]. Since this is considered a chronic and life-threatening disease, the long process and uncertainty about the outcome, as well as periodic crisis and anger toward periodic treatments requires strong resilience [5]. In mental health literature, resilience means the ability to adapt to difficult situations and provide flexible responses to daily pressures of life [6].

Generally, resilience is a complex and multidimensional concept, and other health concepts are often considered as prerequisite for resilience. Following knowledge of their diagnosis as an undesirable event,

adolescents with cancer experience physical and mental crises, and to manage these crises and enhance adolescents' health, it is essential to identify these parameters and apply a model that predicts resilience in this group [7].

Considering that adolescents with cancer have rarely been the target of studies conducted on psychosocial and spiritual care associated with cancer, and that few studies have been conducted to direct nursing interventions to help them achieve effective coping and resilience against the disease, knowledge and awareness in this particular area can provide an important step toward development of interventions [8].

Amid, application of models or assessment of efficacy of interventions to enhance resilience in adolescents with cancer requires an appropriate tool for the concept.

An existing scale designed to measure the concept is "Connor-Davidson Resilience Scale" (CD-RISC) that was designed by Connor and Davidson in 2003 in the United States to measure resilience. This scale has suitable validity and reliability, and has been translated into various languages, and its psychometrics has been assessed in countries such as China , South Africa, India, the U.S.A., Australia, and Brazil, and in various populations including students, adolescents, general public, and specific professional groups like nurses and other healthcare providers [9].

This scale has 25 items with 5-option Likert scale. In Iran, this scale was translated for the first time, and its psychometrics was assessed by Mohammadi (2005) on 718 men aged 18-25 years, in healthy and addict groups [10].

Given the importance of disease resiliency in adolescents with cancer, and considering that CD-RISC has never undergone psychometric assessment in adolescents, especially in adolescents with cancer, and since there is still no tool available in Iran for measuring this concept in adolescents with cancer, this study was conducted with the aim to find psychometrics of the Persian version of Connor-Davidson Resilience Scale in adolescents with cancer in Iran.

**MATERIALS AND METHODS**

In this methodological research, psychometric properties of the Persian version of Connor-Davidson's Resilience Scale (CD-RISC) were investigated in adolescents with cancer. Study population comprised all adolescents with cancer, attending oncology clinics and departments of Children's Medical Center (the largest pediatrics cancer center in Iran), Ali-Asghar pediatrics subspecialty clinic and hospital, and Tehran's Taleghani hospital (90 patients), oncology clinics and departments of Imam Khomeini, Taleghani, ShahidMotahari hospitals and Omid Medical Research Center in Urmia (35 patients), Pediatrics Medical Center in Tabriz (30 patients), and Cancer Research Center in Isfahan (45 patients). It should be noted that Tehran hospitals are considered the center for referral of adolescents with cancer from all over Iran, and can be considered to nearly represent community of adolescents with cancer. Given lack of subjects in these centers, and since in this study convenient sampling method was used, other available referral centers were also used.

**Connor-Davidson Resilience Scale**:

This scale was designed by Connor and Davidson in 2003 in the United States to measure resilience, with 25 items according to factor analysis and 5 subscales including "personal competence" (8 items), "tolerance of negative effects and strengthening against stress" (7 items), "positive acceptance of change" (5 items), "self-control" (3 items, and "spiritual influences" (2 items) [12, 13]. Scoring is based on Likert scale from zero for not true at all to 4 for always true, and an overall score is worked out for resilience, ranging from minimum zero to maximum 100, and higher scores indicate greater resilience [13]. Internal consistency (Cronbach'salpha) of Connor-Davidson Resilience Scale was reported α=0.89, with stability r=0.87 [12].

In 2005, this scale was translated and validated by Mohammadi in Iran. Translation of the scale into Persian and back into English was confirmed by designers of the scale, and Cronbach'salpha was used to establish its reliability, and factor analysis to determine its construct validity. Results obtained indicated single factor scale. Cronbach'salpha was found α=0.93. In a study by Samani et al. (2007), Cronbach'salpha was α=0.87 [10].

**Psychometrics of Persian version of Connor-Davidson Resilience Scale (CD-RISC) in adolescents with cancer**

First, the designer (Dr. Davidson) was e-mailed and his permission was obtained. Then, the Persian translation was made available to the researcher. To determine psychometrics of the scale, face, content, and construct validity (confirmatory factor analysis), internal consistency and stability were examined. To determine face and content validity, opinions of 10 experts were sought, from fields of nursing, psychology, psychometrics (one clinical psychometrics expert, one oncologist, two psychiatric nurses, two cancer nursing trainers, one pediatric nursing trainer, and three assistant nursing professors, experienced

in questionnaire design), after assessment, their comments were provided as Content Validity Index (CVI). These experts were selected purposively.

To determine content validity, relevance, simplicity, and clarity of items of the scale were decided in a 4-point scale from 1 to 4 [14], and content validity of the scale for each of the three domains and also for the whole scale was calculated. These experts also assessed and confirmed face validity of translated scale. Next, scale was made available to 10 adolescents with cancer, and their views were sought on simplicity of use and understandability of the statements. By the end of this stage, no change was found necessary in the number and contents of items.

In assessment of construct validity of the scale, convenient sampling was used to achieve sufficient sample size for confirmatory factor analysis. Adolescents aged 12 to 21 years entered the study with minimum of one year since their diagnosis of cancer, with knowledge of their disease, and literacy. Moreover, they had no other particular chronic disease besides cancer, and had no siblings with chronic diseases. Type and stage of cancer, or type of treatment were not parts of inclusion criteria. The sample size required for confirmatory factor analysis to determine construct validity varies according to different researchers. Ultimately, 200 samples were selected according to these criteria [15].

Permissions to conduct study and necessary coordination with research fields were carried out. Written consents were obtained from participating adolescents and their parents, and then they completed CD-RISC and demographic and clinical questionnaires, containing 15 items on age, gender, education, parents' education and occupation, family income, number of siblings, patient's name, type of treatment, age at onset of disease, duration of the disease, type of treatment and any metastasis. If a patient was unable to complete questionnaires, researcher read the questions and ticked the answers according to patient's response. Completion of questionnaire took around 20 to 25 minutes.

To determine construct validity of the CD-RISC scale, confirmatory factor analysis was used with AMOS-21 software and fitness indices were calculated including Chi-square on degree of freedom, Comparative Fit Index (CFI), Parsimonious Comparative Fit Index (PCFI), Root Mean Square Error of Approximation (RMSEA), and HOELTER's Index [16-18].

Internal consistency reliability of scale was found via Cronbach'salpha on samples from factor analysis section. To determine stability (performing retest), data were collected from 25 adolescents selected according to study inclusion criteria, and test-retest was performed with 3 weeks. To comply with ethical considerations, study objectives were explained to all participants and their written consent was obtained. Participants were assured of confidentiality, and that they could withdraw at any stage they wished, and if they liked, they could be informed of results.

## RESULTS

Demographic and clinical details of participating adolescents are presented in table 1.

**Table 1**: Demographic and clinical details of participating adolescent.

| Variable | Categories | Number | Percentage |
|---|---|---|---|
| Age | 12-14 | 80 | 40 |
| | 15-17 | 48 | 24 |
| | 18-21 | 72 | 36 |
| Gender | Boy | 101 | 50.5 |
| | Girl | 99 | 49.5 |
| Type of cancer | ALL | 80 | 40 |
| | AML | 50 | 25 |
| | Brain tumor | 33 | 16.5 |
| | Hodgkin | 22 | 11 |
| | Prostate | 4 | 2 |
| | Other | 11 | 5.5 |
| Age at onset of cancer | Younger than 10 years | 46 | 23 |
| | 10-15 | 84 | 42 |
| | Older than 15 | 70 | 35 |
| Type of treatment | Chemotherapy | 125 | 62.5 |
| | Radiotherapy | 16 | 8 |
| | Surgery | 7 | 3.5 |
| | All above | 52 | 26 |
| Metastasis | Yes | 4 | 2 |

| | | | |
|---|---|---|---|
| | No | 196 | 98 |
| Duration of disease | Less than 1 year | 63 | 31.5 |
| | 1-3 years | 56 | 28 |
| | More than 3 years | 81 | 40.5 |
| Total | | 200 | 100 |

To determine content validity of scale, content validity index was used and content validity in areas of relevance, clarity, and simplicity were found 0.89, 0.96, and 0.97, respectively. Also, SCVI value was 0.98.To determine construct validity, confirmatory factor analysis was used. Results of standard estimate model indicated inappropriate status of fitness indices including CFI, PCFI, and RMSEA (table 2).

Model was modified using AMOS software according to recommendations to modify fitness indices in confirmatory factor analysis. AMOS software provides researchers with data to improve the model, and modification process continues until acceptable fitness indices are obtained (Brown, 2006). Accordingly, item number 2 "There is at least one person close enough to help me at the time of stress (mental pressure)", was eliminated from the third subscale (positive acceptance of change) due to a very low correlation coefficient, which led to improved fitness of the model.

Reliability of the whole tool was found α=0.82 and for each subscale including personal competence (α=0.75), tolerance of negative effects and strengtheningeffects to stress (α=0.72), positive acceptance of change (α=0.74), self-control (α=0.73), and spiritual influences (α=0.75). Pearson correlation coefficient results for test-retest showed P<0.05, and r=0.404.

| Table 2: Fitness indices of Persian version of Connor-Davidson Resilience Scale before and after modification of model | | | |
|---|---|---|---|
| Fitness index | Desirable values | Values before modification | Values after modification |
| $X^2/df$ | Less than 5 | 3.395 | 1.563 |
| Comparative Fitness Index (CFI) | Greater than 0.9 | 0.512 | 0.903 |
| Parsimonious Comparative Fitness Index (PCFI) | Greater than 0.5 | 0.460 | 0.687 |
| Root Mean Square Error of Approximation (RMSEA) | Less than 0.08 | 0.110 | 0.053 |
| HOELTER's Index | Greater than 200 (suitable) | 86 | 86 |
| | 75-200 (good and acceptable) | | |
| | Less than 75 (poor) | | |

## DISCUSSION AND CONCLUSION

Resilience, as a protective factor against future dangers and people's positive capacity to cope with stresses and crises in life [19], is closely associated with adolescents' mental health [20]. Considering the importance of resilience in adolescents with cancer and lack of a valid and reliable tool to measure this concept in this group, this study was conducted with the aim to assess psychometrics of the Persian version of "Connor-Davidson Resilience Scale" in Iranian adolescents with cancer.

In this study, psychometrics of "Connor-Davidson Resilience Scale" and its factor structure were investigated. Generally, CVI value as a standard for content validity of scales should be considered 0.9 and above [21]. Given that content validity of the Persian version of CD-RISC was found 0.98, hence, the above scale has a suitable content validity.

Confirmatory factor analysis of CD-RISC was performed using a sample of 200 adolescents with cancer. Results of the model's fitness indices showed inappropriate fitness of the Persian version of CD-RISC for the original model (with 25 items and 5 subscales). Thus, model was modified according to recommendations to modify fitness indices in confirmatory factor analysis using AMOS software. Accordingly, item number 2 "There is at least one person close enough to help me at the time of stress (mental pressure)", was eliminated from the third subscale (positive acceptance of change), which led to improved fitness of the model.

Burns & Anstey [22] in their study titled "One-dimensional variance analysis of Connor-Davidson Resilience Scale" conducted on 1775 Australian adolescents, following confirmatory factor analysis, also found very low correlation between item 2 and other items [22], which agrees with the present study results. Tusaie et al. [23] in their study aiming to determine resilience and predicting factors in rural adolescents found that social support from friends had a negative effect on their mental resilience [23]. This was somewhat in agreement with the present study in eliminating item 2 from the scale, which can justify elimination of this item.

Connor-Davidson Resilience Scale psychometric assessment has been performed in various countries and populations. Although, in the present study, the 5 subscales in the original version of CD-RISC in adolescents with cancer were confirmed, there is a significant variation in results of studies conducted, and it seems it is dependent on participants' age (general population vs. patients, patientsvs, healthy people) and culture [9].

In a study by Yu & Zhang (2007) titled "Psychometrics of Connor-Davidson Resilience Scale" conducted in China, it was found that spirituality and belief in God item had a low score compared to scores obtained for this item in other societies. Since Chinese people are less religious compared to people in other societies, such results were to be expected, which reflect cultural texture of society in resilience [24].

Reliability for the whole scale was found α=0.82, which agrees with reliability found in previous studies [9, 10, and 25], and shows suitable internal consistency.Performing face and content validities, construct validity, internal consistency and stability of the translated scale indicated that generally, the Persian version of resilience scale with 24 items and 5 subscales is confirmed for use in Iranian adolescents with cancer, and that its dimensional structure is similar to the original version. Thus, this scale is applicable for studying resilience of Iranian adolescents with cancer.The present study results also have applications in nursing research.

Although, the scale assessed in the present study enjoys high level of validity and reliability, further studies will lead to elimination of potential problems within it, and facilitate its application. Furthermore, since this scale underwent psychometrics in order to measure resilience in adolescents with cancer, its application and psychometrics are recommended in other adolescent groups, including adolescents with mental disorders, high-risk behaviors and other common diseases in adolescents.

### STUDY limitations

In the present study, resilience was measured using self-reporting questionnaires. Thus, it is possible that adolescents' answers to questions may have been affected by mental status, education level, and social acceptability bias. Certain experts in humanity research believe confirmatory factor analysis may increase the chances [26], which may be regarded as a study limitation.

### ACKNOWLEDGEMENTS

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