



# The Assessment of Alexithymia Across Positive and Negative Emotions: The Psychometric Properties of the Iranian Version of the Perth Alexithymia Questionnaire

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## Abstract

**Background:** Construct of Alexithymia is important for understanding psychopathology that its assessment is of high interest as persons with difficulty in processing their emotions (either positive and negative) are more vulnerable to psychopathology problems.

**Objectives:** The current study aimed to determine the psychometric properties of the Perth Alexithymia questionnaire (PAQ), and to describe appropriate measures for the field of clinical psychology and psychiatry.

**Methods:** The Persian version of the PAQ was produced through forward translation, reconciliation, and back translation. The study population was all staff (soldiers) of the army force in Tehran, Iran, in 2018 - 2019. Two hundred and fifty four soldiers were selected by convenience sampling method. The following questionnaires were used to collect data: the PAQ, The Deliberate Self-Harm inventory (DSHI), Borderline Personality scale (STB), Cognitive Flexibility inventory (CFI), and Self-Compassion scale (SCS) short-form. The construct validity of the PAQ was evaluated using confirmatory factor analysis, divergent, and convergent validity. Internal Consistency and test-retest reliability (2 weeks' interval) were applied to evaluate reliability. Data were analyzed using LISREL (version 8.8) and SPSS (version 22).

**Results:** PAQ and its subscales were found as valid and reliable measures, with good internal consistency and good test-retest reliability. The PAQ showed good internal consistency (Cronbach's  $\alpha = 0.91$ ). Concerning the convergent validity, PAQ and its subscales showed a significant positive correlation with self-report measures of DSHI and STB ( $P < 0.05$ ). However, they were negatively correlated with Self-Compassion scale (SCS) short-form and CFI ( $P < 0.05$ ), which demonstrated a good divergent validity. Moreover, while the results of this study support the five-factor models of the PAQ ( $RMSEA = 0.08$ ,  $NFI = 0.94$ ,  $CFI = 0.95$ ), the two-factor model does not fit the data.

**Conclusions:** The PAQ showed good validity and reliability and can be useful for evaluating Alexithymia in the army force samples. The PAQ can be considered promising as a measure in Alexithymia-related research and clinical settings.

**Keywords:** Alexithymia, Emotions, Factor Analysis, Psychometrics, Self-Report

## 1. Background

Positive (such as happiness) and negative (such as sadness) emotions are produced by three channels of the emotional system: subjective-experimental (anger), physiological (increased heart rate), and behavioral (trying to escape) (1). Different people have various capacities for the emotional responses process, which is mainly reflected in their traits of alexithymia (1-3). Alexithymia is a trait characterized by the ability to focus attention and accurately

appraise the emotions (4). Alexithymia is a construct consisting of difficulty in identifying feelings (DIF), describing feelings (DDF), and externally oriented thinking (EOT) (5). Alexithymia consists of cognitive and affective dimensions. The cognitive dimension is characterized by problems with recognition, verbalizing, and analyzing feelings. While the affective dimension includes reduced levels of emotional experience and imagination (6). Alexithymia may cause a spectrum of psychopathologies, including de-

pression (7), anxiety (8), psychosomatic (9), substance use (10), eating (11), and personality disorders (12). Besides, high levels of Alexithymia can also intervene with some psychotherapy approaches (e.g. psychoanalysis) (13). Several measurement tools are developed to measure the construct of Alexithymia (14-16). However, these tools have significant limitations that have diminished their clinical and research application (4). Preece et al. have investigated the differences between the models of Alexithymia and its measurement (3, 17). The Perth Alexithymia questionnaire is based on the attention-appraisal model (4). The evaluation model defines the Alexithymia attention as a continuous, multidimensional construct containing three components related to DIF, DDF, and EOT (3). These components are conceptualized within the framework of a valuation system. Valuation systems contain four stages of the situation-attention-appraisal-response sequence through which one evaluates the meaning of the stimulus (4, 18). EOT is characterized by a problem in the attention phase of this valuation system, and DIF and DDF are identified as problems in the valuation phase (4). In other words, when an emotional response occurs, people with high levels of Alexithymia are more prone to face difficulty in focusing attention and careful evaluation. Measuring Alexithymia should include both positive and negative emotions (4). van der Velde et al. (19), in a recently conducted meta-analysis reported different neural correlations depending on whether negative or positive emotions are processed. Moreover, Alexithymia measurement should be separated based on the DIF and DDF subscales and covers both positive and negative emotions (4). As people with difficulty in processing emotions (either positive and negative) are more vulnerable to psychopathology problems, assessment of Alexithymia is clinically important. However, existing tools cannot provide a comprehensive assessment of the Alexithymia construct through positive and negative emotions (1). On the other hand, having reliable tools to measure this construct is important to expand research and evaluate the effectiveness of currently available treatments.

The PAQ has been developed and investigated in cultures different than the Iranian culture. Nevertheless, investigating the psychometric traits of the scale in different cultures would be useful for its external validation (20). Since high levels of alexithymia have been reported among soldiers (21, 22) we decided to evaluate the psychometric properties of PAQ in a sample of Iranian army soldiers. The present study also has evaluated the test-retest reliability and divergent validity of the PAQ, which are not addressed in Preece et al. (4).

## 2. Objectives

Alexithymia comes with critical psychological consequences. Considering the lack of a reliable and valid scale in Iran and its importance in clinical research and treatment, the current study aimed to investigate the psychometric properties of the Persian version of the Perth Alexithymia questionnaire.

## 3. Methods

### 3.1. Participants and Sampling

In this cross-sectional descriptive study, which has used factor analysis (structural equations modeling) methodology, a sample of soldiers of the Islamic Republic of Iran Army in Tehran in 2018 - 2019 is investigated. When using the confirmatory factor analysis (CFA) approach, calculating the minimum sample size is critical, which is around 200 subjects (23). Nevertheless, the highest validity of CFA is when the sample size is over 250 (24). In this line, using the convenience sampling method, 300 soldiers were recruited. However, 46 questionnaires were excluded due to failure to complete the data. The inclusion criteria included being a student and a willingness to participate in the study. The exclusion criteria were a history of severe medical illness and substance abuse. Participants were informed that they can withdraw whenever wanted. To control the effect of order and fatigue, the questionnaires were presented in different order. The research does not impose any financial burden on participants. The present study is approved by the Ethics Committee of the AJA University of Medical Sciences (code: 1397.043).

### 3.2. Measures

#### 3.2.1. Perth Alexithymia Questionnaire

Perth Alexithymia questionnaire (PAQ) is a 24 items questionnaire designed to assess alexithymia in adults and adolescents. The PAQ contains three alexithymia components (i.e. DIF, DDF, and EOT) and five subscales (N-DIF = Negative-Difficulty identifying feelings, P-DIF = positive-difficulty identifying feelings, N-DDF = negative-difficulty describing feelings, P-DDF = positive-difficulty describing feelings, G-EOT = general-externally orientated thinking). The subscales were scored on a seven-point Likert scale, ranging from one (strongly disagree) to seven (strongly agree). Higher scores indicate higher levels of alexithymia. The subscales are designed in a manner to theoretically shape a meaningful compound. The questionnaire of alexithymia has excellent psychometric properties (4). The comparability between the Persian translation and the original version of PAQ has been confirmed by translation

and back-translation methods. So that, first, four Ph.D. candidates in clinical psychology translated the PAQ to Persian separately. Next, a bilingual individual was asked for back-translation, and the back-translated version was reviewed by other bilingual experts. The final version of the Persian PAQ was matched to the original version by two bilingual clinical psychologists. Next, the scale was implemented on a sample of 20 subjects to identify errors.

### 3.2.2. Borderline Personality Scale

This scale is designed to measure borderline personality patterns and includes 24 yes/no items. Jackson et al. reported a reliability coefficient of retest equaled to 0.61 (25). In a clinical trial of patients with borderline personality disorder, differential validity, and Borderline Personality scale (STB) construct were confirmed (26). This scale has favorable psychometric properties in Iran (27).

### 3.2.3. The Deliberate Self-Harm Inventory

The Deliberate Self-Harm inventory (DSHI) is a 17 items questionnaire to assess aspects of deliberate self-harm behaviors, including frequency, duration, and type of self-harm. The questions should be answered by yes or no. Retest and construct validity, and convergent and divergent validity of the inventory have been reported properly in the samples of patients and undergraduate students (28). Moreover, the inventory has been widely used in various studies (28, 29). The test-retest reliability and Cronbach's alpha coefficients are reported to be equaled to 0.92 and 0.82, respectively (28).

### 3.2.4. Self-Compassion Scale Short-Form

Self-Compassion scale (SCS) short-form is a 12 item questionnaire scored on a five-point Likert scale ranging from 1(almost never) to 5(almost always). The correlation coefficient is calculated as  $r=0.97$ , and the retest reliability is reported as 0.92 (30). The Iranian version of this scale is reported to have favorable psychometric traits (31).

### 3.2.5. Cognitive Flexibility Inventory

Cognitive Flexibility inventory (CFI) is a 20-item scale developed to assess cognitive flexibility, intended to challenge individuals to replace maladaptive thoughts with more adaptive thinking. The inventory is scored on a 7-point Likert-scale, ranging from "strongly disagree" to "strongly agree".

The CFI can be used for both clinical and non-clinical samples to assess the individual's progress in developing flexible thinking in CBT for depression and other mental disorders. The CFI demonstrated to have adequate levels of

validity, reliability, and internal consistency (32). The psychometric properties of the Persian version of STB are reported as excellent (33).

### 3.3. Statistical Analysis

Data were analyzed using SPSS version 22. Test-retest reliability, convergent validity, internal consistency, and divergent validity of the Persian PAQ were evaluated. Internal consistency was evaluated by Cronbach's alpha. A Cronbach's alpha coefficient ranging from .70 to .95 indicates good internal consistency (34). Test-retest reliability was calculated via the intraclass correlations coefficient (ICC). An intraclass correlation (ICC)  $\geq 0.70$  identifies the decent reproducibility of a measure (34).

The construct validity of the PAQ was assessed by the five-factor structures of the PAQ, as recommended in the original version, using LISREL software (version 8.8). The model was fine-tuned by the maximum likelihood optimization method. The performance was examined using multiple indices, including the chi-square statistic ( $\chi^2$ ), the comparative fit index (CFI), normed fit index (NFI), non-normed fit index (NNFI), root mean square error of approximation (RMSEA), and standardized root mean residual (SRMR). CFI, NFI, and NNFI values  $> 0.90$  were judged to indicate acceptable fit, as were RMSEA and SRMR values  $< 0.08$  (23, 24). A normal chi-square of 0 to 3 indicates an acceptable model fit (35). Incremental Fit Index (IFI)  $\geq 0.95$  represents the good fitting of the model (23). The goodness of fit index (GFI) and adjusted goodness of fit index (AGFI)  $\geq 0.90$  indicative of good fitting models (36).

## 4. Results

### 4.1. Description of the Sample

In total 254 soldiers were participated in the present study, with an age range of 18 to 30 years old. The mean age of participants was  $25.71 \pm 3.86$ . Concerning the marital status, 216 participants were single (85.03%) and 38 were married (14.9%). Regarding the educational status 88 of the subjects had a BSc degree (34.64%), 96 had diploma (31.88%), 70 had a degree lower than diploma (27.55%). The mean and standard deviation of the PAQ subscale are shown in Table 1.

### 4.2. Internal Consistency

Cronbach's alphas were calculated with the total sample ( $n=254$ ). PAQ and subscales were found to have a good internal consistency, see Table 2.

#### 4.3. Test-Retest Reliability

The test-retest reliability was calculated for both PAQ and its subscales using a sample of 32 soldiers who filled the PAS for two times, in an interval of two weeks. The results indicated good test-retest reliability of the PAQ and all five subscales, with a significant ICC between time 1 and time (PAQ, ICC = 0.86; N-DIF, ICC = 0.93; P-DIF, ICC = 0.87; N-DDF, ICC = 0.84; P-DDF, ICC = 0.84; EOT, ICC = 0.88).

#### 4.4. Convergent and Divergent Validity of MSI-BPD

The convergent validity of the PAQ was evaluated using the correlation between PAQ total score and its subscales with scores on self-report measures of STB and DSHI. As expected, the results demonstrated positive correlations between the PAQ and its subscales with STB and DSHI ( $P < 0.05$ ).

To evaluate the divergent validity of PAQ, the correlation between the PAQ and two theoretically less related constructs, namely Self-compassion and CFI, was measured. A negative correlation was found between PAQ and these two scales ( $P < 0.05$ ) (See Table 3).

#### 4.5. Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was conducted to evaluate the construct validity of the PAQ and to deter-

mine the fit of the factor structures obtained by Preece et al. (4). Based on the results of PAQ, five-factor models were tested. See Table 4 for fit indices of five-factor models. The results showed that the five-factor models fitted the data well. The two-factor model (G-DAF = general-difficulty appraising feelings, G-EOT = general-externally orientated thinking) didn't have an acceptable fit.

## 5. Discussion

Alexithymia is considered a risk factor for several psychiatric disorders because it prevents emotion regulation and disrupts one's successful adaptation that doesn't come to words (37). Moreover, alexithymia is associated with an increased risk of medical and psychiatric disorders. Hence, it is also important to have reliable instruments to measure this construct in order to develop research and evaluate the effectiveness of currently available treatments for alexithymia. The present study intended to assess the psychometric traits of the Persian PAQ among a sample of Iranian soldiers. The results indicated that the five-factors model, including EOT, N-DIF, P-DIF, N-DDF, and P-DDF, was well fine-tuned. This finding is consistent with the results of other studies on both non-clinical and clinical samples (4) as well as the theoretical basis of the subject (3). A normal chi-square of 0 to 3 indicates an acceptable model fit (35). Nevertheless, in the present study,  $\chi^2/df$  was greater than 3 (3.91), which indicates a poor fit of the data to the original model. Chi-square is highly sensitive to sample size, which may cause overestimation of the fitness (through increased degree of freedom) (38). So we used indices that are independent of the sample size, such as CFI, NNFI, SRMR, and RMSEA. The two-factor model does not fit the data well. The results of the examination of these factor structures of the PAQ were inconsistent in both non-clinical and clinical samples (4).

The PretPAQ is based on the Assessment-Attention model. Thus unlike the previous tools, it's intended to measure alexithymia through positive and negative emotions. For example, Feldman Barrett et al. (39) demonstrated that distinguishing between negative emotions is not similar to positive emotions. The PAQ uses positive and negative emotions to separate DIF and DDF subscales. Meanwhile, it provides us the ability to estimate emotional capacity based on the evaluation stage. It's worth noting that none of the previous tools developed to measure alexithymia can provide such information. To calculate ICC for the PAQ and its subscales, we used the Test-retest reliability method on a sample of 32 soldiers with an interval of two weeks. PAQ also demonstrated good internal consistency, as proved by previously conducted studies (4). The STB and DSHI were

**Table 1.** Mean and Standard Deviation of PAQ Subscale in Soldiers<sup>a</sup>

	Number	Values
<b>General alexithymia</b>	254	78.47 ± 23.47
<b>N-DIF</b>	254	13.76 ± 5.26
<b>P-DIF</b>	254	11.77 ± 4.35
<b>N-DDF</b>	254	14.97 ± 5.35
<b>P-DDF</b>	254	12.72 ± 4.65
<b>EOT</b>	254	25.23 ± 8.05

Abbreviation: SD, standard deviation.

<sup>a</sup>Values are expressed as mean ± SD.

**Table 2.** Internal Consistency (Cronbach's Alpha Coefficients) for the PAQ Score and 5 Subscales

	Number of Items	Cronbach's Alpha
<b>PAQ total</b>	24	0.91
<b>N-DIF</b>	4	0.86
<b>P-DIF</b>	4	0.82
<b>N-DDF</b>	4	0.84
<b>P-DDF</b>	4	0.76
<b>EOT</b>	8	0.85

Abbreviations: G-EOT, general-externally orientated thinking; N-DDF, negative-difficulty describing feelings; N-DIF, negative-difficulty identifying feelings; PAQ, Perth Alexithymia questionnaire; P-DDF, positive-difficulty describing feelings; P-DIF, positive-difficulty identifying feelings.

**Table 3.** Convergent and Divergent Validity of the PAQ and Subscales

Scale	PAQ	N-DIF	P-DIF	N-DDF	P-DDF	EOT
STB	0.30 <sup>a</sup>	0.34 <sup>a</sup>	0.15 <sup>b</sup>	0.37 <sup>a</sup>	0.11	0.25 <sup>a</sup>
DSHI	0.39 <sup>a</sup>	0.54 <sup>a</sup>	0.03 <sup>a</sup>	0.49 <sup>a</sup>	0.01	0.46 <sup>a</sup>
CFI	-0.42 <sup>a</sup>	-0.48 <sup>a</sup>	-0.27 <sup>a</sup>	-0.40 <sup>a</sup>	-0.21 <sup>a</sup>	-0.38 <sup>a</sup>
<b>Self-compassion</b>	-0.41 <sup>a</sup>	-0.51 <sup>a</sup>	-0.12	-0.48 <sup>a</sup>	-0.10	-0.43 <sup>a</sup>

Abbreviations: DSHI, The Deliberate Self-Harm inventory; G-EOT, general-externally orientated thinking; N-DDF, negative-difficulty describing feelings; N-DIF, negative-difficulty identifying feelings; PAQ, Perth Alexithymia questionnaire; P-DDF, positive-difficulty describing feelings; P-DIF, positive-difficulty identifying feelings; SCS, Self-Compassion scale short-form; STB, Borderline Personality scale.

<sup>a</sup>Correlation is significant at 0.01 level.

<sup>b</sup>Correlation is significant at 0.05 level.

**Table 4.** The Goodness of Fit Indices for Five-Factor Models of PAQ

Fit Indices	$\chi^2$	df	$\chi^2/df$	RMSEA	IFI	CFI	SRMR	NNFI	NFI	RFI
Five-factor	856.50	219	3.91	0.08	0.95	0.95	0.07	0.95	0.94	0.93
Two-factor	2272.57	251	9.05	0.17	0.91	0.89	0.09	0.90	0.90	0.89

used to evaluate convergent validities of PAQ. According to the results, the PAQ and its subscales showed a positive correlation with STB. These results are consistent with other studies (40, 41). Studies have shown that alexithymia is more common among people with borderline personality disorder (BPD) (40). Also, non-suicidal self-injury in BPD patients is associated with alexithymia (41). People with alexithymia have difficulty in appropriately identifying emotions. Failure to properly identify emotions may cause multiple problems in interpersonal relationships, so individuals may turn to self-harm behaviors to address these problems. PAQ and its subscales had a positive correlation with DSHI, which is consistent with other studies (42, 43). The results also showed that PAQ and its subscales had a negative correlation with self-compassion (44, 45) and cognitive flexibility (46, 47). As mentioned before, alexithymia is a deficit in the cognitive processing of emotional information characterized by both emotional and cognitive distresses. Therefore, self-compassion, as an emotion regulation strategy, is useful to address their problems. In the present study, the results of the CFA supported the application of five-factor structures. This research demonstrated the reliability of the test-retest and divergent validity that had not been addressed in previous research. Hence, future studies using the PAQ would be useful for strengthening the theoretical comprehension of the alexithymia construct and its relationship to other variables. The current study had limitations. Firstly, using a self-reporting approach to collect the data. Hence, the findings may be exposed to potential inflation by common method variance. Secondly, alexithymia was assessed by a self-report scale and was not verified through assessment by a mental health professional. Thirdly, participants were

limited to a particular group with certain demographic characteristics: They were all serving their military service and were mostly single, young males. Generally, due to the aforementioned limitations, caution should be taken when generalizing the findings of the present study. Moreover, the participants were not sufficiently diversified to serve as a standard reference in clinical decision making. On the other hand, the test-retest reliability had both a limited period and was performed on small sample size. Further studies with longer study periods and larger sample sizes are needed to investigate the test-retest reliability of the PAQ.

### 5.1. Conclusions

The Persian version of the PAQ indicated good validity and good reliability to measure Alexithymia in an army force sample. It also provides useful insights into the literature on the cross-cultural validity of this measurement. Moreover, it provided further support for the generalizability of the observed relations between Alexithymia and other psychopathologies in the previously conducted studies. The findings of the present study are in line with the literature. The PAQ showed notable promises in Alexithymia's research and clinical practice. Therefore, the authors recommend using this questionnaire in future studies. Nevertheless, further studies are needed to confirm its validity across different populations.

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## Footnotes

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## References

1. Gross JJ, Jazaieri H. Emotion, Emotion Regulation, and Psychopathology. *Clin Psychol Sci*. 2014;2(4):387-401. doi: [10.1177/2167702614536164](https://doi.org/10.1177/2167702614536164).
2. Lane RD, Weihl KL, Herring A, Hishaw A, Smith R. Affective agnosia: Expansion of the alexithymia construct and a new opportunity to integrate and extend Freud's legacy. *Neurosci Biobehav Rev*. 2015;55:594-611. doi: [10.1016/j.neubiorev.2015.06.007](https://doi.org/10.1016/j.neubiorev.2015.06.007). [PubMed: 26054794].
3. Preece D, Becerra R, Allan A, Robinson K, Dandy J. Establishing the theoretical components of alexithymia via factor analysis: Introduction and validation of the attention-appraisal model of alexithymia. *Pers Individ Differ*. 2017;119:341-52. doi: [10.1016/j.paid.2017.08.003](https://doi.org/10.1016/j.paid.2017.08.003).
4. Preece D, Becerra R, Robinson K, Dandy J, Allan A. The psychometric assessment of alexithymia: Development and validation of the Perth Alexithymia Questionnaire. *Pers Individ Differ*. 2018;132:32-44. doi: [10.1016/j.paid.2018.05.011](https://doi.org/10.1016/j.paid.2018.05.011).
5. Bagby R, Taylor GJ, Parker JD. The twenty-item Toronto Alexithymia scale—II. Convergent, discriminant, and concurrent validity. *J Psychosom Res*. 1994;38(1):33-40. doi: [10.1016/0022-3999\(94\)90006-x](https://doi.org/10.1016/0022-3999(94)90006-x).
6. van der Velde J, Gromann PM, Swart M, Wiersma D, de Haan L, Bruggeman R, et al. Alexithymia influences brain activation during emotion perception but not regulation. *Soc Cogn Affect Neurosci*. 2015;10(2):285-93. doi: [10.1093/scan/nsu056](https://doi.org/10.1093/scan/nsu056). [PubMed: 24760016]. [PubMed Central: PMC4321628].
7. Honkalampi K, Hintikka J, Laukkanen E, Lehtonen J, Viinamaki H. Alexithymia and depression: a prospective study of patients with major depressive disorder. *Psychosomatics*. 2001;42(3):229-34. doi: [10.1176/appi.psy.42.3.229](https://doi.org/10.1176/appi.psy.42.3.229). [PubMed: 11351111].
8. Zeitlin SB, McNally RJ. Alexithymia and anxiety sensitivity in panic disorder and obsessive-compulsive disorder. *Am J Psychiatry*. 1993;150(4):658-60. doi: [10.1176/ajp.150.4.658](https://doi.org/10.1176/ajp.150.4.658). [PubMed: 8031330].
9. Duddu V, Isaac MK, Chaturvedi SK. Alexithymia in somatoform and depressive disorders. *J Psychosom Res*. 2003;54(5):435-8. doi: [10.1016/s0022-3999\(02\)00440-3](https://doi.org/10.1016/s0022-3999(02)00440-3).
10. Thorberg FA, Young RM, Sullivan KA, Lyvers M. Alexithymia and alcohol use disorders: a critical review. *Addict Behav*. 2009;34(3):237-45. doi: [10.1016/j.addbeh.2008.10.016](https://doi.org/10.1016/j.addbeh.2008.10.016). [PubMed: 19010601].
11. Taylor GJ, Parker JD, Bagby RM, Bourke MP. Relationships between alexithymia and psychological characteristics associated with eating disorders. *J Psychosom Res*. 1996;41(6):561-8. doi: [10.1016/s0022-3999\(96\)00224-3](https://doi.org/10.1016/s0022-3999(96)00224-3). [PubMed: 9032719].
12. Berenbaum H. Childhood abuse, alexithymia and personality disorder. *J Psychosom Res*. 1996;41(6):585-95. doi: [10.1016/s0022-3999\(96\)00225-5](https://doi.org/10.1016/s0022-3999(96)00225-5).
13. Leweke F, Bausch S, Leichsenring F, Walter B, Stingl M. Alexithymia as a predictor of outcome of psychodynamically oriented inpatient treatment. *Psychother Res*. 2009;19(3):323-31. doi: [10.1080/10503300902870554](https://doi.org/10.1080/10503300902870554). [PubMed: 20183393].
14. Bermond B, Vorst HC, Vingerhoets AJ, Gerritsen W. The Amsterdam Alexithymia Scale: its psychometric values and correlations with other personality traits. *Psychother Psychosom*. 1999;68(5):241-51. doi: [10.1159/000012340](https://doi.org/10.1159/000012340). [PubMed: 10516529].
15. Taylor GJ, Ryan D, Bagby RM. Toward the development of a new self-report alexithymia scale. *Psychother Psychosom*. 1985;44(4):191-9. doi: [10.1159/000287912](https://doi.org/10.1159/000287912). [PubMed: 383277].
16. Bagby RM, Taylor GJ, Parker JD, Dickens SE. The development of the Toronto Structured Interview for Alexithymia: item selection, factor structure, reliability and concurrent validity. *Psychother Psychosom*. 2006;75(1):25-39. doi: [10.1159/000089224](https://doi.org/10.1159/000089224). [PubMed: 16361872].
17. Bagby RM, Taylor GJ, Quilty LC, Parker JD. Reexamining the factor structure of the 20-item Toronto alexithymia scale: commentary on Gignac, Palmer, and Stough. *J Pers Assess*. 2007;89(3):258-64. doi: [10.1080/00223890701629771](https://doi.org/10.1080/00223890701629771). [PubMed: 18001226].
18. Gross JJ. Emotion Regulation: Current Status and Future Prospects. *Psychol Inquiry*. 2015;26(1):1-26. doi: [10.1080/1047840X.2014.940781](https://doi.org/10.1080/1047840X.2014.940781).
19. van der Velde J, Servaas MN, Goerlich KS, Bruggeman R, Horton P, Costafreda SG, et al. Neural correlates of alexithymia: a meta-analysis of emotion processing studies. *Neurosci Biobehav Rev*. 2013;37(8):1774-85. doi: [10.1016/j.neubiorev.2013.07.008](https://doi.org/10.1016/j.neubiorev.2013.07.008). [PubMed: 23886515].
20. Mohammadian Y, Mahaki B, Lavasani FF, Dehghani M, Vahid MA. The psychometric properties of the Persian version of Interpersonal Sensitivity Measure. *J Res Med Sci*. 2017;22:10. doi: [10.4103/JRSM-1955.199093](https://doi.org/10.4103/JRSM-1955.199093). [PubMed: 28400832]. [PubMed Central: PMC5361440].
21. Huang KC, Tseng DS, Lin CH, Chung WC. Interpersonal-Psychological Theory, Alexithymia, and Personality Predict Suicide Ideation among Maladjusted Soldiers in Taiwan. *Suicide Life Threat Behav*. 2017;47(5):603-11. doi: [10.1111/sltb.12315](https://doi.org/10.1111/sltb.12315). [PubMed: 27883207].
22. Barahmand U, Hoozoori R. A Study of Alexithymia and Dissociative Experiences in Soldiers and Male University Students. *Proc Soc Behav Sci*. 2013;84:165-70. doi: [10.1016/j.sbspro.2013.06.529](https://doi.org/10.1016/j.sbspro.2013.06.529).
23. Kline RB. *Principles and practice of structural equation modeling*. New York: Guilford Publications; 2015.
24. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct Equ Modeling*. 1999;6(1):1-55. doi: [10.1080/10705519909540118](https://doi.org/10.1080/10705519909540118).
25. Jackson M, Claridge G. Reliability and validity of a psychotic traits questionnaire (STQ). *Br J Clin Psychol*. 1991;30(4):311-23. doi: [10.1111/j.2044-8260.1991.tb00952.x](https://doi.org/10.1111/j.2044-8260.1991.tb00952.x). [PubMed: 1777753].
26. Shankar R. *Borderline personality disorder and the psychosis spectrum: a personality and divided visual field study*. University of Oxford; 1998.
27. Mohammadzadeh A, Goodarzi MA, Taghavi MR, Mollazadeh J. [The study of factor structure, validity, reliability and standardization of borderline personality scale in Shiraz university students]. *J Fundam Mental Health*. 2005;7(27-28):75-89. Persian.
28. Gratz KL. Measurement of deliberate self-harm: Preliminary data on the Deliberate Self-Harm Inventory. *J Psychopathol Behav Assess*. 2001;23(4):253-63. doi: [10.1023/a:1012779403943](https://doi.org/10.1023/a:1012779403943).
29. Cerutti R, Manca M, Presaghi F, Gratz KL. Prevalence and clinical correlates of deliberate self-harm among a community sample of Italian adolescents. *J Adolesc*. 2011;34(2):337-47. doi: [10.1016/j.adolescence.2010.04.004](https://doi.org/10.1016/j.adolescence.2010.04.004). [PubMed: 20471075].
30. Raes F, Pommier E, Neff KD, Van Gucht D. Construction and factorial validation of a short form of the Self-Compassion Scale. *Clin Psychol Psychother*. 2011;18(3):250-5. doi: [10.1002/cpp.702](https://doi.org/10.1002/cpp.702). [PubMed: 21584907].
31. Khanjani S, Foroughi AA, Sadighi K, Bahrainian SA. [Psychometric properties of Iranian version of self-compassion scale (short form)]. *Pajohandeh J*. 2016;21(5):282-9. Persian.

32. Dennis JP, Vander Wal JS. The Cognitive Flexibility Inventory: Instrument Development and Estimates of Reliability and Validity. *Cogn Ther Res*. 2009;34(3):241-53. doi: [10.1007/s10608-009-9276-4](https://doi.org/10.1007/s10608-009-9276-4).

33. Mohammadi H, Alizadeh K. An Investigation of Reliability and Validity of Strategy Inventory for Language Learning among Iranian University Students. *Int J English Lang Teach*. 2014;1(2). doi: [10.5430/ijelt.v1n2p53](https://doi.org/10.5430/ijelt.v1n2p53).

34. Terwee CB, Bot SD, de Boer MR, van der Windt DA, Knol DL, Dekker J, et al. Quality criteria were proposed for measurement properties of health status questionnaires. *J Clin Epidemiol*. 2007;60(1):34-42. doi: [10.1016/j.jclinepi.2006.03.012](https://doi.org/10.1016/j.jclinepi.2006.03.012). [PubMed: 17161752].

35. Mulaik SA, James LR, Van Alstine J, Bennett N, Lind S, Stilwell C. Evaluation of goodness-of-fit indices for structural equation models. *Psychologic Bull*. 1989;105(3):430-45. doi: [10.1037/0033-2909.105.3.430](https://doi.org/10.1037/0033-2909.105.3.430).

36. Browne MW, Cudeck R. Alternative ways of assessing model fit. *Sociologic Methods Res*. 1992;21(2):230-58. doi: [10.1177/0049124192021002005](https://doi.org/10.1177/0049124192021002005).

37. Cox BJ, Swinson RP, Shulman ID, Bourdeau D. Alexithymia in panic disorder and social phobia. *Compr Psychiatry*. 1995;36(3):195-8. doi: [10.1016/0010-440X\(95\)90081-6](https://doi.org/10.1016/0010-440X(95)90081-6).

38. Schermelleh-Engel K, Moosbrugger H, Müller H. Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Method Psychol Res Online*. 2003;8(2):23-74.

39. Feldman Barrett L, Gross J, Christensen TC, Benvenuto M. Knowing what you're feeling and knowing what to do about it: Mapping the relation between emotion differentiation and emotion regulation. *Cogn Emotion*. 2001;15(6):713-24. doi: [10.1080/02699930143000239](https://doi.org/10.1080/02699930143000239).

40. Ritzl A, Csukly G, Balazs K, Egerhazi A. Facial emotion recognition deficits and alexithymia in borderline, narcissistic, and histrionic personality disorders. *Psychiatry Res*. 2018;270:154-9. doi: [10.1016/j.psychres.2018.09.017](https://doi.org/10.1016/j.psychres.2018.09.017). [PubMed: 30248486].

41. Sleuwaegen E, Houben M, Claes L, Berens A, Sabbe B. The relationship between non-suicidal self-injury and alexithymia in borderline personality disorder: "Actions instead of words". *Compr Psychiatry*. 2017;77:80-8. doi: [10.1016/j.comppsych.2017.06.006](https://doi.org/10.1016/j.comppsych.2017.06.006). [PubMed: 28646684].

42. Greene D, Hasking P, Boyes M. The associations between alexithymia, non-suicidal self-injury, and risky drinking: The moderating roles of experiential avoidance and biological sex. *Stress Health*. 2019;35(4):457-67. doi: [10.1002/smj.2879](https://doi.org/10.1002/smj.2879). [PubMed: 31173454].

43. Ludtke J, In-Albon T, Michel C, Schmid M. Predictors for DSM-5 non-suicidal self-injury in female adolescent inpatients: The role of childhood maltreatment, alexithymia, and dissociation. *Psychiatry Res*. 2016;239:346-52. doi: [10.1016/j.psychres.2016.02.026](https://doi.org/10.1016/j.psychres.2016.02.026). [PubMed: 27088878].

44. Rusk DA. Exploration of the relationship between self-compassion, alexithymia and emotion regulation in a clinical population. *Era*. 2015.

45. Gilbert P, McEwan K, Gibbons L, Chotai S, Duarte J, Matos M. Fears of compassion and happiness in relation to alexithymia, mindfulness, and self-criticism. *Psychol Psychother*. 2012;85(4):374-90. doi: [10.1111/j.2044-8341.2011.02046.x](https://doi.org/10.1111/j.2044-8341.2011.02046.x). [PubMed: 23080529].

46. Duarte J, Pinto-Gouveia J. Correlates of psychological inflexibility mediate the relation between alexithymic traits and positive emotions. *J Contextual Behav Sci*. 2017;6(1):96-103. doi: [10.1016/j.jcbs.2016.12.002](https://doi.org/10.1016/j.jcbs.2016.12.002).

47. Zhu X, Wang XY, Huang Y, Yao SQ, Tang HB. [A Comparative Study of Wisconsin Card Sorting Test in Individuals with Different Degrees of Alexithymia]. *Chin J Clin Psychol*. 2006;14(2):132. Chinese.