Stress and Health

Stress and Health **25**: 103–109 (2009)
Published online 21 July 2008 in Wiley InterScience (www.interscience.wiley.com). **DOI:** 10.1002/smi.1218
Received 26 June 2007; Accepted 05 February 2008

Psychometric evaluation of perceived stress scale for Turkish university students

Müge Çelik Örücü*,† and Ayhan Demir

Middle East Technical University, Ankara, Türkiye

Summary
The purpose of the study was to investigate the applicability of the Perceived Stress Scale (PSS) to a Turkish sample. PSS (Cohen, Kamarck, & Mermelstein, 1983) is a general appraisal instrument that measures the degree to which situations in one's life are appraised as stressful. Five hundred and eight freshman students at the Middle East Technical University at the age of 16–29 filled in the Turkish translation of the PSS. The alpha coefficient for the Turkish version of PSS was found as 0.84, and PSS correlated 0.61 with the General Health Questionnaire. Exploratory and confirmatory factor analysis of the PSS showed that the scale consisted of two factors: Perceived Helplessness factor and Perceived Self-efficacy. In general, the data indicated that the PSS provides a reliable and valid measure of perceived stress for a Turkish sample. The findings provide useful information for researchers and practitioners wishing to adapt foreign psychological tests to different cultures, especially in relation to the assessment of university students. Copyright © 2008 John Wiley & Sons, Ltd.

Key Words
Perceived Stress Scale; reliability; Turkish university students; validity

Introduction

Adjusting to university life proves to be stressful for many adolescents and young adults. The challenging academic hurdles, the need to form new friends and many adjustments imposed as a result of living away from home, add considerably to the normal developmental tasks required from youth. University students differ markedly in the effectiveness of their adjustments to these stressors (Matheny et al., 2002).

Stressful life circumstances are often found to be associated with a deteriorated physical and psychological health status. Therefore, it is important to conceptualize these stressful life experiences. The psychological stress tradition places emphasis on the organism's perception and evaluation of the potential harm posed by objective environmental experiences. When their environmental demands are perceived to exceed their abilities to cope, individuals label themselves as stressed and experience a concomitant negative emotional response. Psychological models of stress argue that events influence only those

* Correspondence to: Müge Çelik Örücü, Middle East Technical University, Medical Center, 06531 Ankara, Turkey.
† E-mail: mcelik@mc.metu.edu.tr

persons who appraise them as stressful, that is, perceive stress. It is important to emphasize that stress appraisals are determined not solely by the stimulus condition or the response variables, but rather, by the persons` interpretations of their relationships to their environments (Cohen, Kessler, & Gordon, 1997).

The most influential model of the appraisal process has been the one proposed by Lazarus (Lazarus & Folkman, 1984). In the original formulation of his model, it was argued that an appraisal of a stimulus as threatening or benign, termed primary appraisal occurs between stimulus presentation and stress reaction. Primary appraisal is presumed to depend on two classes of antecedent conditions: the perceived features of the stimulus situation and the psychological structure of the individual (Monroe & Kelly, 1997).

As university students confront many stressors, accurate measurement of perceived stress has implications for greater understanding of the susceptibility and treatment of psychopathology. Stress assessment may also serve as an important predictor for treatment response and may aid with monitoring treatment progress (Roberti, Harrington, & Storch, 2006).

The only empirically established index of which researchers are aware that falls into the category of general appraisal instrument is the Perceived Stress Scale (PSS) (Cohen, Kamarck, & Mermelstein, 1983). The PSS was developed based on Lazarus's concept of appraisal. The PSS measures the degree to which situations in one's life are appraised as stressful (Lazarus & Folkman, 1984). The 14 items in the original scale were designed to tap the degree to which respondents find their lives unpredictable, uncontrollable and overloading, and was intended for use in community samples with at least a junior high school education. The PSS was found to be a good measure to possess good psychometric qualities (e.g. adequate reliability and predicted associations with other indices of stress; Cohen & Williamson, 1988).

A 14-item version of the PSS (PSS-14) has been used in many studies, and one of them was investigating the relationship of coping resources to the perception of personal stress and life satisfaction among American and Turkish university students. Mean differences in scores of American and Turkish students on these constructs were compared and regression analysis was used to examine the contribution of coping resources and perceived stress to life satisfaction. As nothing was mentioned about the factor structure, or the validity and the reliability studies before the application of the scale in a different culture and language, this version was not used in the present study. The translation and back translation of the scale was done only to ensure comparability (Matheny & et al., 2002).

In another study, the effects of gender, place of residence and perceived support from family on perceived stress and self-rated adjustment of university students were investigated by using the 14-item measure of the PSS. A significant effect of gender on perceived stress, with females showing higher overall levels of stress than males was found (Lafreniere & Ledgerwood, 1997).

Deckro et al. (2002) examined the effects of a 6-week mind/body intervention on college students' psychological distress, anxiety and perception of stress. There was an experimental and a wait-list control group. The experimental group received six 90-min group-training sessions in the relaxation response and cognitive behavioural skills. The Symptom Checklist-90-Revised, Spielberger State-Trait Anxiety Inventory and the PSS were used to assess the students´ psychological state before and after the intervention. Significantly greater reductions in psychological distress, state anxiety and perceived stress were found in the experimental group.

The factor structure and psychometric properties of the PSS were examined with psychiatric patients. Beck Depression inventory was also used for the predictive validity of the PSS. Factor analysis of the PSS established that the scale consisted of two factors. The first factor was comprised primarily of items reflecting adaptational symptoms. The second factor was found to reflect coping ability (Hewitt, Flett, & Mosher, 1992). Martin, Kazarian and Breiter (1995) replicated and extended Hewitt et al.'s (1992) findings, using a sample of 203 adolescent psychiatric inpatients. All patients admitted to the adolescent unit in a psychiatric hospital over a 3-year period were administered the PSS, as well as measures of depression, life events, dysfunctional attitudes and intellectual abilities. Consistent with Hewitt et al. (1992), two factors were found in the PSS, reflecting perceived distress and perceived coping ability. Regression analyses indicated that, for males, both factors account for independent variance in depression, whereas for females, only the distress factor is related to depression. In addition, for both male and female, dysfunctional

DOI: 10.1002/smi

attitudes account for a significant variance in depression in addition to the PSS, but negative life events do not. None of the variables were related to intellectual abilities. Implications for clinical assessment and intervention were discussed.

Extensive normative data on 2.387 respondents are available for not only the original 14-item version of the PSS, but also ten-item (PSS-10) and four-item versions, which provide a rich reference base for studying perceived stress across gender, SES, age groups, race and other characteristics. Although all three versions provide strong psychometric data and are related to relevant outcomes in expected ways, Cohen and Williamson (1988) note the relative superiority of, and therefore, recommend the 10-item version. Roberti et al. (2006) updated psychometrics of the PSS-10 and explanatory factor analysis revealed a two factor structure measuring Perceived Helplessness and Perceived Self-efficacy. Items 1, 2, 3, 6, 9 and 10 were loaded in the first factor and items 4, 5, 7 and 8 were loaded in the second factor. In the present study, the 10-item version is used.

PSS was used in different languages such as Nepali (Eller & Mahat, 2002) and Swedish (Eskin & Parr, 1996). PSS was translated into Nepali with other instruments to examine perceived stress, coping style, and symptoms of anxiety and depression in HIV+ Nepali women who were former commercial sex workers. Cronbach's alpha reliability coefficient was 0.72 for the Nepali version of PSS. The result of the findings was that the level of perceived stress was similar to that observed in a healthy female population of similar age. The primary coping style was problem-focused, with the strategy of seeking social support used most. Depression measured with the entire Center For Epidemiologic Studies Depression Scale was 3 per cent but it was 18 per cent on the somatic subscale. Twenty-two per cent of the variance in depression was predicted by the combination of perceived stress and the coping strategy of escape avoidance. Twenty-four per cent of the variance in anxiety was predicted by the combination of perceived stress and three coping strategies: problem solving, accepting responsibility and distancing (Eller & Mahat, 2002).

For the reliability and validity study of the Swedish version of PSS-14, the scale was administered to 87 college students. The internal consistency (0.82) and split-half reliability estimates (0.84) of the Swedish version of the PSS proved to be highly adequate, and the scale demonstrated adequate construct validity. The construct validity of the PSS was determined by computing correlation coefficient between the total PSS, PSS item scores and Beck Depression Inventory, Life Events and Perceived social support from friends and family. The PSS correlated significantly and positively with symptoms of depression, and negatively with social support from friends and family; however, factor analysis was not conducted for this study (Eskin & Parr, 1996).

While entering university is seen as a positive event, it represents a transition that is likely to involve several stressful features. Clearly, being a new university student is likely to impose a very salient role. Compared with the more structured environment of a high school, a university is likely to involve more ambiguous expectations and demands on students. As university students face with various stressors, being able to assess and reduce student stress is an important concern for counselling in higher education and counselling centres because of the students' various adjustment and physical health problems. Professionals, therefore, need to be aware of valid instruments to measure and track stress.

The purpose of this study was to provide factorial analytic findings, construct validation and normative data for the Turkish adaptation of PSS-10 in a sample of Turkish university students. Gender difference was also examined in order to keep track of the previous related studies (Eskin & Parr, 1996; Roberti et al., 2006).

Method

Participants

As a sampling procedure, random sampling was used. Subjects were 508 Middle East Technical University preparatory school students between the ages of 15–29 (mean age = 18.57), 199 of them were female and 306 of them were male.

Instrument

The PSS-10, (Cohen, Kamarck, & Mermelstein, 1983) measures an individual's appraisal of their life as stressful (i.e. unpredictable, uncontrollable and overloading). Item examples include, 'How

often have you felt nervous or stressed?' and 'How often have you felt confident about your ability to handle your personal problems?' People rated how often they had experienced these feelings in the last week on a five-point Likert scale from 0 = never to 4 = very often. PSS-10 scores were obtained by reversing the scores on the four positive items; the items were 4, 5, 7 and 8. Total scores range from 0 to 40, with higher scores indicating greater overall distress. Coefficient alpha reliability was 0.86 for a newly diagnosed breast cancer population consistent with alphas from 0.75 to 0.86 in the general literature (Cohen, Kamarck, & Mermelstein, 1983).

The PSS-10 was used for its improved internal reliability and factor structure over other versions of the PSS (Cohen & Williamson, 1988). The translation of scale into Turkish was done with a qualitative method that is a one-way translation (translation and control of the questionnaire with a different group of translators after inquiry; Savaşır, 1994). The scale was translated into Turkish independently by three psychologists and two psychological counsellors who had at least a master's degree and knew both languages well. Later, an English language teacher selected the best translation among those five translations; also, the researcher and her supervisor compared the similarities and differences between the translations. Selection of items was also based on the appropriateness of the language for the group of subjects that will be used for research purposes.

The translated items best representing the original item were then back translated to the original language by a native speaker of the English language who knew both languages well. Not many discrepant items were found. Additionally, a Turkish language teacher reviewed the final form and her suggestions were incorporated into the translation. Then, this form was presented to the professionals working with university students and also to researchers.

General Health Questionnaire (GHQ-12) (Goldberg & Williams, 1991) is a self-administered instrument, which is used to detect the degree of emotional distress in a general population. In completing the GHQ-12, subjects rate each item on a four-point Likert-type scale. The items are scored 0 for the first two ratings and 1 for the last two ratings. The range of scores on the questionnaire is from 0 to 12. Lower scores indicate better psychological well-being. Stuart and Klimidis (1993) found that the GHQ-12 has a reasonably good validity when applied in Turkish version. GHQ has been used in stress-related studies (Ebrecht et al., 2004).

Procedure

As a way of convenient sampling, Middle East Technical University's Preparatory School, which is a language school for university students, was chosen. There are three levels of classes at the school: pre-intermediate, intermediate and upper-intermediate. There are 20–22 students in each class and there are 50 classes for each level. For the present study, among 150 classes, 30 classes were selected randomly—10 classes from each level, which means nearly 600 students. During the end of the first semester, permission was obtained from the director of the Preparatory School, who also arranged the classes randomly and arranged the day of scale administrations. The researcher and her colleagues went to classes on the same day and gave standard information about the research purpose. The questionnaires were distributed to the students at the time that teachers were present in their classes, and no permission was required for the participants under the age of 18. The estimated number of students in all of the classes was 600 but only 508 provided full data. It took about 10–15*TH*min for the participants to complete the questionnaires in their classes.

Results

The dimensionality of the 10 items from PSS was analysed using principal components factor analysis with a sample of 508 students. Three criteria were used to determine the number of factors to rotate: a priori hypothesis that the measure was two-dimensional, the screen-test and the interpretability of the factor solution.

Barlett's test of sphericity was 1600.216 ($p < 0.0001$) and Kaiser–Meyer–Olkin measure of sampling adequacy was 0.88, which supported the use of these data in a factor analysis.

The initial solution yielded two components with Eigenvalues exceeding 1, accounting for a total of 56.24 per cent of the variance. Inspection of the screen-plot indicated two factors. A varimax rotation was conducted with these two factors. First factor included items 1, 2, 3, 6, 9 and 10 which could be labelled as 'Perceived Helpless-

DOI: 10.1002/smi

ness', and second factor composed of items 4, 5, 7, 8 labelled as 'Perceived Self-efficacy' like Roberti et al. (2006) did in their study.

In the present study, the Turkish adaptation of PSS showed that the first factor consisted of all items of negative experience and the second factor consisted of all items of positive experience. However, on scrutinizing the factor loading, item 5 cross loaded onto both factors. Depending on the previous studies as to establish equivalence and as theoretically item 5 was an item of positive experience, it was included in self-efficacy factor.

The first factor accounted for 42.66 per cent of the item variance, the second factor accounted for 13.57 per cent of the item variance. Descriptive statistics and factor analytic findings for the 10 items are presented in Table I.

The LISREL 8.30 program (Jöreskog, K. G., & Sörbom, D. (1999b). LISREL 8.30. Chicago: Scientific Software International Inc.)was used to perform confirmatory factor analysis. A maximum likelihood was the estimation method, and covariance matrices were analysed, and the two-factor model was tested. The fit of the models was evaluated using multiple criteria: Chi-square (χ^2)/ degrees of freedom (df) ratio, the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), the root mean square error of approximation (RMSEA) and comparative fit index (CFI). The following criteria were used to indicate goodness of fit: GFI, AGFI and CFI 0.90 and higher, RMSEA 0.08 or lower, and Chi-square/df ratio 3 or lower (Bentler, 1990; Bollen, 1990; Cole, 1987).

First of all, the two-factor model was evaluated. In this model, six items related to helplessness were specified to identify with the Perceived Helplessness factor, and four items with self-efficacy were specified to identify with the Perceived Self-efficacy. Confirmatory factor analysis for the two-factor model of the Turkish version of the PSS yielded the following GFIs: $\chi^2(34) = 128.968$, $p < 0.001$; $\chi^2/df = 3.8$; GFI = 0.95; AGFI = 0.92; RMSEA = 0.07 and CFI = 0.97. These indices indicated an almost good fit. That the chi-square\ df is higher than recommended was probably due to a large sample size.

Standardized Lambda Values, Standard Errors, *t*-values and Squared Multiple Correlations of the items of the Turkish Version of the PSS-10 (2-factor Model) were presented in Table II.

As can be seen from Table II, the first factor represented items of Perceived Helplessness. Six items were positively and significantly loaded on this factor. In the second factor which was named as Perceived Self-efficacy, four items were loaded.

Descriptive Statistics

The mean [Mean (M) = 18.89] and standard deviation [standard deviation (SD) = 6.78] were computed for the total score and two factors of the scale; Perceived Helplessness (M = 11.75; SD = 4.79) and Perceived Self-efficacy (M = 7.10; SD = 2.92). Also, the mean of the General Health Questionnaire of the present study was 3.01 (SD = 3.15). Independent sample *t*-test was used to understand whether there was a difference for

Table I. Varimax-rotated factor loadings, communalities, Eigenvalues and explained variances of the items of the Turkish version of Perceived Stress Scale (2-factor model).

Item no.	Communalities	Factor 1 Perceived helplessness	Factor 2 Perceived self-efficacy	M	SD
1	0.54	0.72		2.06	0.97
2	0.60	0.75		1.91	1.12
3	0.47	0.67		2.36	1.14
5	0.57	0.55	0.52	1.77	1.03
6	0.50	0.66		1.69	1.05
9	0.56	0.75		2.25	1.07
10	0.65	0.76		1.46	1.11
4	0.50		0.70	1.57	1.00
7	0.61		0.77	1.97	0.95
8	0.61		0.75	1.81	0.97
Eigenvalue		4.26	1.35		
Pct. of variance	Total 56.24	42.66	13.57		

M = mean, Pct. = Percentage; SD = standard deviation.

Table II. Standardized Lambda values, standard errors (SE), *t*-values and squared multiple correlations of the items of the Turkish version of the PSS-10 (2-factor model).

Factors and item no.	λ	SE	*t*	R^2
Perceived helplessness				
1	0.64	0.04	15.19	0.41
2	0.73	0.05	18.10	0.54
3	0.59	0.05	13.67	0.34
6	0.67	0.04	15.97	0.44
9	0.65	0.05	15.29	0.41
10	0.79	0.04	20.03	0.62
Perceived self-efficacy				
4	0.55	0.05	11.18	0.27
5	0.76	0.05	17.25	0.57
7	0.52	0.05	11.08	0.27
8	0.64	0.04	13.99	0.40

gender in the perception of stress. A significant difference was found between male (M = 18.12; SD = 6.53) and female (M = 20.12; SD = 6.98) on the PSS-10 and the total score, $t_{(491)} = 3.23$, $p = 0.001$.

The Cronbach's alpha reliability coefficients for the PSS-10 are as follows: PSS-10 total score (ten items, 0.84); Perceived helplessness factor (six items; 0.83); and Perceived self-efficacy (four items, 0.71). The correlation between PSS and GHQ was 0.61 ($p < 0.01$) for the total score, and 0.60 ($p < 0.01$) for the first factor and 0.45 ($p < 0.01$) for the second factor, respectively, indicating that people who have more health complaints have higher perceived stress levels.

Discussion

In this study, we sought to investigate the applicability of the PSS. It was argued that a psychometrically sound global measure of perceived stress could provide valuable information about the relationship between stress and pathology. The PSS measures the degree to which situations in one's life are appraised as stressful (Cohen, Kamarck, & Mermelstein, 1983).

In line with the aim of the study, a translation and adaptation of PSS into Turkish language (and culture) was accomplished. Exploratory and confirmatory factor analysis was conducted. Results revealed a two-factor structure measuring Perceived Helplessness and Perceived Self-efficacy, which was in parallel with Roberti et al.'s study (2006). The current findings reveal that the PSS-10 is a reliable and valid instrument for the assessment of perceived stress in university students.

Although it might be considered as a small difference, a gender difference was observed in this sample. Mirowsky and Ross (1995) found in their study that gender influences the appraisal process of stressful events in ways that are consistent with the differing socialization patterns of males and females (Mirowsky & Ross, 1995).

In his study, Matud (2004) examined gender differences in stress and coping in a large sample (1566 women and 1250 men) between 18 and 65 years old, with different socio-demographic characteristics. The results of multivariate analysis of covariance, after adjusting for socio-demographic variables, indicated that the women scored higher than the men in chronic stress and minor daily stressors. Although there was no difference in the number of life events experienced in the previous 2 years, the women rated their life events as more negative and less controllable than the men.

With the use of PSS-10, both researchers and counsellors working with university students will obtain data, which will guide their further studies and applications. Also, this instrument can be used with the general population as mentioned in the original version, and many studies can be conducted with either pathological or normal samples.

There is a major gap in cross-cultural research on health outcomes which is that the most measurements have been developed in English-speaking countries, and there are relatively few measurements which have been properly constructed or appropriately translated and evaluated in non-English-speaking culture (Hutchinson, Bentzen, & Konig-Zahn, 1996). Therefore, the Turkish adaptation of the PSS will give researchers the opportunity to conduct cross-cultural studies related with the appraisal of stress and with other cultural variables.

Convenience sampling was used in the present study, specifically university students. The results may be affected by biases resulting from social status, gender, or very specific factors relating to the level or subject of study. It is important that those using this scale in new populations assure themselves of its internal consistency and factor structure.

Overall, the results clearly support the use of the Turkish version of the PSS as a reliable and valid tool for measuring mental stress.

DOI: 10.1002/smi

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