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The Psychometric Properties of Turkish Version of Depression Anxiety Stress Scale-21 (DASS-21) in Health Control and Clinical Samples

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Abstract

This paper presents the Turkish version of the Depression Anxiety Stress Scale-21 (DASS-21) in health control and clinical samples, examined its psychometric properties. Construct validity and concurrent validity were conducted in validity studies. Depression Anxiety Stress Scale-42 (DASS-42) was used for concurrent validity. In reliability analysis, the instrument's internal consistency and re-test reliability were studied. Results of explanatory factor analyses demonstrated that 21 items yielded three-factors. Results of confirmatory factor analyses for three-dimensional model showed acceptable fit index values in health control sample and perfect fit index values in clinical sample. Factor loadings ranged from 0.42 to 0.72. In the concurrent validity, significant positive relationships were found between DASS-42 and DASS-21. Cronbach alpha internal consistency coefficient was found as α=0.87 for depression sub-scale, α=0.85 for anxiety sub-scale and α=0.81 for stress sub-scale in clinical sample. Moreover, test-retest reliability coefficient was obtained as r=0.68 for depression sub-scale, r=0.66 for anxiety sub-scale and r=0.61 for stress sub-scale in health control sample, and corrected item-total correlations ranged from 0,43 to 0,77 in clinical sample. In second study, DASS-21 discriminated the patients (depression mean score=10.83; anxiety mean score=10.39; stress mean score=11.85) from the healthy subjects (depression mean score=5.88; anxiety mean score=5.37; stress mean score=7.90) well (U=5310.50; 4748.50; 5562.50, p=0.00). According to psychometric properties, DASS-21 is a reliable and valid instrument in the assessment of depression, anxiety, and stress levels.

Keywords: Depression, anxiety, stress, scale

Öz

Depresyon Anksiyete Stres-21 Ölçeğinin (Dasö-21) Normal ve Klinik Örneklemde Türkçe Versiyonun Psikometrik Özellikleri

Bu çalışmada, Depresyon, Anksiyete, Stress Ölçeği-21'in (DASÖ-21) normal ve klinik örneklemde Türkçe sürümü ve psikometrik özellikleri sunulmuştur. Geçerlik çalışması için yapı geçerliği ve ölçüt geçerliği uygulanmıştır. Ölçüt geçerliğ çalışmasında Depresyon, Anksiyete, Stress Ölçeği-42 (DASÖ-42) kullanılmıştır. Güvenirlik analizlerinde ölçek iç tutarlık güvenirliği ve test - tekrar test güvenirliği çalışılmıştır. Açıklayıcı faktör analizi sonucu 21 maddeli ölçek üç alt boyutta toplanmıştır. Doğrulayıcı faktör analizi sonucu bu üç alt faktörlü yapı normal örneklemde kabul edilebilir uyum indeksi değerlerine, klinik örneklemde ise mükemmel uyum indeksi değerlerine sahip olduğu görülmüştür. Faktör yükleri 42 ila 72 arasında sıralanmıştır. Ölçüt geçerliği çalışmasında DASÖ-42 ile DASÖ-21 arasında pozitif ilişkiler bulunmuştur. Klinik örneklemde Cronbach alfa iç tutarlık güvenirlik katsayısı depresyon alt ölçeği için α=0.87, anksiyete alt ölçeği için α=0.85 ve stres alt ölçeği için α=0.81olarak bulunmuştur. Normal örneklemde test tekrar test korelasyon katsayıları depresyon alt ölçeği için r=0.68, anksiyete alt ölçeği için r=0.66 ve stres alt ölçeği için r=0.61 olarak bulunmuştur. Ayrıca klinik örneklemde düzeltilmiş madde toplam korelasyon katsayıları 43 ila 77 arasında sıralanmaktadır. İkinci çalışmada, DASÖ-21 hastalarla (depresyon ortalama puan=10,83; anksiyete ortalama puan =10,39; stres ortalama puan =11,85), normalleri (depresyon ortalama puan=5,88; anksiyete ortalama puan =5,37; stres ortalama puan =7,90) iyi düzeyde ayırt etmiştir (U=5310,50; 4748,50; 5562,50, p=0,00). Elde edilen psikometrik özelliklere göre DASÖ-21 depresyon, anksiyete ve stres düzeyini geçerli ve güvenilir bir şekilde değerlendirmektedir.

Anahtar Kelimeler: Depresyon, anksiyete, stres, ölçek

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INTRODUCTION

Depressive disorders are most frequently observed psychiatric disorders. Therefore, they have become a common public health problem. Major depression is a severe and recurrent disorder which is associated with decrease in the functionality and life quality along with medical mortality and morbidity (Spijker et al., 2004; Üstün et al., 2000). Depression is in the fourth order throughout the world according to the World Health Organization (WHO) disability rankings and it is estimated that it will be even in the more top rankings till 2020 (Murray & Lopez, 1996; 1997). Major Depressive Disorder is the most studied type of depressive disorders and the risk has been detected as 5–12% in male and 10–25% in female during the life-span (American Psychiatric Association, 1994). According to the results of epidemiological studies in Turkey, the clinical prevalence of depression is about 10% (Küey & Güleç, 1993). Passer and Smith (2007) defined major depression as a strong depressed state that leaves people unable to function effectively in their lives. They examined depression symptoms in four categories, which are emotional (i. e., hopelessness, sadness, fatigue, apathy), cognitive (i.e., maladaptive beliefs about self, life, nature), motivational (i. e., lack of perseverance, lack of enthusiasm), and somatic symptoms (i. e., sleep disorders, loss of appetite or excessive appetite).

Anxiety

Anxiety is defined as the state of tension and apprehension which is a natural response to perceived threat (Passer & Smith, 2012). Anxiety is the most commonly co-occurring disorder with depression (Couwenbergh et al., 2006). Even though anxiety disorders and depressive disorders are different from each other, they are sometimes evaluated together in terms of symptoms or disease (Sanderson, 1990). The structure of anxiety has been explained in many different theories. Aubery Lewis (1970) defined anxiety as "anxiety is an emotional state, with the subjectively experienced quality of fear or a closely related emotion". In cognitive theory, Beck (1976) conceptualized anxiety as "thinking disorders" or "emotional disorders" (Beck & Clark, 1988). In Eysenck's (1992; 2004) "Processing Efficiency Theory", state of anxiety is determined interactively by trait or test anxiety and by situational stress. Clark and Watson (1991) developed the triple model by assessing the specific and overlapping characteristics of mood disorders and anxiety. The model is based on the affect (mood), the negative affect and the positive affect which can influence the psychological overstimulation. Negative affect contains general stress symptoms, and it is observed together with depressive disorders and anxiety disorders. Besides, positive affect contains enthusiasm, excitement and energy, and there is a decrease in positive affect in depression. The third item of the model was hyperarousal, somatic tension and induction, and these are accepted as specific to anxiety.

Stress

Stress is basically a physiological state and it progresses as a process (Lazarus, 1990). Stress is viewed as a relationship between the person and environment (Lazarus & Folkman 1984, p. 19) Psychological stress refers to a relationship with the environment that the person appraises as significant for his or her well-being, and in which the demands tax or exceed available coping resources (Lazarus & Folkman 1986, p. 63). All inner and outer inducers can be the source of stress (Çiçek, 2006). Generally, it has roles in the adaptation of human being to physiological and psychological conditions (Özkaya et al., 2008). In this regard, the important point is the level of stress. Low level of stress contributes to the ability of people to cope with events, to develop themselves and to be successful. However, excess amount of stress can prevent the coping skills of people and even leads to physical and psychological diseases (Boenisch & Haney, 2003; Rowshan, 1997). In studies, when the stress is substantially complicated, it causes primarily psychiatric disorders such as depressive disorders and anxiety disorders as well as severe physical diseases such as cardiovascular diseases (Cohen, Kessler, & Gordon, 1997). Besides, it was detected that excess amount of stress adversely affected the clinic features of various diseases (Greenberg, 1990).

Depression, Anxiety, Stress Scales

Psychiatric and psychological assessment scales are useful to embody the mental status of patients by using numbers. These scales assist the diagnosis, evaluation of the severity, assessment of the response to treatment, and scanning (Morley & Snaith, 1995). In psychiatry and psychology, there are scales related to almost all situations, and these scales relatively facilitate the work of clinicians.

The highest number of scales has been developed for depressive and anxiety disorders among all mental disorders. Depression evaluation scales are important for the determination of the depression severity, and the

evaluation of the response to treatment. However, there should be clinical observation for the exact diagnosis (Gallo et al., 2000). Some tests are applied by clinicians (Hamilton Depression Rating Scale, Montgomery-Asberg Depression Rating Scale, etc.) whereas some others can be applied by patients (Zung Depression Scale, Beck Depression Inventory, Geriatric Depression Scale) (Beck, 1961; Hamilton, 1960; Montagomery & Asberg, 1979; Snaith & Taylor, 1985; Yesavage et al., 1983; Zung, 1965). Clinicians use the tests mostly in order to follow the disease of the patients in the clinics, and patients apply these tests for scanning and scientific studies (Ebrinç, 2000). Tests can be generally insufficient to differentiate anxiety and depression from each other because some of the items of these scales are similar. Hamilton Anxiety and Hamilton Depression Scales are two of the mostly applied scales, and they are substantially similar to each other as well as they show high level of correlation (Clark, 1989; Moras et al., 1992). Additionally, Continuous Anxiety Scale is not only sensitive to anxiety symptoms but also to depression symptoms (Bieling et al., 1998). State-Trait Anxiety Scale (STAI) was developed by Spielberger et al. (1983). STAI measures two types of anxiety: it is an instrument to measure presence and severity of current symptoms of anxiety, and general tendency to be anxious.

DASS development depends on the depression and anxiety triple model of Clark and Watson (1991). DASS was developed in order to establish a scale which can be filled by patient, contain the main symptoms of anxiety and depression, meet the high psychometric standards, and which can differentiate the anxiety and depression from each other. Stress items were also added to these scales, and finally DASS (with 42 items) was created by Lovibond (1983). Depression scale contains the symptoms associated with dysphoric mood (sadness, despair, etc.); anxiety scale contains excess physical excitement, panic attacks, and fear symptoms (tremor, anxiety, physical symptoms, etc.); and stress scale contains symptoms such as tension, irritability, and extreme responsiveness to stressful events (Lovibond & Lovibond, 1995a). In studies, it was detected that the Turkish version of DASS-42 was a valid and reliable scale (Bilgel & Bayram, 2010; Hekimoğlu et al., 2012).

Stress is caused by many factors such as life events, trauma, education, parenthood, work, etc. Hence, there are many scales associated with stress [i.e., Parental Stress Scale (PSS; Berry & Jones, 1995), Educational Stress Scale (Sun, Dunne, Hou, & Xu, 2011), Academic Expectations Stress Inventory (Ang & Huan, 2006)]. However, there are fewer scales which can be used to measure our daily stress levels. Folkman and Lazarus (1980) developed Ways of Coping Questionnaire in order to determine coping strategies in response to stressful events or stressor in life. Cohen, Kamarck, and Mermelstein (1983) designed the Perceived Stress Scale (PSS, 14 items) to measure the degree to which situations in one's life are appraised as stressful.

Present Study

DASS-21 was created by Lovibond by selecting some of the items of DASS-42 in order to shorten the application time (Lovibond & Lovibond, 1995b). Both the original version of DASS with 42 items and the shorter version with 21 items have been shown to be reliable and valid scales to measure depression, anxiety and stress levels according to the studies performed with clinical groups, society and different cultural and ethnic groups (Antony et al., 1998; Brown et al., 1997; Clara et al., 2001; Crawford & Henry, 2003; De Beurs et al., 2001; Daza et al., 2002; Henry & Crawford, 2005; Lovibond, 1998; Lovibond & Lovibond, 1995b; Norton, 2007; Taylor, 2005).

As a result of a study conducted in Australia, it was indicated that DASS-21 was both easy to implement and a low cost scale as well. However, it was shown to be effective in the detection of the variances in depressive and anxiety disorder patients (Ng et al., 2007). Furthermore, it allows measuring the severity of the three psychological and psychiatric conditions in a short time due to its low number of items. Besides, there is no other tool which allows assessing the stress levels of clinical psychiatry and psychology samples. Therefore, we aim to perform the validity and reliability study of the Turkish version of the DASS-21 scale by examining its psychometric properties.

INITIAL STUDY

METHODS

Study Group

The study group of the first study was 420 formation education certificate program students who were not diagnosed with depression before. They were selected via accessible sampling techniques. Participants were

from different faculties (such as; Faculty of Arts and Sciences, Faculty of Fine Arts, and School of Physical Education and Sports) and city of Kütahya (254 of them were female and 166 of them were male). Their age range was between 21 and 41, and the mean age was 24.54 (SD=3.06).

Instruments

DASS-21 (DASS-21): DASS-21 was developed by Lovinond and Lovibond (1995a) by selecting the items of the DASS-42 in order to shorten the time. DASS-21 contains 7 items for each scale and the result of the assessment is multiplied by two (Lovibon & Lovibon, 1995b). The reliability and validity studies of DASS-21 were performed by researchers via selecting appropriate items of DASS-42 that was developed by Lovibond and Lovibond (1995a) (Antony et al. 1998; Clara et al., 2001; Crawford & Henry, 2003; Henry & Crawford, 2005). Antony et al. (1998) performed a study with clinical and non-clinical samples and they calculated the Cronbach's alpha internal consistency reliability coefficient value as 0.94 for depression subscale, 0.87 for anxiety subscale and 0.91 for stress subscale (Antony et al., 1998). Henry and Crawford (2005) showed that Cronbach's alpha internal consistency reliability coefficient value was 0.88 for depression subscale, it was 0.90 for the stress subscale and it was 0.93 for the entire scale. According to the same study, the fit index values of the DASS-21 model developed by Lovibond and Lovibond (1995) were S-Bχ_2=628.0, χ^2=1092.1, df=180 RCFI=0.93, SRMR=0.03, RMSEA= 0.05 (Henry & Crawford, 2005).

DASS-42 (DASS-42): The original scale was developed by Lovibond and Lovibond (1995a, 1995b) and DASS-42 (DASS-42) is an assessment tool to evaluate itself which is composed of 42 items and 3 subscales. It has a quaternary rating system ("0" = Never, "1" = Sometimes, "2" = Frequently, "3" = Always) and there are 14 items in each subscale. Scoring is not performed according to the total score of the subscales; instead an evaluation is done by considering the score intervals (Lovibon & Lovibon, 1995a, 1995b). The Turkish adaptation of the scale was performed by Bilgel and Bayram (2010). It was shown that the total variance of the triple factor structure was 44% as a result of the explanatory factor analysis (EFA) which was applied to the findings of the 1102 participants. Then, fit index values of the confirmatory factor analysis (CFA) were calculated as χ^2/df=3.17, GFI= 0.90, CFI= 0.92, RMSEA=0.04. In the criterion validity study, it was shown that there were positive associations between the DASS-42 scale and the Hospital Anxiety Depression Scale. Cronbach's alpha internal consistency coefficient was calculated as 0.87 for depression subscale, 0.86 for anxiety subscale and 0.88 for the stress subscale. Furthermore, the corrected item-total correlation values were between 0.48 and 0.70 for the depression subscale, between 0.33 and 0.59 for the anxiety subscale and between 0.43 and 0.70 for the stress subscale. According to these results, the scale can be used in a study in a valid and reliable manner (Bilgel & Bayram, 2010).

Procedure

Primarily, we contacted via e-mail with Peter LOVIBOND who was one of the researchers and who developed the scale for the Turkish adaptation study: there were two Turkish adaptation studies for the longer version of the scale with 42 items. Permissions were obtained in order to create the Turkish version of the scale with 21 items via examining different cultures.

There are certain steps in the Turkish adaptation of the scale:

1. The mostly used 21 items of the scale were translated into Turkish by four specialists who received the title of doctor in the USA and England;

2. Then, the Turkish versions were translated to English;

3. The consistency between these two versions were examined by applying both to 32 individuals who could speak both English and Turkish.

4. Same four specialists, and one Turkish language and literature specialist discussed the content and the grammar of the Turkish versions of the scale, required corrections were done, and the trial Turkish forms were obtained.

5. In the last step, the forms were distributed to the participants upon the examination and the corrections of specialists who received their PhD in the fields of psychiatry, psychology, and psychological services in education. The data were transferred to the computer programs and EFA, CFA, criterion validity, reliability, and item analyses were performed by using package programs.

RESULTS

Linguistic equivalence

Turkish and English versions of the scale were applied to 32 individuals who spoke both English and Turkish in two weeks' interval, and the relationship between them was calculated as r=0.86; the relationship between the first Turkish version and the second Turkish version of the scale was calculated as r=0.92.

Structural Validity

Explanatory Factor Analysis (EFA): In the structure validity study of the scale, the Kaiser-Meyer-Olkin (KMO) coefficient was calculated, and Barlett Spehericity test was applied in order to detect the suitability of data which were obtained from the 220 students (students of training certificate program) to the explanatory factor analysis. It is required that KMO is higher than 0.60 and Barlett test is significant for the suitability of the data to the explanatory factor analysis (Büyüköztürk, 2007). As a result of our analysis, KMO sampling suitability coefficient was found as 0.917, and χ^2 value of the Bartlett Sphericity was found as 1760.949 ($p<0.001$, df=210). EFA was achieved in order to exhibit the factor structure of the study groups which was composed of adults. It was observed that the scale was three dimensional in the Scree Plot graph. The items were not free while performing the EFA, and they were limited with triple factors as it was in the original scale. This three-factor structure is the variance distribution measurement of the total variance of the structure with factors. The distribution (and the change) of the values of the data set according to the mean values was measured. Accordingly, it has been concluded that the scale is suitable for the Turkish culture but the items need to be confirmed. These three factors explain the 49.72% of the total variance of scale, the 15.91% of the anxiety subscale, and the 14.47% of the stress subscale (Table 1). Item factor loads were between 0.52 and 0.75 for depression subscale; between 0.45 and 0.68 for anxiety subscale, and between 0.42 and 0.76 for stress subscale.

Confirmatory Factor Analysis (CFA): CFA was performed for the data obtained from 200 students from the faculty of education in order to confirm the structure obtained from the results of EFA. It is crucial to consider the goodness of fit criteria during the evaluation of the CFA model adaptation (Ilhan & Çetin, 2014). In this study, Chi-Square Goodness,

Table 1: Explanatory Factor Analysis factors and variance values in health control sample

	Depression	*Anxiety*	*Stress*
Stress-1	0.232	0.301	0.630
Anxiety-1	0.244	0.546	0.335
Depression-1	0.691	0.198	0.139
Anxiety-2	-0.008	0.503	0.169
Depression-2	0.519	0.271	0.061
Stress-2	0.274	0.303	0.668
Anxiety-3	0.119	0.568	0.192
Stress-3	0.240	0.148	0.760
Anxiety-4	0.313	0.614	0.207
Depression-3	0.749	0.110	0.288
Stress-4	0.353	0.233	0.503
Stress-5	0.006	0.050	0.640
Depression-4	0.606	0.192	0.276
Stress-6	0.103	0.247	0.416
Anxiety-5	0.303	0.450	0.272
Depression-5	0.553	0.225	0.185
Depression-6	0.681	0.285	0.131
Stress-7	0.256	0.241	0.448
Anxiety-6	-0.023	0.678	0.271
Anxiety-7	0.174	0.460	0.113
Depression-7	0.747	0.125	0.147
Total variance (%)	19.34	15.91	14.47

Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR) and Tucker Lewis index (TLI) were used for CFA. First of all, χ^2 value was divided to degree of freedom (df) for Chi-Square Goodness test. Values lower than 2 referred to excellent fit, lower than 3 referred to good fit, and lower than 5 referred to acceptable fit (Byrne 2010). For CFI, GFI and TLI, when values were higher than 0.95 it referred to the excellent fit; when values were between 0.90 and 0.94 it referred to good fit; and when values were between 0.85 and 0.89 it referred to acceptable fit (Browne & Cudeck, 1993; Marsh et al., 2004; Tucker & Lewis, 1973). In case values of RMSEA were lower than 0.05 it referred to excellent fit, if the values were between 0.06 and 0.08 it referred to the acceptable fit. Besides, in case the values of SRMR were less than 0.05 it referred to excellent fit, and if the values were between 0.06 and 0.10 it referred to acceptable fit (Kline, 2011). In the results of CFA of the DASS-21, the fit index values were found as GFI=0.906, CFI=0.905, TLI=0.896, RMSEA=0.065, SRMR=0.067. The factor loads related to

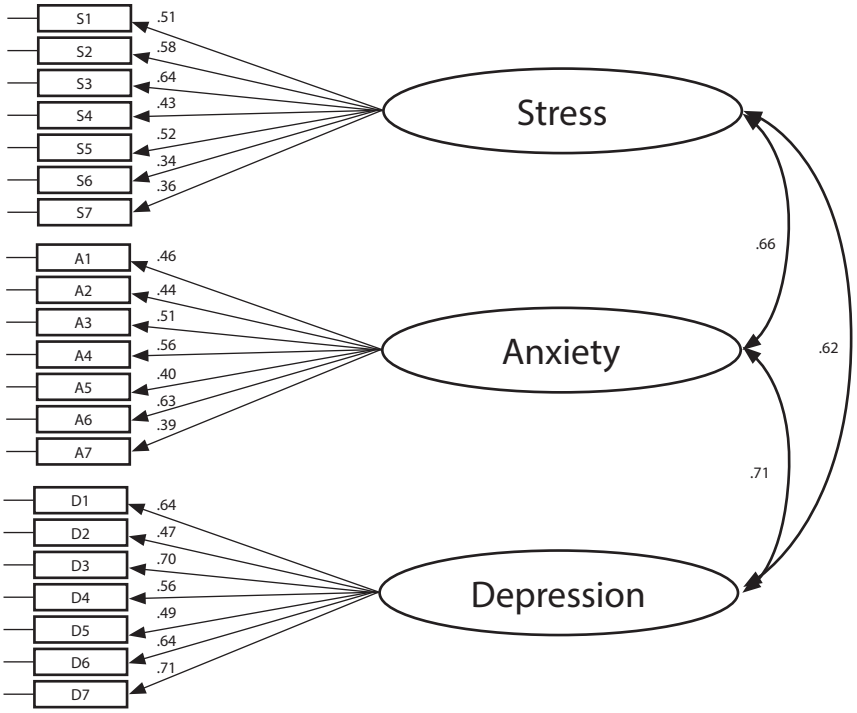

Figure 1. Confirmatory factor analysis of DASS-21 in health control sample.

the triple model which was obtained from CFA can be seen in Figure 1.

In Figure 1, it is seen that item factor loads change between 0.34 and 0.64 for stress subscale; between 0.39 and 0.63 for anxiety subscale; and between 0.47 and 0.71 for depression subscale. In accordance with the above criteria, it is possible to claim that the triple structure of the scale is protected in the sample group which is composed of Turkish university students.

Criterion validity

Similar scale validity study of the scale showed that the correlation value between DASS-21 and DASS-42 was found as r=0.89.

Reliability

As a result of the reliability studies of the study, the Cronbach's alpha internal consistency coefficient of the scale was found as 0.85 for the depression subscale, 0.80 for the anxiety subscale and 0.77 for the stress subscale. Furthermore, it was calculated that test-retest correlation coefficient was r=0.68 for the depression subscale, r=0.66 for the anxiety subscale and r=0.61 for the stress subscale when the scale was applied to 72 individuals from the same study group with 21 days apart.

Item Analysis

Item analyses were performed for the corrected item-total correlation coefficients, item total correlations when the items were removed, and the values between sub 27% and top 27% values. Results can be observed in Table 2.

According to the findings shown in Table 2, the corrected item total correlation coefficients of the scale were between 0.47 and 0.70 for the depression subscale; they were between 0.30 and 0.64 for anxiety subscale, and between 0.44 and 0.59 for stress subscale. Furthermore, t values related to the items in the DASS were found to be between 3.22 and 13.60. When t values were higher than 2.58, it was significant at the level of 0.01 (Kline, 2011).

SECOND STUDY

Study Group

Participants of the second study were 101 patients who went for treatment to the psychiatry clinic due to psychological and psychiatric problems. They were diagnosed with Hamilton Depression Rating Scale and Major Depressive Disorder according to the DSM-IV (American Psychiatric Association, 1994) criteria. Participants were selected with the help of purposeful sampling. The 88 of the patients

Table 2: Corrected item-total correlation coefficients, and t values in health control sample

	Mean ± SD	*Corrected item-total correlation coefficients*	*Item-total correlations when items are removed*	*t*
Stress-1	1.24±0.76	0.44	0.76	13.72**
Anxiety-1	1.08±0.82	0.30	0.79	13.99**
Depression-1	0.91±0.85	0.65	0.82	13.86**
Anxiety-2	0.60±0.76	0.55	0.74	18.63**
Depression-2	1.11±0.82	0.47	0.85	13.12**
Stress-2	1.36±0.96	0.48	0.75	16.34**
Anxiety-3	0.55±0.81	0.46	0.76	13.43**
Stress-3	1.16±0.92	0.59	0.72	14.61**
Anxiety-4	0.86±0.89	0.52	0.75	16.36**
Depression-3	0.69±0.81	0.70	0.81	21.68**
Stress-4	0.45±0.68	0.48	0.75	12.90**
Stress-5	0.98±0.86	0.46	0.75	14.95**
Depression-4	0.94±0.84	0.63	0.82	14.23**
Stress-6	1.41±0.91	0.46	0.75	16.80**
Anxiety-5	0.83±0.92	0.64	0.72	19.19**
Depression-5	0.83±0.86	0.53	0.84	16.98**
Depression-6	0.64±0.84	0.63	0.82	17.79**
Stress-7	1.28±0.92	0.55	0.73	15.99**
Anxiety-6	0.74±0.88	0.56	0.74	20.47**
Anxiety-7	0.68±0.78	0.51	0.75	22.73**
Depression-7	0.72±0.95	0.65	0.82	16.70**

**p<0.01

were female and 13 were male. The age of the patients changed between 18 and 55 and the mean age was 29 (SD=8.52).

Measurement Tools

DASS-21 (DASS-21): DASS-21 was developed by Lovinond and Lovibond (1995) by selecting the items of the DASS-42 in order to shorten the time. DASS-21 contains 7 items for each scale and the result of the assessment is multiplied by two (Lovibon & Lovibon, 1995). The reliability and validity studies of the Turkish version of the DASS-21 were performed by Sariçam. It was concluded that the scale was a valid and reliable scale.

Procedure

Primarily, the ethical permission document was obtained from the Dumlupinar University, Evliya Çelebi Training and Research Hospital (Dumlupinar University Clinical Research Ethics Committee, 03.08.2015 and decision number 2015/09–16) in order to use this Turkish DASS-21 scale for scientific purposes in clinics. Then, scale application forms were filled by the patients who were admitted to the Dumlupinar University, School of Medicine, Psychiatry clinic and who were diagnosed with major depressive disorder according to the DSM-IV criteria (American Psychiatric Association, 1994). The answers of patients were evaluated by a psychiatrist. After that, data were transferred to the computer programs, various analyses were performed in order to assess the validity and reliability studies of the scale in case of it was applied to clinical samples. The psychometric properties of the scale in the clinical samples were examined by using construct validity, discriminant validity, internal consistency reliability, and item analysis. The factor structure of the scale was already known and CFA was used in order to confirm the structure validity of the scale in the clinical samples. The mean scores of control individuals and patients were compared to each other for the discriminant validity study. Corrected item total correlation coefficients were examined for internal consistency reliability for Cronbach's alpha coefficient, and

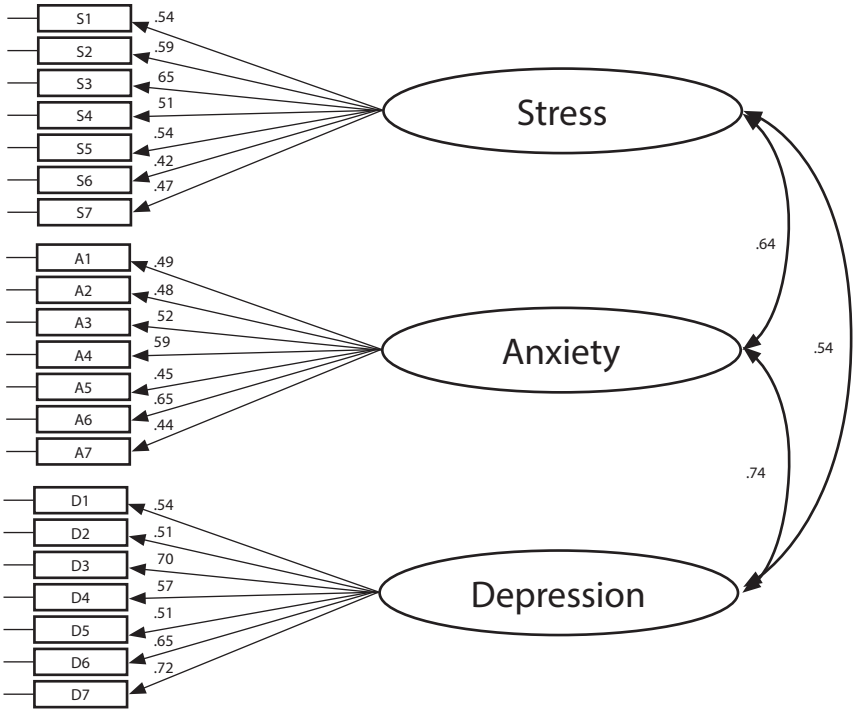

Figure 2: Confirmatory factor analysis of DASS-21 in Clinical Sample.

item analysis. The significance level was accepted as 0.05 ($p<0.05$).

RESULTS

Structural Validity

Confirmatory factor analysis (CFA): CFA was applied to the data obtained from 101 patients for the structural validity of the scale in order to confirm its structure when it is used with clinical samples. In this study, Chi-Square Goodness Test, Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR) and Tucker Lewis index (TLI) were used for the CFA. Primarily, χ^2 value was divided to degree of freedom (df) for the Chi-Square Goodness Test. As a result of CFA performed for DASS-21, the fit indexes of the model with 21 item and triple structure were examined and minimum chi-square value was significant [χ^2 (39, N= 101) =74.57, p=0.00)]. Fit index values were found as GFI=0.951, CFI=0.956, TLI=0.925, RMSEA=0.044, SRMR=0.046. Factor loads which were obtained from CFA and which was related to the triple structured model can be seen in Figure 2.

According to Figure 2, item factor loads were between 0.42 and 0.66 for stress subscale; they were between 0.44 and 0.65 for anxiety subscale; and they were between 0.51 and 0.72 for depression subscale. Accordingly, it is possible to claim that the triple structure of the scale is protected when it is used for the clinical patient samples.

Discriminant Validity

In the discriminant validity study of the scale, the mean depression, anxiety, stress scores of control individuals and patients were compared to each other by using Mann Whitney U test and the results are shown in Table 3.

As it can be seen in Table 3, the stress scores of control individuals ($\bar{X}$= 7.90) were significantly lower compared to the mean scores of patients ($\bar{X}$= 11.85) (U=5562.50; Z=7.10; p<0.01. Similarly, the mean anxiety scores of controls ($\bar{X}$= 5.37) were also significantly lower when compared to the scores of patients ($\bar{X}$= 10.39) (U=4748.50; Z=8.17; p<0.01). Finally, we also observed that controls ($\bar{X}$= 5.88) had significantly lower mean depression scores according to the mean scores of patients ($\bar{X}$= 10.83) (U=5310.50; Z=7.43; p<0.01).

Table 3: Comparison of DASS-21 Scores of Clinical Sample and health control

	Group	*N*	*Mean*	*SD*	*U*	*p*
Stress	Normal	220	7.90	3.93	5562.50**	0.00
	Patient	101	11.85	4.59		
Anxiety	Normal	220	5.37	3.88	4748.50**	0.00
	Patient	101	10.39	5.18		
Depression	Normal	220	5.88	4.33	5310.50**	0.00
	Patient	101	10.83	5.55		

**p<0.01

Table 4: Corrected item-total correlation coefficients in patient group

	Corrected item-total correlation coefficients	*Item-total correlations when items are removed*
Stress-1	0.57	0.77
Anxiety-1	0.47	0.85
Depression-1	0.67	0.85
Anxiety-2	0.67	0.82
Depression-2	0.43	0.88
Stress-2	0.51	0.78
Anxiety-3	0.59	0.83
Stress-3	0.53	0.78
Anxiety-4	0.58	0.83
Depression-3	0.71	0.84
Stress-4	0.44	0.79
Stress-5	0.68	0.75
Depression-4	0.68	0.85
Stress-6	0.58	0.77
Anxiety-5	0.61	0.83
Depression-5	0.68	0.85
Depression-6	0.62	0.86
Stress-7	0.46	0.80
Anxiety-6	0.69	0.82
Anxiety-7	0.66	0.82
Depression-7	0.77	0.84

Reliability

In the reliability studies of the scale by using clinical samples, the Cronbach's alpha internal consistency reliability coefficient was 0.87 for depression subscale and it was 0.81 for stress subscale.

Item Analysis

Item analyses were performed for the corrected item-total correlation coefficients and item total correlations when the items were removed. Results can be observed in Table 4.

According to the findings shown in Table 4, the corrected item total correlation coefficients of the scale were between 0.43 and 0.77 for the depression subscale; they were between 0.47 and 0.67 for anxiety subscale; and they were between 0.44 and 0.68 for stress subscale.

DISCUSSION

In this study, it is aimed to adapt the DASS-21 into Turkish in order to use it for the evaluation of depression, anxiety and stress levels, and examine the psychometric findings. In order to do that, the validity, structure and criterion validities of the DASS-21 were determined. It was achieved by the application of structure validity, CFA and EFA. The reason of the EFA application was to evaluate the original DASS-21 factor structure in the Turkish samples (Büyüköztürk et al., 2004; Sümer, 2000). According to the EFA, factor loads were higher than 0.30 as it was also shown in literature as an acceptable value (Büyüköztürk, 2007; Çokluk et al., 2012). CFA was performed in order to confirm the model, whose factor structure was already known, in different type of samples (Yurtkoru, 2013). As a result of the concurrent validity (criterion validity) study, it was concluded that the scale was valid. In the discriminant validity study, it was observed that the scale could discriminate the control individuals and the patients from each other. According to the results of the DASS-21 validity studies, Cronbach's alpha internal consistency reliability coefficient and correlation coefficient obtained from test-retest were shown to be acceptable. Cronbach's alpha internal consistency reliability coefficient minimum value was 0.70, and corrected item total correlation values were higher than 0.30 (Erkuş, 2014). These values show that the psychological assessment tool of the DASS-21 is suitable for the development and adaptation criteria. When the studies performed in the USA, Italy and Canada were compared to each other, they had lower values compared to the results found in the study in Turkey even though the values were similar (Antony, 1998; Bottesia, 2015; Osman et al., 2012). However, better values were observed in the study conducted in Spain (Bados et al., 2005; Musa et al., 2007; Nur et al., 2014). These variances can be due to the different cultural structures. Additionally, when we

compared the short and the long version of the scale (Bilgel & Bayram, 2010) which were applied to healthy control individuals, the validity and the reliability of the long version was better compared to the short version (Bilgel & Bayram, 2010). Furthermore, it was indicated that reliability and validity values of the DASS-42 applied to Turkish clinical samples by Hekimoğlu et al. (2012) were better compared to the values of the DASS-21 applied to the clinical patient samples.

DASS-21 provides an overview of the depression, anxiety, and stress levels of both healthy individuals and patients. It has been thought that it can also give an opportunity to diagnose and evaluate the disorders, perform the psychiatry, psychotherapy, counseling applications. Furthermore, this study will surely contribute to the literature, since there is no similar and short Turkish scale which is related to psychology, psychiatry, and education.

Limitations

The validity and reliability studies of the scale should be performed by using larger clinical samples. Especially, numbers of male patients and female patients should be balanced in clinical samples. Furthermore, similar scale validity studies which will be applied to clinical samples should also be performed by using different measuring tools.

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