



Türk Fizyoterapi ve Rehabilitasyon Dergisi

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THE VALIDITY AND RELIABILITY OF COGNITIVE FAILURES QUESTIONNAIRE IN UNIVERSITY STUDENTS

RESEARCH ARTICLE

ABSTRACT

Purpose: The aim of this study was to culturally adapt, validate and investigate the Turkish version of Cognitive Failures Questionnaire (CFQ) in university students.

Methods: Reliability was assessed using the Interclass Correlation Coefficient (ICC) and confidence interval %94-96. In the study, three hundred and fortyfive students completed both CFQ and Test Anxiety Inventory (TAI) who were in the examination term and average age were 20.9±1.8 years.

Results: The present study, 265 (76.8%) of the participants were female 80 (23.2%) of were male. Cronbach's alpha coefficients and ICC's at time 1 and time 2 were as follows: 0.90 (Confidence Interval (CI) 95%; 0.85—0.94); 0.93 (CI 95%; 0.89—0.96). The mean difference was 0.25 with 95 % CI—2.30 to 3.11. Thirtysix of the students were retested within twice over 2 weeks to assess test-retest reliability. The Pearson's correlation coefficient ($r=0.39$; $p<0.001$) revealed strong relation between CFQ and TAI total score. Turkish version of CFQ was found reliability and validity and responsive instrument for evaluating cognitive failures in university students.

Discussion: The people's own perception of changes in their cognitive status is the most important indication of the success of the interventions. Individual-reported outcomes (IROs) specifically give the people's perspective. While the Turkish version of CFQ is found a reliable and a valid PRO, CFQ's use is recommended in terms of field studies and researches related with students. However, it should be studied with larger samples and different illnesses.

Key words: Cognitive; reliability; validity; student

BİLİŞSEL DURUM ÖLÇEĞİ'NİN ÜNİVERSİTE ÖĞRENCİLERİNDE GEÇERLİLİĞİ VE GÜVENİRLİLİĞİ

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Bu çalışmanın amacı Bilişsel Durum Ölçeğini kültürel adapte etmek ve geçerliliğini üniversite öğrencilerinde incelemektir.

Yöntemler: Güvenilirlik, Interclass Korelasyon Katsayısı (ICC) ve %94-96 güven aralığı kullanılarak değerlendirilmiştir. Çalışmaya sınav döneminde ki, ortalama yaşları 20.9±1.8 yıl olan hem Bilişsel Durum Ölçeğini hem de Sınav Kaygı Envanterini tamamlayan 345 öğrenci dahil edilmiştir.

Sonuçlar: Katılımcıların 265'i (%76.8) kız, 80'i ise (23.2%) erkektir. Cronbach's alpha katsayıları ve ICC's birinci ve ikinci ölçüm için 0.90 (Güven aralığı (CI) 95%; 0.85—0.94); 0.93 (CI 95%; 0.89—0.96) dir. Ortalama fark 0.25'dir (% 95 CI—2.30 - 3.11). Test-tekrar test güvenilirliğini ölçmek amacıyla 36 öğrenci 2 hafta içinde iki kez değerlendirilmiştir. Pearson's korelasyon katsayısına göre ($r=0.39$; $p<0.001$) Bilişsel Durum Ölçeği ve Sınav Kaygı Envanteri toplam puanları arasında kuvvetli ilişki tespit edilmiştir. Bilişsel Durum Ölçeğinin Türkçe versiyonu güvenilir, geçerli ve üniversite öğrencilerinde bilişsel durumu değerlendirmek için duyarlı bir araç olarak bulunmuştur.

Tartışma: Müdahalenin başarı göstergesi için bireylerin bilişsel durumlarıyla ilgili kendi algılandığındaki değişikliklerin ortaya koyulabilmesi çok önemlidir. Birey tarafından bildirilen sonuçlar özel olarak kişinin algısını gösterir. Bilişsel Durum Ölçeği geçerli ve güvenilir bir araç olarak bulunmuştur ve ölçeğin kullanımı öğrencilerle ilişkili saha çalışmaları ve araştırmalar açısından önerilir. Buna rağmen, daha büyük örneklerle ve farklı hastalıklarda çalışılması ihtiyacı vardır.

Anahtar kelimeler: Biliş; güvenilirlik; geçerlilik; öğrenci

INTRODUCTION

Cognitive failure is defined as a mistake or failure in the performance of an action that the person is normally capable of completing (1). Memory, distractibility or a physical blunder interferes with successful completion of the task although there is adequate cognitive ability (2). The term encompasses numerous types of execution lapses: 1) lapses in attention (i.e., failures in perception), 2) memory (i.e., failures related to information retrieval), and 3) motor function (i.e., the performance of unintended actions, or action slips) (3). There are many cognitive failure questionnaires and some of these only evaluate one cognitive parameter while some are general (4-6). The Cognitive Failures Questionnaire (CFQ) is used widely to measure general cognitive failures (7-9). CFQ is concerned with everyday memory failures and is used as a self-report measurement that was designed to assess mental lapses. The questionnaire was developed in 1982 by Broadbent to assess the frequency of everyday mistakes and errors (7).

CFQ has been found to be a valuable measurement for cognitive failure occurring due to distraction when working under stress (10,11). Students have to perform a large number of tasks under stress during the examination week. Increased stress has an influence on the cognitive state and can lead to anxiety findings (9). Anxiety is defined as a future-oriented mood state associated with preparation for possible, upcoming negative events by Barlow (12). Test anxiety is thought to be a serious problem that has a negative effect on making vital or occupational decisions, prevents demonstration of the full capacity, and decreases the academic performance of students and sometimes even forces them to take a break from their education.

Although it is quite important to evaluate the cognitive failure there is no assessment scale in Turk-

ish. CFQ can be completed at home, this can make it practical for busy the practitioner. As a result, we choose to translate the CFQ into Turkish as it is less costly and time consuming than developing a new tool. As far as we know, there is no self-reported measurement of cognitive failure in use in Turkey. The aim of this study was therefore to validate and evaluate the Turkish version of the Cognitive Failures Questionnaire (CFQ) in Turkish university students.

METHODS

This study was approved by the Ethics Committee of Hacettepe University (GO 14/92-2014), Faculty of Medicine in Ankara, Turkey and was conducted in accordance with the rules of the Declaration of Helsinki. Three hundred and forty five university students participated in the present study. Socio-demographic information (age, gender, residence) was taken from all participation. Before their participation, written and oral informed consent was obtained from all subjects.

Participants were eligible for the study if they met the following inclusion criteria: being a university student, having no neurological and mental illnesses, being during the examination week and being volunteer to participate the study.

Instruments

Cognitive Failures Questionnaire

CFQ is a self-report questionnaire measuring failures of perception, memory and motor function. CFQ consists of 25 items and the subjects answer the items on a five-order scale (ranging from "never" to "always"). The five response choices are: (0) never, (1) very rarely, (2) occasionally, and (3) quite often, (4) very often. An example of a question is 'Do you fail to listen to people's names when you are meeting them?' Scores for the CFQ can range from 0 to 100. A high score indicates increased

Table 1. Bland and Altman tests for test-retest reliability, n=36

Instrument	Bland and Altman tests			
	ddiff	SDdiff	95% LoA	Percentage of differences lies between ± 1.96 SDdiff
CFQ	0.25	8.41	- 16.23 — 16.73	97.22

CFQ = Cognitive Failures Questionnaire ddiff = the mean of the differences between the two assessments, SDdiff = the standard deviation of the differences between the two assessments, 95% LoA = ddiff \pm 1.96 x SDdiff

Table 2. Discriminative validity of the CFQ based on TAI groups, N= 345

Test Anxiety Inventory Groups	N	Cognitive Failures Questionnaire	
		Mean \pm SD	95 % CI
Low (≤ 28)	65	37.3 \pm 14.4	35.8 — 38.8
Moderate (29 – 52)	240	43.3 \pm 13.5	41.9 — 44.7
High (≥ 53)	40	51.8 \pm 13.2	50.4 — 53.2

CFQ = Cognitive Failures Questionnaire ddiff = the mean of the differences between the two assessments, SDdiff = the standard deviation of the differences between the two assessments, 95% LoA = ddiff \pm 1.96 x SDdiff

tendency to cognitive failure. CFQ has valid and reliable instrument (2,7,13,14).

Test Anxiety Inventory

Test Anxiety Inventory (TAI) was developed for use with adolescents and adults and consists of 20 items that ask respondents to indicate how they generally feel in test situations by reporting the frequency that they experience specific symptoms of anxiety before, during and after examinations. Respondents rate their responses on a 4-point Likert-type scale. The four response choices are: (1) almost never, (2) sometimes, (3) often, and (4) almost always. Values of item 1 are reversed. The TAI has two subscales that assess worry and emotionality as major components of test anxiety. Each subscale consists of eight items with the remaining four (1, 12, 13, and 19) items not included in either subscale. The TAI total scores may range from 20 to 80, with higher scores indicates a higher test anxiety (15). The Turkish version of TAI showed reliability, reproducibility, and validity (16).

Translation procedure

The translation process of the original English version of the CFQ was done according to the guidelines of Guillemin et al. (17) after the permission was taken from the developing authors of CFQ. Three physiotherapists who were experienced (19, 18, and 16-year) in occupational therapy translated the original English version into Turkish. Their mother tongue were Turkish, three of the Turkish translations were compared for inconsistencies. An addition and a change were made in question 5 and 11, respectively. An activity is added the 5th question to ensure that the question was more understandable for Turkish speaking people. Its final version was formed from “do you bomb into peo-

ple?” to “yolda yürürken insanlara çarptığınız olur mu?”. Today, e-mail is more preferred than the letter. So, we translated the word “letters” as “e-posta veya evraklar” in the 11th question. The first step of translation procedure was finalized, after these slight changes were made by consensus. Finally, a professional translator whose mother tongue was English translated the CFQ-Turkish back into English blindly and independently. This translator neither had any medical knowledge nor knew anything about the CFQ. The back-translated version was compared with the original English version.

Sample size justification

The sample size was determined based on statistical power analysis procedures using PASS 2005 software (NCSS, Kaysville, UT, USA). For reliability study, with an assumption of twenty-five items for the CFQ, the expected Cronbach's alpha value of 0.90 or higher (H1: CA1=0.90), the acceptable reliability of at least 0.80 (H0: CA0=0.80), $\alpha = 5\%$ and $\beta = 20\%$, then, the estimated sample size was 33 participants.

Statistical analysis

In this study, we used the PASW Statistics 18 for statistical analyses. We checked the missing values for each questionnaire prior to further analysis. The CFQ data were checked for normality by generating skewness and kurtosis statistics. Spearman's and Pearson's correlation coefficients were calculated to evaluate the relationship between the CFQ scores and participant characteristics. Acceptability was assessed in terms of refusal rate and rates of missing data. To assess the internal consistency reliability Cronbach's alpha (CA) coefficients were calculated at Time 1 and Time 2. Values equal to or greater than 0.70 were considered acceptable

Table 3. DConvergent validity of the CFQ (Pearson's correlation coefficients), n= 345

Test Anxiety Inventory	Cognitive Failures Questionnaire	
	r	95 % CI
Worry	0.41*	32 — 49
Emotionality	0.38*	29 — 47
Total	0.39*	30 — 48

*: Correlation is significant at the 0.01 level (2-tailed).

(18,19). Test-retest reliability was assessed using the intra-class correlation coefficient (ICC) with a two-way random-effects model and the 95 percent confidence interval (95% CI) and the Bland and Altman method (20). In this study, the duration of test-retest was four weeks, which included term and final term exams. The mean difference between the two assessments, 95 percent limits of agreement (LoA) as the mean difference (1.96SD), and the percentage of differences lies between ± 1.96 SD diff were calculated. The ICC values were interpreted as excellent reliability ≥ 0.80 , moderate reliability 0.60 to 0.79, and questionable reliability < 0.60 (21).

Examining the floor and ceiling effects assessed content validity. We hypothesized that floor and ceiling effects are less than 20% (22).

Construct validity was analyzed in terms of discriminative and convergent validity (23, 24). The discriminative validity was investigated by examining differences in scores of the CFQ between groups of individuals measured by the TAI. As no TAI norms exist for university students, low, moderate, and high anxiety groups were formed using sample-specific means and one and two standard deviations based on the TAI questionnaire total responses. We hypothesized that high anxiety group has statistically significant higher CFQ scores than low and moderate group. Group difference was tested by ANCOVA controlling the gender effect. Convergent validity was investigated by examining the Pearson's correlation coefficients of the scores of CFQ and Test Anxiety Inventory (TAI). Pearson's correlation coefficients were interpreted as either excellent relationship $|r| \geq 0.91$; good $0.90 \geq |r| \geq 0.71$; fair $0.70 \geq |r| \geq 0.51$; weak $0.50 \geq |r| \geq 0.31$; little or none $|r| \leq 0.3$. A p value of 0.01 was taken as the level of significance (25).

RESULTS

The study sample was predominantly female (76.8 %) with a mean age 20.9 ± 1.8 . Two hundred and four of the students (59.1 %) stay with their family, 86 (24.9 %) at dormitory and the rest 55 (15.9 %) stay with their flat-mates. There were no significant correlations between the CFQ total scores and either age ($r = 0.03$, $p = 0.552$) or gender ($\rho = -0.04$, $p = 0.457$).

Acceptability

All eligible subjects accepted to take part in the study. There were no missing values across the questionnaires of interest.

Reliability

Cronbach's alpha coefficients and ICC's at Time 1 and Time 2 were as follows: 0.90 (CI 95%; 0.85 — 0.94); 0.93 (CI 95%; 0.89 — 0.96). The mean difference was 0.25 with 95 % CI -2.30 to 3.11 . The 95% limits of agreement were from -16.23 to 16.73 , which included 97.22 % (35/36) of all participants' difference data (Table 1).

Validity

No ceiling and floor effects were detected for the CFQ. The CFQ total scores by TAI groups were presented on Table 2. There were statistically significant differences between groups ($F = 13.62$, $p = 0.001$). Correlation coefficients are significant at 0.01 levels and there were weak positive correlations between the CFQ and TAI scores (Table 3).

DISCUSSION

Cognitive failures is occurred in the everyday slips or errors (7). These slips are occurred when people has a lot of work cause of decreased attention and high load capacity of memory. People are not remembering the names and lacking of the mind. At

the end, unintentional mistakes or slips are done (26). Therefore, cognitive failures measurement is important issue. For this purpose, the present study was planned to do the Turkish version of CFQ. As a result of this study, it is concluded that the Turkish version of CFQ is a reliable, valid, and responsive instrument for evaluating cognitive failures in university students.

Cognitive skills are the important role players in the student performance. Newmann, Wehlarge, and Lamborn's (1992) explained of cognitive role as "the student's psychological investment in and effort directed toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote" is related to academic work (27).

Students cope with a lot of different situations when their student role is continuing. Staying home or dorm, keeping remains to be both family support or not, orientation from the new school environment and having new friends are impacted their anxiety, stress and high-level cognitive skills as executive functions. It may be negatively affected academic skills of students and they kept away university life. Also, examination term is stressfull period for the university students. They may be drawing away their occupation and community. To predicted that problems is of great importance. This study's other significance is as follows: the number of university students in our country is increasing day by day and professionals of university should use Turkish CFQ to detect their students' cognitive failures as earlier as to have taken some precautions and solutions to solve those problems. Therefore, university students may start their new lives happier and participate community healthier. All are explained why they were selected as participants in the study.

Regarding reliability (Cronbach α scores) and test-retest (ICC) scores were found that excellent reliability as same as Broadbent et al. (1982). They stated that they repeated tests meaningful at 6 weeks later, but would lower initial-final correlations. Similarly, in the present study, Turkish version test-retest scores (ICC) were meaningful four weeks later. Additionally, we agreed with Bridger et al (2013), when people have highly CFQ scores; they have more opportunity for cognitive failures

because they are more actively in that term. For the same reason, they would be more inclined to psychological strain, being exposed to higher work demands such as exam term for students. We participated another researcher in high test-retest reliability of the CFQ is really a reflection of a constant cognitive load at school/ work etc. and not a measure of a stable personality trait (7,14).

When looked at the validity scores, CFQ and TAI scores had found positive correlations same as another researches (7,14,28,29). Sullivan and Payne (2007) stated that the relationship between cognitive failures, anxiety, and psychological tension (29). When anxiety is increased, perception and attention are worse affected (7,30). Broadbent et al (1982) emphasized that when job demands were higher, cognitive failures has occurred. The result of the present study was found that anxiety and cognitive failures has also affected each other in during examination weeks because the student has a lot of cognitive load.

In the translation procedure of CFQ, it was previously mentioned that all the items are adjusted to Turkish culture. However, some phrases for example 'letter' was adapted as 'e-mail' according to current necessities. At the end of this original research, the CFQ Turkish version is useful in the industrial, clinical and educational areas to detect potential cognitive failures.

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