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Confirmatory factor analysis of the university student depression inventory (USDI)

Ali Rezaii Sharif [a] *, Mahmoud Ghazi-Tabatabaei[b], Elaheh Hejazi [c], M. Habibi Askarabad[d], Gh. R Dehshiri [e], fatemeh Rezaii Sharif[f]

[a] *Department of of educational Psychology, Tehran University,Tehran, Iran*
[b] *Department of Demography , Tehran University,Tehran, Iran* [b]
[c] *Department of of educational Psychology, Tehran University,Tehran, Iran*
[d] *Department of Psychology , Tehran University,Tehran, Iran*
[e] *Department of Psychology,allameh Tabataba'i University,Tehran, Iran*
[f]*Department of Psychology , mohaghegh Ardabili University,Ardabil, Iran*

Abstract

The university student depression inventory (USDI) was developed by Khawaja and Bryden , (2006) as a self-report measure of the student depression in university. Depression is widespread among university students and university students commonly experience depression. Khawaja and Bryden used exploratory factor analysis to examine the factor structure of the USDI. The purpose of the present study was to further assess the underlying factor structure of the USDI using Confirmatory Factor Analysis (CFA). Sample in this study consists of 442 university student (246 female and 196 male). The results of our analysis support the theoretical suppositions of Khawaja and Bryden's three dimensional model depression. Confirmatory Factor analyses revealed three factors: Academic motivation, cognitive - emotional and lethargy. Internal consistency and test-re test reliability coefficients were 0/91 and 0/84. Respectively the subscale reliabilities were acceptable. Convergent and divergent validity coefficients were appropriate.

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Keywords: Confirmatory factor analysis, university student, depression.

1. Introduction

Depression is one of the most common mental disorders that in today's world have increased. Depression is a common emotional disorder, causes distress and impairs functioning. The cognitive, physiological, behavioral and motivational symptoms are the core features of this disorder (Beck, 1967; Khawaja and Bryden , 2006). Depression is the leading cause of disability in the United States for ages 15–44 (NIMH, 2006). Major depressive disorder is associated with 27.2 lost workdays and bipolar disorder (I or II) with 65.5 lost workdays for each ill worker per year (Kessler et al., 2006). Depression has been defined in a number of ways in the research literature (DSM-IV, 1994), including as a transient mood or affective state, a syndrome of related symptoms, and a clinical disorder defined by official nosologies (DSM-IV, 1994). University students (the term refers to university and college students) also

* Ali Rezaii Sharif. Tel.: +989144514673; fax: + 98 21 88259420.
E-mail address: rezaiisharif@ut.ac.ir.

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commonly experience depression. Estimates of depression in the university population ranges from 30% of students experiencing some level of depression to around 15% of students experiencing clinical levels of depression at any one time (McLennan, 1992; Rosenthal and Schreiner, 2000; Khawaja & Bryden , 2006). Depression is a serious problem for university students. Depressed students are shown to have problems with university academic work and motivation, and report receiving lower grades than non-depressed students (Lyubomirsky et al., 2003; Khawaja & Bryden, 2009). Depression is common among Iranian students as a one of the important social groups. Researchers show that the student who suffered depression has more problems in academic tasks (bageriyazdi et al., 1995). In their study about psychological health students of Tehran University show that 30% from student have depression. In another study Ahmadi (1995) show that 18/6% in Shiraz university student has mild depression, 16/6% has middle depression and 8/5% of student has major depression. In their study 44/9% of student had depression and the male 16/9% was in high level than female 13/5%. In Parto (1999) study this result was confirmed. The University Student Depression Inventory (USDI) was developed to measure depression among university Students. This inventory that has designed by Khawaja & Bryden, (2006) at Quzland University. This has high level of psychometric. According Khawaja & Bryden, (2006) there is evidence that students experience some slight variations in symptoms. For example, changes in sleep and appetite may indicate depression in a clinical population but may not be a reliable indicator of depression in a student population as the University lifestyle may influence sleep and eating patterns and may not reflect changes related to depression. There is also evidence that students may experience cognitive symptoms, such as concentration difficulties, perfectionism and low self-evaluation, more frequently than clinical. Further, students experience motivational problems in the form of loss of interest and initiative and social difficulties related to developing friendships and assertiveness. According Khawaja & Bryden, (2006) Student Depression involves Lethargy, Cognitive/Emotional and Academic Motivation factors. The Lethargy factor of the USDI is characterized by a combination of physiological, behavioral and cognitive manifestations. This factor is consistent with previous research on the factor structure of depression in students. The Cognitive/Emotional factor of the USDI is characterized by cognitive symptoms, emotional symptoms and social withdrawal. This factor is consistent with previous research on the factor structure of depression in students, and confirms that cognitive symptoms are important in student depression. The third factor of the USDI, Academic Motivation, is characterized by motivation and procrastination items related to study. Students frequently experience motivation problems (Vredenburg et al., 1988). Moreover, procrastination is a common motivational symptom in mild depression (Beck, 1967). This factor is unique to the USDI, and therefore includes items that affect depressed students but are not usually included in other depression scales (Khawaja & Bryden, 2006).

Factor analysis includes a variety of correlation analyses designed to examine the interrelationships among variables (Carr, 1992; Ozcinar, 2006). Daniel (1988) stated that factor analysis is "designed to examine the covariance structure of a set of variables and to provide an explanation of the relationships among those variables in terms of a smaller number of unobserved latent variables called factors. In confirmatory factor analysis, the researcher begins with a hypothesis prior to the analysis. This model, or hypothesis, specifies which variables will be correlated with which factors and which factors are correlated. The hypothesis is based on a strong theoretical and/or empirical foundation (Stevens, 1996). The purpose of this paper was to test whether the factor structure of The USDI (Khawaja & Bryden, 2006) could be replicated on an independent sample using confirmatory factor analysis with maximum likelihood estimates. For this propose we used CFI.

2. Methods

2.1. Participants and procedure

The population of this study was all of undergraduate student who studying at university of Tehran in 2007 -2008 academic year. Data of this study was collected in three sample groups:

A: this group consists of 100 students in ten faculties by using of proposed sampling. The purpose of this group is pilot study.

B: original group: this group was consisting of 442 students.

A total of 442 (196 men, 246 women) undergraduate students completed the USDI in a classroom setting. The mean age for the men was 22.16 years (SD = 4.82) and 25.18 years (SD = 8.69) for the women. Ss. All participants completed the USDI in 25min or less.

2.2. Measures

Participants completed a short demographic information form, the University Student Depression Inventory, the Beck Depression Inventory and Oxford Happiness Inventory.

2.2.1. The Beck Depression Inventory (BDI):

The Persian version of the BDI is a self-report measure of depression consisting of 21 items, with a four-point scale ranging from a little of the time (1) to most of the time (4). There is a considerable literature on the it's reliability and validity in mental health contexts is established (Beck et al., 1961). A meta-analysis of the BDI's reliability estimates reported a mean a coefficient of .81 for non-psychiatric samples (Beck, Steer, & Garbin, 1988). Inclusion of the BDI-II allowed for assessment of the Convergent validity of the USDI.

2.2.2. Oxford Happiness Inventory (OHI):

The Oxford Happiness Inventory is 29 item self-report questionnaire used to assess Happiness developed by Argyle et al, (1989). The participant is asked to answer positively worded items on a four point intensity scale from 1 (definitely no) to 4 (definitely yes) in response to the question. The purpose of this measure is to assesses of Divergent validity of the USDI.

3. Results

3.1. Confirmatory factor analyses

As this was the first study to examine the factor structure of the USDI among Iranian university students. Confirmatory factor analysis with maximum likelihood, using LISREL 8.7 (Jöreskog & Sörbom, 2004), Following the recommendation of Cole (1987) the goodness of fit was evaluated using four criteria: chi-square goodness-of-fit; the goodness-of-fit (GFI), the adjusted goodness-of-fit (AGFI), and the root mean-square residual (RMS). We used multiple criteria as each has strengths and weaknesses in assessing the goodness-of-fit between the proposed hypothetical model and the actual data (Cole, 1987; Marsh, Balla & McDonald, 1988). The following criteria were used, respectively, to indicate the goodness-of-fit of the model to the data: for the chi-square test, a no significant x2 (a significant x2 indicates that a significant amount of actual co-variance remains unexplained); GFI > 0.85; AGFI > 0.80; RMS co.10 (Anderson & Gerbing, 1984). In addition to these fit criteria we were also interested in examining the parameter estimates of the relationship between the factors. In the present study the data were initially fitted to the three factor pattern matrix reported by (Khawaja & Bryden, 2006), 3-factor was found to have a moderately good fit to the data. Although the chi-square was significant [Z2 (471) = 1360.56, P < 0.001]. The goodness-of-fit index was acceptably high (GFI = 0.980), as was the adjusted goodness-of-fit index (AGFI 0.977). The root mean square residual also suggested that the model provided a good fit to the data (RMSR = 0.077). 1 Lethargy items (number 18) have relatively lower loadings on their designated factor, when compared across all other items. The content of these item suggest that these item is measure of suspiciousness. See in figure 1and table 1.

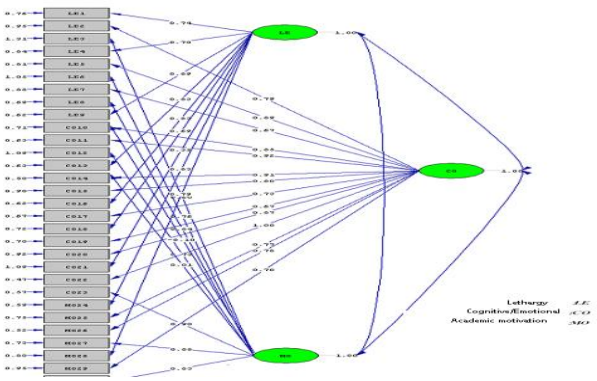

Fig. 1. Results of the confirmatory factor analysis on the USDI for model.

3.2. Exploratory factor analysis

The Kaiser–Meyer–Olkin Measure of Sampling Adequacy was .94 indicating a "marvelous" level of inter correlations among the items (Kaiser, 1974). Similarly, Bartlett's test of sphericity showed that there was significantly sufficient correlations between the items to perform factor analysis, approximate $\chi 2$ (.937) = 7934.591, p< .001. The scree test showed that three factors had a larger proportion of variance apportioned to them than the remaining factors. A Direct Oblimin (oblique) rotation was used three factors were highly correlated The factor analysis resulted in a 30 item scale which loaded on three factors as shown in Table 2. Factor 1, Cognitive/Emotional, comprised of 14 items which included items regarding emotional and cognitive aspects of depression, specifically suicidal ideation, worthlessness, and emotional emptiness and sadness. Factor 2, Academic Motivation, comprised of seven items which included items regarding motivation and study tasks, specifically lecture attendance and motivation to study. Factor 3, Lethargy, comprised of nine items which included items regarding lethargy, concentration difficulties, and task performance. The total variance explained by these factors was calculated from the sums of squared loadings from the structure matrix. The total variance explained by the Cognitive / Emotional, Academic Motivation and Lethargy factors was 26.56, 16.92, and 16.51, respectively and ensemble is 59.9. As oblique rotation was used and factors were moderately correlated, these were overestimates of the total variance explained and therefore must be interpreted with caution. See in table 1 and figure 2.

The three factors were highly inter correlated, and the items which comprised each factor were positively related to the items which comprised the other factors. Items on the Cognitive Emotional factor were correlated to the Lethargy factor (.54) and the Academic Motivation factor (.45). Items on the Lethargy factor were correlated with the Academic Motivation factor (.24). (See Table 2).

Table 1 Factor analysis for 30 item USDI

	Cognitive/E motional	***Academic motivation***	***Lethargy***
Factor 1: Cognitive/Emotional			
22. I feel disappointed in myself	***.826***	.320	.520
11. I feel emotionally empty	***.812***	.286	.432
5. I feel worthless	***.811***	.303	.311
10. No one cares about me	***.792***	.286	.365
14. I feel sad	***.784***	.311	.476
26. I do not cope well	***.777***	.431	.415
25. I feel withdrawn when I'm around others	***.760***	.334	.351
19. I feel like I cannot control my emotions	***.753***	.310	.304
7. I have thought about killing myself	***.732***	.262	.177
2. I wonder whether life is worth living	***.730***	.310	.360
17. I have thought about killing myself	***.724***	.353	.399
15. I worry I will not amount to anything	***.717***	.248	.291
20. I spend more time alone than I used to	***.703***	.308	.470
29. I think most people are better than me	***.670***	.199	.272
Factor 2: Academic motivation			
27. I do not find study as interesting as I used to	.402	***.843***	.183
30. I have trouble completing study tasks	.430	***.843***	.247
23. I have trouble starting assignments	.388	***.820***	.211
6. I don't attend lectures as much as I used to	.220	***.819***	.101
8. I don't feel motivated to study	.424	***.816***	.220
12. Going to university is pointless	.380	***.816***	.093
3. I do not have any desire to go to lectures	.165	***.757***	.045
Factor 3: Lethargy			

13. I find it hard to concentrate	.436	.207	***.838***
9. My energy is low	.481	.143	***.804***
28. My study is disrupted by distracting thoughts	.449	.087	***.780***
4. I do not have the energy to study at my usual level	.268	.222	***.772***
1. I am more tired than I used to be	.317	.239	***.762***
16. I don't feel rested even after sleeping	.583	.210	***.760***
24. Daily tasks take me longer than they used to	.407	.307	***.751***
21. My mood affects my ability to carry out assigned tasks	.145	-.141	***.581***
18. Challenges I encounter in my studies overwhelm me	.250	.051	***.347***

Note: N=442. Factor loadings are in italics. (Structure Matrix).
Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

3.4. Convergent and divergent validity

To examine the relationship between the USDI and the convergent and divergent validity measures, Pearson's correlations were calculated Results indicated that the USDI with its sub scales was significantly correlated with all measures of Depression and Happiness, (P >:01). This indicates that the USDI has a good divergent and convergent validity. (See Table 2).

Table 2 Pearson's correlations among variables

Variable	*USDI*	*Factor 1*	*Factor 2*	*Factor 3*
USDI				
Cognitive/Emotional	*.90***			
Academic motivation	*.67***	*.45***		
Lethargy	*.75***	*.54***	*.24***	
BDI	*.72***	*.65***	*.58***	***.58****
OHI	*-.60***	*-.53***	*-.56***	***-.54****

Note. USDI: the university student depression inventory; Factor 1 = Lethargy; Factor 2 = Cognitive/Emotion; Factor 3 = Academic motivation; BDI-II: Beck Depression Inventory—Second Edition; OHI: Oxford Happiness Inventory
* P < .05.
** P < .01.

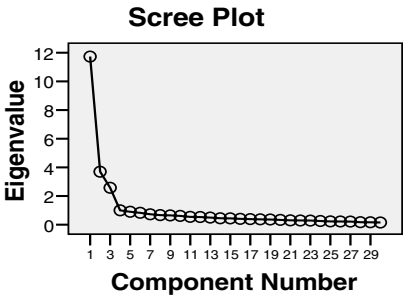

Fig. 2, scree plot of USDI

4. Conclusion

The purpose of this paper was to test whether the factor structure of The student depression inventory (Khawaja & Bryden , 2006) could be replicated on an independent sample using confirmatory factor analysis with maximum likelihood estimates. On examination of the factor Loadings and standardized residuals, 1 items dealing with suspicion from the original lethargy sub scale were found to have relatively low factor loadings. Removing the 1 suspicion item from the USDI scale resulted in a slightly higher internal consistency value than was obtained from the original scale, even after estimating alpha values with equal scale length. Based on the results of this study, it is

suggested that the USDI scale may be improved psychometrically if the 1 suspicion item were removed from the scale. Following this suggestion, The USDI may be improved by either remaining with a 3-factor model, with revisions to the Cognitive/Emotional factor to be first, Academic motivation to be second and Lethargy to be tertiary sub scales.

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