Title: Psychometric properties of the Arabic version of the UCLA Loneliness Scale (ULS-8) among Saudi female undergraduate students

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Abstract:

Background: The prevalence of loneliness among students indicates the need for its assessment by a valid and reliable tool. This study investigates the psychometric properties of the Arabic version of the short-form UCLA Loneliness Scale (ULS-8) among Saudi undergraduate students.

Methods: A cross-sectional survey was distributed to the participants (n=753) through their university emails to target female students in two universities in Riyadh, Saudi Arabia. They completed an Arabic translation of the eight items UCLA Loneliness Scale and the Arabic version of the Patient Health Questionnaire-9 (PHQ-9). Construct validity of the Arabic version of ULS-8 was evaluated by exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The convergent validity of the scale was assessed using PHQ-9. Reliability was assessed by Cronbach alpha.

Results: Construct validity showed that the ULS-7, which excluded item #3 from the ULS-8, had had a greater good-fit model. The score of ULS-7 had converged significantly and positively on the depression score (r=0.679, p <0.010). The overall Cronbach’s an of the ULS-6 was 0.78.

Conclusion: The present study results indicate that the Arabic version of ULS-7 was an adequate concise measure of loneliness.

Keywords: Loneliness, validity, reliability, UCLA loneliness scale, students.
**Introduction**

The ability of a person to make a close connection with other people is one of the most critical settings of a healthy personality. There are various psychological, philosophical, and sociological descriptions of loneliness. Researchers have defined loneliness as a concept related to a person’s perception of a lack of social and intimate relationships, as well as a reaction of despair, longing, or emotion [1]. Loneliness has also been described as a subjective sense of lacking familial or social contact to the degree they wanted, which is responsible for reduced quality of life [2]. Interpersonal relationships are one of the additional vital determinants of the standard of one’s life. The scarcity of social skills and understanding and the lack of social support result in loneliness [3]. Loneliness is outlined by Peplau and Perlman (1982) as the distress that occurs when one’s social relationships are perceived as being less satisfying than what is desired [4].

As the university is considered a transitional period, loneliness is commonly experienced by university students, which may affect the quality of forming relationships [5,6]. Many studies showed the significant prevalence of loneliness among university students. The prevalence was reported as 49.5%, 56%, and 60.2% among universities in Ethiopia, Palestine, and Turkey [2,7,8]. This indicates the need to assess the loneliness among females by a valid and reliable tool.

The UCLA loneliness scale, first designed by Russel et al. in 1978, is used substantively in personality research as a screener for loneliness [9]. The shortened and revised version, put forward by Hays and DiMatteo in 1980 [10], later became more widely used for its less cumbersome survey time on participants; it combines the 20 original items into eight items, based on a factor analysis, and is therefore denoted as ULS-8. This study aimed to investigate the psychometric properties of the Arabic version of ULS-8 with a sample of Arabic individuals in the Kingdom of Saudi Arabia. This can facilitate researchers to study and measure loneliness among Arab individuals.
Subjects and methods:

The sample of this study was female students from two main universities in Riyadh, Saudi Arabia: Princess Nourah bint Abdulrahman University (PNU) and King Saud University (KSU). Ethical approval was obtained from the Institutional Review Board at PNU (IRB-PNU:20-0225) in Riyadh, Saudi Arabia. The study was performed in accordance with the principles stated in the Declaration of Helsinki. Informed consent was obtained from the participants. The cross-sectional survey was distributed to the participants through their university emails in July and August 2020. Data was collected using the convenience sampling technique, and Google forms link. A total of 753 female students: 75.2% were 18–22 years old, and 24.8% were 23 years old or older. They were from different colleges: colleges of humanities (61.5%), colleges of health science (13.3%), colleges of sciences (13.8%), and colleges of the community (11.4%). They were also from different levels: 45.6% were junior, 41% were sophomore, and 13.3% were seniors. Most of the participants had a GPA of more than 4 out of 5 (73.6%), and the rest of them had 4 or less out of 5.

The questionnaire measures loneliness and depression using Arabic versions of the eight items of the University of California Los Angeles (UCLA) Loneliness Scale and Patient Health Questionnaire 9 (PHQ-9). Each item of ULS-8 is rated on a 4-level score; 1 (never), 2 (rarely), 3 (sometimes), and 4 (always). The total score range is 8 to 32 points, and the higher scores indicate a higher level of loneliness. The PHQ-9 questionnaire was then used to gauge depression among the sampled participants. The instrument is also a Likert scale-based psychometric self-assessment that contains nine items, all individually scored from 0 to 3. The total score range is 0 to 27 points, and the higher scores indicate higher severity of depression. The scale’s validity and reliability have been verified throughout different regional studies to become a widely used tool in screening for depression. More specifically, the Arabic-translated version of the PHQ-9 was found to be valid and reliable for detecting depression in Saudi Arabia on a sample of university students in a previous study [11].
The Arabic version of the ULS-8 loneliness scale was developed as a part of this research’s procedures. A methodological study of the translation and cross-cultural adaptation of the scale was conducted, according to the stages of translation. The process underwent the four steps: 1) Synthesis of translation, 2) Synthesis of back-translation, 3) Development of a synthesized version with the expert committee, and 4) Experimental application. Two bilingual translators conducted the first stage without interacting during the time they were working. In the second stage, these translations were translated from Arabic back into the scale’s original language (English) by two bilingual mental health experts who had not taken part in the previous step. The next step was the development of a synthesized version. The scale then went through an evaluation of language clarity, relevance, and theoretical dimensions. Specialists conducted this work with enough clinical experience to act as judges. This evaluation considered the scale to be adequate. The process then proceeded to the experimental application of the approved version by distributing it to 15 college students aiming to identify any difficulties in understanding the items and to check whether the instrument fit the target population. After completing the scale, the volunteered students were asked if they understood the meanings of the items they had answered and if they had any questions regarding any items on the scale. There were no difficulties in understanding the scale items.

A factor analysis was conducted to observe the construct validity of the Arabic translated ULS-8. To test the validity of the translated questionnaire, we conducted an exploratory factor analysis (EFA) on one equal half of our sample, and the other half was tested using a confirmatory factor analysis (CFA). We first, however, test the adequacy of our sampling using a Kaiser-Meer-Olkin (KMO) measure and the sphericity using Bartlett's test to test for uniformity in the differences of the variances among any combination of items. To test the fit of the CFA model, we recorded a comparative fit index (CFI), Tuckert-Lewish fit index (TLI), and root square error of approximation (RMSEA). To test for unidimensionality, we tested the unidimensional congruence test (Unico), explained common variance test (ECV), and mean of item residual absolute loading index of unidimensionality (MIREA). To test
the reliability of the two instruments – the ULS-8 and PHQ-9 – Cronbach’s alpha coefficient test was done. For any scores with the reliability of α<0.7, we considered each item’s inter-item correlation (an item’s correlation with the summed score of the other items) to question and reconsider the inclusion of any item that falls below an individual score of 0.4; all are using the functions library on Statistical Package for the Social Sciences (SPSS 20.0).

**Results**

**Construct validity:**

**Exploratory factor analysis (EFA):**

The Kaplan-Meirr-Olkin (KMO) index of sampling adequacy showed that the sample size was sufficient for the factor analytic procedure (KMO = 0.83), with a determinant index of 0.118 and a significant Bartlett’s test of sphericity (p<0.001), both indicating the suitability of the factor analysis to the correlation matrix between these eight indicators and the absence of collinearity between these indicators of loneliness. The initial exploratory factor analysis (EFA) showed that the eight items had sufficient inter-correlations with 0.3 and above values. The FACTOR program conducted Parallel analysis, the scree plot test, and the eigenevalue indexes all agreed on the presence of one dimension that may be extracted from the eight indicators of loneliness. In addition, the results of tests of Undimnesionality were: Unidimensional congruence (Unico) = 0.988, Explained common variance (ECV) = 0.905, and Mean of item residual absolute loading (MIREAL) = 0.169. These results showed that the indicators of loneliness were necessarily comprising one construct, indicating that data can be treated as essentially unidimensional.

**Confirmatory Factor Analysis (CFA):**
The Confirmatory Factor Analysis (CFA) procedure was applied initially to the correlation matrix between the eight indicators combined. The initial factor solution results showed a misfit between the proposed and measured correlation matrixes indicating a problem may have existed, and by evaluating the standardized residual matrices of the CFA solution and the program recommended modification indexes, it was found that the item “#L3 I am an outgoing person” had a significant error correlation with the other items (as evidenced with a standardized residual $\geq 2.75$ standard points with the indicators of loneliness (particularly the items: #L1 I lack companionship, #L2 There is no one I can turn to, and #L7 I am unhappy being so withdrawn). Therefore, item#3 measuring outgoingness was removed from the analysis model keeping the remaining seven loneliness indicators. The CFA analysis was re-run, which showed greater goodness-of-fit between proposed and measured correlation matrixes with the removal of item #3 (Figure 1).

**Figure 1:** Path diagram of ULS-7
The overall Chi-squared goodness-fit index showed a good fit between a seven-item model with the data ($\chi^2(12)=19.91, p=0.069$), which indicated a non-statically significant difference between the proposed path model and the data. The other indexes of fit were done: Comparative Fit Index (CFI)= 0.994, Tucker-Lewis Fit Index (TLI)= 0.990, The Root Mean Square Error of Approximation (RMSEA) =0.03 (90% C.I 0.000-0.052, PCLOS=0.932). These results showed an overall substantive and satisfactory fit of the model too.

All the seven tested indicators of loneliness had a salient standardized loading to their latent parent factor (loneliness) with loadings well above 0.32, except item #7, which had a loading of 0.30 to its latent factor, indicating the convergent validity of these indicators. Figure 1 displays the
standardized loadings (i.e., correlations) between these seven indicators with their latent factor (loneliness). The final factor solution explained 44.7% of the shared covariance between the loneliness seven indicators which is a substantial amount of commonality between these indicators. The Composite reliability (Cr=0.78) of these seven loneliness indicators was substantial. Finally, the items (1, 2, and 7) were allowed to be correlated in this factor solution because they are expected to be correlated anyway since they all characterize a lack of companionship. We accepted this 7-item ULS-7 factor solution and computed a loneliness score by adding up the seven items shown in the analysis model yielding a female student’s perceived loneliness index between (0–28 Points), which was used in further analysis the study.

Convergent validity:
As Item 3 was deleted, we examined the convergent validity of ULS-7. The Bivariate Pearson’s correlation (r) test showed that the female student’s loneliness (ULS-7) score had converged significantly and positively on their depression score ($r = 0.679, p <0.010$). This is indicative of the convergent validity of the ULS-7.

Descriptive analysis of ULS-8 items:
The mean, standard deviation, skewness, and kurtosis of each item of the ULS-7 are shown in Table 1.

<table>
<thead>
<tr>
<th>Items</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I lack companionship.</td>
<td>3.05</td>
<td>1.02</td>
<td>-0.840</td>
<td>-0.432</td>
</tr>
<tr>
<td>2. There is no one I can turn to.</td>
<td>2.52</td>
<td>1.09</td>
<td>-0.072</td>
<td>-1.286</td>
</tr>
<tr>
<td>4. I feel left out.</td>
<td>2.24</td>
<td>1.06</td>
<td>0.266</td>
<td>-1.199</td>
</tr>
</tbody>
</table>

Table 1: Descriptive analysis of each item of ULS-7 among female university students.
5. I feel isolated from others.  2.7  1.03  -0.347  -1.018
6. I can find companionship when I want it.  3.1  0.91  0.772  -0.240
7. I am unhappy being so withdrawn.  2.62  1.14  -0.231  -1.345
8. People are around me but not with me.  2.67  1.1  -0.274  -1.240

Reliability:

Internal consistency:
The Cronbach’s alpha test for the ULS-8 suggested acceptable reliability, Cronbach’s alpha = 0.777.

Discussion
The UCLA Loneliness Scale is a commonly used tool for loneliness. This study examined the psychometric properties of a short-form UCLA Loneliness Scale (ULS-8) in a female university students sample. The results of this study showed that ULS-8 has acceptable internal consistency, and the newly formed ULS-7 has good construct validity and convergent validity after excluding Item 3 (“I am an outgoing person”) from the scale as it didn’t have sufficient factor loading. This result is similar to previous studies that assessed the scale's psychometric properties among different populations, including Turkish adolescents, Taiwanese students, and the Chinese elderly [12–14]. These studies suggest that there could be a cultural difference in the comprehension of this item. So, this may not be fully comprehended in Eastern societies. The results of EFA and CFA revealed that the ULS-7 had a single factor structure with a well-fit model, which is indicative of good construct validity.
Loneliness is a negative situation with emotional, cognitive, and motivational effects on interpersonal relationships [15]. Many studies support the positive association between loneliness and depression [16–20]. Loneliness was considered as a longitudinal risk factor for depression [21]. It also showed a moderate and significant effect on depression [15]. Due to the evident significant association between loneliness and depression, it was acceptable to measure depression by the PHQ-9 for criterion validity for loneliness. This study shows that the loneliness score had converged significantly and positively on the depression score, which indicated a sufficient criterion validity of the ULS-7.

Some limitations of this study should be considered. One limitation is that participants include only female gender and undergraduate students, limiting the generalizability in administering the tool to different populations. Another limitation is the common-method effect that may be due to using self-reported scales in criterion validity. In future studies for the scale's psychometric properties, we recommend including both genders and a wide age range to represent the Saudi population and to use other objective measures or other self-report loneliness scales for criterion validity.

Conclusion:
In conclusion, the results of this study indicate that the ULS-7 is an adequate tool for measuring loneliness in female Saudi students.

List of Abbreviation
CFA Confirmatory factor analysis
CFI Comparative fit index
EFA Exploratory factor analysis
KMO Kaiser-Meer-Olkin
MIREA Mean of item residual absolute loading index of unidimensionality
PHQ-9 Patient Health Questionnaire-9
RMSEA Root square error of approximation
SPSS Statistical Package for the Social Sciences
Conflict of Interests:

The authors declare that there is no conflict of interest regarding the publication of this article.

Funding:

None.

Consent to Participate:

Informed consent was obtained from all the participants.

Ethical Approval

This study was approved by the Institutional Review Board at PNU (IRB-PNU:20-0225) in Riyadh, Saudi Arabia.

References


[12] Yildiz MA, Duy B. Adaptation of the short-form of the UCLA loneliness scale (ULS-8) to


