



Does the Total Score Make Sense? Factor Structure of the Geriatric Depression Scale-15 (GDS-15)

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INTRODUCTION

The Geriatric Depression Scale (GDS; Brink, Yesavage, Lum et al., 1982) was specifically designed to measure depression in older population. Consisting of 30 items with a “yes/no” format, the GDS is a well-accepted screen in the assessment of depression with the geriatric population (Adams, Matto, & Sanders, 2004). The shorter form of the GDS, the 15-item GDS (GDS-15; Sheikh & Yesavage, 1983) also has been widely used by clinicians and researchers as an acceptable and time effective substitute for the 30-item GDS (Leshner & Berryhill, 1994).

Despite the prominence and widespread use of the GDS-15, the factorial structure of this scale has rarely been examined and is unclear. Adams et al. (2004) reported that the only exploratory factor analysis of the GDS-15 was performed using Pearson matrices, which assumes continuous data and ignores that the response format of GDS-15 (yes-no) yields categorical data. This exploratory factor analysis found support for at least two factors. The only confirmatory factor analysis (CFA) of the GDS-15 indicated the presence of three factors (Brown, Woods & Storandt, 2007). However, the sample size used for conducting that CFA was relatively small (N=167) and the results have not yet been replicated using a larger sample.

The results of these few factor analyses seem to question whether GDS-15 is indeed a unidimensional measure and whether a single, total score should be computed and used. This question has important clinical consequences from both practical and clinical standpoints given the widespread use of this measure as a screening tool for depression.

PURPOSE OF STUDY

The purpose of this study was to examine the factor structure of the GDS-15 by conducting a categorical exploratory factor analysis (EFA) and a categorical confirmatory factor analyses (CFA). To date, no factor analytic studies seem to have employed a statistical model appropriate to the categorical (i.e., binary) structure of the GDS-15 items.

METHOD

Participants

This study sample consisted of 896 adults ages 16 to 94 years ($M=57.44$, $SD=19.97$) who completed the Geriatric Depression Scale-15 (GDS -15; Yesavage et al., 1993). The sample included 418 males and 478 women who were relatively well educated ($M= 12.20$ years of education; $SD= 2.21$). All participants identified their ethnicity/race as Caucasian. In this sample, the Cronbach's alpha reliability coefficients of the GDS -15 have ranged from .75 to .80.

Measures

The Geriatric Depression Scale-15 (GDS-15; Sheikh & Yesavage, 1986) is a 15-item short-form measure of depressive symptoms in older adults. It is comprised of items 1, 2, 3, 4, 7, 8, 9, 10, 12, 14, 15, 17, 21, 22, and 23 from the original 30-item GDS (Yesavage et al., 1983). A yes-no response format is used and scores range from 0 to 15.

Date / /	Please tick ✓
1. Are you basically satisfied with your life?	Yes <input type="checkbox"/> No <input type="checkbox"/>
2. Have you dropped many of your activities and interests?	Yes <input type="checkbox"/> No <input type="checkbox"/>
3. Do you feel that your life is empty?	Yes <input type="checkbox"/> No <input type="checkbox"/>
4. Do you often get bored?	Yes <input type="checkbox"/> No <input type="checkbox"/>
5. Are you in good spirits most of the time?	Yes <input type="checkbox"/> No <input type="checkbox"/>
6. Are you afraid that something bad is going to happen to you?	Yes <input type="checkbox"/> No <input type="checkbox"/>
7. Do you feel happy most of the time?	Yes <input type="checkbox"/> No <input type="checkbox"/>
8. Do you often feel helpless?	Yes <input type="checkbox"/> No <input type="checkbox"/>
9. Do you prefer to stay at home, rather than going out and doing things?	Yes <input type="checkbox"/> No <input type="checkbox"/>
10. Do you feel you have more problems with memory than most?	Yes <input type="checkbox"/> No <input type="checkbox"/>
11. Do you think it is wonderful to be alive now?	Yes <input type="checkbox"/> No <input type="checkbox"/>
12. Do you feel pretty worthless the way you are now?	Yes <input type="checkbox"/> No <input type="checkbox"/>
13. Do you feel full of energy?	Yes <input type="checkbox"/> No <input type="checkbox"/>
14. Do you feel that your situation is hopeless?	Yes <input type="checkbox"/> No <input type="checkbox"/>
15. Do you think that most people are better off than you?	Yes <input type="checkbox"/> No <input type="checkbox"/>
TOTAL SCORE	

The only demographic information collected was age, sex, education, and ethnicity/race.

Procedure

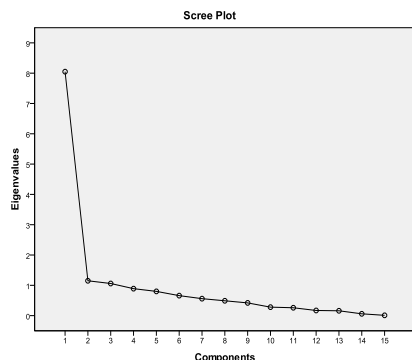
First, a categorical EFA and a modified Parallel Analysis (Liu & Rijmen, 2008) were conducted on tetrachoric matrices to examine the GDS-15 factor structure. Next, a one factor model was tested with a CFA using tetrachoric matrices with Robust Maximum Likelihood estimation. The fit indices used for the CFA were the Comparative Fit Index (CFI; Bentler, 1990) and the root mean square error of approximation (RMSEA; Steiger, 1990). A CFI with values above .90 indicates a good fit; the higher the better. A RMSEA value at or below .05 would indicate a good fit of the data to the model, whereas a value between .05 and .08 would be considered acceptable (Browne & Cudeck, 1993).

RESULTS

Exploratory Factor Analysis (EFA)

Principal Component Analysis (PCA) on the tetrachoric matrix of the GDS-15 using LISREL initially extracted three components corresponding to three eigenvalues larger than 1 (8.05, 1.15, and 1.06). However, the results of a modified parallel analysis for ordinal data, the ratio between the first and second eigenvalue, and the interpretability of the extracted components justified the retention of a

single factor. In other words, EFA suggested that all of the 15 items of the GDS-15 load on the single factor (presumably of depression) and that computing a total score is legitimate. Subsequently, we tested the one factor model indicated by the EFA by performing a confirmatory factor analysis which is a much stricter method of determining the factor structure of a scale.



Confirmatory Factor Analysis (CFA)

During the CFA, all 15 items of the GDS-15 were constrained to load on one factor and the factor loading of the first factor was set to 1 to allow the variance of the latent variable to be freely estimated. Using Robust Maximum Likelihood (RML) as the estimation method for analyzing tetrachoric matrices and the asymptotic covariance matrix as the weighted matrix for RML, the one factor model of the GDS-15 showed a very good fit in the present sample: chi square= 442.53, $p < .001$, RMSEA= 0.02, CFI=1. These findings indicate that the one factor model fits the present set of data and, hence, provided further support for the unidimensionality of the GDS-15.

CONCLUSIONS

Using data analysis models to fit the categorical structure of the GDS-15 data correctly, the scale was found to have a unidimensional structure. Thus, a total GDS-15 score can be computed and meaningfully interpreted as a unitary construct. This study raises awareness about choosing appropriate methods of data analysis and suggests that previous research using continuous EFA to identify the GDS-15 factor structure may have rendered distorted results.

Given that this study is the first examination of the GDS-15 factor structure that treats the data as categorical, it is impossible to compare these findings with those of previous studies. Thus, more studies will need to replicate the findings of this research.

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