An examination of the measurement adequacy of the CES-D among African American women family caregivers

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Abstract

The CES-D has been used extensively in community-based surveys to describe and explain the prevalence of depression in the general population. Yet, questions have been raised regarding its adequacy for use among ethnic minority because of its factor variance. Employing a within-gender and race approach, we test the validity of the CES-D for use among a sample of African American women family caregivers. Using data from a cross-sectional community sample of 521 urban and rural African American women family caregivers, this study examines the dimensionality of the CES-D by testing four different measurement models through confirmatory factor analyses. Among the four measurement models tested using Weighted Least Squares estimation, our findings support previous research that has identified four dimensions in the CES-D: depressed affect, positive affect, somatic complaints, and interpersonal relations for our sample. Additionally, a three-factor (somatization) model and a four-factor model were shown to be equivalent. Implications for further measurement and model testing, and the use of the CES-D for research among African American women caregivers are discussed.

Keywords

Depression; Mental Health; Ethnicity; Confirmatory Factor Analysis

1. Introduction

Developed to measure depressive symptoms in the general population, the Center for Epidemiologic Studies Depression Scale (CES-D) has been used extensively by researchers in community-based surveys to describe and explain the prevalence of depression (Radloff, 1977; Long Foley et al., 2002; Perreira et al., 2005). The CES-D has high internal consistency (Callahan and Wolinsky, 1994; Radloff, 1977), and is generally assumed to assess the same underlying symptoms of depression among different groups (Aneshensel, Clark, and Frerichs, 1983). Despite its extensive use in epidemiological and other community-based studies, some researchers have questioned its adequacy for use among different racial/ethnic groups because of its measurement variance across different racial and gender groups (Foley et al., 2002; Perreira et al., 2005).

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For example, Callahan and Wolinsky (1994) found considerable variance in depressive rates, as measured by the CES-D, for different race-gender combinations of older primary care patients. In their study, they suggested that significant differences among these groups might be due to three possible explanations: high non response rates because of their lower functioning sample, socio-cultural differences, and/or measurement artifact, i.e., the wording of items on the scale. These explanations highlight issues related to different aspects of the lack of measurement equivalence (or invariance) that may be due to biases in the conceptualization of the construct of interest, methodological strategies, or administration of the measurement (Byrne and Watkins, 2003). Further, in a study using a convenience sample of older African Americans, ages 59 to 96 years, Long Foley and her colleagues (2002), found further evidence that items of the CES-D loaded differently on four factors in comparison to previous works. Although these studies illuminate some of the problems inherent in the dimensionality of the scale, the generalizability of these findings are limited because these researchers relied on convenience samples that included African Americans.

Several researchers have found the four-factor structure to be consistent across different samples. In their examination of three different samples (two of which were convenience samples of community-dwelling African American men and women with a history of drug use and an exclusively White sample, as well as a stratified random sample comprising a nationally representative sample of African Americans), Nguyen et al. (2004) found that the four-factor structure of the CES-D was robust across all three samples. Still, Nguyen et al. (2004) reported that they did not find evidence of factor loading invariance across the subgroups in their sample and argued that the factors might not be measuring the same facets of depression. Similarly, Blazer et al. (1998) found support for the four-factor structure model for a representative sample of older adults in North Carolina. However, in their study using data from a nationally representative sample of youth ages 12 – 20 years, Perreira and her colleagues (2005) found that the CES-D was not psychometrically equivalent across different racial-ethnic groups, that consisted of White, Black, Asian, Hispanic youth who were either immigrants or native-born. They posited that these cross-ethnic differences might be due to issues of respondents' unfamiliarity with the CES-D and social desirability.

In addition to the multifaceted nature of depression, its measurement is made more complex from a cross cultural standpoint in that researchers recognize that depression is sometimes manifested and expressed differently across various cultural groups (Iwata et al., 2002). Indeed, some researchers argue that African Americans are more likely to somaticize their depression than their White counterparts (Blazer et al., 1998). As such, researchers have to exercise caution in making cross cultural comparisons because in comparisons of psychological constructs like depression "scores are interpretable only in light of evidence that the meaning and dimensional structure of the construct … as well as the items comprising the measuring instrument are group-equivalent" (Byrne et al., 2009, p. 95).

Our sole focus on African American women caregivers stems from the observation that depression is disproportionately represented among women and non whites (Barbee, 1992) and that most researchers conceptualize negative outcomes of caregiving as depressive symptoms and many operationalize the symptoms with the CES-D (Pinquart and Sörensen, 2003). In her review of depressive symptoms among African American women, Barbee (1992) emphasized the importance for researchers to consider contextual factors such as racial and gender status when examining depression among African American women. By limiting our analyses to African American women caregivers, we are better able to address the diversity that exists within one racial and gender group (Rozario et al., 2008). In employing a within-gender and race approach, we test the validity of the CES-D for use among a group of African American women family caregivers.

2. Methods

2.1 Study participants

Data came from a cross-sectional study of a community sample of 521 urban and rural African American women family caregivers of African American elders (over 65 years). The data collection for the original study, the Black Rural and Urban Caregivers Mental Health and Functioning Study, was conducted between July 1999 and August 2002 in urban and rural locations in Missouri with the approval of the Institutional Review Board of Washington University in St. Louis.

The sample of caregivers were obtained using reverse screening methodology on a list of Medicare enrollees who were African Americans, 65 years or older, and residing in the St. Louis metropolitan area or in seven rural Southeast counties. The researchers used stratified random sampling method to obtain a list of African American elders from the list of urban Medicare enrollees, while they selected everyone from the list of rural Medicare enrollees. Because of the smaller pool of elderly Black Medicare enrollees in the rural counties, the principal investigator and her team decided to screen all 1,994 enrollees to achieve a pool of 285 eligible caregivers. For the rural caregivers, we achieved a response rate of almost 93%. We yielded an overall response rate of 88%.

Trained interviewers screened the identified enrollees to determine if they met the inclusion criteria of self-identification as either African American, Black, Negro, or Colored; being 65 years or older; and receiving unpaid help from an African American female caregiver with at least one activity of daily living, or one instrumental activity of daily living, or decision making. The screeners asked eligible elders to provide the contact information of up to two unpaid African American women who provide them with help. The elders identified ninety-five percent of their caregivers as helping them most, while the remaining caregivers were secondary helpers. A second screening was done with the caregivers to verify if they met the criteria for inclusion in the study, which were being African American women and providing unpaid help to their elder relatives.

Upon receiving written consent, in-home interviewers conducted interviews that lasted approximately 2.5 hours using computerized assisted personal interview. Caregivers were compensated $15 for their participation upon completion of the interviews. Further details of the sample selection are reported elsewhere (see Chadiha et al., 2004).

2.2. Analysis

Comprising 20 items, the original CES-D Scale measures the respondent's self-reported current level of depressive symptoms, with an emphasis on the affective dimension of depressive symptoms (Radloff, 1977). Sample statements include "You did not feel like eating; your appetite was poor," "You had trouble keeping your mind on what you were doing," "You felt depressed," and "You felt everything was an effort." Responses ranged from 0=rarely or none of the time to 3=most or all the time. Four items were reversed scored and a summative score was obtained for each respondent. Since we were interested in a-priori testing of and comparability with previously identified measurement models in Perreira et al.'s (2005) study of CES-D, we excluded two items, "Your sleep was restless" and "You had crying spells," from our factor analyses. In their secondary data analyses, Pereira et al. (2005) excluded these items because the dataset that they relied on, ADD-Health, did not include these items in their questionnaire.

For the psychometric analyses, we conducted descriptive analyses (n = 521), including item-by-item description and item-total correlations. Then we performed confirmatory factor analyses (CFA) on four different measurement models to examine the dimensionality of the

CES-D. The four structural models were: a) a single-factor model, b) a three-factor model with Depressed and Positive Affect, Somatic Complaints, and Interpersonal Relations as factors (Model 1: Positive Affect), c) another three-factor model with Depressed Affect and Somatization, Positive Affect, and Interpersonal Relations as factors (Model 2: Somatization), and d) a four-factor model with Depressed Affect, Positive Affect, Somatic Complaints, and Interpersonal Relations as factors (see Table 1). We chose a confirmatory approach over an exploratory approach given the theoretical and a-priori nature of the relationships between the observed and latent variables. We used the maximum likelihood (ML) estimation method and the weighted least squares (WLS) estimation method to analyze the factor structure. We used ML to reproduce and compare Perreira et al.'s results with our sample of African-American female caregivers. However, as individual CES-D items were ordinal in measurement, we re-estimated the measurement models using WLS, and compared the results. The WLS is an appropriate estimation method for use when the data are ordinal in nature, and data are not assumed to be normally distributed (Bryne, 1998;Schumacker and Lomax, 2004). We inputted a polychoric correlation and an asymptotic covariance matrix to conduct the WLS analyses. All analyses were performed using LISREL 8.80 and PRELIS 2.0 (Jöreskog and Sörbom, 2007).

The CFA involves the use of structural equations to estimate the relationships between observed variables and latent variables. The use of the structural equations framework also permits the estimation of measurement error simultaneously. A total of 18 observed variables were used to estimate different measurement models as detailed by Perreira et al. (2005). All four measurement models were evaluated through a series of nested CFA. As recommended by Bentler (2007), all models were evaluated for fit using multiple criteria namely the Chi-square statistic, the Chi-square/degree of freedom ratio, the Root Mean Square Error of Estimation (RMSEA), the 90% Confidence Interval of the RMSEA, the Comparative Fit Index (CFI), and the Goodness of fit Index (GFI). We also used the model Akaike Information Criterion (AIC) to compare alternative models (Kline, 1998). All variables were observed for deviations from normality and listwise deletion was used for missing data.

3. Results

3.1. Description of the sample

The average age of our sample of African American women caregivers was 53.8 years (SD= 15.05 years, range 19–92 years). The majority of caregivers were daughter caregivers (57%) followed by wife caregivers (23%). About 55% of the caregivers reported that they were widowed, and only 29% reported that they were married. Our sample reported receiving an average of 12.3 years (SD=2.74 years) in formal education. Income wise, the median household income was $18,500 (Mean =$24,000, SD = $18,444). Our sample was almost evenly divided between urban (49.1%) and rural (50.9%) caregivers. Urban caregivers reported a significantly higher mean annual income, $29,531 (SD = 20,237) than their rural counterpart, $17,780 (SD=13,440).

The mean CES-D score for our sample was 8.99 (SD = 8.32). The Cronbach's alpha for the CES-D for this sample was high ($\alpha = 0.83$). Using the cutoff of 16, we found that slightly more than 18% of the caregivers were at risk of clinical depression. Indeed, this is considerably a higher prevalence rate of depression than that of Blazer et al.'s epidemiological findings among older African Americans (9.5%). In our bivariate analyses, we did not find any statistically significant difference in the CES-D scores between rural and urban caregivers. Table 2 presents the item-by-item descriptive analyses of the CES-D Scale. The responses of African American caregivers were skewed towards less depressive symptoms in our sample, which is similar to Long-Foley et al.'s (2002) findings of a sample

of older African Americans. On average, about 72% of the sample reported rare or no "negative" symptoms (or most of the time for "positive" symptoms) for all items. This is a lower percentage than that of Long-Foley et al.'s community-based sample of older African Americans.

3.2. Confirmatory factor analysis

Based on Perreira et al.'s conceptual framework, we first performed CFA on the four measurement models using ML estimation. Table 3 summarizes the fit indices for the four measurement models using ML and WLS estimation methods. While the models converged, the fit indices do not indicate good fit with the data with ML estimation. The criteria for a good fit between the model and data are: chi-square/df ratio values less than 3; RMSEA values less than 0.05; CFI and GFI values greater than .90 (Byrne, 2008;Kline, 1998;Schumacker and Lomax, 2004).

We then evaluated each model against the other using nested CFA. A model is assumed to be nested within another model if the chi-square difference test is statistically significant between the models being compared. Among the four measurement models, we find that the single-factor and the two three-factor model are nested within the four-factor model. With a statistically significant difference in chi-square, the four-factor model represents a statistically better fit than the single-factor ($\Delta\chi_{df\,=\,6} = 317.44$) and the two three-factor models (Model 1 and Model 2) ($\Delta\chi_{df\,=\,3} = 190.66$ and $\Delta\chi_{df\,=\,3} = 14.65$ respectively). Like Perreira et al. (2005), our results also confirm that with ML estimation, the four-factor model represents the best improvement in fit across structural models, albeit indicating a poor overall model fit for each structural model.

Examination of the factor loadings for the measurement models using ML estimation also illustrates the improvements to the factor loadings moving beyond a single factor structure for depression (See Table 4). Only 40% of the factor variance in depression is measured by the 18 items together as a one-dimensional construct. In the three-factor model (Model 1: Positive Affect), 46% of the factor variance (Depressed and Positive Affect) is explained by 10 items; 31% of the factor variance (Somatic Complaints) is explained by six items; and 60% of the factor variance (Interpersonal Relations) is explained by two items. In the second three-factor equivalent measurement model (Model 2: Somatization), 43% of the factor variance (Depressed Affect and Somatization) is explained by 12 items; 46% of the factor variance (Positive Affect) is explained by four items; and 59% of the factor variance (Interpersonal Relations) is explained by two items. In the four-factor model, six items explain 58% of the factor variance for Depressed Affect; four items explain 46% of the factor variance for Positive Affect; six items explain 31% factor variance for Somatic Complaints; and two items explain 60% of the factor variance for Interpersonal Relations.

Since the individual items of the CES-D are essentially ordinal in nature, we performed another nested CFA using WLS estimation method. Table 3 presents the results of the CFA for the four measurement models using WLS. All measurement models show good fit indices. We find that the single-factor model is nested within the first three-factor (Model 1: Positive Affect) model ($\Delta\chi_{df\,=\,3} = 16.64$), the second three-factor (Model 2: Somatization) model ($\Delta\chi_{df\,=\,3} = 53.19$), and the four-factor model ($\Delta\chi_{df\,=\,6} = 58.44$). The four-factor model is statistically a better fit than the three-factor (Model 1: Positive Affect) ($\Delta\chi_{df\,=\,3} = 41.8$). However, the chi-square difference test was not statistically significant between the four-factor and the three-factor (Model 2: Somatization) model. Thus, the four-factor model and the three-factor (Model 2: Somatization) models appear to be alternative models for this sample of caregivers. In order to further compare these two models, we used the Akaike Information Criterion (AIC). The model with the lowest AIC is preferred when comparing two alternative models (Kline, 1998). Our results show that the three-factor (Model2:

Somatization) model has only a slightly lower model AIC (AIC = 340.76) compared to the four-factor model (AIC = 341.51).

Examination of the factor loadings for the measurement models using WLS also illustrates the improvements to the factor loadings moving beyond a single factor structure for depression (See Table 4). All the observed 18 variables together explain 67% of the factor variance in Depression. In the three-factor model (Model 1: Positive Affect), 77% of the factor variance (Depressed and Positive Affect) is explained by 10 items; 48% of the factor variance (Somatic Complaints) is explained by six items; and 62% of the factor variance (Interpersonal Relations) is explained by two items. In the second three-factor equivalent measurement model (Model 2: Somatization), 65% of the factor variance (Depressed Affect and Somatization) is explained by 12 items; 68% of the factor variance (Positive Affect) is explained by four items; and 77% of the factor variance (Interpersonal Relations) is explained by two items. In the four-factor model, six items explain 70% of the factor variance for Depressed Affect; four items explain 68% of the factor variance for Positive Affect; six items explain 48% factor variance for Somatic Complaints; and two items explain 76% of the factor variance for Interpersonal Relations.

4. Discussion

Our study contributes to the growing body of literature regarding the universality of the factor structure of the CES-D. Using the cutoff of 16 on the CES-D, our sample of African American women caregivers had a much higher prevalence of clinically-relevant depression rates than other community-based and clinical samples (Blazer et al. 1998; Callahan and Wolinsky, 1994). Perhaps this speaks to the challenges our sample of women caregivers faced in performing their caregiving role (Aneshensel et al., 1981). We concur with Long-Foley and her colleagues (2002) that a single score, usually calculated for study participants, may not necessarily provide a good indication of the severity of depressive symptoms, especially for cross cultural comparisons. Although our findings using both estimation methods support previous findings of the robustness of the four-factor structure of the CES-D (Blazer et al., 1998, Nguyen et al., 2004), we also found support for the three-factor somatization model when we used the WLS estimation method. This coheres with previous conceptualization of depressive symptoms that indicate a lack of distinction between somatic complaints and depressive affect among African Americans (Nguyen et al., 2004, Blazer et al., 1998). Still, unlike our finding obtained with the WLS estimation method, Blazer et al. (1998) found that the three-factor model that combined depressive affect and somatic complaints into one factor reduced the model fit substantially.

The purpose of our study was to examine if the four measurement models investigated by Perreira et al. would be replicated with a sample of African American women caregivers. As such, our findings relate only to the first step in the examination of configural invariance. In other words, we do not test for factor invariance across subgroups within our sample. Hence, these findings need to be assessed in the light of this preliminary step. In order to retain comparability, we used similar items and also employed similar estimation methods, namely ML. However, given the non-normal distribution and the ordinal nature of our data, we employed a more appropriate estimation technique, namely the WLS. As such our findings differ from that of Perreira et al, and as other authors (e.g., Mulaik, 2007) have noted point to the importance of considering distributional properties of manifest variables or indicators.

The results in our study indicating statistical equivalence between the three-factor somatization model and the four-factor model also emphasize the importance of considering specificity of the sample, and the importance of considering and testing alternative theoretical models (Barrett, 2007; Bentler, 2007). In a recent study using matched samples

of African American and White pregnant women, Canady, Stommel, and Holzman (2009) found similarities in the factorial structure of the CES-D between these two racial groups. Perhaps of significance is their method of matching subsamples to disentangle the influence of ethnicity from other potentially confounding demographic factors. We believe that future research studies may require cross-validation of our findings with a similar and independent sample of caregivers. This notwithstanding, Byrne and Watkins (2003) caution against assuming that measurement invariance within a subgroup guarantees invariance across the different subgroups in a mixed sample. Such considerations might apply to cross-gender comparisons as well, since the socialization of men and women in any society plays a role in how depression is manifested and presented by the different genders. As such, when making cross-cultural (as well as cross-gender) comparisons, researchers are advised to test the measurement adequacy separately before comparing the subgroups within a given sample (Byrne and Watkins, 2003).

In our discussion of the findings and implications of the study, it is important to note a number of limitations of the data and the analysis. Like Nguyen et al. (2004), we elected to frame our analyses within a confirmatory mode because of the extensive validation of the CES-D by other researchers. Further, our reliance on cross sectional data did not allow us to examine the possible changes that may emerge in factor structures over time among our sample of African American women caregivers. In the original study, the study team systematically drew a sample of women caregivers in both the urban and rural settings in a mid-Western state, who had various kinship ties to their older frail relatives and were diverse in their socio-demographic characteristics. While the urban sample was identified from a stratified random sampling of Black Medicare enrollees, the study team screened all rural Black Medicare enrollees to identify a pool of eligible caregivers. Of the 1547 Black rural Medicare enrollees, the study team identified 285 (18.4%) potential rural respondents. The different sampling method for the rural sample and the geographic location of the study, one mid-Western state, might limit the generalizability of our findings. Indeed, future research needs to be done with nationally representative samples of African American caregivers for purposes of comparison with our sample drawn from a limited geographic location.

While we realized the importance in the consideration of the context of the lives of African American women when studying depression and used a within-race and gender approach with our choice of sample, we did not explicitly examine the diversity of lives of our sample in our current analyses. Hence, it would be important for future research to consider sub-sample comparisons using a within-gender and race approach. In order to fully examine the configural variance or invariance of the CES-D, it would be important to consider other levels of equivalence (i.e., variance or invariance in factor loadings etc.) through a multi-group analysis with our sample. Since we did not undertake such an analysis, our study findings are limited to an examination of the alternative measurement models for our overall sample. To appropriately capture the complexity of contextual influences in cross-cultural comparisons in future research, Byrne et al. (2009) argue for the need to use hierarchical analyses because cross-cultural data are hierarchically structured" in that individual respondents are nested within their respective cultures (p.96). Indeed, such an analyses would address Barbee's (1992) assertion that researchers need to consider the interactive nature of sexism and racism when studying depression among African American women.

Despite the limitations, our examination of the CES-D illustrates several strengths. First, our analyses of the CES-D were based on a-priori, confirmatory approach as opposed to exploratory analyses. Second, we tested the validity of four separate measurement models of the CES-D for a specific sample of African-American female caregivers, who demonstrated a higher incidence of depression. Most community-based studies of depression among older

people and people of various ages have utilized samples with reportedly lower depression rates. Third, by replicating previously discussed factor structure of the CES-D, we compare and test the stability of the different measurement models with our sample. Fourth, instead of assuming a theoretically continuous distribution, we explicitly note the distributional characteristics of the individual CES-D items and use appropriate estimation technique. In so doing, we are able to compare the results across different estimation techniques with the same sample. Finally, from a measurement standpoint, it is always important for researchers to be clear about their purpose for using the CES-D Scale and sample characteristics in their research especially in considering its measurement equivalence when using it to test hypotheses in cross-cultural research (Clark et al., 1981). Overall, our findings emphasize the need for future research to consider the measurement properties of the CES-D before testing any theoretical models.

Acknowledgments

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Table 1

Four Alternative Factor Patterns for the 18-item CES-D

1-factor model	3-factor model (Model 1: Positive Affect)	3-factor model (Model 2: Somatization)	4-factor model
	Depressed and Positive Affect	*Depressed Affect and Somatization*	*Depressed Affect* blues
blues	blues	blues	depressed
depressed	depressed	depressed	failure
failure	failure	failure	fearful
fearful	fearful	fearful	lonely
lonely	lonely	lonely	sad
sad	sad	sad	
good as other people	good as other people	bothered	*Positive Affect*
hopeful	hopeful	appetite	good as other people
happy	happy	mind	hopeful
enjoyed life	enjoyed life	effort	happy
bothered		talked less	enjoyed life
appetite	*Somatic Complaints*	get started	
mind	bothered		*Somatic Complaints*
effort	appetite	*Positive Affect*	bothered
talked less	mind	good as other people	appetite
get started	effort	hopeful	mind
unfriendly	talked less	happy	effort
dislike	get started	enjoyed life	talked less
			get started
	Interpersonal Relations	*Interpersonal Relations*	*Interpersonal Relations*
	unfriendly	unfriendly	unfriendly
	dislike	dislike	dislike

Table 2

Item-total Correlation and Response Distribution of CES-D items among older African American women family caregivers (n = 521)

How often have your felt this way during the past week?	Item-total correlation (factor label)	Rarely or none of the time (%)	Some or little of the time (%)	Occasionally or a moderate amount of the time (%)	Most of all of the time (%)
1. You were **bothered** by things that usually don't bother you	0.39 (somatic complaint)	59	25	13	3
2. You did not feel like eating, your **appetite** was poor	0.39 (somatic complaint)	68	21	6	5
3. You felt that you could not shake of the **blues**	0.55 (depressed affect)	78	14	5	3
4. You felt that you were just as **good** as others [R]	0.26 (positive affect)	5	6	5	85
5. You had trouble keeping your **mind** on what you were doing	0.46 (somatic complaint)	59	24	11	7
6. You felt **depressed**	0.60 (depressed affect)	74	17	6	4
7. You felt that everything was an **effort**	0.30 (somatic complaint)	43	23	9	24
8. You felt **hopeful** about the future [R]	0.28 (positive affect)	8	11	10	71
9. You thought your life has been a **failure**	0.42 (depressed affect)	88	8	2	2
10. You felt **fearful**	0.56 (depressed affect)	86	7	4	3
11. You were **happy** [R]	0.53 (positive affect)	3	12	12	74
12. You **talked** less than usual	0.42 (somatic complaint)	64	19	8	8
13. You felt **lonely**	0.56 (depressed affect)	71	16	7	6
14. People were **unfriendly**	0.33 (interpersonal relations)	75	18	4	3
15. You **enjoyed** life [R]	0.33 (positive affect)	2	6	5	86
16. You felt **sad**	0.58 (depressed affect)	69	20	7	3
17. You felt that people **disliked** you	0.42 (interpersonal relations)	84	12	3	2
18. You could not get **"going"**	0.48 (somatic complaint)	65	23	8	3

Note: [R] Item was reverse coded for the purpose of calculating the mean CES-D score for the sample.

Table 3

Model Goodness-of-fit Indices using Maximum Likelihood (ML) and Weighted Least Squares (WLS) Estimation

Model	χ^2 (df)	χ^2/df	RMSEA	CFI	90% CI for RMSEA	GFI
Maximum Likelihood Estimation						
Single Factor	1371.07 (135)	10.15	.12	.89	.11 – .12	.81
Three Factor (Model 1: Positive Affect)	1244.29 (132)	9.43	.11	.90	.11 – .12	.82
Three Factor (Model 2: Somatization)	1068.28 (132)	8.09	.10	.92	.095 – .11	.85
Four Factor	1053.63 (129)	8.17	.10	.92	.095 – .11	.85
Weighted Least Squares Estimation						
Single Factor	319.95 (137)	2.33	.05	.95	.044 – .058	.98
Three Factor (Model 1: Positive Affect)	303.31 (134)	2.26	.05	.96	.042 – .057	.98
Three Factor (Model 2: Somatization)	266.76 (134)	1.99	.044	.97	.036 – .052	.98
Four Factor	261.51 (131)	1.99	.044	.97	.036 – .052	.98

Table 4

Standardized Factor Loadings with Maximum Likelihood (ML) and Weighted Least Squares (WLS) Estimates

Observed Variable	One factor model		Three factor Model (Model 1: Positive Affect)		Three factor Model (Model 2: Somatization)		Four factor Model	
	ML	WLS	ML	WLS	ML	WLS	ML	WLS
Latent Variable	*Depression*		*Depressed and Positive Affect*		*Depressed Affect and Somatization*		*Depressed Affect*	
Blues	.74	.93	.74	.93	.75	.92	.74	.92
Depressed	.80	.95	.81	.94	.81	.94	.82	.94
Failure	.68	.89	.68	.89	.68	.88	.68	.88
Fearful	.79	1.00	.78	1.00	.79	1.00	.79	1.00
Lonely	.75	.89	.76	.89	.75	.90	.76	.90
Sad	.77	.88	.77	.88	.77	.89	.78	.88
			Positive Affect		*Positive Affect*		*Positive Affect*	
Good as other people	.74	.84	.42	.82	.48	.82	.48	.82
Hopeful	.42	.59	.42	.59	.55	.63	.55	.63
Happy	.70	.91	.71	.91	.86	.92	.86	.92
Enjoyed life	.55	.88	.56	.89	.74	.90	.74	.89
			Somatic Complaints		*Depressed Affect and Somatization*		*Somatic Complaints*	
Bothered	.51	.69	.51	.69	.52	.68	.52	.69
Appetite	.51	.71	.54	.71	.51	.69	.54	.70
Mind	.60	.79	.64	.80	.60	.80	.64	.81
Effort	.38	.52	.42	.52	.39	.51	.42	.52
Talked less	.52	.61	.56	.62	.52	.62	.56	.63
Get started	.60	.78	.63	.78	.61	.68	.63	.78
			Interpersonal Relations		*Interpersonal Relations*		*Interpersonal Relations*	
Unfriendly	.44	.66	.63	.69	.64	.73	.64	.72
Dislike	.60	.99	.90	1.00	.88	1.00	.89	1.00