

Depressing Factors: Exploring the Factor Structure of the Center for Epidemiologic Studies Depression Scale (CES-D)

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Introduction

- Depression and anxiety frequently co-occur (Brown & Barlow, 1992), resulting in increased distress, decreased functionality, and poorer prognosis (e.g., van Balkom et al., 2008).
- The CES-D (Radloff, 1977) is a commonly used and freely accessible self-report measure of depressive symptoms; however, recent investigations have called into question the robustness and suitability of the original 4-factor 20-item factor structure (e.g., Schroevers et al., 2000; Stansbury et al., 2008).
- Alternative factor structures including unitary, 2-, 3-, and 4-factor models have been proposed, suggesting the original factor structure may be unstable. Moreover, most previous factor-analytic studies utilized principal component analysis (PCA) to perform exploratory factor analysis (EFA). Osborne, Costello, and Kellow (2008) strongly discourage the use of PCA for EFA, advising instead that researchers use principal axis factoring (PAF).
- The present investigation assessed the CES-D factor structure with EFA – using data from an undergraduate sample – and confirmatory factor analysis (CFA) – with data from a clinical sample.

Method

Participants

- Participants for the EFA included 809 undergraduate students who completed the CES-D as part of other investigations:
 - 209 men, ages 18-37 ($M = 20.7$; $SD = 3.2$)
 - 600 women, ages 18-50 ($M = 20.7$; $SD = 4.2$)
- Participants for the CFA included 519 tertiary rehabilitation patients from a government sponsored rehabilitation program who completed the CES-D as part of a tertiary assessment:
 - 245 men, ages 18-85 ($M = 42.4$; $DS = 12.7$)
 - 274 women, ages 18-79 ($M = 43.1$; $DS = 12.7$)

Measures

- The CES-D is a 20-item measure that assesses symptoms of depression. Items are phrased as self-statements (e.g., “I did not feel like eating; my appetite was poor”, “I felt hopeful about the future”). Respondents rate how frequently each item applied to them over the course of the past week using a four point Likert scale ranging from 0 (“Rarely or none of the time [less than 1 day]”) to 3 (“Most or all of the time [5-7 days]”).

Procedure

- EFA was conducted on CES-D item responses of the undergraduate sample using recommended procedures (Costello & Osbrone, Osborne et al., 2008). CFA was conducted on CES-D item responses of the clinical sample to evaluate the discovered EFA factor structure.

Results

Results of EFA

- EFA was conducted using PAF with promax rotation on CES-D data from the undergraduate sample (see Table 1). Item retention was based on recommendations of Osborne et al. (2008): eigenvalues > 1, parallel analysis, communalities > .4, factor loadings > .5, and cross-loaded items < .32.
- This resulted in a 2-factor 8-item model accounting for 55% of the variance (Table 1.).
 - Factor 1 items: 3, 6, 14, 18, 19; $\alpha = .87$
 - Factor 2 items: 4, 8, 12; $\alpha = .75$

Results of CFA

- Fit indices were assessed following recommendations of Hu & Bentler (1999):
 - Chi square/df ratio (CMIN) = 3.48 (values should be < 2.0)
 - Root Mean Square Error of Approximation (RMSEA) = .07 (should be $\sim .06$ or lower)
 - Comparative Fit Index (CFI) = .98 (should be $\approx .95$)
 - Standardized Root Mean Square Residual (SRMR) = .04 (should be below .08)
 - Expected Cross Validation Index (ECVI) = .19 (lower values generally better; Brown & Cudeck, 1993)
- CFA of CES-D item responses of clinical sample participants suggested that the 2-factor 8-item model was statistically superior to competing models.

Discussion

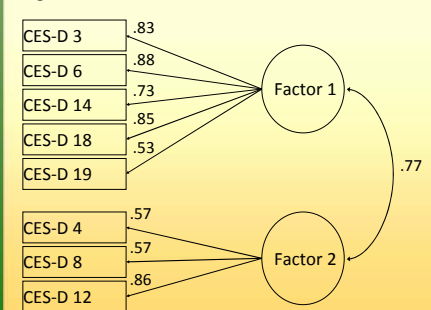
- Several items from the CES-D may be redundant or have content that may be confounded by other variables. For example, item 17 (“I had crying spells”) exhibited large and significant sex differences and was therefore excluded.
- The current investigation supported the 2-factor 8-item solution as excellent, performing well relative to precedent solutions. The two factors can be conceptualized as negative and positive affect – with the absence of positive affect representing flattened affect and therefore being implicitly associated with depressive symptoms.
- Alternative models also performed well (i.e., 2-factor 10-item, 3-factor 16-item, and 4-factor 20-item models); however, the ECVI criterion, used for comparing non-nested models, supported the 2-factor 8-item model.
- While the 2-factor 8-item model was the best solution, it is possible that relevant clinical information may be overlooked when using only 8 items; accordingly, the potential loss of sensitivity should be evaluated in future research. Comparative sensitivity and specificity of this shorter version relative to the full CES-D should also be addressed in future research.
- The current results may not be robust because of the samples used; specifically, undergraduates and persons with protracted injury-based physical disabilities rather than an unconfounded sample with depressed mood.

Table 1: EFA Factor Loading and Descriptive Statistics

CES-D Item	F1	F2	M	SD	Skew (SE = .09)	K (SE = .17)	CITC	α
1. I was bothered by things that usually don't bother me.	-	-	.59	.79	1.25	1.11	.50	.75
2. I did not feel like eating; my appetite was poor.	-	-	.54	.80	1.46	.99	.40	.76
3. I felt that I could not shake off the blues...	.76	-.72	.92	1.03	1.03	1.16	.63	.74
4. I felt that I was just as good as other people.	-.69	1.95	1.03	-.54	1.17	-.28	.81	
5. I had trouble keeping my mind on what I was doing.	-	-	1.12	.89	.40	.90	.53	.74
6. I felt depressed.	.81	-.74	.92	1.02	1.05	.64	.74	
7. I felt that everything I did was an effort.	-	-	1.06	.92	.50	.90	.45	.75
8. I felt hopeful about the future.	-.78	1.83	.92	-.37	.96	-.26	.80	
9. I thought my life had been a failure.	-	-	.36	.70	2.01	1.22	.50	.75
10. I felt fearful.	-	-	.58	.82	1.31	1.12	.49	.75

CES-D Item	F1	F2	M	SD	Skew (SE = .09)	K (SE = .17)	CITC	α
11. My sleep was restless.	-	-	1.11	.98	.48	-.79	.40	.76
12. I was happy.	-	.56	2.07	.87	-.56	-.54	-.44	.81
13. I talked less than usual.	-	-	.74	.82	.91	1.3	.52	.75
14. I felt lonely.	.79	-	.96	.98	.68	-.63	.62	.74
15. People were unfriendly.	-	-	.45	.70	1.52	1.9	.48	.75
16. I enjoyed life.	-	-	1.72	1.08	-.34	-1.15	-.18	.80
17. I had crying spells.	-	-	.53	.83	1.46	1.13	.49	.75
18. I felt sad.	.81	-	.93	.89	.69	-.30	.66	.74
19. I felt that people dislike me.	.56	-	.55	.81	1.39	1.17	.55	.75
20. I could not get “going”.	-	-	.88	.89	.77	-.22	.54	.75

Figure 1: 2-Factor 8-Item Model



Note: SD = standard deviation; K = kurtosis; CITC = corrected item-total correlation; α = scale alpha if item deleted; shaded items comprise CES-D factors; Special thanks to M.P. Abrams for his timely assistance.