

DIFFERENCES AMONG CORE DIMENSIONS OF THE CENTRE FOR EPIDEMIOLOGICAL STUDIES DEPRESSION (CES-D) SCALE ACROSS AGE AND GENDER GROUPS

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ABSTRACT

The Centre for Epidemiological Studies Depression Scale (CES-D) is a widely used self-report scale to assess depressive symptom levels among the general population. The purposes of the study are to explore the factor structure of CES-D in a population-based Canadian sample and to compare focal constructs of CES-D across age and gender. Confirmatory factor analysis supported the four-factor structure of the CES-D across three age categories and both genders. Subscales scores, however, showed important differences primarily based on gender. Attending to these specific symptom dimensions could help explain known gender differences in depression.

Depression is a debilitating mental health illness, characterized by the presence of symptoms that include depressed mood and/or loss of interest or pleasure in daily activities for at least a two-week period (American Psychiatric Association, 2000). Greater number and severity of depressive symptoms are associated with poorer health including increased levels of morbidity, health care service utilization, and mortality (Anda et al., 1990; Bula, Wietlisbach, Burnand, & Yersin, 2001; DiPietro, Anda, Williamson, & Stunkard, 1992; Farmer et al., 1988; Frederick, Frerichs, & Clark, 1988). Despite the availability of screening tools and efficacious treatment techniques, depression remains largely under diagnosed and under treated (Wells et al., 1989; Worrall, Angel, Chaulk, Clarke, & Robbins, 1999).

Although not a diagnostic instrument, the Centre for Epidemiological Studies Depression Scale (CES-D) is one of the most widely used self-report scales to assess current levels of depressive symptomology among the general population (Gotlib & Hammen, 2002; Radloff, 1977). The CES-D is freely available and readily adapted to web-based surveys (e.g., Price, McLeod, Gleich, & Hand, 2006), and several studies report good psychometric properties for this 20-item scale (Carpenter, Andrykowski, & Wilson, 1998; Devins, Orme, & Costello, 1988; Knight, Williams, & McGee, 1997; Radloff, 1977). Although one- to five-factor models for the CES-D have been reported in the literature, only the four-factor structure originally proposed by Radloff has been confirmed empirically (Fountoulakis et al., 2001; McCallum, Mackinnon, Simons, & Simons, 1995; Rhee et al., 1999). These four subscales are: (a) depressed affect, (b) somatic symptoms, (c) lack of well-being, and (d) interpersonal relations. Recent studies suggest that the composite summary score typically used may not be the most informative and useful CES-D measure (Rhee et al., 1999; Schroevers, Sanderman, van Sonderen, & Ranchor, 2000). Yet, in almost all studies, only the overall composite score is used to categorize individuals as being at risk for depression or not. Such viewing of depression as a single entity could hide theoretically and/or clinically relevant variability and thereby undermine the task of understanding depression (Gotlib & Hammen, 2002), and it may also restrict the usefulness of the CES-D as a screening tool.

Most studies that use the CES-D as a single factor model report differences across age and gender in total score. In some studies, the relation between age and depression has been shown to have a curvilinear trend with higher levels among the youngest group and adults over 75 years of age (Gatz, Johansson, Pedersen, Berg, & Reynolds, 1993; Jorm, 2000; Newmann, Engel, & Jensen, 1991b). Other studies suggest higher prevalence among older adults than younger or middle-aged adults (Kessler, Foster, & Webster, 1992; Mirowsky & Ross, 1992). In terms of gender, women are twice as likely to suffer from diagnosed depression as men (Stephenson-Cino, Steiner, Krames, Ryan, & Huxley, 1992), and they also report more symptoms on scales like the CES-D (Nolen-Hoeksema & Girgus, 1994). This gender difference is significant across most cultures and demographics (Weissman et al., 1996). No interaction between age and gender in overall levels of depressive symptoms has been observed (Gatz & Hurwicz, 1990).

Other demographic factors such as socioeconomic, marital, and health status have been shown to be associated with depression. In the depression literature, education, occupation, and income are used as independent variables or together as a composite score to reflect socioeconomic status. A recent meta-analysis showed that individuals with a low socioeconomic status are 181% more likely to be depressed, and a dose-response for education and income has been observed (Lorant et al., 2003). There are only limited studies examining the association between marital status and depression. Health status, assessed using body mass index or perceived health status, has been shown to be related to depression (Anda et al., 1990; Bula et al., 2001; DiPietro et al., 1992; Farmer et al., 1988; Frederick et al., 1988; Johnston, Johnson, McLeod, & Johnston, 2004). While these demographic and health factors have been examined in the depression literature, age and gender are the most commonly studied factors.

There is a paucity of population-based studies examining the age and gender differences in the components of depression. Reported age and gender difference in depression composite scores may thus be due to only a subset of components of depression. Most of the pertinent studies are limited to

certain groups within the population such as middle-aged women or elderly men (Hertzog, Van Alstine, Usala, Hultsch, & Dixon, 1990; McCallum et al., 1995; Ross & Mirowsky, 1984) or elderly women (Newmann, Engel, & Jensen, 1991a, 1991b). Based on a population-based, cross-sectional sample in the United States, Gatz and Hurwicz (1990) found no gender differences in the subscales and an age difference only for the lack of well-being subscale. However, their study did not account for other background characteristics such as marital status, education, occupation, income, or health status known to influence depression (DiPietro et al., 1992; Scarinci et al., 2002). With the exception of Gatz and Hurwicz's study, we have found no research available on how the core dimensions of depression present across a broad range of age and gender groups in the general population. Thus, the purpose of the present study is two-fold: (a) to compare the focal constructs of CES-D across gender and age groups, and (b) to examine the factor structure of CES-D in a population-based Canadian sample.

METHODS

Data Source and Participants

The Nova Scotia Health Survey (NSHS), a population-based survey implemented in 1995 to explore the health status and preventative practices of Nova Scotians, provided our data. The sample ($n = 5578$) was identified using a stratified, probability sampling strategy. This population-based cohort comprised men and women over 18 years of age, with the exception of those living in long-term care facilities and those not registered in the provincial medical insurance register. The identified sample was representative of the Nova Scotia population with respect to age and gender. Of the 5578 individuals identified, 72% ($n = 3227$) completed the home interview of the NSHS. Detailed information on the sampling strategy is reported elsewhere (MacLean et al., 1996). For the present analysis, only those who completed the CES-D ($n = 3135$) were included and this represented 97.1% of those who participated in the NSHS. The NSHS was approved by the ethics review board of a Canadian university.

Measures

Demographic information such as gender, age, marital status, health, education, occupation, and income was obtained by an interviewer-administered questionnaire. Depressive symptomology was assessed using the 20-item Centre for Epidemiological Studies Depression Scale (Radloff, 1977). Each item is scored on a 4-point scale. Potential scores range from 0 to 60, with a higher score indicating greater number and severity of depressive symptoms. Similar to other epidemiological studies, a score of 16 or above was used as a cut-off for classifying individuals at risk of depression (Gatz & Hurwicz, 1990). A higher cut-off was also used (a score of 22 or higher) to classify individuals to be at higher risk for depression and more likely to have met diagnostic criteria had they been assessed (Lyness et al., 1997; Pfaff & Almeida, 2005).

Statistical Analysis

Means and frequencies were used to describe the population in terms of their demographic characteristics and level of depressive symptoms. The demographic characteristics of those at risk for

depression, based on CES-D cut-off scores, were compared with those who were not at risk for depression using chi-square tests. The percentage of those at risk for depression, total CES-D scores, and scores for each of the CES-D subscales were compared across age and gender groups using a chi-square test, *t*-test or ANOVA as appropriate. To examine magnitude of difference between groups, effect sizes were calculated (Kazis, Anderson, & Meenan, 1989). An effect size of 0.2 is considered *small*, 0.5 *moderate*, and ≥ 0.8 *large* (Cohen, 1977).

Confirmatory factor analysis was performed using the structural equation modelling program AMOS 5.0 (Arbuckle, 2003) with maximum likelihood estimation. The raw data were entered into AMOS 5.0 in order to generate a covariance matrix for analysis. To assess the fit of the data to the hypothesized models, the following fit indices were examined. The likelihood ratio chi-square is a popular measure of model fit but is often statistically significant because of sample size (see Byrne, 2001; Kline, 1998; Thompson, 2004). For that reason, the likelihood ratio chi-square is presented for comparison purposes rather than as a test of model fit. Lower values reflect better fit between model and data. A normed chi-square or χ^2 / df ratio of less than 3 is indicative of good fit (Kline, 1998). Two fit indices that evaluate the proposed model but take into account sample size are the normed fit index (NFI) and the comparative fit index (CFI); values for both indices that exceed a recommended cut-off value of .90 indicate good fit (Byrne, 2001). The goodness-of-fit index (GFI) is equal to the proportion of variability in the covariance matrix explained by the model; values greater than .90 indicate a reasonable fit of the model to the data (Kline, 1998). The root mean square error of approximation (RMSEA) is a measure of fit that is sensitive to the number of estimated parameters in the model; a value less than .08 indicates good fit (Byrne, 2001). Subsequent confirmatory factor analyses were performed separately by gender and by age categories to assess the generalizability of the CES-D factor structure across these demographic groups.

RESULTS

The age of the participants ranged from 18 to 98 years (47.6 ± 19.6). All the demographic variables except age were dichotomized for use in subsequent analyses. Of the participants, 50% were women, 63% were married or living with a partner, 48% had more than 12 years of education, and 72% had an annual income of over 20,000 Canadian dollars (equivalent to the Statistics Canada's Low Income Cut-off). Based on the summary score of CES-D, 15% were categorized as at risk for depression (using a cut-off of 16 or higher) and 7% were at high risk for depression (cut-off of 22 or higher). Compared to those who were not at risk, those who were at risk for depression had poorer perceived health ($X^2(1) = 214.4, p < .01$), lower education ($X^2(1) = 11.7, p < .01$), lower income ($X^2(1) = 32.4, p < .01$), were not actively employed ($X^2(1) = 5.6, p < .05$), and were single ($X^2(1) = 37.0, p < .01$). Similar relations were evident when comparing those at high risk for depression with those who were not at risk.

The prevalence rates of depression risk (CES-D ≥ 16) were different across age and gender groups (see Table 1). Women were more likely to be at risk than men ($X^2(1) = 19.2, p < .01$) with 17.2% of the women sampled and 11.8% of the men meeting the criteria. A linear trend was observed for age

($X^2(2) = 12.4, p < .01$), with young adults (18 to 34 years of age) reporting the highest level of risk for depression (17.1%), compared to middle-aged (35 to 64 years of age, 14.4%) and older adults (over 65 years of age, 11.3%). The results were unchanged when the higher CES-D cut-off (CES-D ≥ 22) for risk for depression was compared to other individuals who were not at risk for depression.

Table 1
Scores of CES-D Core Dimensions Across Age and Gender Groups
(Means $\pm$ SE, with Confidence Intervals)

Age group in years (sample)	Men				Women			
	18–34 (<i>n</i> = 533)	35–64 (<i>n</i> = 662)	65 + (<i>n</i> = 360)	Total (<i>n</i> = 1,555)	18–34 (<i>n</i> = 510)	35–64 (<i>n</i> = 675)	65 + (<i>n</i> = 395)	Total (<i>n</i> = 1,580)
CES-D score	7.52 $\pm$ 0.35	6.86 $\pm$ 0.31	5.64 $\pm$ 0.42	6.68 $\pm$ 0.21	9.50 $\pm$ 0.35	8.23 $\pm$ 0.31	7.38 $\pm$ 0.40	8.37 $\pm$ 0.21
Confidence interval	6.84–8.20	6.25–7.47	4.82–6.47	6.27–7.09	8.80–10.19	7.63–8.83	6.59–8.16	7.96–8.77
Percent at risk (CES-D ≥ 16)	12.4	13.4	7.8	11.8	22.0	15.3	14.4	17.2
Depressive affect	1.88 $\pm$ 0.15	1.93 $\pm$ 0.13	1.52 $\pm$ 0.18	1.77 $\pm$ 0.09	3.18 $\pm$ 0.15	2.88 $\pm$ 0.13	2.55 $\pm$ 0.17	2.87 $\pm$ 0.09
Confidence interval	1.59–2.16	1.67–2.18	1.17–1.86	1.60–1.95	2.89–3.47	2.62–3.13	2.22–2.89	2.70–3.04
Somatic symptoms	3.42 $\pm$ 0.14	2.93 $\pm$ 0.12	2.50 $\pm$ 0.17	2.95 $\pm$ 0.08	3.81 $\pm$ 0.14	3.38 $\pm$ 0.12	3.10 $\pm$ 0.16	3.43 $\pm$ 0.82
Confidence interval	3.15–3.69	2.69–3.18	2.17–2.83	2.79–3.11	3.53–4.09	3.14–3.63	2.78–3.41	3.27–3.59
Lack of well-being	1.76 $\pm$ 0.11	1.68 $\pm$ 0.10	1.40 $\pm$ 0.13	1.61 $\pm$ 0.07	2.08 $\pm$ 0.11	1.66 $\pm$ 0.10	1.52 $\pm$ 0.13	1.75 $\pm$ 0.06
Confidence interval	1.55–1.97	1.49–1.86	1.14–1.66	1.47–1.74	1.87–2.30	1.48–1.85	1.27–1.76	1.63–1.88
Interpersonal relations	0.46 $\pm$ 0.04	0.33 $\pm$ 0.03	0.23 $\pm$ 0.04	0.34 $\pm$ 0.02	0.42 $\pm$ 0.04	0.31 $\pm$ 0.03	0.21 $\pm$ 0.04	0.31 $\pm$ 0.02
Confidence interval	0.39–0.53	0.27–0.39	0.14–0.31	0.30–0.38	0.35–0.49	0.25–0.37	0.13–0.29	0.27–0.35

Note. SE = standard error.

Table 1 also shows the mean, standard error, and confidence intervals of the four subscales by age and gender categories. To explore differences among age groups and between genders in symptom number and severity across the four subscales reported in the literature, 3 X 2 between-subjects factorial analyses of variance were performed with the depressive affect, somatic symptoms, lack of well-being, and interpersonal relations subscales of the CES-D as dependent variables. Independent variables were age category (18–34, 35–64, and over 65 years) and gender.

Unique contributions for predicting gender differences were made by two of the subscales: depressive affect and somatic symptoms. Compared to men, women had higher levels of depressive affect ($M = 2.87$ vs. 1.77 , $F[1, 3158] = 79.83$, $p < .001$) and somatic symptoms, ($M = 3.43$ vs. 2.95 , $F[1, 3158] = 18.29$, $p < .001$). The magnitude of association between somatic symptoms and gender was minimal ($\eta_p^2 = .006$). However, a slightly stronger, albeit small, effect size for gender and depressive

affect was observed ($\eta_p^2 = .025$). Neither the lack of well-being, ($M = 1.75$ for women vs. 1.61 for men, $F[1, 3158] = 2.21, p > .05$), nor interpersonal subscales, ($M = 0.31$ for women vs. 0.34 for men, $F[1, 3158] = 0.65, p > .05$) differed by gender.

Statistically significant differences were observed based on age groups for all four subscales: depressive affect ($F[2, 3158] = 5.20, p < .001$), somatic symptoms ($F[2, 3158] = 13.48, p < .001$), lack of well-being ($F[2, 3158] = 7.62, p < .001$) and interpersonal relations ($F[2, 3158] = 16.47, p < .001$). Subscale scores for different age groups (18–34, 35–64, and 65+) were as follows: depressive affect ($M = 2.53, 2.40, 2.04$), somatic symptoms ($M = 3.61, 3.16, 2.80$), lack of well-being ($M = 1.92, 1.67, 1.46$), and interpersonal relations ($M = 0.44, 0.32, 0.22$). The magnitude of association between the subscale scores and age ranged from $\eta_p^2 = .003$ to .010. Bonferroni post-hoc tests ($p < .05$) revealed the younger age group had more depressive symptoms than the older age group in all four subscales of the CES-D; the younger age group had more depressive symptoms than the middle-age group in all subscales except for the depressive affect subscale. The middle-age group had more depressive symptoms than the older age group for the interpersonal relations subscale. No interaction between age and gender was observed for any of the four subscales.

For the confirmatory factor analysis of the total sample, each of the 20 items of the CES-D was a measured variable assigned to one of four factors or latent variables consistent with the factor analysis of Radloff (1977). The four factors were correlated. For the total sample ($n = 3135$), all estimates of the standardized factor pattern coefficients (interpreted as standardized regression weights) were statistically significant at $p < .001$, with the exception of items fixed to 1.0 to scale the factors. Ninety-two cases (3%) were removed because of missing values.

Values for the fit indices for the subscales are reported in the first row of Table 2. All of the fit values suggested good model fit for the four-factor model with the 20 items assigned to their respective four factors. Modification indices may suggest changes to a model to improve fit. In this case, examination of these indices suggested the residual errors associated with item 17 (*I had crying spells*) and item 18 (*I felt sad*) of the depressive affect factor, and item 7 (*I felt that everything I did was an effort*) and item 20 (*I could not get "going"*) of the somatic symptom factor could be correlated to reduce the likelihood ratio chi-square value. Correlated residual errors can arise from a high degree of overlap in the content of two items (see Byrne, 1993). Nonetheless, model fit for the four-factor model was acceptable without these modifications. By comparison, a one-factor model produced fit values that suggested poor model fit; see the second row of Table 2. Although the goodness-of-fit (GFI) value was above the .90 cut-off and RMSEA below the .08 cut-off, values for the normed fit index (NFI) and the comparative fit index (CFI) were below the .90 cut-off, and the χ^2 / df ratio was double that for the four-factor model. We also examined a second-order model for comparison with a single factor representing *depression* predicting the four factors of depressive affect, somatic symptoms, lack of well-being, and interpersonal relations. The second-order model fit the data as well as the four-factor model (see row 3 of Table 2). That is, the four-factor model and the second-order model are equivalent and cannot be distinguished on the basis of fit statistics. In such cases, Byrne (2001) states that "judgment as to whether or not a measuring instrument should be modeled as a first-order or as a second-order

structure ultimately rests on substantive meaningfulness as dictated by the underlying theory” (p. 138). For these reasons and in accordance with the principle of parsimony, we chose to use the traditional four-factor model in our subsequent analyses of gender and age subsamples to explore the generalizability of the CES-D’s factor structure.

Table 2
Confirmatory Factor Analysis of the CES-D
for the Full Sample and Demographic Subgroups

Model	χ^2	<i>df</i>	χ^2/df	NFI	CFI	GFI	RMSEA
Full Sample ^a							
Four-factor	1213.1	164	7.40	.932	.941	.961	.045
One-factor	614.6	170	15.38	.854	.862	.916	.068
Second-order	1215.0	166	7.32	.932	.941	.960	.045
Subsample analyses							
Males ^b	600.7	164	3.66	.920	.940	.961	.041
Females ^c	866.0	164	5.28	.916	.931	.946	.052
Ages 18–34 ^d	565.2	164	3.45	.908	.933	.947	.048
Ages 35–64 ^e	675.6	164	4.12	.924	.941	.949	.048
Ages 65+ ^f	543.0	164	3.31	.851	.890	.929	.055

Note. NFI = normed fit index; CFI = comparative fit index; GFI = goodness-of-fit index; RMSEA = root mean square error of approximation; *df* = degree of freedom.

^a *n* = 3135. ^b *n* = 1555. ^c *n* = 1580. ^d *n* = 1043. ^e *n* = 1337. ^f *n* = 755.

Thompson (1997) and Graham, Guthrie and Thompson (2003) recommend that both standardized factor pattern and structure coefficients be reported and examined when factors are correlated (see Table 3). When factor pattern coefficients for an item were fixed at zero, the corresponding factor structure coefficients for other factors were always smaller than the factor structure coefficient for the assigned factor. Thus, the factor structure coefficients suggest an interpretation consistent with the pattern structure coefficients. Correlations between factors were .84 between somatic symptoms and depressive affect, .73 between lack of well-being and depressive affect, .68 between lack of well-being and somatic symptoms, .49 between depressive affect and interpersonal relations, .42 between somatic symptoms and interpersonal relations, and .39 between lack of well-being and interpersonal relations.

The sample was split by gender and the four-factor model was tested for females and males. Values for the fit indices for males are reported in Table 2, row 4. The results for females are reported in row 5. The sample was recombined and then split by age. The results for participants 18 to 34 years of age, 35 to 64 years of age, and 65 years of age and older are presented in rows 6, 7, and 8 of Table 2. Model fit was good for both genders and for all age groups except for values for NFI and CFI for participants 65 years of age and older.

Table 3
Standardized Factor Pattern and Structure Coefficients for the Four-Factor CES-D

Item	Depressive		Somatic		Well-being		Interpersonal	
	Pattern	Structure	Pattern	Structure	Pattern	Structure	Pattern	Structure
3. Blues	.74	.74	.00	.62	.00	.54	.00	.36
6. Depressed	.80	.80	.00	.67	.00	.58	.00	.39
9. Failure	.51	.51	.00	.43	.00	.37	.00	.25
10. Fearful	.52	.52	.00	.43	.00	.38	.00	.25
14. Lonely	.65	.65	.00	.54	.00	.47	.00	.32
17. Crying	.56	.56	.00	.47	.00	.41	.00	.28
18. Sad	.76 ^a	.76	.00	.63	.00	.55	.00	.37
1. Bothered	.00	.45	.53	.53	.00	.36	.00	.23
2. Appetite	.00	.38	.45	.45	.00	.31	.00	.19
5. Mind	.00	.47	.56	.56	.00	.38	.00	.24
7. Effort	.00	.49	.59	.59	.00	.40	.00	.25
11. Sleep	.00	.41	.49	.49	.00	.33	.00	.21
13. Talked	.00	.40	.48	.48	.00	.33	.00	.21
20. Get going	.00	.51	.61 ^a	.61	.00	.42	.00	.26
4. Good	.00	.33	.00	.31	.46	.46	.00	.18
8. Hopeful	.00	.36	.00	.34	.50	.50	.00	.19
12. Happy	.00	.56	.00	.52	.77	.77	.00	.30
16. Enjoy	.00	.52	.00	.49	.71 ^a	.71	.00	.28
15. Unfriendly	.00	.24	.00	.21	.00	.20	.50	.50
19. Disliked	.00	.37	.00	.33	.00	.30	.76 ^a	.76

Note. Fixed parameters are presented as zeros. The items are listed as they loaded in each of the subscales.

^a All standardized factor pattern coefficients were statistically significant at $p < .001$ except for those coefficients fixed at 1.0 and not tested.

DISCUSSION

The findings of the present study have implications for community mental health as the CES-D is one of the most widely used self-report scales in screening those at risk for depression in the community setting. In most research studies, only the overall composite score is used to categorize individuals as being “depressed” or “not depressed,” although studies suggest that a composite summary score may not be the most informative and useful index obtainable from the CES-D (Rhee et al., 1999; Schroevers et al., 2000). Consistent with the literature, confirmatory factor analysis of the CES-D in the present study supports the four subscale structure, which has reasonably been interpreted as depressive affect, somatic symptoms, lack of well-being, and interpersonal relations (Radloff, 1977). Furthermore, we have shown that the four-factor model fit was good for both genders and across the three age groups examined.

As indicated earlier, Gatz and Hurwicz (1990) reported that there was no gender difference in symptom levels across the four CES-D subscales and found age difference only in the lack of well-

being subscale. In our large sample, however, statistically significant age and gender differences were observed. Also, the magnitude of association between gender and depressive affect was strongest. A recent and quite thorough review of the literature on gender differences in depression makes no mention of differences between women and men in their symptomatology (Nolen-Hoeksema, 2002). Our data suggest that females' elevated scores are primarily due to depressive affect and, to a lesser extent, somatic complaints. These effects were small; however, they are of potential theoretical importance in understanding gender differences in depression. Focusing on these subsets of depressive symptoms may assist in developing better explanations for the known difference in prevalence of mood disorders between genders and could be useful in understanding the emergence of depressive disorders in adolescence and early adulthood. Young adults (18–34 years) reported the highest levels of depressive symptoms on all four subscales. Public health and community mental health professionals could play a crucial role in the early identification and intervention of depression to prevent morbidity and diminished quality of life associated with the condition. Further research should examine the factors contributing to the higher prevalence of depression among younger adults and develop efficacious treatment options.

Interestingly, older adults reported lower scores on all four subscales of depression, including somatic symptoms. Researchers have suggested that older adults might have higher prevalence of somatic symptoms in light of the higher levels of age-related decline in physical health (Gatz & Hurwicz, 1990; Hertzog et al., 1990). Alternatively, somatic symptoms observed among older adults might be attributed to age-related changes and not to depression. Also, in the present study, all individuals over 65 years of age were grouped together. Within a sample of elderly females, depressive symptoms have been shown to change over a 5-year study period (Newmann et al., 1991b). Given the higher level of heterogeneity in background and health characteristics observed among the older cohort, further breakdown of this age group might be necessary to better understand the variability in the subscales.

Similarly, the heterogeneity of the younger group (18 to 34 years of age) is a limitation of the present study. Interpreting the age-related differences is also limited by the cross-sectional nature of the data, which precludes demonstrating any developmental profiles. In the original CES-D study, depressive symptoms present in the past week were assessed, whereas in the present study, depressive symptoms over the past 2 weeks were reported. However, the 2-week period has been used by several other studies using CES-D. CES-D cut-off scores predict those at risk, or at high risk, for depression but do not provide clinical diagnoses of depressive disorders. As such, we were unable to assess the predictive power and clinical significance of the components of depression. Further research is needed to explore these issues.

Finally, a key issue for any screening tool is its accuracy (Bieling, McCabe, & Antony, 2004). While our data do not include clinical diagnoses, it is possible that attention to the dimension of symptom loading could be used to make the CES-D a more sensitive and specific screening tool to identify those with a diagnosable mood disorder. While beyond the scope of our paper, the broader issue of whether depression is best considered a continuous or dichotomous variable needs to be acknowledged. While diagnostic categories are clearly useful, the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; American Psychiatric Association, 2000) explicitly recognizes the

limitations of its categorical classification system and “encourages specific attention to boundary cases” (p. xxxi); it allows that giving a diagnosis to someone whose “clinical presentation falls just short of meeting the full criteria” (p. xxxii) is clinically justified in some circumstances. For example, Fergusson, Horwood, Ridder, and Beautrais (2005) found that adolescents who had subthreshold depression were significantly at risk for experiencing a later depressive episode and/or suicidal behaviours. Other investigations have shown that those with subthreshold depression already show impairment in psychosocial functioning (Gotlib, Lewinsohn, & Seeley, 1995). Furthermore, the DSM-IV stipulates that a gradation in severity (mild, moderate, severe) is to be specified within the major depressive disorders.

Our approach has been to use all the information available from the interval scales provided by the CES-D while also recognizing the clinical reality of diagnostic groups. We suggest that selective (secondary) prevention programs that use the CES-D for screening might benefit from attending to specific dimension scores of symptoms reported among those individuals identified as being at risk of being diagnosed with depression. In previous work by Price et al. (2006), only 29% of male and 34% of female undergraduates identified as being at risk for depression using the CES-D (using cut-off scores of 24 for males and 22 for females) actually met diagnostic criteria for major depressive disorder when subsequently administered the Composite International Diagnostic Interview. Further work may show that differential weighting of the underlying CES-D dimensions, perhaps by gender, could reduce this false positive rate.

While “the logic of prevention programs [for depression] is ineluctable” (Dobson & Dozois, 2004, p. 283), there is a paucity of empirical data showing statistically significant effects of prevention programs. Just as effective treatment planning by therapists can be facilitated by attending to specific symptoms presented by clinically depressed patients (Nezu, Nezu, McClure, & Zwick, 2002), researchers might increase the power of their intervention studies by attending to the dimensional loading of symptoms and selecting participants whose symptoms are more suitable to the specific inoculation program being administered. It is hoped that the findings of the present study will serve as a catalyst to further research in the area of the subscales of depression across various age and gender groups and their use for promoting mental health in the community.

RÉSUMÉ

L'échelle d'évaluation de l'état dépressif du Centre for Epidemiological Studies (CES-D) est un instrument largement utilisé pour mesurer, à l'aide d'auto-évaluations, le degré des symptômes de dépression dans une population. L'objectif de cette étude était d'explorer la structure factorielle de cette échelle en utilisant un échantillon de la population canadienne, et de comparer ensuite les principaux constructs selon l'âge et le sexe. Une analyse factorielle confirmatoire a étayé le modèle d'échelle à quatre facteurs dans trois groupes d'âge et pour les deux sexes. Les résultats obtenus aux sous-échelles, cependant, ont montré d'importantes différences, principalement entre les sexes. Il serait donc utile, pour mieux expliquer les différences entre les hommes et les femmes sur le plan de la dépression de prêter une attention particulière aux dimensions spécifiques de ces symptômes.

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