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Never too old to learn : the effectiveness of the Coping with Depression course for elderly

Haringsma, R.

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The criterion validity of the Center for Epidemiological Studies Depression Scale (CES-D) in a sample of self-referred elders with depressive symptomatology

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Abstract

Background

The criterion validity of the Center for Epidemiological Studies Depression scale (CES-D) was assessed in a group of elderly Dutch community-residents who were self-referred to a prevention program for depression.

Methods

Paper-and-pencil administration of the CES-D to 318 elders (55-85 years). Criterion validity was evaluated with the Mini International Neuropsychiatric Interview (M.I.N.I.), a clinical diagnostic interview based on DSM-IV. Sensitivity and specificity for various cut-off scores of CES-D were compared with the DSM-IV major depressive disorder (MDD) and with clinically relevant depression (CRD), a composite diagnosis of MDD, subthreshold depression or dysthymia. Furthermore, the characteristics of true versus false positives were analyzed.

Results

For MDD, the optimal cut-off score was 25, (sensitivity 85%, specificity 64%, and positive predicted value of 63%). For CRD, the optimal cut-off was 22 (sensitivity 84%, specificity 60%, and positive predicted value 77%). True positives, MDD and CRD, reported significantly more anxiety symptomatology and more co-morbid anxiety disorders, false positives reported more previous depressive episodes.

Conclusions

The criterion validity of the CES-D for MDD and CRD was satisfactory in this semi-clinical sample of elders. Subjects scoring ≥ 25 constitute a target group for further diagnostic assessment in order to determine appropriate treatment.

Introduction

Prevention of depression in the elderly has become a priority in Community Mental Health Care. For this purpose, 'outreach programs' have been developed (Cuijpers, 1998b; Cuijpers et al., 1995; Lewinsohn et al., 1984). Participants are recruited through announcements in the local media. Open recruitment probably attracts participants with a high base rate of depressive complaints, a history of previous depressive episodes, high levels of anxiety and co-morbid psychiatric disorders. This calls for a two stage screening procedure with a valid instrument like the Center for Epidemiological Studies Depression scale (CES-D) (Radloff, 1977). The CES-D is recommended to assess depressive symptomatology in the elderly (Beekman et al., 1994; Himmelfarb and Murrell, 1983; Lewinsohn et al., 1997; Radloff & Teri, 1986), but has not been investigated as yet for this target group.

Beekman et al. (1997a) studied the criterion validity of the CES-D in a community sample of Dutch elders; they advised to use ≥ 16 as cut-off. In clinical settings however, this cut-off yielded high false-positive rates. Depending on the setting, recommended cut scores varied from 20 to 27 (Himmelfarb and Murrell, 1983; Schulberg et al., 1985; Zich et al., 1990). Himmelfarb and Murrell (1983) used the CES-D to discriminate between a community sample and a clinical sample of elders; they recommended 20 as cut-off score.

In this study, the criterion validity of the CES-D was examined in a group of elderly community residents, self-referred to an outreach program for secondary prevention of depression provided by Dutch Community Mental Health Care Centers. In the elderly milder forms of depression are more prevalent than major depressive disorder (MDD), however they cause as much suffering (Beekman et al., 1995; Hybels et al., 2001; Lewinsohn et al., 2000). Therefore the power of the CES-D to screen for all the disorders in the depressive spectrum is also studied: major depressive disorder (MDD); subthreshold depression (SD) and dysthymia, taken together as clinically relevant depression (CRD).

Following Beekman et al. (1997a), we also studied the characteristics of true and false positives. They found that higher levels of anxiety symptoms were characteristic for true positives, but sociodemographic characteristics, medication and physical health did not predict classification. In addition to these variables, the predictive value of co-morbid anxiety disorders and the presence of previous depressive episodes will be studied here.

Method

Sampling and Procedures

This study was part of a field-study into the effectiveness of the Coping-with-Depression Course for elders (Cuijpers, 1998a; Lewinsohn et al., 1984). The program aims at secondary prevention of mild depressive symptoms and is provided by 60% of the prevention departments of Community Mental Health Care Centers (CMHCC) in

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the Netherlands. Using active recruitment methods, participants were recruited and accepted by the CMHCCs. Eligible for this study were all the participants aged 55 and older. The study was approved by the Medical Ethics Committee of the Leiden University Medical Centre. All subjects signed an informed consent. After joining the study, a booklet with baseline questionnaires was distributed to be completed at home. Within two weeks diagnostics by the researchers took place. The Mini International Neuropsychiatric Interview (M.I.N.I.; Overbeek et al., 1999; Sheehan et al., 1997, 1998) was used. All baseline questionnaires were checked for missing items and incorrect responses. These were discussed with the participant and remediated.

Measures

The M.I.N.I. (Sheehan et al., 1998) assesses the most prevalent axis 1 disorders according to the diagnostic and statistical manual of mental disorders (DSM-IV; American Psychiatric Association, 1994). Diagnoses are based on the dimensional scores obtained. Current MDD (score 5-9), subthreshold depression (SD, score 2-4), and dysthymia were used as criteria. These three diagnoses were combined into the diagnosis 'Clinically Relevant Depression (CRD)'. Interviews were conducted by trained interviewers at the CMHCCs; interrater reliabilities were .94 (MDD), .87 (SD), and 1.0 (Dysthymia).

Anxiety symptomatology was measured with the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A) (Zigmond & Snaith, 1983). The recommended cut-off of 8 was used as demarcation between high and low anxiety levels. Physical health was assessed with the scales for pain and physical functioning of the Medical Outcome Study Short Form General Health Survey (MOS-SF-20) (Kempen, 1992; Stewart et al., 1988), and with a checklist with chronic medical conditions Central Bureau for Statistics (CBS, 1989).

Statistics

The Statistical Package for Social Sciences (SPSS) 11.1 was used. Using Receiver Operating Characteristics (ROC), the association between CES-D scores and the different clinical diagnoses (MDD and CRD) was studied. χ^2 analyses and logistic regression analyses were used to compare characteristics of false and true positives.

Results

The mean age of the 318 participants was 65.5 years ($SD = 7.2$), range 55-85. Participants were predominantly female, frequently living alone, and educated to low or middle levels (see Table 1). The mean sum score on the CES-D was 25.9 ($SD = 9.7$); 85% had a sum score ≥ 16 . The mean score on the HADS anxiety scale was 10.2 ($SD = 4.2$); 75% had a score ≥ 8 .

Table 1. *Sample Characteristics (N = 318)*

Variable	N = 318	(%)	Mean (SD)
Age 55 – 85			65.5 (7.2)
55-64	160	(50.3%)	
65-74	110	(34.6%)	
75-85	48	(15.1%)	
Sex			
Female	231	(72.6%)	
Living situation ^a			
Alone	150	(47.3%)	
Level education ^a			
Low	104	(33.0%)	
Middle	127	(40.3%)	
High	84	(26.7%)	
Medication use: ^b			
Antidepressants and/or sedatives [#]	167	(52.7%)	
CES-D sum score			25.86 (9.74)
≥ 16	269	(84.3%)	
≥ 22	213	(67.0%)	
≥ 25	179	(56.3%)	
HADS anxiety score			10.23 (4.21)
≥ 8	238	(74.8%)	
MOS-SF 20			
MOS-pain			45.91 (33.27)
MOS physical funct ^c			54.96 (33.2)
Chronic diseases (nbr) ^d			
None	96	(31.3%)	
One	106	(34.5%)	
More than one	105	(33.2%)	
Axis I Disorders:			
No axis I disorder	82	(25.8%)	
Axis I, but not CRD	40	(12.6%)	
CRD	196	(61.6%)	
Depressive disorders CRD:			
MDD	133	(41.8%)	
SD	37	(11.6%)	
Dysthymia	26	(8.2%)	
Anxiety disorders	133	(41.8%)	
CRD with co-morbid anxiety disorder	97	(30.5%)	
MDD history			
Never MDD,	45	(14.2%)	
MDD in remission	140	(44.0%)	

^a 3 missing observations ; ^b 1 missing observation; ^c 2 missing observations; ^d 11 missing observations; [#] includes St John's Worth; CES-D = Center of Epidemiological Studies–Depression scale; HADS = Hospital Anxiety and Depression Scale; MOS-SF 20 = Medical Outcome Study Short Form General Health Survey; CRD = Clinically Relevant Depression. CRD can be either MDD or SD or Dysthymia; MDD = Major Depressive Disorder; SD = Subthreshold Depression.

Table 2. AUC, Sensitivity, Specificity and Positive Predicted Value (PPV) of the CES-D for different cut-off and different combinations of depressive disorders

Disorder	AUC	CES-D ≥ 16			CES-D ≥ 18			CES-D ≥ 20			CES-D ≥ 22			CES-D ≥ 25		
		Sens	Spec	PPV	Sens	Spec	PPV	Sens	Spec	PPV	Sens	Spec	PPV	Sens	Spec	PPV
MDD ^a	.833	96.2	23.8	47.6	94.7	31.9	50	93.2	43.2	54.1	91	50.3	56.8	85	64.3	63.1
MDD+SD ^b	.801	95.3	27.7	60.2	94.1	37.8	63.5	90	48.6	66.8	87.1	56.1	69.5	77.1	67.6	73.2
MDD+Dysthym	.800	93.1	23.9	55	90.6	32.1	57.1	88.1	44	61.1	86.2	52.2	64.3	78.6	66	69.8
CRD ^c	.79	92.9	28.7	67.7	90.8	39.3	70.6	86.2	50.8	73.8	83.7	59.8	77	73	70.5	79.9

^a MDD=Major Depressive Disorder; ^b SD = Subthreshold depression; ^c CRD= Clinically Relevant Depression. CRD can be either MDD or SD or Dysthymia.

Table 3. Characteristics of True and False positives for MDD and CRD

	MDD cut off 25 <i>n</i> = 179		CRD cut off 22, <i>n</i> = 213	
	True pos <i>n</i> = 113	False pos <i>n</i> = 66	True pos <i>n</i> = 164	False pos <i>n</i> = 49
HADS anxiety scale				
≥ 8	91%	76%	89%	78%
Anxiety disorders	56%	32%	51%	31%
Previous depressive episodes	54%	80%	62%	86%

The area under the curve (AUC) found with ROC analyses was 0.83 for MDD [$SE = 0.02$; 95% Confidence Intervals (CI) 0.79 - 0.88; $p < 0.001$] and 0.79 for CRD ($SE = 0.3$; CI 0.74 - 0.84; $p < 0.001$). Specificity, sensitivity and positive predicted values (PPV) were calculated using the cut scores 16, 18, 20, 22, 24, 25 and 26 (see Table 2). With MDD as the criterion, the cut score 25 showed optimal balance between sensitivity (85%) and specificity (64%), PPV 63%. For CRD, 22 was a better cut-off, with a sensitivity of 84%, specificity of 60% and PPV 77%.

Using the cut-off ≥ 25 as indication for MDD, the sample had 113 true positives (TPs) and 66 false positives (FPs). TP or FP showed no relationship with demographic characteristics, medication or physical health variables. However, TPs scored significantly higher on the HADS-A than FPs, $t(177, n = 179) = -4.4$; $p < 0.001$. Also significant was the association with anxiety disorders, $\chi^2(1, n = 179) = 8.6$, ($p < 0.01$), and with previous depressive episodes, $\chi^2(1, n = 179) = 11.4$, $p = 0.001$. Anxiety disorders were predominant in TPs, whereas previous depressive episodes were highest in FPs. Direct logistic regression with anxiety, co-morbid anxiety disorders and previous depressive episodes as predictors was statistically reliable, $\chi^2(3, n = 179) = 39.8$, $p < 0.001$. Controlling for confounding, anxiety [Odds Ratio (OR) 1.2], co-morbid anxiety disorders (OR 2.3) and previous depressive episodes (OR .21) reliably distinguished between TPs and FPs.

Using the cut-off ≥ 22 as an indication for the presence of CRD, the sample counted 164 TPs and 49 FPs. A similar pattern emerged. First, no relationship was found with demographic characteristics, medication or the physical health variables. Second, TPs scored significantly higher than FPs on the HADS the anxiety scale, $t(211, n = 213) = -4.9$; $p < 0.001$. Third, significant associations were found with anxiety disorders, $\chi^2(1, n = 213) = 5.6$, $p < 0.05$ and with previous depressive episodes, $\chi^2(1, n = 213) = 8.9$, $p < 0.01$. Anxiety disorders were more prevalent in TPs than in FP, whereas FPs had a higher proportion of previous depressive episodes. Direct logistic regression analysis with anxiety, co-morbid anxiety disorders and previous depressive episodes as predictors was statistically reliable, $\chi^2(3, n = 213) = 39.95$, $p < 0.001$. When controlling for confounding factors, anxiety (OR 1.3), and previous depressive episodes (OR .19) reliably distinguished between TPs and FPs. However,

the unique contribution of co-morbidity became statistically borderline significant. Table 3 summarizes the characteristics of TPs and FPs.

Discussion

Sociodemographic characteristics, physical and mental health status show that the elders in this study represent a vulnerable group in the community. They resembled a sample of psychiatric outpatients more than a community sample. Clinical diagnosis showed that the vast majority had a lifetime DSM-IV-diagnosis for MDD and that 42% met the criteria for a current MDD. The mean CES-D score was 25.9, a figure similar to that reported by Radloff (1977) for her psychiatric sample. SD (12%) and dysthymia (8%) were much less prevalent. However, co-morbid anxiety disorders were widely prevalent (30.5%)

In our sample with its high rate of psychiatric disorders, the CES-D is moderately accurate (Greiner, Pfeiffer and Smith, 2000) in detecting MDD. The optimal cut-off for the CES-D lies higher than in a community sample. The optimal cut scores of 25 for MDD and 22 for CRD are similar to those found in studies of clinical samples (Himmelfarb & Murrell, 1983; Schulberg et al., 1985; Zich et al., 1990). Studies in which the HADS or Geriatric Depression Scale (GDS) were used in psychiatric settings corroborate our findings: reported sensitivities were good, while the specificities were low (Silverstone, 1994 and Chattat et al., 2001).

Despite these higher cut scores the proportion of false positives (FP) was still substantial. TPs and FPs did not differ with regard to sociodemographic characteristics or physical health variables. This is consistent with other studies where no direct association was found between physical illness and MDD (Beekmann et al., 1997b; Williamson & Schulz, 1992; Zeiss et al., 1996).

However, TPs and FPs did differ in mental health status. In the TPs high levels of anxiety and co-morbid anxiety disorders were more prevalent than in the FPs. This is in line with the study results of Beekman et al., (1997a; 2000), Flint, (1994) and Schoevers et al., (2003). The FPs were characterized by more previous depressive episodes than TPs. This suggests that a high CES-D score, combined with a previous history of depression, falsely points to a current depressed state. However, such a score might indicate that either a new depression is developing or that the last depression is not completely in remission.

In our opinion, subjects scoring ≥ 25 on the CES-D should be followed up with a diagnostic interview to specify clinical diagnosis and appropriate treatment. In this group 63% will have a MDD and therefore should be treated in a curative program rather than a prevention program. The CES-D can also be used as an outcome measure, since it measures the current level of symptomatology and is sensitive to changes over time (Radloff, 1977; Radloff and Teri, 1986). In an outtake procedure a score ≥ 25 may indicate that more care is needed.

A feature of this study that might have an effect on the scores is the paper-and pencil mode of administration of the CES-D. Geerlings et al., (1999) found that scores

were 2 - 2.7 points higher in questionnaires that were mailed than in face-to-face interviews. Most of the studies referred to here used interviews to obtain CES-D scores. It cannot be excluded that the higher optimal cut-off found here, partly depends on mode of administration.

In conclusion, the CES-D has satisfactory criterion validity for use as a screenings instrument in a two stage screening procedure with self-referred elders in a prevention setting. A cut-off ≥ 25 for the screening of relevant clinical depression seems most advantageous in a setting where co-morbid psychopathology and a history of previous episodes of depression are likely. Subjects who score above the cut-off should be followed-up with a diagnostic interview to specify a clinical diagnosis and differentiate between those who deserve therapeutic attention from those for whom a prevention program is suitable. After attending the program, the CES-D can be used to indicate those elders who need further care.

Key Points

- This sample of self-referred elders with depressive complaints resembles a clinical sample
- CES-D is a valid screening instrument for diagnoses of MDD and clinical relevant depression for self-referred elders with depressive complaints
- Elders with a high score on the CES-D in combination with a previous MDD are possible candidates for secondary prevention programs clinical diagnostics should be performed on elders with a CES-D score ≥ 25 , to select those that fulfill criteria for MDD and need appropriate treatment

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