The Center for Epidemiologic Studies Depression Scale (CES-D): Is It Suitable for Use with Older Adults?

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Abstract. With the aim of verifying the suitability of the CES-D scale for use in long-term care institutions for older adults, the CES-D questionnaire was used to collect patient-reported assessments, and two well-known psychometric instruments – the Hospital Anxiety and Depression Scale (HADS) and the Barthel Index of Abilities of Daily Living – were used to collect nurse-reported assessments, based on observations of patients' behaviours. With regard to possible frequent cases of cognitive impairment and/or insufficient motivation to give sensible responses to CES-D questions, the patient-reported responses were collected from patients during one-on-one sessions with a nurse. The reliability, concurrent validity, and the trustworthiness of the obtained data were supported with proper values of the Cronbach's alpha coefficient, $0.70 <$ alpha < 0.85, with significant correlation between CES-D and HADS-Depression, $R = 0.50$, $p < 0.001$, and with significant correlation between scores of particular CES-D items vs. final CES-D evaluations of depression, proved by significance $p < 0.001$ for 18 of 20 CES-D items. These findings supported the effectiveness of the one-on-one session methodology in questionnaire surveys for older adults. The postulation that cases of self-reported depression included somewhat different information about the patient than nurse-reported depression concerning the same patient was supported with the evidence that, in spite of the significant correlation between the Barthel Index and HADS-Depression, $R = -0.17$, $p = 0.016$, and in spite of the significant correlation between CES-D and HADS-Depression, the correlation between the Barthel Index and CES-D, equal to $R = -0.08$ was insignificant at $p = 0.244$. The findings of this study, considered jointly, support the valuableness of the CES-D scale for use in one-on-one surveys for older adults.

Introduction

The patient is the primary recipient of treatment. Consequently, there is a clear need to recognize and value the patient's satisfaction with all aspects of therapeutic and nursing care. For that reason, physicians and nurses are

methodically trained to improve and maintain communication skills during care (Knapp, 2007; Student Nurse Journey, 2012), especially with respect to older patients (Burgio et al., 2001; Levy-Storms, 2008). They are prepared to avoid any unwanted motherly behaviours (Chmiel et al., 2010). An even greater focus is put on so-called elder-speak (Botek, 2015; Meisner, 2012; Williams et al., 2004) because the use of elder-speak can totally destroy a patient-nurse interaction; all communication can be reduced to talk about nothing. One of the best ways for professional caregivers to prevail over the temptation to fall into elder-speak is to make use of a recognized questionnaire with fixed questions, such as the SF-36 scale (Hayes et al., 1995) during "question and answer sessions" with patients.

In this study, the Center for Epidemiologic Studies Depression Scale (CES-D) was used to collect patient-reported assessments during a series of one-on-one sessions with residents of a nursing home. Two recognized scales, the Hospital Anxiety and Depression Scale (HADS) and the Barthel Index, were used to collect nurse-reported assessments, based on observations of patients' behaviours. The Barthel Index is routinely used at all long-term care institutions in Poland with the aim of assessing patients' abilities to perform everyday activities (Kuźmicz et al., 2008). The HADS is also routinely used at numerous long-term care institutions (Bjelland et al., 2002). The HADS questionnaire includes two subscales, HADS-Anxiety and HADS-Depression. It should be noted that the HADS-Depression and CES-D were intended to measure the same psychometric property, "inclination to depressive moods", which creates an opportunity to assess the concurrent validity of the obtained data. From another point of view, the two observational scales, the Barthel Index and HADS, created an opposition to the self-administrated CES-D scale.

In this study, the focus was placed on the CES-D depression scale for some weighty reasons. The intensity of depressive moods in residents of long-time care can be considered as an aggregate indicator of patients' well–being. The CES-D depression scale is simple and quick to administer. The CES-D questionnaire, along with accurate short instructions, can be found anywhere (Counselling Resource Research Staff, 2012), and is available in Polish (Dojka et al., 2003). It was originally created with the aim of measuring depressive moods in the general population. Nonetheless, for many years it has been used extensively with a broad range of subjects of various ages and with diverse health conditions (Park et al., 2014). In spite of that circumstance, guidelines pertaining to the psychometric characteristics required to validate use of the CES-D scale with older adults (those aged 65 and older) have not become available thus far, which makes any validation

analyses performed for this population somewhat troublesome, but more interesting from a methodological perspective.

Materials and Methods

At the beginning of the research, in October 2013, all of the present residents receiving long-term care at the nursing home under investigation were taken into consideration. Then, the course of forming the research group was split into two phases – a phase before the questionnaire survey and a phase during the questionnaire survey. The exclusion criteria used as well as other details concerning participants are presented in Tables 1 and 2.

Table 1. Forming the research group: exclusions before the survey

Gender	Women		Men		Total	
Exclusion criteria	n	%	n	%	n	%
disagreement	0	0.0	0	0.0	0	0.0
incapacitation	6	2.2	13	10.2	19	4.8
communication	0	0.0	0	0.0	0	0.0
mental/oncological	19	7.1	7	5.5	26	6.6
death	0	0.0	0	0.0	0	0.0
Total excluded	25	9.4	20	15.6	45	11.4
Initial number	267	100	128	100	395	100
Total remaining	242	90.6	108	84.4	350	88.6
The % was computed with respect to initial number (100%) at each group						

Table 2. Forming the research group: exclusions during the survey

Gender	Women		Men		Total	
Exclusion criteria	n	%	n	%	n	%
disagreement	16	6.6	4	3.7	20	5.7
incapacitation	2	0.8	0	0.0	2	0.6
communication	37	15.3	11	10.2	48	13.7
mental/oncological	4	1.7	0	0.0	4	1.1
death	48	19.8	21	19.4	69	19.7
Total excluded	107	44.2	36	33.3	143	40.9
Initial number	242	100	108	100	350	100
Total remaining	135	55.8	72	66.7	207	59.1
The % was computed with respect to initial number (100%) at each group						

During the first phase, N = 45 patients were excluded from the initial group of N = 395 patients, and during the second phase, N = 143 patients were excluded from the remaining N = 350 patients. In both phases, the same exclusion criteria were used, but during the first phase, the needed information was obtained from clinical documentation only, whereas during the second phase, information obtained from patients was utilized also.

Five exclusion criteria were applied, namely, the obvious criterion of "death of participant"; "formal incapacitation" (which makes it impossible to give valid consent); direct "disagreement to take part in the survey"; recognised acute mental or oncological disease; recognised difficulties in communication with the participant. Concerning difficulties in communication, here the indirect disagreement to give honest answers was included if any serious doubts were stated by the reviewer (Chmiel et al., 2012). Moderate mental impartment didn't give a direct reason to exclude a participant, based on the known principle: "Not knowing where I am doesn't mean I don't know what I like" (Mozley et al., 1999). Finally, N = 207 patients were included in the study, N = 135 women and N = 72 men.

With the aim of verifying the suitability of the CES-D scale for use with older adults in long-term care institutions, the questionnaire survey was made with the use of three psychometric instruments: the CES-D scale, the Hospital Anxiety and Depression Scale (HADS), and the Barthel Index of Abilities of Daily Living (Bjelland et al., 2002; Kuźmicz et al., 2008). Consequently, the material for the analyses includes three data sets: the set of demographic and clinical data, extracted from clinical documentation, the set of data obtained with use of the three psychometric instruments – the CES-D scale, the HADS, and the Barthel Index – and the set of other notes made by nurses during the one-on-one sessions with patients.

The range of the CES-D scale is equal to $0 \leq \text{CES-D} \leq 60$, and the range of the HADS-Depression subscale is equal to $0 \leq \text{HADS-D} \leq 21$, both with greater values for deeper depressive moods. The range of the HADS-Anxiety subscale is equal to $0 \leq \text{HADS-A} \leq 21$, with greater values for deeper anxiety. The range of the Barthel Index is equal to $0 \leq \text{Barthel} \leq 100$, with greater values signifying lower ability to perform everyday activities.

The resulting scores for the Barthel Index and for the two subscales of HADS, that is HADS-Anxiety and HADS-Depression, were calculated simply as usual by summing all of the scales' scores (Bjelland et al., 2002; Kuźmicz et al., 2008). The scoring of the CES-D is somewhat more complicated. The CES-D depression scale includes twenty simple questions. Sixteen questions are articulated in a negative direction, for example, question 6: I felt depressed, or question 14: I felt lonely. However, four of the items are

worded in a positive direction, such as question 12: I was happy, or question 16: I enjoyed life, which makes it possible to control for response bias (Górkiewicz, 2014). Responses to the CES-D are based on the frequency of depressive feelings and behaviours during the week prior to administration of the questionnaire. A respondent is asked to choose and indicate only one of four admissible answers to each question. The frequency "Rarely or none of the time (less than 1 day)" is scored with 0 points; the frequency "Some or a little of the time (1–2 days)" is scored with 1 point; "Occasionally or a moderate amount of the time (3–4 days)" is scored with 2 points; and "Most or all of the time (5–7 days)" is scored with 3 points. Therefore, scoring usually takes no more than about 5–10 minutes. The resulting score is computed as the sum of the all twenty scores, but after converting the reverse scores into the direct shape: $0 \rightarrow 3$; $1 \rightarrow 2$; $2 \rightarrow 1$; and $3 \rightarrow 0$.

The statistical analyses performed in this study included descriptive statistics, the basic tests of statistical significance: the chi-square test for distribution, Student's t-test for mean values, and F-test for standard variances, applied respectively to the random variables under consideration. The relationships between variables were analysed using the Pearson correlation, with partial correlation and linear regression. The value less than 0.05 was chosen as the level of significance.

A Cronbach's alpha was calculated to determine internal consistency reliability, and concurrent validity was assessed by analysing the correlation between the CES-D and the HADS-Depression (HADS-D) subscale. In addition, the trustworthiness of the measurements made with the CES-D scale was supported with estimated Pearson coefficients of correlation between each particular item of the CES-D and the general assessment was computed as the sum of all items.

All of the computations are quite straightforward, so they can be made with any spreadsheet software with a proper set of statistical functions, such as Excel for Windows (Górkiewicz et al., 2001). In case of need, useful statistical calculators with proper instructions are readily available on-line, e.g. (Lowry, 2011).

Results

The distribution of age and duration of care is shown in Tables 3 and 4. The chi-square test showed a significant difference between men and women with respect to the age of participants, $p < 0.001$, and also with respect to duration of care, $p = 0.030$.

Table 3. The subgroup of women: distribution of age and duration of care

Age of Participant	Duration of Care						Total	Total %
	1	2	3	4	5–6	>6		
up to 50	1	2	0	0	0	0	3	2.2
51–60	1	3	2	1	1	0	8	5.9
61–70	5	4	3	5	1	6	24	17.8
71–80	4	5	8	1	6	2	26	19.3
81–90	16	18	13	9	3	8	67	49.6
over 90	0	3	0	2	2	0	7	5.2
Total	27	35	26	18	13	16	135	100
Total %	20.0	25.9	19.3	13.3	9.6	11.9	100	
Age of participant, her Duration of care – both measured in years								

Table 4. The subgroup of men: distribution of age and duration of care

Age of Participant	Duration of Care						Total	Total %
	1	2	3	4	5–6	>6		
up to 50	0	2	0	0	0	1	3	4.2
51–60	3	7	1	1	3	4	19	26.4
61–70	3	3	1	3	5	1	16	22.2
71–80	5	7	1	2	5	1	21	29.2
81–90	3	5	0	2	0	1	11	15.3
over 90	0	1	0	0	1	0	2	2.8
Total	14	25	3	8	14	8	72	100
Total %	19.4	34.7	4.2	11.1	19.4	11.1	100	
Age of participant, his Duration of care – both measured in years								

The descriptive statistics of the CES-D, the Barthel Index and both HADS subscales, HADS-Anxiety and HADS-Depression, are shown in Tables 5 and 6.

The chi-square test showed that the distribution of age in the group of women, presented in Table 3, differed significantly from normal distribution, with a mean value of 77.7 and SD = 11.5 (according to estimates presented in Table 5), p < 0.001. The distribution of age in the group of men, presented in Table 4, did not differ significantly from normal distribution, with a mean of 68.9 and SD = 12.2 (according to estimates presented in Table 6), p = 0.314. Analogously, the distributions of all remaining variables, CES-D, Barthel, HADS-A and HADS-D, did not differ significantly

Table 5. Descriptive statistics of age, CES-D, Barthel and HADS in women

Parameter	Age	CES-D	Barthel	HADS-A	HADS-D
N	135	135	135	135	135
mean	77.7	23.8	19.8	2.6	2.8
SD	11.5	9.7	12.3	1.3	1.5
median	82	24	20	3	3
min/minS	32	0/0	0/0	1/0	1/0
max/maxS	94	49/60	40/100	6/21	9/21
skewness	−1.40	−0.02	0.21	0.36	0.70
kurtosis	2.42	−0.04	−1.28	−0.78	0.80
HADS-A – subscale HADS-Anxiety; HADS-D – subscale HADS-Depression; minS – the minimal possible value; maxS – the maximal possible value of a scale					

Table 6. Descriptive statistics of age, CES-D, Barthel and HADS in men

Parameter	Age	CES-D	Barthel	HADS-A	HADS-D
N	72	72	72	72	72
mean	68.9	24.2	25.3	2.6	2.6
SD	12.2	10.6	13.4	1.4	1.3
median	68.5	24	25	2	2.5
min/minS	30	2/0	0/0	1/0	1/0
max/maxS	94	55/60	40/100	6/21	5/21
skewness	−0.33	0.35	−0.40	0.66	0.30
kurtosis	0.09	0.39	−1.34	−0.39	−1.04
HADS-A – subscale HADS-Anxiety; HADS-D – subscale HADS-Depression; minS – the minimal possible value; maxS – the maximal possible value of a scale					

from suitable normal distributions, with a significance level of $p > 0.05$. All of these findings correspond to estimated values of skewness and kurtosis, shown in Tables 5 and 6, because for normal distribution, by definition, skewness = 0 and kurtosis = 0.

The results of the comparisons made between the women's group vs. the men's group, made with regard to the mean values and the standard deviations of age, CES-D, Barthel Index, and both HADS subscales, HADS-Anxiety and HADS-Depression, are shown in Table 7. It was observed that the women's group differed significantly from the men's group with respect to age, $p < 0.001$, and Barthel Index, $p = 0.002$, but did not differ with respect to CES-D, HADS-Anxiety and HADS-Depression, $p > 0.05$.

A series of four linear regression models $Y = b_0 + b_1 \cdot Age + b_2 \cdot Gender$, where the outcome variable was $Y =$ CES-D, the Barthel Index, and both

Table 7. The significance of the differences between the women's vs. the men's groups

Test	Age	CES-D	Barthel	HADS-A	HADS-D
p|test.t_1	<0.001	0.385	0.002	0.422	0.169
p|test.F	0.539	0.384	0.448	0.575	0.177

HADS-A – subscale HADS-Anxiety; HADS-D – subscale HADS-Depression; p\|test.t_1 – the significance of the one-sided Student's t-test for mean values at two independent samples; p\|test.F – the significance of the F-test for standard variances

of the HADS subscales, HADS-Anxiety and HADS-Depression, were estimated. The distributions of the regression errors were evaluated visually, based on the $Y = b_0 + b_1 \cdot \text{Age}$ charts. Then, for each model separately, the two null hypotheses were considered – the first hypothesis being that $b_1 = 0$ and the second hypothesis that $b_2 = 0$. It was concluded that only at the model: Barthel Index = $b_0 + b_1 \cdot \text{Age} + b_2 \cdot \text{Gender}$, should the null hypothesis $b_2 = 0$ be rejected, p = 0.003. For each of all of the seven remaining hypotheses under consideration, a significance of p > 0.05 was found.

The internal consistency of the Barthel Index and the CES-D scale was supported with estimated values of Cronbach's alpha, equal to alpha = 0.848 and alpha = 0.816 for the CES-D, in women's and men's subgroups respectively, and alpha = 0.726 and alpha = 0.741 for the Barthel Index, in women's and men's subgroups respectively.

The trustworthiness of the obtained data was supported with the estimated Pearson coefficients of correlation between scores of each particular item of the CES-D and the general score computed as the sum of all items, for number of pairs N = 207 (Table 8).

Table 8. Correlation between scores of separate items and general score of the CES-D

Item	Text of the CES-D item	R	p
4.	I felt that I was just as good as other people	0.09	0.197
8.	I felt hopeful about the future	0.31	<0.001
12.	I was happy	0.45	<0.001
16.	I enjoyed life	0.57	<0.001
19.	I felt that people disliked me	0.20	0.004
other	[each of the K = 15 remaining items of CES-D]	0.26–0.67	<0.001

The concurrent validity of the CES-D and HADS-Depression (HADS-D) subscale was supported with the Pearson coefficient of correlation, R = 0.50,

p < 0.001 for N = 207, and also with the coefficient of partial correlation between these scales (with eliminated influence of the Barthel Index), R = 0.50, p = 0.024 (Table 9).

Table 9. Correlation coefficients between the CES-D, HADS-D and Barthel Index

X	Y	Z	R_{XY}	p	$R_{XY.Z}$	p
CES-D	HADS-D	Barthel	0.50	<0.001	0.50	0.024
CES-D	Barthel	HADS-D	−0.08	0.244	0.002	0.990
HADS-D	Barthel	CES-D	−0.17	0.016	−0.145	0.038
R_{XY} – coefficient of a Pearson correlation between variables X and Y; $R_{XY.Z}$ – coefficient of a partial correlation between variables X and Y; but with eliminated influence of a Z variable						

The main results were associated with two ascertained relationships between variables considered in this study. The first relationship consisted of a positive correlation between the positively directed items of the CES-D scale and the negatively directed general CES-D score. This relationship is shown in Table 8. The second relationship consisted of a significant correlation between a nurse-reported HADS-D score of a patient's depression and nurse-reported Barthel Index score, in comparison with a lack of correlation between a patient-reported CES-D score of his/her depression and a nurse-reported Barthel Index score. This relationship is shown in Table 9.

Discussion

In this study, self-reported depression, as measured using the CES-D scale with the residents of a nursing home, was confronted with nurse-reported depression, as measured by the HADS-Depression (HADS-D) scale with the same group of patients. However, it should be noted once again that in general about 20% of those who achieve a high CES-D score in fact do not meet the full psychiatric criteria for major or clinical depression (Counselling Resource Research Staff, 2012). Accordingly, in this study, the CES-D scores, collected using the ground rule: "proper instrument + proper procedure + proper attitude", were considered as an aggregate indicator of patients' well-being. In addition, the Barthel Index was used with the same research group as usual, in a nurse-reported mode.

With regard to possible frequent cases of cognitive impairment and/or insufficient motivation to give sensible responses to CES-D questions, the

patient-reported responses were collected from patients during one-on-one sessions with a nurse, who read a single CES-D item step-by-step, in case of need giving some necessary explanation and encouragement, and then listened to the patient's response and recorded it on the CES-D form. It should be emphasized that during a session, the nurse should properly document the course of interaction with a patient (Dijkstra, 2002; Shinkfield et al., 2015). The applied procedure created the best circumstances possible for the respondents to reflect and formulate proper answers to the questionnaire questions (Collins, 2003).

Because one-on-one sessions are very time-consuming and must be carried out by skilled interviewers, the following fundamental questions arose: Is all of the effort made in applying the CES-D superfluous? Does the patient-reported CES-D measurement of depression add any valid information to the evaluation made by a nurse with the use of the HADS-D scale?

In this study, the possible valuableness of the CES-D measurements was supported with the main finding that the correlation between the Barthel Index and HADS-D, equal to $R = -0.17$, was significant at $p = 0.016 < 0.05$ for $N = 207$ pairs. However, the correlation between the Barthel Index and CES-D, equal to $R = -0.08$, was insignificant at $p = 0.244 > 0.05$ for $N = 207$ pairs. This finding supported the postulation that, in spite of the significant correlation between the CES-D and HADS-D, $R = 0.50$, $p < 0.001$ for $N = 207$ pairs, self-reported depression included somewhat different information about the patient than nurse-reported depression of the same patient. The partial correlation method made this contrast more expressive, transforming $R = -0.17$, $p = 0.016$ into $R = -0.145$, $p = 0.04$ and $R = -0.08$, $p = 0.244$ into $R = -0.002$, $p = 0.990$ (Table 9).

The results obtained by this study correspond with known findings concerning differences in patient and care-provider perceptions (Berlowitz et al., 1995; Chmiel et al., 2010; McCormack, 2004; Ready et al., 2004; Rothwell et al., 1997). Thus, disagreements in patient and care-provider assessments are usual, but they cannot be interpreted on every occasion only in terms of either a patient's trustworthiness or of a care-provider's competency. However, some weighty doubts often arise with respect to patients' competence (Gerrie et al., 2006; Trummer et al., 2006), as well as with respect to the style of communication with patients employed by health care workers (Berry, 2009; Botek, 2015).

Unfortunately, the best possibilities to give proper assessments do not guarantee consistency, validity, and trustworthiness of the obtained data, especially with respect to data obtained in institutional long-term care settings for older adults, who can have cognitive impairment or dementia. The

reliability and concurrent validity of the obtained data were supported with proper values of Cronbach's alpha > 0.70 and with a significant correlation between CES-D and HADS-Depression. Concerning trustworthiness of data obtained with the CES-D questionnaire, it is known that in practice, the standard way of confirming an individual's credibility consists of a repeated examination method in which individuals receive the same set of questions on two different occasions (Górkiewicz et al., 2005). Nevertheless, with respect to the CES-D scale, it should be noted that this scale can be used to confirm a patient's credibility on the base of a non-repeated examination, owing to the proper share of opposite questions among the twenty items of the questionnaire (Górkiewicz, 2014). In this study, it was found that among the 20 items of the CES-D scale, the patient-reported scores of 18 items of the CES-D scale (including 3 of the 4 opposite items) were highly significantly correlated with the general score of the CES-D, with a significance level of $p < 0.001$. This gives clear support for credibility of the obtained data. Only two items of the CES-D scale occurred somewhat confusing for respondents, the details of which are shown in Table 8. Both of these mind-bending items can be wrongly interpreted by respondents in terms of aloneness, isolation, and separation from other people. For example, item 4: "I felt that I was just as good as other people" can give the wrong impression and be interpreted as "I felt like an outsider, like a haughty judge assessing others", and item 19: "I felt that people disliked me" can be misinterpreted to mean "I felt like an outcast, like a recluse". Thus, all of the wavering with these items seems to be quite natural and spontaneous because of older patients' very strong emotional orientation concerning their social environment (Fiori et al., 2006).

There were two main limitations of this study. First, the study participants were recruited from a single nursing home only. In addition, only universal psychometric instruments were used. In consequence, specific problems of the residents and of the care providers at the nursing home were omitted.

There are clear prospects for overcoming the above limitations in further research, due to possible cooperation with other long-term care institutions, and with possible use of other psychometric instruments, such as the Polish version of the Newcastle Satisfaction with Nursing Scale (Gutysz-Wojnicka et al., 2007) and/or a Polish version of a scale to measure staff satisfaction with work in elderly care (Donahue et al., 2008; Engström et al., 2006; Peña-Sánchez et al., 2011). Moreover, in our opinion, larger-scale studies on efficient assessment methods are still urgently required to overcome the complexity of the issues present in nursing homes offering long-term care.

Conclusions

In this paper, it was demonstrated that the Center for Epidemiologic Studies Depression Scale (CES-D) can be successfully used to collect patient-reported assessments from older adults in long-term care institutions, during one-on-one sessions with a nurse.

It was proven that patient-reported CES-D measurements of depression add some additional information to evaluations made by nurses with use of the observational scale known as the Hospital Anxiety and Depression Scale (HADS).

The reliability, concurrent validity, and trustworthiness of the obtained data were supported with proper values of Cronbach's alpha coefficient, with significant correlations between CES-D and HADS assessments of depression, and with significant correlations between scores of particular CES-D items vs. final CES-D evaluation of depression.

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