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Original article

Depression as a proxy of negative affect? A critical examination of the use of the CES-D in type 2 diabetes

La dépression comme reflet de l'affectivité négative ? Un examen critique de l'utilisation du CES-D dans le diabète type 2

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Abstract

Objectives. – Recent research suggests depression as measured by self-endorsed symptoms lists is associated with poor health outcomes in chronic illness. Yet, it is probable that these lists of symptoms reflect other concepts such as general distress or negative affect when used as dimensions.
Methods. – To test for this hypothesis, we explored associations of the Centre of Epidemiological Studies-Depression, Radloff ([CES-D], 1977) with disease severity in diabetes and how trait negative affect from the Profile of Mood States ([POMS]; Usala & Hertzog, 1989; adaptation by Cohen et al., 1995) impact these associations in a sample of 502 people with type 2 diabetes.
Results. – We found that the CES-D included two dimensions of negative and positive experience. Each CES-D component was independently linked to disease severity. However, controlling for trait negative affect suppressed the correlation between the CES-D negative experience component and disease severity. Item-level analyses revealed that the negative experience component of the CES-D bore an emotional tone of sadness but not anger.
Conclusions. – When using the CES-D, distinguishing positive and negative components is necessary. Self-reported depression symptoms from the CES-D have no incremental validity over negative affect.

Keywords: Depression; Diabetes; Negative affect; Positive affect; CES-D

Résumé

Objectifs. – La littérature récente suggère que la dépression, mesurée à l'aide de listes de symptômes par des questionnaires autodescriptifs est associée à un moins bon état de santé dans la maladie chronique. Il est possible que les listes de symptômes, quand elles sont utilisées sous forme de dimensions, reflètent d'autres concepts que la dépression, par exemple une détresse générale ou une affectivité négative.
Méthodes. – Pour tester cette hypothèse, nous avons examiné les associations entre le Centre of Epidemiological Studies-Depression, Radloff ([CES-D], 1977) avec la gravité de la maladie dans le diabète, et comment l'affectivité négative (Profile of Mood States ; Usala & Hertzog, 1989 ; adaptation de Cohen et al., 1995) influence ces associations dans un échantillon de 502 personnes avec un diabète de type 2.
Résultats. – Nous avons trouvé que le CES-D comprend deux dimensions, de vécu négatif versus positif. Chaque composante du CES-D est liée indépendamment et inversement à la gravité de la maladie. Cependant, quand le rôle de l'affectivité négative est contrôlé, l'association entre la composante « vécu négatif » au CES-D et la gravité de la maladie disparaît. Une analyse au niveau des items affectifs révèle que la composante « vécu négatif » comprend une tonalité émotionnelle de tristesse mais non d'irritation.
Conclusion. – Il est recommandé de distinguer les composantes négative et positive quand on utilise le CES-D. Les symptômes dépressifs autorapportés du CES-D n'ont pas de validité incrémentielle au-delà de l'affectivité négative.

Mots clés : Dépression ; Diabète ; Affect négatif ; Affect positif ; CES-D

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1. Introduction

Levels of depressive symptoms are associated with disease status in various illnesses. In diabetes, depressive symptoms and diabetes-related distress are correlated with glycemic control and the course of the illness (Lustman et al., 2000; Peel et al., 2005; Sultan and Heurtier-Hartemann, 2001). This may partly reflect the high degree of strain and burden experienced by patients and the negative psychosocial consequences of the illness (e.g. Hartemann-Heurtier et al., 2001; Ludman et al., 2004). Follow-up studies have also suggested that depression, depressive symptoms or other negative affects could be vulnerability factors for negative diabetes outcomes over time (Penninx et al., 2001; Sultan et al., 2008; Zhang et al., 2005). Many pathways have been suggested to explain this relationship such as poor self-care, increased release of stress hormones or impaired glucose transportation (Musselman et al., 2003; Lustman et al., 2005; Lett et al., 2004). The aim of this study is to examine to what extent a widely used measure of depression relates to disease severity and whether this relation is unique when controlling for negative affect.

In fact, a large body of the research has assessed "depression" through self-reported symptom lists, like the Center for Epidemiologic Studies-Depression ([CES-D], Radloff, 1977). These studies have shown that even a few symptoms of depression are related to poor disease management and status in vascular disorders and to increased complications and poor glycemic control in diabetes (e.g. Kinder et al., 2002; Egede et al., 2005; Bush et al., 2001; Roy et al., 2007; Bruce et al., 2005). Although it was originally intended as an epidemiological measure, rather than a clinical instrument, the CES-D has been used extensively as a screening tool. In early studies, factor analyses identified four dimensions or attributes: "somatic-retarded activity", "depressed affect", "positive affect" and "interpersonal relations" (Ensel, 1986). However, the factor structure has been found to vary greatly from sample to sample, with most current factor structures including one, two or four factors (Stansbury et al., 2006; Shafer, 2006). The CES-D has displayed high levels of sensitivity for clinical depression but low sensitivity for the detection of diabetes-specific emotional problems (Hermanns et al., 2005).

Even with its extensive use, it remains unclear what the CES-D actually measures: some kind of general distress, state depressive symptoms, or trait negative affect. At least eight of the 16 negative items are not assessing affect but rather assess other symptoms of depression. Four or five symptoms endorsed by the participant is certainly far from reflecting clinical depression and may well reflect general distress or trait negative affect, depending on what items are endorsed by participants (Coyne, 1994; Santor and Coyne, 2001). Moreover, recent research suggests that the positive affect items and the negative depression symptoms items of the scale are not equally associated with health outcomes in a number of chronic conditions, such as diabetes and AIDS (Blazer and Hybels, 2004; Moskowitz, 2003; Moskowitz et al., 2008; Ostir et al., 2000). For example, Blazer and Hybels (2004) observed that the positive items from the CES-D predicted a lower risk of mortality in a large sample of elderly people even when gender, ethnicity, education and other variables were controlled. In a sample of men with AIDS, higher average scores on the positive items of the CES-D uniquely predicted lower risk of mortality, even when risk estimates were adjusted for biological markers of AIDS progression and negative affect (Moskowitz, 2003). Moskowitz et al. (2008) also showed that positive items on the CES-D were associated with lower risks of all-cause mortality in people with diabetes. These observations are consistent with previous studies showing that negative affect relates well to poor health outcomes whereas positive affect is associated with better health (e.g. Danner et al., 2001; Cohen et al., 1995). However, no study systematically explored the relationships of the CES-D components with disease status among patients with diabetes. Furthermore, there are no data to help determine whether the negative items on the CES-D reflect state depressive symptoms or rather trait negative affect. Determining the differential relationships between positive and negative items with external diabetes-related variables is important since it may provide additional arguments for using the CES-D subscales separately and it will indicate if the information carried by the negative items is unique in comparison to that of negative affect. This would qualify the status of "depression" as a risk factor of degradation in chronic illness.

We addressed the following questions: What is the independent relationship of each CES-D component with disease severity in diabetes? From the literature, we expected that negative items would correlate positively with disease severity and positive ones would correlate negatively. Second, how are these correlations impacted when trait negative affect is controlled? If the CES-D components bear unique information in the relation to disease severity, one would expect that this relation would be significant when controlling for trait-level negative affect and other personal or illness characteristics. If not, that would give indication that the CES-D may be a proxy of negative affect. Finally, given the widespread use of the scale in health research, it would be valuable to know which affect are more precisely assessed by CES-D components.

2. Methods

2.1. Sample

This study involved a secondary analysis of cross-sectional data collected as part of the San Francisco Family Diabetes Project. The study included a diverse community based sample of patients from four ethnic groups ($N = 502$): Euro-Americans ($N = 116$), Hispanics ($N = 76$), African-Americans ($N = 154$), and Asians ($N = 156$) (Fisher et al., 2001, 2004; Chesla et al., 2004). The inclusion criteria were: type 2 diabetes, between ages 21 and 75, English or Spanish fluency, and no diagnosis of active psychosis or dementia. Patients received a 1.5-h home visit that included questionnaires, physical measurements and interviews, and a mail-back questionnaire. Patients visited a community laboratory for collection of blood and urine specimens. All materials were prepared in English and Spanish, and the project was approved by the Committee on Human Research at UCSF and at each participating facility.

2.2. Measures

2.2.1. CES-D

The CES–D is a 20-item self-report instrument that measures depressive symptoms during the last week: 0 = rarely or none of the time, 1 = some or a little of the time, 2 = occasionally or a moderate amount of the time, and 3 = most or all of the time. Of the 20 items, 16 are negatively worded (e.g. 'I felt sad'), whereas four items are framed positively and require reverse scoring (e.g. 'I felt happy'). The positively worded items have been described as indicators of positive affect (Ensel, 1986; Radloff, 1977) and were additionally inserted to disrupt a potential negative response set in the administration of the scale (Radloff, 1977).

2.2.2. Trait Negative Affect

To measure trait negative affect, we used 12 adjectives from the Profile of Mood States ([POMS] ; Usala and Hertzog, 1989; adaptation by Cohen et al., 1995) assessing anxiety, anger, depression and fatigue. Participants were asked to assess how accurately each of the adjectives listed described them as they were generally or most of the time. The 12 adjectives were: nervous, hostile, depressed, fatigued, tense, angry, sad, worn out, on edge, resentful, unhappy, tired. Response alternatives ranged from not at all accurate (1) to very accurate (4). This scale is recognized as a good measure of trait-level negative affect or negative affectivity (Cohen et al., 1995).

2.2.3. Disease severity

An index of diabetes-specific complications and co-morbidities was used to reflect level of disease severity. This index is the sum of all positive microvascular or macrovascular conditions, as reported by the patient: retinopathy, peripheral neuropathy, kidney disease, heart disease and high blood pressure. We also considered glycated haemoglobin (HbA_{1C}) as an indirect measure of disease progression. HbA_{1C} reflects mean blood glucose levels in the previous 6 to 8 weeks. This was assessed by the High Pressure Liquid Chromatography (HPLC) technique which is the current standard.

Sociodemographic and clinical measures included: age, gender, self-described ethnicity (European-American, Hispanic, African-American, Asian-American), time since diagnosis in years, BMI, current diabetes treatment (diet and exercise, pills, insulin) (Table 1).

2.3. Statistical analyses

We first led analyses on the CES-D using a principal component analysis (PCA) to determine its components. We performed hierarchical regression analyses where disease status and HbA_{1C} were the dependent variable and clinical, sociodemographic variables and CES-D components were the independent variables. In order to isolate the impact of trait negative affect on the correlations, this factor was then forced as a predictor. Finally, we examined correlations of CES-D components to each negative emotion of the POMS to determine which emotional tone is carried by the CES-D.

Table 1
Sample description ($N = 502$).

	n (%)	M	S.D.	Min	Max
Age		53.6	8.8	28	77
Gender					
Men	270 (54)				
Women	232 (46)				
Ethnicity					
European	116 (23)				
Hispanic	76 (15)				
African	154 (31)				
Asian	156 (31)				
Time since diagnosis		6.1	4.6	0.5	30
HbA_{1C}		8.2	1.8	4.5	16.3
$HbA_{1C} > 7$	357 (71)				
$HbA_{1C} > 8$	236 (47)				
Body Mass Index		30.5	7.0	17.0	54.4
Diabetes management					
Diet/exercise	60 (12)				
Pills	355 (71)				
Insulin	87 (17)				
Diabetes severity		1.39	1.14	0	5
0	122 (24)				
1–3	297 (59)				
4–5	83 (16)				
Nephropathy	141 (28)				
Retinopathy	16 (3)				
Peripheral neuropathy	133 (26)				
Heart disease	45 (9)				
High blood pressure	239 (48)				
CES-D 20-item		12.1	8.9	0	56
CES-D ≥ 16	149 (30)				
CES-D ≥ 24	66 (13)				
CES-D 16-item negative		8.1	7.4	0	46
CES-D 4-item positive		7.9	2.6	0	12
POMS Negative affect		21.9	7.3	12	48

CES-D: Centre of Epidemiological Studies-Depression, Radloff; POMS: Profile of Mood States.

3. Results

Of the 502 participants, 270 were men. The distribution of age was less than 50 years: 33 %, 50 to 60 years: 44 %, greater than 60 years: 23 %. Participants had diabetes for an average of 6.1 years and mean HbA_{1C} was 8.20 %. Seventy-one percent of patients used oral hypoglycemics and 17 % used insulin. As detailed in Table 1, co-morbidities were present in 75 % of the sample (mean = 1.4).

3.1. Preliminary analyses on the Centre of Epidemiological Studies-Depression

We first performed a PCA on polychoric correlation coefficients of CES-D items appropriate for ordinal item-response format using MicroFact 2.0 (Waller, 2000) and a parallel analysis to determine the number of components to be retained (O'Connor, 2000, 2007). This suggested a two factor solution with the two first components accounting for 47 % and 8 % of the variance ($GFI = 0.985$, $RMSR = 0.062$). Loadings of the 20 CES-D items on the two retained rotated components (Promax

Table 2
Promax factor loadings of 20 CES-D items after principal component analysis on polychoric correlation coefficients.

Item	Wording	Loadings	
		Factor 1 16 items	Factor 2 4 items
18	Feeling sad (Sad)	0.823	−0.200
10	Feeling fearful (Fearful)	0.798	−0.234
6	Feeling depressed (Depressed)	0.784	−0.287
14	Feeling lonely (Lonely)	0.759	−0.151
3	Feeling that I could not shake off the blues even with help from my family and friends (Blues)	0.751	−0.321
17	Having crying spells (Crying)	0.718	−0.232
1	Bothered by things that usually don't bother me (Bothered)	0.695	−0.231
7	Feeling that everything I did was an effort (Effort)	0.686	−0.100
13	Talking less than usual (Talk less)	0.677	−0.199
20	Feeling that I could not "get going" (Get going)	0.672	−0.075
5	Having trouble keeping my mind on what I was doing (Concentrate)	0.672	−0.200
11	Having restless sleep (Restless sleep)	0.658	−.013
19	Feeling that people dislike me (Disliked)	0.646	−0.249
15	Feeling that people are unfriendly (Unfriendly)	0.627	−0.138
9	Thinking that my life has been a failure (Failure)	0.573	−0.429
2	Not feeling like eating; my appetite is poor (Not eating)	0.547	−0.201
4	Feeling that I was just as good as other people (As good as)	−0.065	0.752
8	Feeling hopeful about the future (Hopeful)	−0.157	0.748
16	Enjoying life (Enjoy life)	−0.408	0.702
12	Feeling happy (Happy)	−0.393	0.667
	Cronbach's alpha	0.902	0.673
	Mean inter-item r	0.371	0.349
	Scale heterogeneity (F values)	40.73**	4.17*

GFI = 0. 985 and RMSR = 0.062 for this solution. For the global 20-item scale, alpha was 0.896, mean inter-item correlation was 0.319 and heterogeneity was $F = 79.63$. $p < 0.001$. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$. Correlation of factor 1 with 2 was −0.463.

rotation) are available in Table 2. The first factor was composed of the sixteen negative symptomatic items and the second factor was composed of the four positive affect items. Both factors were moderately correlated ($r = -0.46$). This structure has already been reported in the literature (e.g. Stansbury et al., 2006). It was further supported by the homogeneity analysis (Streiner, 2003) as indicated in Table 2. We also checked for unidimensionality of the 12 emotional adjectives from the POMS using the same procedure. This analysis yielded one factor accounting for 65 % of the variance ($GFI = 0.995$, $RMSR = 0.085$) and the internal consistency alpha of the scale was 0.93.[1]

3.2. Relationship of Centre of Epidemiological Studies-Depression, components to diabetes severity

We performed a hierarchical regression analysis and examined the association of each CES-D subscales with disease severity and HbA_{1C} alternatively. Block 1 included age, diabetes duration, gender, ethnicity and treatment type; and Block 2 included the positive and negative CES-D subscale scores. When predicting severity, age, a longer duration, African American ethnicity, and insulin treatment were all associated with higher severity levels (Table 3, Block 1). Both CES-D subscale scores displayed a significant association with severity above and beyond the Block 1 controls (Block 1: $\Delta R^2 = 0.154$, $p < 0.001$;

[1] Full details on the two principal component and parallel analyses may be sent on request.

Table 3
Summary of hierarchical regression analyses of severity on personal and illness characteristics, measures of depression and trait negative affect ($N = 502$).

Predictors	Disease severity			
	B	*SEB*	*β*	ΔR^2
Model 1: Block 1				
Age	0.019	0.006	0.145**	
Diabetes duration	0.035	0.012	0.130**	0.154***
Gender: Male	−0.184	0.098	−0.080	
Ethnicity: Hispanic American	0.240	0.160	0.076	
Ethnicity: Asian American	−0.211	0.137	−0.085	
Ethnicity: African American	0.479	0.134	0.195***	
Treatment: pills	0.159	0.150	0.064	
Treatment: insulin	0.539	0.191	0.178**	
Model 1: Block 2				
CES-D 16-item (negative)	0.018	0.007	0.113*	
CES-D 4-item (positive)	−0.050	0.021	−0.100*	0.014*
Model 2: Block 2				
CES-D 16-item (negative)	0.002	0.009	0.013	
CES-D 4-item (positive)	−0.049	0.021	−0.110*	0.011*
Model 2: Block 3				
POMS Negative affect	0.026	0.010	0.167**	0.012**

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
Model 1 includes Block 1: personal and clinical data and Block 2: CES-D depression as predictors. Model 2 includes trait negative affect in Block 3. Coefficients for Model 2 Block 1 remain in the same interpretive range as in Model 1 Block 1 and thus are not reported here.

Block 2: $\Delta R^2 = 0.014$, $p < 0.01$). In particular, a higher negative and lower positive score independently predicted diabetes severity.

We next explored the relationship of trait negative affect to these findings. Adding the 12 adjectives from the POMS to the equation suppressed the relationship of negative CES-D subscale score with disease severity ($\beta = 0.113$, $p < 0.05$ as compared to $\beta = 0.013$, ns when trait negative affect was forced into the equation). It had no effect on the positive CES-D subscale score ($\beta = -0.100$, $p < 0.05$ as compared to $\beta = -0.110$, $p < 0.05$ when trait negative affect was forced into the equation). In this model, trait negative affect was related to the outcome ($\beta = 0.167$, $p < 0.01$) (Table 3).

In order to compare the quantity of information of the health outcome carried by the CES-D subscales and trait negative affect, we compared changes in semi-partial correlation (ΔR^2) in a set of hierarchical regression predicting illness severity. Since the order of predictors in such analyses may be determinant, each of these predictors was entered in turn in the model in first, second and third blocks (six permutations for three predictors). The min-max ranges and median of the six variance values accounted for by each psychological predictor were: [0.70 %–1.60 %], $Md = 1.35$ % for positive CES-D items, [0.10 %–1.00 %], $Md = 0.30$ % for negative CES-D items, [0.00 %–0.80 %], $Md = 0.15$ % for trait negative affect adjectives. Although absolute levels of explained variance are limited, these results suggest that positive items of the CES-D were more informative on disease status than negative items of the same instrument or the external measure of trait negative affect.

When predicting HbA_{1C}, only Block 1 brought significant information ($\Delta R^2 = 0.164$, $p < 0.001$ as compared to $\Delta R^2 = 0.002$, ns for Block 2 and $\Delta R^2 = 0.000$, ns for Block 3). In Block 1, higher levels of HbA_{1C} were associated with a longer duration of diabetes ($\beta = 0.146$, $p < 0.01$), Hispanic or African American ethnicities ($\beta = 0.144$, $p < 0.01$ and $\beta = 0.122$, $p < 0.05$, respectively), oral medication ($\beta = 0.199$, $p < 0.01$) or insulin treatment ($\beta = 0.220$, $p < 0.001$). Lower levels of HbA_{1C} were associated with age ($\beta = -0.135$, $p < 0.01$) and Chinese ethnicity ($\beta = -0.126$, $p < 0.05$). No significant correlation was detected in Block 2 involving CES-D components or original scale. When adding negative affect to the equation, this factor did not show any independent relation to long-term glycaemia ($\beta = -0.020$, $p = 0.756$). and did not modify associations with other variables.

3.3. Specific affect tone in the Centre of Epidemiological Studies-Depression

In order to more closely identify the information carried by the CES-D, we next explored the relationship of the 12 items of the POMS to the CES-D components. The negative CES-D subscale and the positive affect subscale correlated with trait negative affect respectively 0.68 and −0.44. However, these correlations may be due to responses to individual emotional items of the trait negative affect scale. We computed partial correlations of each individual emotional adjective with CES-D subscales holding constant the level of trait negative affect. To do so, we used a procedure first described by Stricker (1982).[2] A significant partial correlation was detected for item 3 'Depressed' (partial $r = .13$, $p < 0.01$), item 6 'Angry' (partial $r = -0.09$, $p < 0.05$), item 7 'Sad' (partial $r = 0.14$, $p < 0.01$) and item 11 'Unhappy' (partial $r = 0.12$, $p < 0.01$) when the 16-item negative subscale of the CES-D was considered. No response bias was observed with the 4-item positive subscale, all items correlating homogeneously. So, specific patterns of negative affects were found in people scoring high on the negative experience CES-D subscale. For a same level of trait-level negative affect, these people with high CES-D scores tended to report to be more 'Depressed', 'Sad', and 'Unhappy' and less 'Angry' most of the time. These patients did not report differentially on other affects such as 'Nervous', 'Hostile', 'Tense' or 'Resentful'. So, the negative items of the CES-D bore specific emotional information beyond mere general trait negative affect since specificities in some negative affects could be observed in high CES-D scorers.

4. Discussion

In this study we explored how CES-D components relate to disease severity, the impact of trait negative affect on these relationships and the link of negative CES-D items with trait negative affect. We found that the CES-D is composed of two relatively independent subscales: positive (four items) and negative (16 items) (Stansbury et al., 2006; Schroevers et al., 2000). The pattern of correlations observed suggests that both positive and negative affect are each independently associated with disease severity. This is in line with the bi-dimensional structure of affect that has traditionally been reported (Watson and Tellegen, 1985; Diener et al., 1995; Diener and Emmons, 1984). The differential correlation pattern of positive and negative items to disease severity is also in line with recent findings showing that positive items of the CES-D uniquely predict lower risk of mortality in people with diabetes (Moskowitz et al., 2008). These authors have shown that in individuals over 65 positive affect are significantly associated with lower risks of mortality independent of negative affect or other significant predictors of mortality. Here, the positive items of the CES-D helped predict severity above and beyond age, gender, ethnicity, diabetes duration and treatment. Moreover, when comparing systemat-

[2] This partial correlation index is the item's partial correlation with the CES-D score, total score being held constant. Items with significant correlations are interpreted as performing differentially. This procedure is a good alternative in classical test theory to other procedures inspired by item-response theory (Cole et al., 2000, p. 286). The equation for computing this partial correlation coefficient is:

$$r_{iS \cdot T\infty} = \frac{r_{iS} - r_{iT\infty} r_{T\infty S}}{\left(\sqrt{1 - r_{iT\infty}^2}\right)\left(\sqrt{1 - r_{T\infty S}^2}\right)}$$

where: r_{iS} is the correlation between the item responses and subgroup standing; $r_{iT\infty}$ is the correlation between the item response and the total score, adjusted for item overlap and corrected for attenuation in the score; $r_{T\infty S}$ is the correlation between the total scores and subgroup standing, corrected for attenuation in the former.

ically the share of variance of disease severity explained by predictors, positive experience items from the CES-D were more informative than other predictors. However, the pathways through which positive affect may impact health are still poorly understood. Some recent findings indicate that positive affect is associated with reduced neuroendocrine, inflammatory and cardiovascular activity, independent of age, gender, socioeconomic position, body mass, smoking and psychological distress (Steptoe et al., 2005). Positive well-being may therefore be directly related to health-relevant biological processes in addition to other indirect pathways (e.g. buffer effects). Given the cross-sectional design though, our results could also be interpreted as reflecting the effect of disease severity on affects. They would suggest that a more severe illness generates a lack of positive affect and emotional gratification to a greater extent than it would do with negative affect or distress.

When controlling for trait negative affect, the 16 CES-D negative items were no longer independently related with disease status. This shows that the relationship of CES-D symptoms with disease status is to some part due to trait negative affect. This is an important result because the CES-D was not developed as a measure of negative affect and includes various symptoms such as psychomotor retardation, low self-esteem or loss of appetite and not just negative affect. The instructions also concern a shorter period of time ('during the last week' as compared to 'generally of most of the time'). The results show that these specific aspects of the CES-D did not bring significant information in their relation to disease severity. In contrast, these results support that disease severity is best predicted by positive affect from the CES-D and trait negative affect from the POMS, but not by depressive symptoms from the CES-D. This could indicate that affects and emotional functioning are more central to predict health outcomes than other depressive symptoms from the CES-D. In fact, negative affects are more clearly reflected in the 12 adjectives trait negative affect measure than the CES-D negative symptoms. From a methodological viewpoint, this would advocate for relying more on psychological measures of affect instead of list of psychiatric symptoms to assess negative affect or distress. It further implies that it would be more fruitful to use positive and negative items of the CES-D separately than the original total score since both sets of items are partly independent and relate differently to external criteria. In addition, associations with positive items are independent of negative affect.

The results also may qualify previous interpretation of the link between aggregated symptoms lists used as quantities and health outcomes in chronic illness. Such relation has often been interpreted as depression being a vulnerability or risk factor to illness severity or degradation. Our results suggest that some part of the depression pattern may be central, namely the affective dimension, or, alternatively, that some stable emotional characteristic may be central in relation to severity (Fisher et al., 2007). They advocate for a more specific and detailed approach when considering depression as a risk factor for deterioration in diabetes. In fact, recent research has shown that patterns of depression in type 2 diabetes were marked by cognitive and anxiety symptoms (Sultan et al., 2009).

The item-response analysis indicated that the information carried by the 16 negative items of the CES-D included precise emotional contents. For a same level of trait negative affect, high respondents on the CES-D report more sadness, unhappiness and depression, than they do anger. No differences are found on hostility, fatigue or nervousness. This shows that the CES-D tends to identify more psychological distress than anxiety or anger. What is striking is that those who score high on the CES-D report feeling less angry, and not more nervous, hostile and tense than low scorers. Thus, our results suggest considering both the positive and negative items of the CES-D separately, and noting that high scores tend to report more psychological distress than they do anger or anxiety. They also underline the need to promote positive affect in people with diabetes since among our psychological predictors, the lack of positive affect is best predicting disease severity.

However, the present study may suffer from a number of limitations. First, the cross-sectional nature of the data prevented us to determine directions of correlations. Although we considered diabetes severity as the outcome, research underlines that the relation of depression with severity is bi-directional in diabetes (Ciechanowski et al., 2003; Egede et al., 2005). Another limitation deals with the measure of negative affect. Instructions used in the original design only enabled us to explore for the role of trait negative affect using adjectives from the POMS. Some other measures or instructions could be used in future research to control for state as well as trait negative affect within self-reported depression measures (e.g. PANAS, Watson et al., 1988; Pélissolo et al., 2007). Another limitation concerns our measure of severity. Although it is very probable that a larger number of complications or comorbidities characterize a more severe illness in diabetes, this measure does not account for severity within one single area. Further research should deal with these limitations by focusing on follow-up data and a variety of clinical measures.

As a conclusion, these results advocate for using subscales in the CES-D when exploring relations of this measure with health outcomes and underline that negative as well as positive affect tend to significantly relate to disease severity. Results also suggest that negative affect is best predictive when assessed by a tool focusing on negative affect instead of a depression inventory like the CES-D. These results, together with the growing body of the literature showing the importance of positive affect in disease evolution, should help qualify previous results of studies using the CES-D as an index of depression and prompt re-analyses of existing datasets. In order to clarify results observed in studies using the CES-D, more psychological research is needed in the future on studying the validity of this measure in relation to negative and positive affect, from a trait as well as a state perspective. This should be systematically performed when using the CES-D as a dimensional measure in people with chronic illness as our study shows that the number of negative depression symptoms and trait negative affect overlap one another.

Conflict of interest

The authors have not declared any conflict of interest.

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