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Subthreshold depression based on functional impairment better defined by symptom severity than by number of DSM-IV symptoms

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ABSTRACT

Background: Depression with fewer symptoms than required for a DSM-IV diagnosis of Major Depressive Disorder (MDD) has consistently been found to be associated with functional impairment. In this study, we aim to define clinically significant depression below the DSM-IV threshold for Major Depressive Disorder (MDD) by means of functional impairment.

Methods: Data used are from 2157 respondents of the Netherlands Study of Depression and Anxiety (NESDA). The Composite International Diagnostic Interview (CIDI) and the Inventory for Depressive Symptomatology-Self Report (IDS-SR30) were compared in their association with functional impairment as measured by the World Health Organization Disability Assessment Schedule II (WHODAS II). We used ANCOVA, adjusting for gender, age, education and somatic conditions, and ROC analyses.

Results: The IDS-SR30 \((p < .001, \eta^2 = .51)\) was more strongly associated with functional impairment than CIDI symptom count \((p < .001, \eta^2 = .035)\). Effect sizes supported four symptoms on the CIDI, and a score within the mild depression range on the IDS-SR30 as adequate cut-offs for defining subthreshold depression, respectively. ROC analyses showed that these cut-offs identified the top 10% and 8% to 60% most dysfunctional respondents, respectively.

Limitations: Suggested cut-offs seem reasonable on the basis of converging findings, but in lack of a golden standard they remain somewhat arbitrary. Furthermore, the design of the study is cross-sectional in nature, no causal inferences between depression and functional impairment can be made.

Conclusions: Although both instruments are associated with functional impairment, the IDS-SR30 seems better suited than the CIDI to define subthreshold depression, with a cut-off in the mild IDS-SR30 range.

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Keywords: Subthreshold depression Affective disorders Functional impairment Disability Clinical significance Classification

1. Introduction

The categorical perspective of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) suggests a qualitative distinction not only between disorders, but also between disorder and normality. As the authors of the DSM-IV point out, in reality this distinction between disorder and normality is not so clear-cut (APA, 1994). Categorical thresholds may not adequately capture clinically significant states (Rivas-Vazquez et al., 2004). To illustrate, major depressive disorder (MDD) is among the most impairing disorders in the world (Lépine, 2001), but impairment is not limited to full blown MDD alone. The presence of less than the five symptoms required for MDD has consistently been found to be associated with significant levels of impairment as well, indicating its clinical relevance (Wells et al., 1989; Sadik and Bona, 2000; Cuijpers et al., 2004; Ormel et al., 2008).

The concept of clinical relevance is of particular importance when dealing with subthreshold depression rather than
full blowned MDD. The developers of the DSM-IV added the “clinical significance criterion”, to differentiate mental disorders from normal problems of living. It asserts that, symptoms must cause distress or impairment in social, occupational, or other important areas of functioning (Spitzer and Wakefield, 1999). Several authors have argued that overall, the clinical significance criterion does not have added value when it comes to full-blown MDD, as the symptoms are in themselves distressing or impairing (Spitzer and Wakefield, 1999; Beals et al., 2004; Zimmerman et al., 2004). However, when it comes to subthreshold depression, clinical significance is not an inherent part of the symptom cluster because of the low number of symptoms needed for the disorder (Baumeister and Morar, 2008). Here, clinical significance, i.e., distress or impairment, can help as intended in DSM-IV (p.7), to “establish the threshold for the diagnosis of a disorder in those situations in which the symptomatic presentation by itself (particularly in its milder forms) is not inherently pathological.”

If subthreshold depression is to be based on a threshold of specific symptoms, these symptoms should still be clinically relevant on subthreshold depression level. Symptoms of depression can be assessed using several types of instruments. First, instruments strictly based on criteria sets as stated in diagnostic manuals can be used, such as the Composite International Diagnostic Interview (CIDI; WHO, 1997). Second, symptoms of depression can be assessed using instruments designed to measure the severity of depression, such as the Inventory for Depressive Symptomatology-Self Report (IDS-SR30; Rush et al., 1986; Altschuler et al., 2006). In this study, we will examine these two instruments, the CIDI and the IDS-SR30, in their ability to pick up on clinically significant depression below the threshold of MDD. In lack of a clear operationalization, clinical significance can been included in various ways in the definition of subthreshold depression (Rapaport et al., 2002; Backenstrass et al., 2006; Forsell, 2007). While we realize that the prevalence of subthreshold depression depends greatly on the operationalization of the “clinical significance criterion” (Baumeister and Morar, 2008), both the subjective nature of distress and the overlap between distress and functional impairment (Thurston-Hicks et al., 1998; Beals et al., 2004) led us to focus on clinical significance in terms of functional impairment in daily life. Thus, in the present paper we operationally equate functional impairment with disability as described in the WHO’s International Classification of Functioning, Disability and Health (ICF; WHO, 2001), as we feel it closely resembles the wording in DSM-IV used for functional impairment.

The purposes of this study are:

1. To establish the ability of the CIDI depression section to detect functional impairment in respondents falling below the MDD symptom threshold.
2. To establish the ability of the IDS-SR30 to detect functional impairment in respondents falling below the MDD symptom threshold.
3. To determine if and why subthreshold depression based on functional impairment is better defined by the IDS-SR30 or by the CIDI.
4. To propose an adequate symptom threshold for subthreshold depression.

2. Methods

2.1. Participants and procedure

Data were derived from the baseline assessment of the longitudinal Netherlands Study of Depression and Anxiety (NESDA; Penninx et al., 2008). The NESDA study focuses on depression and anxiety disorders, their key (mental) health outcomes and demographic, psychosocial, somatic, biological and genetic determinants. Information was gathered during a 4-hour baseline assessment including self-report questionnaires, interviews, a medical examination, implicit cognitive (computer) tasks and blood and saliva collection.

For NESDA, a total of 2981 respondents were recruited from community (n = 564), primary care (n = 1610) and mental health care organizations (n = 807). A general inclusion criterion was an age of 18 through 65 years. To maintain optimal representativeness, only a few exclusion criteria were applied: 1) a primary diagnosis of other psychiatric disorders (psychosis, bipolar disorder or severe addiction disorder) and 2) nonfluency in the Dutch language. More detailed information on design and study sample are described elsewhere (Penninx et al., 2008).

In the present study, 68 of the 2981 respondents were excluded from analyses, for their symptoms were better explained by substance use, a general medical condition or bereavement. In accordance with DSM-IV, a diagnosis of depression was not applicable to these respondents. Another 274 respondents were excluded from analyses because a DSM-IV diagnosis of dysthymia overrules a possible diagnosis of subthreshold depression. Finally, 74 respondents were excluded because of incomplete information on depression symptoms or functioning (IDS-SR30 and WHODAS II data, see below). These 74 respondents did not differ from those included in terms of age or gender, but relatively more respondents with MDD were excluded (χ² (1) = 23.94, p < .001). Respondents with remitted MDD were not excluded. The remaining sample size in this study was N = 2565.

2.2. Measures

2.2.1. Demographic factors

Age, gender and socio-economic status have been found to be associated with depression and impairment (Ansseau et al., 2008). Age, gender and years of educations, measured in a demographics interview, were therefore covaried in current analyses.

2.2.2. Mental health state and mental disorders

Presence of current diagnoses and the number of DSM-IV symptoms were assessed using depression and anxiety sections of the Composite International Diagnostic Interview (CIDI, lifetime version 2.1; WHO, 1997). Diagnoses included MDD and anxiety disorders (generalized anxiety disorder, panic disorder, agoraphobia, social phobia) and were defined as current if symptoms were present within the last month. In NESDA, the CIDI section for MDD was expanded to include items enquiring symptoms experienced within the last month. Based on these items, the number of MDD symptoms within the last month ranged from 0 to 9 as stated by DSM-IV.
The nine symptoms of MDD do not directly include functional impairment.

Symptoms of depression and their severity were also assessed using the Inventory of Depressive Symptomatology-Self Report (IDS-SR30, Rush et al., 1986). The IDS-SR30 was designed to measure all nine criterion symptoms for MDD as stated in DSM-IV, as well as commonly associated symptoms of MDD and melancholic and atypical symptoms features according to DSM-IV. Details of the IDS-SR30, its items and its use are listed on the internet (www.ids-qids.org). Like the nine symptoms of MDD as measured by the CIDI, the IDS-SR30 does not directly enquire functional impairment. Overall scores on the 30-item questionnaire range from 0 to 84 and can be categorized according to severity (Rush et al., 2008): 0–13 = Normal, 14–25 = mild depression, 26–38 = moderate depression, 39–48 = severe depression and 49–84 = very severe depression. In this study, we found high internal consistency for the IDS-SR30 (α = .92).

2.2.3. Somatic conditions

The presence (yes/no) of sixteen self-reported somatic conditions was summed: lung disease, heart conditions, diabetes, stroke, arthritis, cancer, hypertension, ulcers, intestinal disorders, liver disease, epilepsy, chronic fatigue syndrome, allergies, thyroid disease, head injuries and other injuries.

2.2.4. Functioning

Level of functional impairment was assessed using the overall score of the World Health Organization Disability Assessment Schedule II (WHO, 2000). The 36 questions of the WHODAS II cover various areas in a person’s everyday life: communication and understanding, getting around, self care, getting along with people, household activities, work activities and participation in society. Details of the WHODAS II and its items are listed on the internet (www.who.int/icidh/whodas/index.html/). Overall standardized scores ranged from 0–100. In this study we found high internal consistency for the WHODAS II (α = .95).

2.3. Statistical analysis

2.3.1. CIDI symptoms and functional impairment

We started by reporting demographic and clinical characteristics of the total sample (N = 2565) and illustrated the association between number of CIDI symptoms and functional impairment. Subsequently we focused on subthreshold depression and excluded respondents with current MDD from analyses. We first used analysis of covariance (ANCOVA) to test the contribution of MDD symptoms as measured by the CIDI to functional impairment as measured by the WHODAS II. Given the large sample size, in addition to the F-ratio and p-value, we report effect sizes as a standardized indication of the size of found contributions ($\eta^2$; Cohen, 1988). Planned contrasts were used to subsequently determine which levels of subthreshold symptom criteria were associated with elevated functional impairment. In addition to the F-ratio and p-value, we report effect sizes, i.e., Cohen’s d for independent groups and unequal sample sizes using covariate-adjusted means, as a standardized indication of the size of found contrasts (Cohen’s d; Cohen, 1988). We consider a large effect size a meaningful difference and used this as a basis for selecting a cut-off to define subthreshold depression. To rule out possible confounding effects of alternative diagnoses on functional impairment, ANCOVA analyses were repeated excluding respondents with a current diagnosis of anxiety disorders (i.e., generalized anxiety disorder, panic disorder, agoraphobia or social phobia).

Second, we used Receiver Operating Characteristic (ROC) analyses to calculate which level of functional impairment corresponded with the found CIDI cut-off score (Hanley and McNeil, 1983). We identified the range of WHODAS II scores which generated the highest sum of sensitivity and specificity. This criterion minimizes the number of false positives and false negatives, thus minimizing chances that respondents within the given WHODAS II range would falsely be placed above or below the identified cut-off point (Streiner and Cairney, 2007).

2.3.2. IDS-SR30 and functional impairment

Aforementioned statistical analyses were also done to determine associations between IDS-SR30 and functional impairment. Thus, following graphical illustration on how IDS-SR30 and functional impairment go together we removed respondents with current MDD from further analyses. Next, we used ANCOVA with planned contrasts and report F-ratio, p-value and effect sizes to determine which levels of symptom severity were associated with elevated functional impairment, both with and without including respondents with a current anxiety disorder. The category on the IDS-SR30 that corresponded to a difference from normality of large effect size was considered as optimal to define subthreshold depression. We subsequently used ROC analyses to calculate which level of functional impairment corresponded with this IDS-SR30 cut-off score.

3. Results

3.1. Sample statistics

Demographic and clinical characteristics are provided in Table 1.

3.2. CIDI symptoms and functional impairment

A gradual increase in functional impairment parallel to an increase in the number of depression symptoms as measured by CIDI was found (Fig. 1). In order to focus specifically on those respondents with depressive symptoms below the MDD diagnosis threshold, we continued analyses hereafter by excluding all respondents with five depressive symptoms or more on the CIDI (remaining sample size n = 2157). ANCOVA analysis showed a main effect of number of CIDI depressive symptoms on functional impairment, with small effect size (Table 2). Furthermore, planned contrasts indicated that respondents with two symptoms suffered statistically significant impairment compared to respondents without key symptoms of depression, but with small effect size. A difference large in effect size was found in respondents with four symptoms. Excluding respondents with anxiety disorder within the last month did not alter results in terms of effect sizes (Table 2).
We proceeded by exploring the level of impairment that corresponded to the cut-off of four symptoms. ROC analyses showed that, based on the criterion of the highest sum of sensitivity and specificity, a cut-off score of 4 corresponds to identifying the upper 10% most dysfunctional respondents. Sensitivity and specificity values were .10, and .98, respectively (Fig. 2). Thus, the sensitivity and specificity values show that a cut-off point of 4 yields a high false negative rate in our group, as almost all respondents are classified as normal rather than subthreshold. This leaves this cut-off point of limited value for defining subthreshold depression at best. On further exploration as to whether our criterion of a large effect size difference from normality had been too strict, we considered a cut-off of 2 or 3 on the CIDI. These cut-offs corresponded to identification of the top 11% to the top 15% respondents, and the top 15% to the top 18% respondents, respectively. However, sensitivity values were still very low, i.e., .13 for both cut-off points.

3.3. IDS-SR30 and functional impairment

An increase in IDS-SR30 score was accompanied by a linear increase in functional impairment (Fig. 3). As in the CIDI analyses, in further analyses we excluded respondents with five depressive symptoms or more on the CIDI (remaining sample size \(n = 2157\)) in order to focus on those respondents with depressive symptoms below the MDD diagnosis threshold. ANCOVA analysis revealed a main effect of IDS-SR30 on functional impairment, with large effect size (Table 2). Planned contrasts showed that respondents indicating mild depression (IDS-SR30 score 14–25) suffered significantly more functional impairment than respondents considered normal (IDS-SR30 score 0–13), with large effect size. Excluding respondents with an anxiety disorder within the last month did not alter the results in terms of effect sizes (Table 2).

Based on the criterion of highest sum of sensitivity and specificity, ROC analyses revealed that the IDS-SR30 mild depression category (range 14–25) identifies the top 8% up to the top 60% most dysfunctional respondents. Sensitivity values were .79, specificity values were .84 (Fig. 4). Thus the mild depression range on the IDS corresponds with identifying between 8% and 60% of the most dysfunctional individuals, which seems a reasonable range of impairment to define subthreshold depression in a sample where a large effect size difference from normality had been too strict, we considered a cut-off of 2 or 3 on the CIDI. These cut-offs corresponded to identification of the top 11% to the top 15% respondents, and the top 15% to the top 18% respondents, respectively. However, sensitivity values were still very low, i.e., .13 for both cut-off points.

### Table 1

Demographic and clinical characteristics.

<table>
<thead>
<tr>
<th></th>
<th>Below MDD threshold within past month</th>
<th>Above MDD threshold within past month</th>
<th>Total N=2565</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety disorder n (%)</td>
<td>614 (28.5)</td>
<td>235 (57.6)</td>
<td>849 (33.1)</td>
</tr>
<tr>
<td>Male n (%)</td>
<td>709 (32.9)</td>
<td>135 (33.1)</td>
<td>844 (32.9)</td>
</tr>
<tr>
<td>Age mean (SD)</td>
<td>41.8 (13.4)</td>
<td>41.3 (12.2)</td>
<td>41.7 (13.2)</td>
</tr>
<tr>
<td>Years of education mean (SD)</td>
<td>12.5 (3.2)</td>
<td>11.4 (3.1)</td>
<td>12.3 (3.3)</td>
</tr>
<tr>
<td>Number of somatic conditions mean (SD)</td>
<td>1.7 (1.4)</td>
<td>2.0 (1.5)</td>
<td>1.7 (1.4)</td>
</tr>
<tr>
<td>Number of CIDI symptoms mean (SD)</td>
<td>0.2 (0.8)</td>
<td>6.8 (1.3)</td>
<td>1.3 (2.6)</td>
</tr>
<tr>
<td>No key symptoms n (%)</td>
<td>2013 (93.3)</td>
<td>2013 (93.3)</td>
<td>2013 (78.5)</td>
</tr>
<tr>
<td>1 key symptom n (%)</td>
<td>10 (0.5)</td>
<td>10 (0.5)</td>
<td>10 (0.4)</td>
</tr>
<tr>
<td>2 symptoms n (%)</td>
<td>33 (1.5)</td>
<td>33 (1.3)</td>
<td>33 (1.3)</td>
</tr>
<tr>
<td>3 symptoms n (%)</td>
<td>39 (1.8)</td>
<td>39 (1.5)</td>
<td>39 (1.5)</td>
</tr>
<tr>
<td>4 symptoms n (%)</td>
<td>62 (2.9)</td>
<td>62 (2.4)</td>
<td>62 (2.4)</td>
</tr>
<tr>
<td>5 symptoms n (%)</td>
<td>86 (21.1)</td>
<td>86 (21.1)</td>
<td>86 (21.1)</td>
</tr>
<tr>
<td>6 symptoms n (%)</td>
<td>86 (21.1)</td>
<td>86 (21.1)</td>
<td>86 (21.1)</td>
</tr>
<tr>
<td>7 symptoms n (%)</td>
<td>98 (24.0)</td>
<td>98 (24.0)</td>
<td>98 (24.0)</td>
</tr>
<tr>
<td>8 symptoms n (%)</td>
<td>87 (21.3)</td>
<td>87 (21.3)</td>
<td>87 (21.3)</td>
</tr>
<tr>
<td>9 symptoms n (%)</td>
<td>51 (12.5)</td>
<td>51 (12.5)</td>
<td>51 (12.5)</td>
</tr>
<tr>
<td>IDS-SR30 mean (SD)</td>
<td>16.5 (11.1)</td>
<td>36.4 (10.5)</td>
<td>19.7 (13.2)</td>
</tr>
<tr>
<td>Normal n (%)</td>
<td>989 (45.9)</td>
<td>4 (1.0)</td>
<td>993 (38.7)</td>
</tr>
<tr>
<td>Mild n (%)</td>
<td>706 (32.7)</td>
<td>53 (13.0)</td>
<td>759 (29.6)</td>
</tr>
<tr>
<td>Moderate n (%)</td>
<td>380 (17.6)</td>
<td>185 (45.3)</td>
<td>565 (22.0)</td>
</tr>
<tr>
<td>Severe n (%)</td>
<td>74 (3.4)</td>
<td>112 (27.5)</td>
<td>186 (7.3)</td>
</tr>
<tr>
<td>Very severe n (%)</td>
<td>8 (0.4)</td>
<td>54 (13.2)</td>
<td>62 (2.4)</td>
</tr>
<tr>
<td>WHODAS II mean (SD)</td>
<td>19.2 (15.4)</td>
<td>42.7 (15.2)</td>
<td>229 (17.6)</td>
</tr>
</tbody>
</table>

* Values based on IDS-SR30 total score.
* Value represents Mild depression.
* Value represents Moderate depression.
part of respondents were selected for depression or anxiety, or their risk thereof.

3.4. Post-hoc analyses

We considered two possible explanations for found differences between CIDI and IDS-SR30 in association with functional impairment, on which we based two post-hoc analyses. First, inspection of group sizes showed remarkable differences between the instruments in sample distribution (Table 2). Using the IDS-SR30, a large number of participants indicated mild depression or higher, while the CIDI rendered a large number of participants without symptoms of depression, with relatively few respondents having one or more symptoms. The difference in distribution can be explained by a difference in requirement between the instruments. Designed to classify MDD as defined by DSM-IV the MDD section of the CIDI does not enquire subsequent symptoms if neither depressed mood nor anhedonia, the core symptoms of MDD, are reported. If neither core symptom is present, respondents are categorized as having zero symptoms of depression. The IDS-SR30 does not demand specific symptoms to be present; all items are included for a total score. This difference between the two instruments

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**Table 2**
Overall effect and contrast in functional impairment (WHODAS II) by CIDI depressive symptoms and by IDS-SR30 categories.

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>WHODAS II</th>
<th>F</th>
<th>df</th>
<th>p overall</th>
<th>p</th>
<th>Effect size</th>
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<td><strong>All respondents</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Number of CIDI symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No key symptoms</td>
<td>203</td>
<td>18.5</td>
<td>15.2</td>
<td></td>
<td>&lt;.001***</td>
<td>.035</td>
<td></td>
</tr>
<tr>
<td>1 key symptom</td>
<td>10</td>
<td>18.8</td>
<td>15.3</td>
<td></td>
<td>.77</td>
<td>.09</td>
<td></td>
</tr>
<tr>
<td>2 symptoms</td>
<td>33</td>
<td>24.8</td>
<td>13.6</td>
<td></td>
<td>.004***</td>
<td>.48</td>
<td></td>
</tr>
<tr>
<td>3 symptoms</td>
<td>39</td>
<td>26.2</td>
<td>11.2</td>
<td></td>
<td>.004***</td>
<td>.45</td>
<td></td>
</tr>
<tr>
<td>4 symptoms</td>
<td>62</td>
<td>34.5</td>
<td>14.2</td>
<td></td>
<td>&lt;.001***</td>
<td>.98</td>
<td></td>
</tr>
<tr>
<td>IDS-SR30 categories</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Normal (score 0–13)</td>
<td>989</td>
<td>8.9</td>
<td>9.0</td>
<td></td>
<td>Ref.</td>
<td></td>
<td></td>
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<tr>
<td>Mild (score 14–25)</td>
<td>706</td>
<td>21.7</td>
<td>11.2</td>
<td></td>
<td>&lt;.001***</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td>Moderate (score 26–38)</td>
<td>380</td>
<td>35.4</td>
<td>12.0</td>
<td></td>
<td>&lt;.001***</td>
<td>2.44</td>
<td></td>
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<tr>
<td>Severe (score 39–48)</td>
<td>74</td>
<td>46.2</td>
<td>12.9</td>
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<td>&lt;.001***</td>
<td>3.63</td>
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<tr>
<td>Very severe (score 49–84)</td>
<td>8</td>
<td>52.5</td>
<td>16.8</td>
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<td>&lt;.001***</td>
<td>4.40</td>
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<tr>
<td><strong>Respondents without current anxiety disorder</strong></td>
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<tr>
<td>Number of CIDI symptoms</td>
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<tr>
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<td>15.0</td>
<td>13.7</td>
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<td>.83</td>
<td>.05</td>
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<tr>
<td>2 symptoms</td>
<td>23</td>
<td>23.1</td>
<td>12.3</td>
<td></td>
<td>.001**</td>
<td>.67</td>
<td></td>
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<tr>
<td>3 symptoms</td>
<td>24</td>
<td>26.3</td>
<td>10.7</td>
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<td>&lt;.001***</td>
<td>.75</td>
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<tr>
<td>4 symptoms</td>
<td>30</td>
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<td></td>
<td>&lt;.001***</td>
<td>1.19</td>
<td></td>
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<td>IDS-SR30 categories</td>
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<tr>
<td>Normal (score 0–13)</td>
<td>905</td>
<td>8.6</td>
<td>8.9</td>
<td></td>
<td>Ref.</td>
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<tr>
<td>Mild (score 14–25)</td>
<td>445</td>
<td>20.8</td>
<td>10.8</td>
<td></td>
<td>&lt;.001***</td>
<td>1.08</td>
<td></td>
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<tr>
<td>Moderate (score 26–38)</td>
<td>165</td>
<td>35.0</td>
<td>11.8</td>
<td></td>
<td>&lt;.001***</td>
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<tr>
<td>Severe (score 39–48)</td>
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<td>46.9</td>
<td>15.5</td>
<td></td>
<td>&lt;.001***</td>
<td>3.81</td>
<td></td>
</tr>
<tr>
<td>Very severe (score 49–84)</td>
<td>1</td>
<td>54.4</td>
<td>–</td>
<td></td>
<td>&lt;.001***</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

**Note.** Analyses based on respondents without MDD. Analyses adjusted for gender, age, years of education and number of somatic conditions. Ref, reference group. *p < .05, **p < .01, ***p < .001.  

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Fig. 2. ROC analyses: minimum and maximum percentage of impaired subjects corresponding to a CIDI cut-off score of 4 symptoms.

Fig. 3. Total WHODAS II score as a function of symptom severity as measured by the IDS (N = 2565).
Consequently, it is unlikely that timeframe differences have caused a stronger association between the IDS-SR30 and the WHODAS II, relative to that between CIDI and the WHODAS II.

4. Discussion

Results of this large cohort study indicate that the CIDI and the IDS-SR30 differed greatly in their ability to pick up on functional impairment in subthreshold depression. While both were associated with functional impairment, the IDS-SR30 exceeded the DSM-IV based CIDI by far in detecting the impact of depressive symptoms on functioning in daily life. For both instruments we found a linear increase in functional impairment parallel to an increase in depressive symptoms. Based on this gradual increase in functional impairment we found no indication of natural cut-off points to define normality, subthreshold depression or MDD. This finding supports the idea that depression can best be conceptualized within a continuum from normality to full blown depression (Angst and Merikangas, 1997; Hankin et al., 2005). Although it follows that cut-off points between normality and subthreshold depression are arbitrary, we showed that functional impairment becomes apparent early on the continuum. In terms of statistical significance and large effect size, respondents reporting either depressed mood or anhedonia on the CIDI plus three other symptom experienced more impairment in daily life than respondents without the key symptoms of depression. However, the IDS-SR30 may be more suitable than the CIDI to measure clinically relevant subthreshold depression. Respondents reporting mild depression on the IDS-SR30 experienced more functional impairment than respondents scoring within the normal range, and with a large effect size. Use of the IDS-SR30 as opposed to the CIDI to define subthreshold depression and the cut-off score within IDS-SR30 mild depression range were underlined by ROC analyses. Given that most of our respondents were selected for symptoms of depression or anxiety, or their risk thereof, a cut-off point that identifies a substantial number of, but not all, respondents, as being subthreshold depressed seems reasonable.

We considered several explanations for the difference in association with functional impairment between CIDI and IDS-SR30. First, we considered possible differential effects of anxiety disorders on the CIDI or the IDS-SR30. Excluding respondents with these disorders, however, did not change effect sizes of overall main effect or threshold, making it an unlikely explanation for found differences.

Second, we considered a difference in requirements of the two instruments, that is, the CIDI requires either depressed mood or anhedonia for a diagnosis of (subthreshold) depression, while the IDS-SR30 does not. When applying the core symptom requirement in the IDS-SR30, the predictive value of the IDS-SR30 was reduced, lowering Cohen’s d from .53 to .31, still a large effect size, still exceeding the CIDI by far. However, the specific wording of symptoms may be equally important. For example, the CIDI requires the core symptoms to be present during two weeks, most of the day, nearly every day, while the IDS-SR30 does not. It may be that the stricter CIDI wording rules out many respondents who do not pass the two core symptom questions, but who have some depressive symptoms on the less strictly worded items on the IDS-SR30 scale. Consequently, the CIDI may identify fewer impairing symptoms and lose more symptom variance at subthreshold level, compared to the IDS-SR30.
Third, the IDS-SR30 and WHODAS II were not necessarily completed on the same day as the CIDI, which could offer another explanation for the stronger association between the IDS-SR30 and functional impairment compared to the CIDI. Changes in state or symptoms over time could influence the association between instruments. However, time elapsed between the two assessment points was short (mean of 5.8 days), and we found no influence on time elapsed between assessment points on the association between the CIDI and functional impairment, which negates time of completion as a likely explanation.

Fourth, we considered differences between the instruments in the number of items. The CIDI encompasses 9 symptom criteria as described in DSM-IV, while the IDS-SR30 consists of 30 items. The larger range of scores that follows the larger item pool represents a more dimensional and possibly more precise measurement of depression, which could explain a more accurate prediction of functional impairment. However, we corrected for this difference a priori by dividing the IDS-SR30 scores in five categories, ranging from normal to very severe depression. As with the CIDI, all respondents below the MDD threshold were thus represented in five categories. The IDS-SR30 still proved a better predictor of functional impairment than the DSM based CIDI, despite the loss of information as a result of grouping.

Although the difference in score variance between the CIDI and IDS-SR30 was accounted for, the scale on which each item is scored offers a fifth possible explanation for the difference in predictive value between the instruments. While the IDS-SR30 prompts respondents to rate the severity of each symptom on a four point scale, allowing all items to contribute to the total score in corresponding weight, the CIDI states a symptom criterion to be either absent or present. The more subtle presence of depressive symptoms thus picked up by the IDS-SR30 may be lost in the CIDI, which may in part explain their difference in explaining functional impairment.

Several strengths and limitations of this study should be taken into account in evaluating the results. Strengths include the relatively large sample, drawn from community, primary health care and mental health care organisations and the comparison of two diverse depression instruments in their ability to detect functional impairment. Although NESDA is longitudinal in design, the present study is based on the first wave of data and is cross-sectional in nature. Therefore, a limitation is that the data do not allow inferences about causality or the theoretical model underlying the association between (subthreshold) depressive symptoms and functional impairment. Similarly, the functional impairment on which our threshold for clinically relevant depression is based may be neither cause nor effect of depression, but due to other symptoms or circumstances altogether. Also, functional impairment may be the result of the environment interacting with depressive symptoms (Üstün and Kennedy, 2009). Nevertheless, the association between functional impairment and depression is strong even below clinical threshold, as found by multiple studies (Wells et al., 1989; Sadek and Bona, 2000; Cuipers et al., 2004; Ormel et al., 2008). A second limitation may be that, although a considerable group of healthy controls was randomly included, a large part of the sample was selected for (the risk of) anxiety or depression. This sampling method may thus have affected the prevalence of subthreshold depression in our sample, but this does not necessarily influence associations between CIDI or the IDS-SR30 and WHODAS II.

In short, this study demonstrated that both the CIDI and the IDS-SR30 detect clinically significant symptoms of depression below the threshold of MDD. However, the IDS-SR30 is clearly superior to the CIDI. Plausible explanations for this finding are differences in core symptom requirements and their duration, specific wording, the number of items and response format used. A threshold of mild depression on the IDS-SR30 is recommended as a reasonable threshold.

Although subthreshold depression was associated with functional impairment, this does not mean that subthreshold depression should be coined as a disorder, or that for every individual with subthreshold depression treatment is indicated. On an individual level, subthreshold depression as measured by the CIDI or rather the IDS-SR30 may point towards a need for further exploration of the individual’s well-being.

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Conflict of interests

Dr. Nolen has received speaking fees from Astra Zeneca, Eli Lilly, Pfizer, Servier, Wyeth; unrestricted research funding from Astra Zeneca, Eli Lilly, GlaxoSmithKline, Wyeth; and served on advisory boards for Astra Zeneca, Cyberonics, Eli Lilly, GlaxoSmithKline, Pfizer, Servier. None of the other authors have any financial disclosures.

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