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Diagnostic accuracy of the Dutch version of the Somatic Symptom Disorder – B Criteria Scale (SSD-12) compared to the Whiteley Index (WI) and PHQ-15 in a clinical population

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ABSTRACT

Objective: Somatic Symptom and Related Disorders(SSRD) are characterised by an intense focus on somatic symptoms that causes significant distress. A self-report scale developed to assess distress as symptom-related thoughts, feelings, and behaviors (SSD-12) has proved to be a reliable, valid and time-efficient measure for Somatic Symptom Disorder(SSD). This cross-sectional study aimed to compare the SSD-12 with psychiatric assessment as gold standard in a Dutch clinical population for SSRD compared to other widely used measures.
Methods: Data were collected from adult patients visiting a specialised mental health outpatient clinic for SSRD in the Netherlands, between 2015 and 2017. Analyses included item evaluation, scale reliability, construct validity, diagnostic utility and cut points. Performance of SSD-12, Whiteley Index(WI) and PHQ-15 were compared in Receiver operating characteristics (ROC) curves.
Results: 223 patients with SSD, Functional Neurological Disorder, Illness Anxiety(IA) and no SSRD participated. SSD-12 items were normally distributed; total scores correlated with measures of health anxiety, anxiety and depression. The optimal cut point for the SSD-12 was 22 (sensitivity 75.9%, specificity 63.6%). The ROC area under the curve for SSD-12 was 0.75 compared to 0.68 for the WI and 0.65 for the PHQ-15. Combinations of those questionnaires did not yield better results than for the SSD-12 alone.
Conclusion: The SSD-12 alone outperformed the WI and PHQ-15 and combined scales in effectively distinguishing SSRDs from other mental disorders. This may suggest that distress is a more accurate indicator of SSRD than earlier diagnostic criteria as operationalised in the WI and PHQ-15.

1. Introduction

Somatic Symptom and Related Disorders (SSRD) (DSM-5) [1] comprise Somatic Symptom Disorder (SSD) and other conditions characterised by an intense focus on somatic symptoms that causes significant distress, such as illness anxiety (IA) disorder and conversion disorder/functional neurological disorder (CD/FND). For SSD, diagnostic criteria that have to be fulfilled are (A) having one or more somatic symptoms which can be either medically explained or unexplained, (B) the presence of abnormal, maladaptive, excessive, and disproportionate thoughts, feelings, and/or behaviors related to the somatic symptoms that (C) must be persistent, typically for at least 6 months. For IA, criteria are (A) preoccupation with having or acquiring a serious illness, (B) somatic symptoms are either not present, or are only

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mild. If present, or family history indicates a medical condition is likely to develop, preoccupation with a medical condition is clearly excessive or disproportionate, is present for at least 6 months and cannot be better explained by another mental disorder, (C) a high level of anxiety about health, (D) excessive health-related behaviors or maladaptive avoidance. For CD/FND the criteria are one or more symptoms that affect body movement or the senses, and that are not compatible with a neurological or other medical condition. This requirement of the somatic symptoms being unexplained for CD/FND differs from the other SSRDs. CD/FND shares with the other SSRD that the symptoms cause significant distress or problems in social, work or other areas, and require medical evaluation.

The focus on distress related to somatic symptoms that can occur in the context of known medical conditions or of unexplained somatic symptoms requires a new approach to diagnostic procedures for SSRD [2,3]. Toussaint et al. developed a self-report questionnaire called the SSD–B Criteria Scale (SSD-12), to assess criterion B of the SSD diagnosis as the patients' perceptions of their symptom-related thoughts, feelings, and behaviors. They validated the German version of the SSD-12 in a sample of patients from a psychosomatic outpatient clinic [3], in a general population sample to provide norm values [4], and in primary care [5]. Validation supported a three factor model representing cognitive, affective and behavioral factors in addition to a general factor [5]. The SSD-12 proved to be a reliable, valid and time-efficient self-report measure for SSD. Hüsing et al. explored the use of the SSD-12 in a rehabilitation setting. They found sound psychometric properties and provided evidence that the SSD-12 is sensitive to detecting change in SSD over time [6].

Subsequently, the SSD-12 has been validated in a Chinese [7], Persian [8], and Dutch population [9], showing high consistency and a three factor structure. It should be noted that the Dutch version supported a scale structure with the original three subscales of the SSD-12, as well as a scale structure with only one general scale as potentially useful indices of SSD [9]. So far, the SSD-12 has only been validated for SSD. Given that the several disorders in the SSRD classification concern distress related to intense focus on somatic symptoms, it would make sense to not only further explore the use of the SSD-12 for SSD, but also for the other most common SSRD classifications, namely IA and CD/FND. Also, so far, a diagnostic validation study of the Dutch version of the SSD-12 in terms of its discriminant validity to distinguish between SSRD patients and patients with other disorders has not yet been performed. In the clinic, diagnostic assessment by means of psychiatric examination is considered a gold standard and there is a need to explore how the SSD-12 performs compared to psychiatric examination. This study aims to do so.

1.1. Objectives

1) Establish predictive criterion and diagnostic validity of the SSD-12 by comparison with the gold standard of a semi-structured psychiatric examination.
2) Establish cut-off points for the SSD-12 to discriminate between participants with and without SSRD.
3) Explore sensitivity and specificity of SSD-12 to ascertain whether sensitivity and specificity levels previously reported by Toussaint (70% and 67% respectively [10]) are replicated in this clinical population. Exploratory analyses of diagnostic utility of the SSD-12 will be considered independently and in combination with other tools commonly used with this clinical population to ascertain whether a combined approach provides diagnostic advantages.
4) Explore construct validity of the SSD-12.

2. Method

A convenience sample of consecutive adult patients visiting a specialised mental health outpatient clinic for SSRD, the Clinical Centre of Excellence for Body, Mind and Health (CLGG), in Tilburg, the Netherlands, between February 2015 and December 2017. Newly registered patients from CLGG took part in an intake procedure comprising Routine Outcome Monitoring (ROM) with questionnaires, psycho-diagnostic assessment, medical history and physical and neurological examination by physicians, and psychiatric examination by psychiatrists specialised in SSRD. The patients received information at intake that patient related outcome measures assessed for diagnosis and treatment could be used for research on an anonymous basis, unless they refused. Data of non-consenting patients were not included in the study. This protocol was evaluated and approved by the scientific committee of GGz Breburg (CWO2016–14).

The following questionnaires and checklists were administered.

Somatic Symptom Disorder–B Criteria Scale (SSD-12)

The SSD-12 is developed to quantify the B criterion for SSD [3] and consists of 12 items. Responders rate how frequently they experienced each cognition, emotion, or behavior on a 5-point Likert scale (0 = never to 4 = very often). The total score ranges from 0 to 48 (higher scores reflect higher levels of the B criterion).

Patient Health Questionnaire 15-item somatic scale (PHQ-15)

The PHQ-15 assesses the presence and severity of common somatic symptoms within the last 4 weeks using 15 items [11]. Internal reliability of the PHQ-15 is high [11]. Higher scores indicate higher self-rated symptom burden. A score of 10 or more represents the cut-off point for severe somatic symptoms. The PHQ-15 can be used as a screening tool for somatoform disorders, with a sensitivity of 80% and specificity of 59% in the primary care setting and with moderate validity, with reasonable sensitivity but limited efficiency, in the occupational health care setting [12].

Whiteley Index (WI)

The Whiteley Index (WI) assesses health anxiety with 14 questions to be answered with yes or no, with a total score ranging from 0 to 14 [13] It has high sensitivity and specificity for hypochondriacal beliefs [14].

Generalized Anxiety Disorder Scale (GAD-7)

The GAD-7 [15] was used to measure anxiety. This 7-item questionnaire has good reliability and good criterion, construct, factorial, and procedural validity. Items are scored between 0 and 3 with total scores ranging between 0 and 21. A cut-off score of 10 or more is used to indicate at least moderate anxiety.

Patient Health Questionnaire-9 (PHQ-9)

PHQ-9 [16] was used to assess depressive symptoms. Internal reliability of the PHQ-9 is excellent [16]. Items are scored between 0 and 3 with total scores ranging between 0 and 27. A cut-off score of 10 or more is used to indicate at least moderate depression.

Illness Attitude Scale [14]

A self-rated measure that consists of nine subscales designed to assess fears, attitudes and beliefs associated with hypochondriacal concerns and abnormal illness behavior [17]. Scores range between 0 and 108 with sensitivity, specificity and test-retest reliability reported to be excellent [18].

Psychiatric evaluation for SSRD (Gold Standard)

Similar to the earlier study of Toussaint and colleagues [10] the SCID 5 version of SSRD in Dutch was not available at the time, and the MINI interview for DSM-5 was not available either. Therefore, we developed as a diagnostic aid a checklist for the psychiatric examination to be filled in by 5 psychiatrists and 2 psychiatry residents after the psychiatric examination to assess the diagnostic criteria of the SSRD based on the DSM-5 criteria. Individuals were diagnosed with an SSD once they fulfilled the A criterion of one or more somatic symptoms that are distressing or result in significant disruption of daily life, as well as at least one of the three B criteria of either (1) disproportionate and persistent thoughts about the seriousness of one's symptoms, (2) a persistently high level of anxiety about health or symptoms, or (3) excessive time and energy devoted to these symptoms or health concerns. The form required specification of having a mild (only one of the symptoms specified in Criterion B), moderate (two or more of the symptoms

specified in Criterion B), or severe (two or more of the symptoms specified in Criterion B, and multiple somatic complaints or one very severe symptom) condition. Assessors had to specify if persistent (typically >6 months) or with pain. Assessors had to specify if a comorbid medical condition was present, or conversion disorder, illness anxiety or factitious disorder. Also, the assessor could indicate if no SSRD was present at all.

This checklist was checked with the assessors for usability and to ensure that it provided a valid representation of the criteria and diagnostic classification before this classification method was implemented. The psychiatric examination was semi-structured as guided by the medical file. Assessors were trained in following this method and supervised by two psychiatrists (CFC and JvE) who also completed assessments. Supervising assessors reviewed each checklist for completeness and accuracy (supervising assessors did not review their own assessment checklists). In case of doubt, supervisors contacted the appropriate assessor for clarification.

The psychiatrists of the outpatient clinic performed the psychiatric evaluation for this study and used this checklist to draw conclusions about the SSRD diagnosis. The psychiatrists were trained to fill in the SSRD criteria in this checklist. Two psychiatrists checked each checklist for completeness and correctness before it was filed. In case of doubt, the case was discussed between the psychiatrists and consensus on the diagnostic classification was obtained.

2.1. Statistical methods

2.1.1. Descriptive data

Frequencies of the categorical variables (i.e., sex and educational level) and the mean and standard deviation of continuous variables (i.e., age) were determined to describe demographic variables. Education level was obtained following Verhage coding [19] and was recoded to a low (Verhage 1 to 3), middle (Verhage 4 and 5), and high education level (Verhage 6 and 7). We examined if there were differences between patients in the respective SSRD subgroups by *t*-test or ANOVA for the continuous variables and Chi-square or Fisher's exact tests for the categorical variables.

2.1.2. Item evaluation

The distribution of responses to each item was evaluated to understand response tendencies including calculating the mode, median and mean values, and assessing skewness and kurtosis for each item.

2.1.3. Scale reliability

Internal consistency was assessed using Cronbach's alpha scores [20].

2.1.4. Construct validity

Construct validity of the SSD-12 was investigated using scores from several questionnaires. Strong correlations (>0.70) were anticipated with the PHQ-15 due to the focus on the physical symptoms related distress. To determine the discriminant validity, correlations between the SSD-12 and the GAD-7 [15] and PHQ-9 [16] questionnaires were evaluated. Weak correlations(<0.40) were anticipated between SSD-12 and those scales as they measure different disorders or constructs than distress related to physical symptoms. We included the presence of somatic comorbidity as a measure of divergent validity; no association was anticipated for SSD-12 scores as the medical nature of the symptoms is irrelevant for SSRD diagnosis.

2.1.5. Diagnostic utility and cut points

For an ideal cut point, the sensitivity and specificity need to be as high as possible and the false positives and false negatives need to be as low as possible [21]. To determine an ideal cut point, the optimal balance between sensitivity and specificity, positive predictive values (PPV), and negative predictive values (NPV) and efficiency were calculated and compared to those previously reported for the SSD-12 [10]. In addition, receiver operating characteristics (ROC) and an area under the curve (AUC) were calculated, collapsing the SSD, CD/FND and IA groups to form an overall SSRD group. ROC analyses were conducted for the SSD-12, WI, PHQ-15 both individually and combined. Complete cases were included in analyses and STARD guidelines have informed the content of reporting [22]. Finally, logistic regression analysis was run to ascertain whether selected variable(s) were considered to be strong predictors of SSRD classification. A significance level of $p = .05$ was used to determine variables to be included in the model during forward selection. Analyses were conducted using IBM SPSS version 26 [23].

3. Results

The patient sample ($N = 223$) is presented in Table 1 and comprised 89 (40%) male participants. The mean age was 42.9 years (Standard Deviation (*SD*) = 14.14). In terms of clinical classification, SSD was present in 154 (69%) patients, 21 (9%) were diagnosed with CD/FND, and 14 (6%) patients were diagnosed with an IA. The remaining 15% of the patient group did not meet criteria for SSRD but for other, unrelated mental disorders. Age ($F(3) = 0.578$, $p = .63$), gender ($p = .12$), marital status ($p = .80$), educational level ($p = .31$) and somatic comorbidity ($X^2(3) = 4.961$, $p = .18$) did not differ significantly between patients diagnosed with SSD, CD/FND or IA, or no SSRD.

3.1. Item evaluation

The distribution of responses to each item was evaluated to understand response tendencies including calculating the mode, median and mean values, and assessing skewness and kurtosis for each item. As shown in Table 2, responses to all items, except for Question 3, were found to be normally distributed (skewness and kurtosis between −1.00 and 1.00). With a Kurtosis value of −1.02 Question 3 is slightly platykurtic; however, all items are within the acceptable range for skewness and kurtosis and no outliers can be identified [24]. Reliability of the SSD-12 was assessed using Cronbach's alpha; an alpha value of 0.91 indicated high reliability of this instrument [25].

Table 3 shows mean scale scores by SSRD subclassification. PHQ-9, GAD-7, IAS and PSQ51 scores did not differ between subclassifications. WI and SSD-12 scores were significantly higher in IA, and PHQ-15 scores were significantly higher in SSD. SSD-12 scores were significantly lower in the No SSRD group.

3.2. Construct validity

Table 4 shows the correlations between the SSD-12 and the other questionnaires. Text in Table 4 shown in bold indicates significant correlations with the SSD-12 in line with predictions; the strength of these correlations differed from our expectations. We anticipated weak correlations between the SSD-12, GAD-7 and PHQ-9; however, the SSD-12 had moderate correlations with the WI (0.55), the GAD-7 (0.59), and the PHQ-9 (0.52). We had expected a strong correlation between the SSD-12 and PHQ-15 scores but found a significant, but weak (0.37) correlation. These correlations were significant ($p < .001$). As expected, SSD-12 scores were found to be distinct from scores on the PSQ51, IAS and the presence of somatic comorbidity.

3.3. Diagnostic utility and cut points

Table 5 shows the sensitivity, specificity, positive predictive values, and negative predictive values of the SSD-12, WI and PHQ-15 scores for SSRD. The optimal cut point for the SSD-12 was 22 (sensitivity equaled 75.9%, specificity equaled 63.6%, PPV and NPV equaled 92.2% and 31.8%, respectively, efficiency equaled 74%). For the WI the optimal cut point was considered to be 6, and for the PHQ-15 was 12.

Table 1
Sample characteristics.

	SSD $N = 154$	Conversion / FND $N = 21$	Illness Anxiety(IA) $N = 14$	No SSRD (contrast group) $N = 34$	Total SSRD sample $N = 189$	Total Sample $N = 223$
Gender						
Male (%)	62 (40.3)	4 (19.0)	8 (57.1)	15 (44.1)	74 (39.2)	89 (39.9)
Female (%)	92 (59.7)	17 (81.0)	6 (42.9)	19 (55.9)	115 (60.8	134 (60.1)
Age ($N = 193$)						
Mean (SD)	42.9 (14.6)	41.0 (15.4)	40.7 (11.6)	45.6 (12.6)	42.4 (14.4)	42.9 (14.1)
Educational level ($N = 210$)						
Low (%)	27 (17.5)	2 (9.5)	2 (14.3)	6 (17.6)	31 (16.4)	37 (16.6)
Medium (%)	73 (47.4)	14 (66.7)	5 (35.7)	21 (61.8)	92 (48.7)	113 (50.7)
High (%)	43 (27.9)	4 (19.0)	7 (50.0)	6 (17.6)	54 (28.6)	60 (26.9)
Marital status ($N = 222$)						
Married (%)	58 (37.7)	9 (42.9)	8 (57.1)	13 (38.2)	75 (39.7)	88 (39.5)
Living together (%)	36 (23.4)	2 (9.5)	2 (14.3)	5 (14.7)	40 (21.2)	45 (20.2)
Living alone (%)	43 (27.9)	8 (38.1)	3 (21.4)	13 (38.2)	54 (28.6)	67 (30.0)
Living with parents (%)	16 (10.4)	2 (9.5)	1 (7.1)	3 (8.8)	19 (10.1)	22 (9.9)
Employment status ($N = 213$)						
Full-time (%)	9 (5.8)	0 (0)	4 (28.6)	4 (11.8)	13 (6.9)	17 (7.6)
Part-time (%)	22 (14.3)	4 (19.0)	2 (14.3)	5 (14.7)	28 (14.8)	33 (14.8)
Unemployed (%)	10 (6.5)	1 (4.8)	2 (14.3)	3 (8.8)	13 (6.9)	16 (7.2)
Retired (%)	12 (7.8)	1 (4.8)	0 (0)	1 (2.9)	13 (6.9)	14 (6.3)
Student (%)	6 (3.9)	3 (14.3)	1 (7.1)	0 (0)	10 (5.3)	10 (4.5)
Disabled (%)	69 (44.8)	9 (42.9)	3 (21.4)	15 (44.1)	81 (42.9)	96 (43.0)
Other (%)	2 (1.3)	0 (0)	0 (0)	1 (2.9)	2 (1.1)	3 (1.3)
Unknown (%)	15 (9.7)	2 (9.5)	2 (14.3)	5 (14.7)	19 (10.1)	24 (10.8)
Somatic comorbidity						
No somatic comorbidity (%)	47 (30.5)	9 (42.9)	8 (57.1)	11 (32.4)	64 (33.9)	75 (33.6)
Somatic comorbidity (%)	107 (69.5)	12 (57.1)	6 (42.9)	23 (67.6)	125 (66.1)	148 (66.4)

SD=Standard deviation; SSD = Somatic Symptom Disorder; FND=Functional Neurological Disorder; SSRD=Somatic Symptom Related Disorder.

Table 2
Item evaluation.

	N	Mean (SD)	Std. Error	Skewness	Kurtosis
Q1_I think my somatic symptoms are due to a serious illness	220	1.5 (1.2)	0.84	0.33	−0.82
Q2_I am very concerned about my health	220	2.6 (1.0)	0.69	−0.59	−0.03
Q3_My health concerns hinder me in daily life	220	2.2 (1.3)	0.87	−0.17	−1.02
Q4_I am convinced my symptoms are serious	220	2.4 (1.2)	0.81	−0.44	−0.65
Q5_My somatic symptoms make me anxious	220	2.2 (1.2)	0.84	−0.31	−0.80
Q6_My somatic symptoms keep me occupied most of the day	220	2.5 (1.2)	0.84	−0.50	−0.68
Q7_Other people tell me my somatic symptoms are not serious	219	1.4 (1.3)	0.88	0.44	−0.91
Q8_I am afraid that my symptoms will never subside	220	2.8 (1.1)	0.76	−0.80	0.09
Q9_My concerns about my symptoms will never disappear	220	2.5 (1.3)	0.84	−0.47	−0.72
Q10_I think physicians do not take my symptoms seriously	220	1.9 (1.2)	0.84	0.00	−0.89
Q11_Because of my somatic symptoms I cannot concentrate properly on other things	220	2.6 (1.1)	0.76	−0.50	−0.82
Q12_I am worried that my somatic symptoms will continue in the future	220	2.8 (1.1)	0.75	−0.81	−0.03
Total score	220	27.5 (10.4)	0.70	−0.24	−0.39

For each item the full range of the response options (0–4) was used. Total scores ranged between 0 and 48. SD=Standard deviation; Std. Error = Standard error.

The ROC curves presented in Fig. 1, calculated for patients with no SSRD (n = 33) and those classified as having a SSD, CD/FND or IA classification (n = 187) showed an AUC of 0.75 (SE = 0.05, 95% confidence interval (CI) = 0.66–0.84) for the SSD-12 summed score. For the WI total score the AUC was 0.68 (SE = 0.5, 95% CI = 0.58–0.79) and for the PHQ-15 was 0.65 (SE = 0.5, 95% CI = 0.55–0.75). Forwards stepwise logistic regression analysis indicated that SSD-12 total score was a stronger predictor of the presence of an SSRD than the WI total score or PHQ-15 total score. Neither the WI or PHQ-15 significantly improved the prediction of SSRD and were therefore not selected for inclusion in the final model ($X^2(1) = 14.82, p < .001$). The model was considered to be acceptable; the observed data were not significantly different to the outcomes predicted by the model (Hosmer-Lemeshow $X^2(8) = 6.26, p < .62$). Combinations of SSD-12, WI and PHQ-15 using the optimal cut points indicated in Table 5 were also assessed. For the combined SSD-12 and WI the AUC was 0.73 (95% CI = 0.62–0.83), for the combined SSD-12 and PHQ-15 the AUC was 0.70 (95% CI = 0.60–0.81) and for the combined SSD-12, WI and PHQ-15 the AUC was 0.73 (95% CI = 0.63–0.83). These findings show similarities in terms of sensitivity and specificity of the different instruments; however, the SSD-12 regression model accounted for more of the variance in the data than either of the other scales.

4. Discussion

Using a sample of 223 clinical patients, we found that the SSD-12 can be a useful instrument to distinguish individuals with somatic symptom related disorders from those in the contrast group experiencing other mental disorders. We suggest a cut point of 22 for the SSD-12 to indicate that people scoring 0–21 are less likely to be experiencing SSRD than those scoring 22 or higher on this instrument. In addition, the SSD-12 is more sensitive and specific when considered in isolation than when combined with other instruments such as the WI and the PHQ-15 which were also shown to distinguish between the clinical groups in this sample.

Strong correlations were anticipated with the PHQ-15 due to the focus on the physical symptoms related distress; however, although we found higher scores on the PHQ-15 in the SSRD group compared to the non-SSRD group, we found a weak correlation between the SSD-12 and the PHQ-15. This might be explained by the PHQ-15 exploring physical symptoms potentially related to somatization, whereas the SSD-12 focuses on measuring distress related to somatic symptoms in the context of both unexplained and explained medical conditions. This suggests that the SSD-12 indeed measures distress rather than being related to the physical symptoms themselves. We expected weak correlations between the SSD-12 and GAD-7 and PHQ-9 as they measure different disorders or constructs than distress related to physical symptoms. Indeed, the scores on these instruments did not differ significantly between the subgroups in our sample; however, the correlations were moderate rather than weak, suggesting that the distress measured by the SSD-12 may have some overlap with anxiety and depressive symptoms.

We included the presence of somatic comorbidity as a measure of divergent validity; no association was anticipated for SSD-12 scores as the medical nature of the symptoms should be irrelevant for SSRD diagnosis. In line with our expectations, we found no association between the SSD-12 scores and scores for the PSQ51, IAS and the presence of somatic comorbidity, suggesting that distress related to SSRD is not associated with the number of physical symptoms or chronic medical conditions. This confirms that the medical nature of the symptoms is irrelevant for SSRD diagnosis as expressed by the SSD-12. Also, no association was found between SSRD related distress and illness attitude.

Mean scores on the WI were higher in this sample for individuals with health anxiety compared to other groups. This trend is in line with previous research evidence; however, the mean values reported in this clinical sample were higher than have been reported previously [26]. ROC analysis of a previous hypochondriacal patient population indicated an area under the curve for the Whiteley Index of 0.88. Our results suggest that the WI is less useful for a diverse clinical population, such as is presented in this dataset.

The sensitivity and specificity of the SSD-12 and PHQ-15 were previously investigated in a clinical sample of patients who attended a psychosomatic outpatient clinic (n = 372) [10]. Both studies report very similar processes for gold standard assessment. Our data aligns with sensitivity and specificity data which has previously been reported for these instruments and indicates a similar cut point for the PHQ-15; however, our results suggested a lower cut point (⩾22) than previously suggested for the SSD-12 (cut point ⩾26 suggested by Toussaint and colleagues [10]). With a cut point of ⩾22, our findings show increased sensitivity: 76% compared to 70%, and only a slight reduction in specificity: 64% compared to 67% [10].

To the best of our knowledge, this research is the first to extend the use of the SSD-12 to a Dutch clinical population. In this context, our results indicate that the SSD-12 is a useful tool to distinguish somatic symptom-related disorders from other mental disorders. We considered instruments individually and in combination and the SSD-12 alone outperformed other instruments in terms of sensitivity and specificity. Given the focus of the SSD-12 on distress, this may suggest that distress is a more accurate indicator of SSRD than other diagnostic criteria.

Although the ROC values reported in this study may be considered to indicate the SSD-12 as an acceptable instrument to use, we should realise that distinguishing SSD patients from complex mental disorders referred for second opinion is much harder than demonstrating its ability to distinguish SSD cased from the general population. We therefore anticipated that the ROC values comparing those different

Table 3
Mean scale scores by SSRD subclassification.

	No SSRD (1) Mean (SD), N	SSD (2) Mean (SD), N	Conversion/ FND (3) Mean (SD), N	Illness Anxiety (IA) (4) Mean (SD), N	Total SSRD sample Mean (SD), N	Total sample Mean (SD), N	F (df = 3) (*p* value)	Pairwise Comparisons*
GAD-7	9.6 (6.1), 34	11.9 (5.7), 152	10.8 (5.0), 21	11.9 (5.0), 14	11.8 (5.6), 187	11.4 (5.7), 221	1.61 (0.19)	–
PHQ-15	**12.3 (6.0), 33**	**16.0 (5.5), 150**	**15.4 (5.2), 21**	**13.1 (5.0), 14**	**15.7 (5.5), 185**	**15.3 (5.7), 218**	**4.42 (0.01)**	**1 < 2, 1 = 3, 1 = 4, 2 = 3, 2 = 4, 3 = 4**
PHQ-9	14.1 (7.5), 34	14.5 (6.0), 151	13.4 (5.2), 21	10.4 (5.5), 14	14.1 (5.9), 186	14.1 (6.2), 220	2.01 (0.11)	–
IAS	37.6 (13.0), 13	46.4 (18.6), 85	42.7 (19.8), 14	46.6 (19.3), 12	45.9 (18.7), 111	45.1 (18.3), 124	0.97 (0.41)	–
PSQ51	17.5 (8.4), 33	15.8 (9.2), 151	15.8 (8.8), 21	13.0 (8.8), 14	15.6 (9.1), 186	15.9 (9.0), 219	0.84 (0.47)	–
WI	**5.1 (2.8), 29**	**6.9 (2.9), 126**	**6.4 (3.7), 14**	**9.8 (2.1), 12**	**7.1 (3.0), 152**	**6.8 (3.1), 181**	**7.80 (<0.001)**	**1 < 2, 1 = 3, 1 < 4, 2 = 3, 2 < 4, 3 < 4**
SSD-12	**19.4 (10.6), 33**	**28.5 (9.8), 152**	**27.4 (8.3), 21**	**36.1 (7.5), 14**	**29.0 (9.6), 187**	**27.5 (10.4), 220**	**12.18 (<0.001)**	**1 < 2, 1 < 3, 1 < 4, 2 = 3, 2 < 4, 3 < 4**

* Tukey corrected pairwise comparisons. SD=Standard deviation; SSD = Somatic Symptom Disorder; FND=Functional Neurological Disorder; SSRD=Somatic Symptom Related Disorder; GAD7 = General Anxiety Disorder scale; PHQ15 = Patient Health Questionnaire module for somatic symptoms; PHQ9 = Patient Health Questionnaire module for depression; IAS=Illness Attitude Scale; PSQ51 = Perceived Stress Questionnaire; WI=Whiteley Index; SSD-12 = Somatic Symptom Disorder – B Criteria Scale.

clinical samples would likely be lower than when comparing clinical samples to general population samples. Our analyses therefore indicate that this is a useful instrument for clinicians to distinguish one patient group (SSRD) from another. Further research to assess the sensitivity and specificity values for the SSD-12 when comparing clinical SSRD with general population scores could extend the applicability of this measure to primary care settings.

While our results indicate that the SSD-12 is a useful measure to assess somatic symptom-related disorders in Dutch clinical populations, we are mindful that data collection was based on a convenience sample of treatment seeking patients and the proportion of people in the contrast group referred for second opinion was small. In this study adherence to correct criteria for the gold standard assessment was achieved by training all assessors in the use of the gold standard checklist in conjunction with supervision and checks by the two supervisors (CFC and JvE). Assessing inter-rater reliability of gold standard assessments was not within the scope of the paper but could be part of a future validation study for the checklist. At present there is no validated English checklist to support the diagnosis of SSRDs; the checklist used in this research is in Dutch. It would be advantageous to translate and validate an English version of this checklist to support current interview and assessment methods to establish a SSRD classification.

Given the small number of people included in the CD/FND and IA groups, statistical power to find differences is limited and indications of similarities or differences between groups should be interpreted with caution. Demographic data indicated a high level of unemployment and disability in our sample which can be expected for this clinical population but limits the generalisability of our findings to general population samples. It would be worthwhile to collect additional data to enable comparisons between clinical groups (such as SSD, CD/FND and IA) to be made; the sample reported here mostly reflected SSD, with significantly fewer patients with CD/FND or IA diagnoses. Given the clinic used for data collection was a specialised mental health outpatient clinic for SSRD, it is likely that the rate of SSRD identified in this population is higher than would be identified in other psychiatric settings. Consequently, the sensitivity and specificity of the screener when used in the general population might be different. For this reason, the present findings may overstate the diagnostic efficiency of the screener, and in other settings its efficiency may be lower. In line with this, it may be useful to examine other psychiatric settings such as more general psychiatric outpatient clinics or inpatient settings to determine the rate of SSRDs and further examine the suggested cut-off for the SSD-12 to detect these cases in other settings. In addition, it would be advantageous to collect further general population data from a Dutch general population to compare with data collected from other countries.

4.1. Implications for practice

Our findings support the shift in clinical classification to focus on distress. The SSD-12 is a brief self-report tool which is considered better than other widely used measures to identify SSRD.

Additional research exploring the utility of this tool in clinical practice with cut-off values to favour 1) identifying people who may benefit from treatment, or 2) reduce the likelihood of missing people who have case-levels SSRD symptoms, would be beneficial. Further work to investigate this measure in larger clinical and general populations would also be helpful to establish sensitivity estimates for patients with different SSRD profiles and whether different cut-offs may be valuable for use in clinical practice.

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Table 4
Pearson's correlations to estimate convergent and divergent validity.

	SSD-12	GAD-7	PHQ-9	PHQ-15	PSQ51	IAS	WI
SSD-12	(0.91)						
GAD-7	**0.59****	(0.87)					
PHQ-9	**0.52****	0.76**	(0.84)				
PHQ-15	**0.37****	0.58**	0.65**	(0.81)			
PSQ51	**−0.06**	0.06	−0.02	−0.05	(0.97)		
IAS	−0.07	0.01	−0.06	−0.09	0.26*	(0.91)	
WI	0.55**	0.33**	0.26*	0.30**	0.01	0.08	(0.76)
Som. Com.	**0.11**	0.12	0.20*	0.91	0.06	0.10	0.11

*$p < .01$ ** $p < .001$ Cronbach's alpha estimates for scales are shown in parentheses. SSD-12 = Somatic Symptom Disorder – B Criteria Scale; GAD7 = General Anxiety Disorder scale; PHQ9 = Patient Health Questionnaire module for depression; PHQ15 = Patient Health Questionnaire module for somatic symptoms; PSQ51 = Perceived Stress Questionnaire; IAS=Illness Attitude Scale; WI=Whiteley Index; Som. Com. = Somatic Co-morbidity.

Table 5
Sensitivity, Specificity, positive predictive values (PPV), negative predictive values (NPV) and optimal cut points for the SSD-12, WI and PHQ-15.

Cutoff	Sensitivity	Specificity	PPV	NPV
SSD-12				
18	89.3%	39.4%	89.3%	39.4%
19	87.7%	42.4%	89.6%	37.8%
20	80.7%	48.5%	89.9%	30.8%
21	79.1%	48.5%	89.7%	29.1%
22	**75.9%**	**63.6%**	**92.2%**	**31.8%**
23	74.3%	66.7%	92.7%	31.4%
24	70.1%	66.7%	92.3%	28.2%
WI				
4	87.5%	31.0%	86.9%	32.1%
5	78.3%	48.3%	88.8%	29.8%
6	**66.4%**	**55.2%**	**88.6%**	**23.9%**
7	59.9%	72.4%	91.9%	25.6%
8	42.8%	75.9%	90.3%	20.2%
PHQ-15				
10	86.5%	24.2%	86.5%	24.2%
11	81.1%	36.4%	87.7%	25.5%
12	**75.1%**	**42.4%**	**88.0%**	**23.3%**
13	69.7%	51.5%	89.0%	23.3%
14	65.9%	51.5%	88.4%	21.3%
15	58.9%	66.7%	90.8%	22.4%

PPV=Positive predictive value; NPV=Negative predictive value; SSD-12 = Somatic Symptom Disorder – B Criteria Scale; WI=Whiteley Index; PHQ15 = Patient Health Questionnaire module for somatic symptoms.

Ethical standards

All methods were carried out in accordance with relevant guidelines and regulations. The research was conducted ethically in accordance with the World Medical Association Declaration of Helsinki [27]. According to Dutch law, in accordance with the Helsinki Declaration, and according to the Dutch Central Medical Ethical Committee, no explicit informed consent is required for the use of clinical or administrative data, that are routinely collected in the context of treatment provision and anonymized for research. This applied to the samples used in this study. For administrative and treatment purposes by treatment providers in both samples, at intake, patients were informed that Patient Reported Outcome Measures (PROM) and medical data obtained during intake and treatment could be used for research evaluation on an anonymised basis, unless they indicated their dissent. In case of dissent, this was notified in the patient file. Patient files of dissenting patients were excluded from the study. Data were coded in order to create an anonymised dataset. The Institutional Research Board (IRB) of GGz Breburg waived the need for informed consent accordingly and approved the general study protocols regarding collection of data for the samples used in this study - with routine outcome monitoring being integral to the treatment process (no written informed consent was required) (CWO2016-14).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

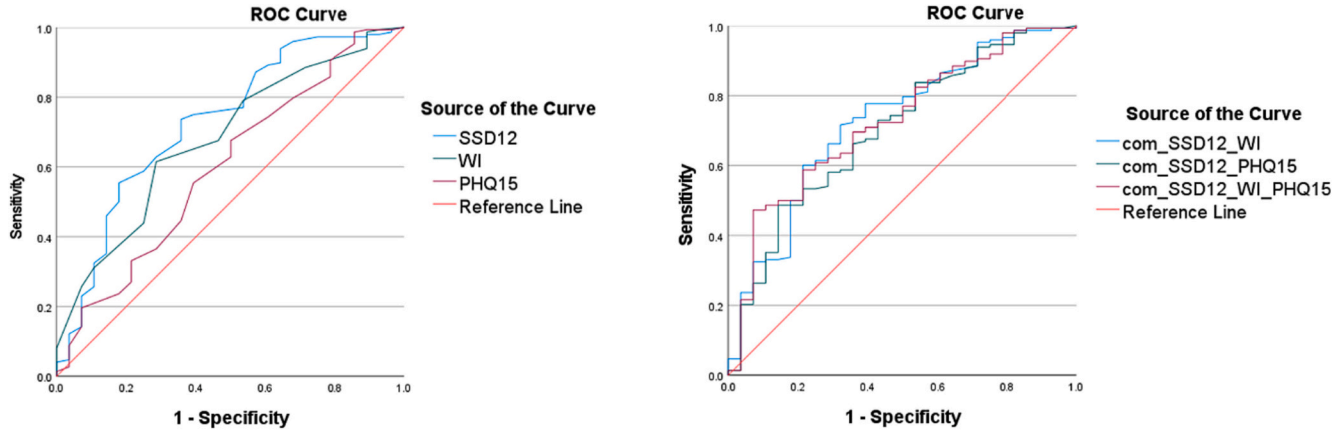

Fig. 1. ROC curves for SSD-12, WI and PHQ-15 independently and combined.
SSD-12 = Somatic Symptom Disorder – B Criteria Scale; WI=Whiteley Index; PHQ15 = Patient Health Questionnaire module for somatic symptoms; com_SSD12_WI = combination of Somatic Symptom Disorder – B Criteria Scale and Whiteley Index using standardised scores; com_SSD12_PHQ15 = combination of Somatic Symptom Disorder – B Criteria Scale and Patient Health Questionnaire module for somatic symptoms using standardised scores; com_SSD12_WI_PHQ15 = combination of Somatic Symptom Disorder – B Criteria Scale, Whiteley Index and Patient Health Questionnaire module for somatic symptoms using standardised scores.

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