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DOI: https://doi.org/10.1007/s10862-013-9367-0

Screening for Dissociative Disorders in Psychiatric Out- and Day Care-Patients

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Abstract

Dissociative disorders are frequent and clinically relevant conditions in psychiatric populations. Yet, their recognition in clinical practice is often poor. This study evaluated the performance of three well known and internationally used dissociation scales in screening for dissociative disorders. Consecutively treated out- and day care-patients (n = 160) from several psychiatric units in Switzerland completed the Dissociative Experiences Scale (DES), Somatoform Dissociation Questionnaire (SDQ-20), and Multidimensional Inventory for Dissociation (MID). The Structured Clinical Interview for DSM-IV Dissociative Disorders-Revised (SCID-D-R) was then administered. Test performance of the scales was analyzed by receiver operating characteristic curves. The diagnostic accuracy, represented by the area under the curve, did not differ significantly between the three summary scales. Cut-off scores for detecting at least 80% of any dissociative disorder and dissociative disorder-not-otherwise-specified/dissociative identity disorder, respectively, were 12 and 20 for the DES, 30 and 33 for the SDQ-20, and 28 and 28 for the MID summary scale. The diagnostic accuracy of the DES subscale 'absorption' and the MID subscale 'somatic symptoms' was equal or slightly lower than the corresponding summary scale. The DES, SDQ-20, and MID summary scales are suitable in screening for dissociative disorders in general psychiatric out- and day care-patients. Adequate cut-off scores in the German-adapted DES are lower than in non-German versions. Screening with the DES subscale 'absorption' and the MID subscale 'somatic symptoms' could be more efficient without the loss of diagnostic accuracy.

Keywords: dissociative disorders, dissociation, sensitivity and specificity, predictive value of tests, correct classification rate, rating scales

Introduction

The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, American Psychiatric Association 1994) lists the four diagnoses dissociative amnesia, dissociative fugue, depersonalization disorder and dissociative identity disorder (DID) in the category dissociative disorders (DDs). Dissociative disorder-not-otherwise-specified category I (DDNOS-I) refers to cases similar to DID but lacking sufficient criteria for a full DID diagnosis, e.g., when there is no amnesia between distinct identities (Steinberg 1994).

There is ample evidence that DDs are relatively frequent conditions in general psychiatric out- and day care patients in Western countries with a median prevalence of 8.7% DD (range: 0.1 - 29.0%) and 3.3% (range: 0.02 - 7.50%) (Dell 2009). DDs are often comorbid conditions, occurring particularly in conjunction with anxiety, affective, and personality disorders (Dell 1998; Johnson et al. 2006; Rodewald et al. 2011). Clinical relevance of a comorbid DD is suggested by the findings that DDs, in particular DDNOS-I and DID, contribute to functional impairment above and beyond the presence of other non-dissociative axis I disorders (Johnson et al. 2006; Mueller-Pfeiffer et al. 2012). Moreover, high levels of dissociation predict a negative treatment outcome (Lima et al. 2010; Michelson et al. 1998; Rufer et al. 2006; Spitzer et al. 2007). Despite this evidence, DDs are rarely diagnosed and rarely considered in treatment planning (Foote et al. 2006; Ginzburg et al. 2010). A possible reason for the lack of diagnostic accuracy in clinical practice might be that subjects with a DD often do not spontaneously report dissociative symptoms, e.g., when they do not regard their chronic experience of depersonalization/derealization as pathological, or alternatively, when they feel ashamed of such things as hearing inner voices as part of dissociative identity confusion.

Over the last decades, several self-rating questionnaires assessing a variety of dissociative symptoms have been developed, which can be used as a time-saving approach in screening for DDs. Yet, there is little or controversial evidence regarding appropriate cut-off scores to be used with many of these scales. This report presents the results of a study that was conducted to

determine the test performance of three well known and internationally used self-report dissociation scales, i.e., the Dissociative Experiences Scale (DES; Bernstein and Putnam 1986), Somatoform Dissociation Questionnaire (SDQ-20; Nijenhuis et al. 1996), and Multidimensional Inventory of Dissociation (MID; Dell 2006a, 2006b; Dell and Lawson 2009), in screening for the presence (or absence) of a DD and more specifically, DDNOS-I or DID in clinical practice, where the aim usually is to minimize the risk of false negative cases. We decided to test the screening performance of the three dissociation scales on DD and DDNOS-I/DID separately, because DDNOS-I and DID are characterized by recurrent dissociative intrusions into every aspect of executive functioning and sense of self (Dell 2006b, 2009) and by high impact on global functioning (Mueller-Pfeiffer et al. 2012), which distinguishes them from 'simpler' DDs, i.e., dissociative amnesia, dissociative fugue, and depersonalization disorder. We also combined DDNOS-I and DID into one classifier because of their strong relationship between each other. The treatment guidelines for both disorders are very similar (International Society for the Study of Trauma and Dissociation 2011), and it is proposed that one of the DSM-V diagnostic criteria for DID be changed, so that DDNOS-I patients would meet diagnostic criteria for DID (Spiegel et al. 2011).

In this research, we first evaluated the predictive value of the DES, SDQ-20, and MID and their subscales for the presence (or absence) of a DD, and separately of DDNOS-I/DID. These disorders were diagnosed by the Structured Clinical Interviews for DSM-IV Dissociative Disorders - Revised (SCID-D-R; Steinberg 1994). Second, we determined the cut-off scores of the three scales that detected DDs and DDNOS-I/DID, respectively, with a sensitivity of .80, which we considered to be appropriate in clinical use in order to minimize the risk of false negative cases at the expense of an increased false positive error rate.

Method

Subjects and Procedure

Data were gathered within a larger study of the relationship between DDs and functional impairment (Mueller-Pfeiffer et al. 2012). As reported in this paper, consecutive subjects between 18 and 65 years with sufficient fluency in the German language, who were in treatment for three or more sessions during 1/2009 to 12/2010, were eligible. Subjects were recruited from two public psychiatric outpatients units, one private practice, and two psychiatric day care units, all located in the counties of St. Gallen or Zurich in Switzerland. The records of 374 subject candidates who fulfilled the inclusion criteria were reviewed. Of these, 62 (16.6%) were not enrolled due to the presence of an exclusion criterion as follows: mental retardation 25, acute psychosis 23, psychiatric disorder due to an underlying medical condition 8, acute suicidal ideation 3, intoxication or withdrawal 3. The remaining 312 subject candidates were invited to participate. Of these 136 (43.6%) declined, yielding a pool of 176 recruited subjects. Recruited subjects did not significantly differ from decliners regarding gender (60.8% vs. 56.6% females, p = .5), age (median = 34.0 vs. 41.5 years, p = .05), and nationality (81.3% vs. 82.4% Swiss, p = .9), suggesting representativeness of our sample. Finally, data from 16 recruited subjects (9.1% of the 176) were excluded from the analysis due to incomplete participation or doubtful validity of the results (e.g., suspected dissimulation or difficulties in understanding the questions) as judged by the interviewer after discussion with the first author, yielding a final sample size of 160 subjects (107 females [76%], median age = 33, interquartile range [IQR] = 20);

Enrolled subjects completed the MID, SDQ-20, and DES in that order. Following that, the SCID-D-R and the Structured Clinical Interview for DSM-IV Axis I and Axis II Disorders (First et al. 1997a; First et al. 1997b) were administered by trained interviewers with a B.Sc. or a M.Sc. degree who were blinded for the results of the self-rating scales. The study protocol was

approved by the institutional review board of the county of St. Gallen, Switzerland. The subjects' written consent was obtained according to the Declaration of Helsinki.

Among the final sample of 160 subjects, 30 (18.8%) were diagnosed by the SCID-D-R (Steinberg 1994) with a DD (0 dissociative amnesia [0.0%], 1 dissociative fugue [0.6%]; 7 depersonalization disorder [4.4%]; 12 DID [7.5%]; 10 DDNOS-I [6.3%]). The proportion of DDs did not differ significantly between treatment settings ($p = .6$). Sociodemographic characteristics and Axis I comorbidity of this sample have previously been presented in another paper (Mueller-Pfeiffer et al. 2012). As previously reported, DD subjects had significant more comorbid Axis I disorders (range = 1 - 6; median = 3) compared to Non-DD subjects (range = 0 - 7; median = 1; $p < .001$). DDNOS-I and DID subjects had a higher total number of comorbid Axis I disorders and more comorbid anxiety disorders than Non-DD subjects; DDNOS-I subjects had more comorbid affective disorders than Non-DD subjects (ps < .05). In addition (not previously reported), forty-seven (36.2%) of Non-DD subjects, 22 (75.8%) of DD subjects, and 15 (71.4%) of DDNOS-I/DID subjects were diagnosed as having a personality disorder (DD, DDNOS-I/DID > Non-DD, ps < .01). Median DES, MID, and SDQ-20 scores for Non-DD, DD, and DDNOS-I/DID subjects are presented in Table 1.

Measures

The diagnosis of a DD was ascertained using the German version of the SCID-D-R (Gast et al. 2000). Reliability and validity of the American and German versions of SCID-D-R are good to excellent (Rodewald 2005; Steinberg 1989-1992). Inter-rater reliability for the diagnosis of the five DSM-IV DDs according to the SCID-D-R in this study was high (Fleiss' kappa = .9, 95% CI [.73, 1.00], $n = 84$) (Mueller-Pfeiffer et al. 2012).

Probably the most often used questionnaire to measure psychological manifestations of dissociation in normal and clinical populations is the DES (Bernstein and Putnam 1986). The development of the scale is based on a conceptualization of a dissociative continuum. According

to this view, dissociation can occur in healthy as well as in psychiatric subjects and differs only in the degree of its manifestation (Brown 2006). The 28 items of the DES are rated on an 11-point scale with increments of 10 points ranging from 0 (“never”) to 100 (“always”), with higher scores representing more dissociative symptoms. Although the authors of the DES derived the three factors of absorption, amnesia, and depersonalization/derealization, results from later studies suggested a single factor only (Fischer and Elnitsky 1990; Ruiz et al. 2008). The DES has sound psychometric properties (Bernstein and Putnam 1986; Carlson and Putnam 1993; Carlson et al. 1993; Marmar et al. 1994). However, controversial evidence is available regarding which cut-off score optimally differentiates between DDs and other mental disorders. Carlson et al. (1993), using a large North American sample, suggested a DES score of 30 or higher to identify subjects with a DID. Draijer & Boon (1993) found that a cut-off score of 25 best distinguished between subjects with DDs from those with other mental disorders in their Dutch sample. Interestingly, lower cut-off scores are recommended from German studies. In three studies, cut-off scores of 17.5, 15, and 9 in the German adaption of the DES (Freyberger et al. 1998) was recommended for the detection of subjects with DDNOS-I/DID (Rodewald et al. 2006), DDs in general (Backers et al. 2008), and clinical levels of depersonalization/derealisation (Michal et al. 2004), respectively. This largely corresponds to our suggestion of a cut-off score between 15 and 20 for the screening of DDs derived from a Swiss sample of chronic and severely impaired psychiatric outpatients (Mueller et al. 2007). Finally, Simeon et al. (1998) reported an optimal DES cut-off score of 12 for the detection of depersonalization disorders. The psychometric properties of the German adaptation of the DES (Cronbach’s alpha = .91; test–retest reliability Pearson r = .86; good differentiation of psychiatric patients from healthy subjects, and psychiatric patients with a DD from psychiatric patients without a DD and healthy subjects) are comparable to the original version (Freyberger et al. 1998; Spitzer et al. 1998).

The SDQ-20 (Nijenhuis et al. 1996) is a 20-item rating scale that measures somatoform manifestations of dissociation such as disruptions in sensation, movement and other bodily

functions. The development of the scale was grounded in the theoretical framework that dissociative symptoms are the result of an underlying trauma-related (pathological) structural dissociation of the personality (Van der Hart et al. 2004). The 20 items of the SDQ-20 are each rated on 5-point scale ranging from 1 to 5, yielding a minimum score of 20 and a maximum score of 100, with higher scores representing greater levels of somatoform dissociation. Factor analyses have suggested unidimensionality of the SDQ-20 (Nijenhuis et al. 1998). The psychometric properties of the SDQ-20 are good (Mueller-Pfeiffer et al. 2010; Nijenhuis et al. 1996, 1998). Little data are available regarding suitable cut-off scores of the SDQ-20 when used to screen for the presence of DDs. In two studies, using a Turkish (Sar et al. 2000) and a Portuguese (Amaral do Espirito Santo and Pio-Abreu 2007) sample, cut-off scores of 30 and 35, respectively, were suggested. The psychometric properties of the German adapted SDQ-20 (Cronbach's alpha = .91; test–retest reliability Pearson r = .89; good differentiation between patients with versus without DD) and its cross-cultural validity are excellent (Mueller-Pfeiffer et al. 2010).

The MID (Dell 2006a, 2006b; Dell and Lawson 2009) is a comprehensive scale with 218 items (168 dissociation items, 50 validity items) for the measurement of pathological dissociation that assesses 6 general dissociative symptoms (i.e., 'memory problems', 'depersonalization', 'derealization', 'flashbacks', 'somatic symptoms', 'trance'), 11 consciously experienced intrusions from a dissociated self-state, and 6 fully-dissociated activities of another self-state. Moreover, it provides categorical diagnoses (i.e., DID, DDNOS, posttraumatic stress disorder, and borderline personality disorder). The items are rated on an 11-point scale that ranges from 0 ("never") to 10 ("always"). The scale provides a summary score between 0 and 100 by calculating the mean score of the 168 dissociation items, multiplied by 10. The MID has demonstrated good reliability and validity (Dell 2006a). The author recommends a summary score of 30 and above as an appropriate cut-off score indicative of a DD (Dell 2011). Preliminary data suggests sound psychometric properties of the German version of the MID (Cronbach's

alphas between .69 and .94; good differentiation between patients with versus without a DD) (Gast 2003).

Data Analysis

To assess internal consistency of the three dissociation scales, we computed Cronbach's alphas including an adjusted bootstrap percentile confidence interval, based on M = 1000 bootstrap replications. **To assess the quality of items, we computed average inter-item correlations, and item-total correlations**. To assess the distribution of the three summary scores and to visually compare these between subjects with and without DDs and with and without DDNOS-I/DID, respectively, we calculated kernel density estimates [Epanechnikov kernel with bandwidth chosen according to Silverman's "rule of thumb" (Silverman 1986)] for the three summary scores.

To assess the diagnostic ability of the different scales with regard to presence of a DD and presence of a DDNOS-I/DID, respectively, we computed a receiver operating characteristic (ROC) curve and the corresponding area under the curve (AUC) for each psychometric instrument's summary and dimension scores separately. Wald confidence intervals for the AUCs were computed on the logit-scale and re-transformed. Formulas for these confidence intervals are from Hanley and McNeil (1982).

To assess the performance of binary classifiers we calculated sensitivity (proportions of diagnosed DD and DDNOS-I/DID subjects, respectively, testing positive), specificity (proportions of non-DD and non-DDNOS-I/non-DID subjects, respectively, testing negative), positive predictive value (proportions of subjects testing positive who are correctly diagnosed), negative predictive value (proportions of subjects testing negative who are correctly diagnosed), correct classification rate (proportions of all subjects who are correctly diagnosed), and Fleiss' kappa (quantifies the agreement in classification divided by the agreement that would be expected by chance). Because predictive values are affected by the prevalence of the disorder in

a particular population, i.e. the base rate, we calculated predictive values for various selected prevalence rates. Additionally, Cohen's kappa (percentage of agreement corrected for chance) was calculated for the agreement of the DES, SDQ-20, and MID in classification of DD and DDNOS-I/DID, respectively, at cut-off scores that provided a minimal sensitivity of .80.

In order to control for the potential influence that comorbid Axis I and Axis II disorders could have on the results, we used a ROC generalized linear model (ROC-GLM) approach (Pepe 2003) for determining the influence of selected DSM-IV diagnostic categories on intercept and slope of the probit-transformed ROC curves for DES, SDQ-20, and MID summary scores with regard to presence of a DD. A separate model was performed for the presence versus absence of an affective disorder, anxiety disorder, or personality disorders. Other diagnostic categories were not considered in this analysis because of low numbers of observations in certain strata, which prevented sufficiently robust statistical inference.

For correlation coefficients, we provided confidence intervals based on Fisher's z-transformation. All confidence intervals were computed at a confidence level of 95%, all tests were applied two-tailed, and a significance level of .05 was used. All computations were done in R (R Development Core Team 2011).

Results

Internal consistency, quality of items, and distributions

Cronbach α's were very high for all three dissociation scales (DES: .94, 95% CI [.92, .96]; SDQ-20: .89, 95% CI [.85, .92]; MID: .990, 95% CI [.987, .992]). Average inter-item correlations were M = .39, range = .07 - .84 for the DES; M = .29, range = -.05 - .60 for the SDQ-20; and M = .31, range = -.13 - .83 for the MID. **Item-total correlation indices lower than .40 were found for item #17 for the DES, #7, 17 for the SDQ-20, and #56, 67, 94, 157, 170, 203 for the MID (Supplemental Table 1).** The kernel density estimates (Fig. 1) illustrate that subjects without a DD and DDNOS-I/DID, respectively, generally presented with lower scores in the DES, SDQ-

20, and MID compared to those with a DD and DDNOS-I/DID, respectively. We found moderate inter-correlations between DES and SDQ-20 summary scores (Pearson r = .74, 95% CI [.67, .81], n = 160), and SDQ-20 and MID summary scores (Pearson r = .76, 95% CI [.69, .82], n = 160). A high inter-correlation was found between DES and MID summary scores (Pearson r = .90, 95% CI [.87, .93], n = 160). An inter-correlation matrix among summary and dimension scores of the three scales is presented in Table 2.

Receiver operating characteristic curve analyses

As shown in Figure 2A, all three scales discriminated similarly well between subjects with versus without DDs. We found AUCs of .84 (95% CI [.74, .90]) for the DES, .83 (95% CI [.73, .89]) for the SDQ-20, and .84 (95% CI [.75, .90]) for the MID summary scale (Table 3). Highest AUC among the DES subscales was found for 'absorption', and among the MID subscales for 'somatic symptoms'. AUCs for these subscales were equal or slightly lower than the corresponding summary scale.

Each scale and subscale (except MID 'depersonalization' and 'flashbacks') provided slightly better diagnostic accuracy for subjects with versus without DDNOS-I/DID (Figure 2B) than for subjects with versus without DDs (Figure 2A). AUCs for the former comparison were .89 (95% CI [.78, .95]) for the DES, .86 (95% CI [.78, .92]) for the SDQ-20, and .86 (95% CI [.76, .92]) for the MID summary scale (Table 3).

A minimum sensitivity of .80 for detecting DDs was found for a cut-off score of 12 for the DES, 30 for the SDQ-20, and 28 for the MID summary scale. Specificity (.69 to .82), positive predictive value (.38 to .51), negative predictive value (.94 to .95), correct classification rate (.70 to .82), and Fleiss' kappa (.33 to .51) at these cut-off scores were lowest for the DES, followed by the SDQ-20, and followed by the MID.

A minimum sensitivity of .80 for detecting DDNOS-I/DID was found for a cut-off score of 20 for the DES, 33 for the SDQ-20, and 28 for the MID summary scale (Table 4). Specificity

(.82 to .86), positive predictive value (.39 to .40), negative predictive value (.96 to .97), correct classification rate (.80 to .81) and Fleiss' kappa (.43 to .45) at these cut-off scores were comparable between the three scales.

A minimum sensitivity of .80 for detecting DDs was found for a cut-off score of 21 for the DES subscale 'absorption'. Specificity (.72), positive predictive value (.40), negative predictive value (.94), correct classification rate (.74) and Fleiss' kappa (.38) at this cut-off score were equal or slightly higher than for the DES summary scale at a cut-off score of 12 (which provided also a minimum sensitivity of .80). A minimum sensitivity of .80 for detecting DDs was found for a cut-off score of 13 for the MID subscale 'somatic symptoms'. Specificity (.74), positive predictive value (.41), negative predictive value (.94), correct classification rate (.75) and Fleiss' kappa (.40) at this cut-off score were lower than for the MID summary scale at a cut-off score of 28.

A minimum sensitivity of .80 for detecting DDNOS-I/DID was found for a cut-off score of 24 for the DES subscale 'absorption'. Specificity (.75), positive predictive value (.35), negative predictive value (.96), correct classification rate (.76) and Fleiss' kappa (.36) at this cut-off score were lower than for the DES summary scale at a cut-off score of 20. A minimum sensitivity of .80 for detecting DDNOS-I/DID was found for a cut-off score of 15 for the MID subscale 'somatic symptoms'. Specificity (.78), positive predictive value (.37), negative predictive value (.96), correct classification rate (.78) and Fleiss' kappa (.39) at this cut-off score were lower than for the MID summary scale at a cut-off score of 28. Sensitivity and specificity, positive and negative predictive values, correct classification rate, and Fleiss' kappa at various cut-off scores of the DES, SDQ-20, and MID are presented in Supplemental Table 2. Cohen's Kappa as a measure of agreement among the DES, SDQ-20, and MID in the classification of DD and DDNOS-I/DID, respectively, at cut-off scores providing a minimal sensitivity of .80 in our sample, are presented in Table 5.

There was no significant influence of the presence of a comorbid affective disorder, anxiety disorder, or personality disorder on intercept and slope of the probit-transformed ROC curves for DES, SDQ-20, and MID summary scores with regard to presence of a DD. This suggests that our results are not confounded by psychiatric comorbidity.

Discussion

The aim of this study was to evaluate the accuracy of three widely used dissociation questionnaires in the prediction of the presence of a DD and, more specifically, DDNOS-I/DID, in a psychiatric outpatient and day-care patient population. The summary scales of the DES, SDQ-20, and MID each showed good discrimination in terms of AUC. The DES subscale 'absorption' and the MID subscale 'somatic symptoms' showed equal or slightly lower discrimination than the corresponding summary scale of the full instrument. Cut-off scores for detecting at least 80% of any DD and DDNOS-I/DID subjects, respectively, were 12 and 20 for the DES, 30 and 33 for the SDQ-20, and 28 and 28 for the MID summary scale.

The AUC of .84 that we found in our sample confirms the ability of the DES to discriminate between DD and non-DD subjects among psychiatric out- and day care-patients with mixed axis I disorders. This diagnostic accuracy of the DES is in good agreement with the Steinberg et al. study (1991) that determined an AUC of .79 in a mixed psychiatric outpatient sample. The optimal screening cut-off scores, however, substantially diverged in these two studies. Whereas in this study, a DES cut-off score of only 12 provided .80 sensitivity and .69 for subjects with any DD versus no DD, Steinberg et al. found that a DES cut-off score of between 20 and 25 (exact score not indicated) provided .80 sensitivity and .93 specificity. Cross-cultural differences in proneness to report dissociative symptoms (viz., lower in Swiss than in North Americans), differences in DES versions (German translation versus English original); differences in sampling approach (consecutive versus convenience) and sample size (30 DD and 130 non-DD versus 15 DD and 21 non-DD) all might have contributed to these discrepant findings.

When tested on the correct classification of DDNOS-I/DID subjects versus non-DDNOS-I/non-DID subjects, we determined an AUC of .89 for the DES that is comparable to the AUC of .88 reported by Carlson et al. (1993). Only Drajier et al. (1993) found a substantially higher AUC of .96 in their Dutch sample of psychiatric in- and outpatients. No AUC was reported by Rodewald et al. (2006) in a German sample of mixed psychiatric in- and outpatients that included a group of healthy controls. The optimal cut-off scores of 20 (providing a sensitivity of .82 and specificity of .80) and 27 (providing a sensitivity of .80 and specificity of .99), respectively, that were determined in this Swiss study and Rodewald et al.'s German study (2006), were lower than the cut-off score of 30 (providing a sensitivity of .80 and specificity of .80) and 35 (providing a sensitivity of .81 and specificity of .89), respectively, in the Carlson et al.'s American (1993) and Drajiers et al.'s Dutch study (1993). Taken together, these differences again suggest a cross-cultural difference resulting in lower optimal cut-off scores in Swiss/German general psychiatric populations when using the German adaptation of the DES for the screening for DDNOS-I/DID.

Regarding the SDQ-20, we found an optimal cut-off score of 30 for providing .83 sensitivity and .74 specificity for any DD versus non-DD subjects and a cut-off score of 33 for providing .82 sensitivity and .80 specificity for DDNOS-I/DID versus non-DDNOS-I/non-DID subjects. The latter is in good agreement with Sar et al. (2000), who reported an optimal cut-off score of 35 yielding .84 sensitivity and .87 sensitivity for DDNOS-I/DID versus non-DDNOS-I/non-DID in their Turkish convenient sample that included a group of DDNOS-I/DID subjects, psychiatric subjects with mixed diagnoses, and non-clinical subjects.

Regarding the MID, we found an optimal cut-off score of 28 that provided .80 sensitivity and .82 specificity for DD versus non-DD subjects and also a cut-off score of 28 that provided .86 sensitivity and .80 specificity for DDNOS-I/DID versus non-DDNOS-I/non-DID subjects. There are no studies available for comparison in the literature. According to the MID manual

(Dell 2004), a mean MID score between 15 and 20 suggests the presence of a "mild DD" (e.g., depersonalization disorder), and above 20 the presence of a DDNOS-I or DID.

Taken together, we found no significant differences between the diagnostic accuracy of the DES, SDQ-20, and MID, as represented by their AUCs. From a practical standpoint, the 28-item DES and 20-item SDQ-20 seem more suitable for screening purposes than the much longer, 218-item MID. In contrast, the MID, which covers the full range of dissociation, may be more suitable for a comprehensive psychometric assessment of dissociative pathology. Looking at positive predictive values and correct classification rates, the cut-off scores we selected for a sensitivity greater than .80 in the DES, SDQ-20, and MID, only predicted an accurate diagnosis (positive predictive value) of between 38% and 51% for DDs and between 39% and 40% for DDNOS-I/DID in our sample. In other words, the use of these instruments with optimal screening scores lacks sufficient diagnostic accuracy because of high false positive rates, which often is the case for screening instruments. This is not necessary an undesirable feature of instruments used for screening purposes, where the consequences of missing a true positive are more serious than diagnosing a false positive. However, as is often the case with screening instruments, follow-up testing with a more definitive diagnostic evaluation that has better specificity is required, e.g., by the SCID-D-R in patients with a positive result according to one of these three psychometric instruments. Looking at negative predictive values, the cut-offs for a sensitivity greater than .80 in the DES, SDQ-20, and MID, predicted an accurate negative diagnosis in between 94% and 95% for DDs, and between 96% and 97% for DDNOS-I/DID, respectively in our sample. This suggests that the use of these instruments at their appropriate cut-off scores is a relative safe approach for ruling out a DD or DDNOS-I/DID.

It is of interest of comparing the performance of subscales of the DES and MID with the performance of the full instrument as manifested in the summary score. The AUCs of the DES subscale 'absorption' were equal or slightly lower than the AUCs of the DES summary scale when testing the correct classification of DD subjects or DDNOS-I/DID subjects, respectively.

This suggests that using this DES subscale does not improve the overall diagnostic accuracy but could make the screening more efficient when applying a cut-off score of 21 for detecting DDs , and 24 for detecting DDNOS-I/DID. The AUCs of the MID subscale 'somatic symptoms' were equal than the AUCs of the MID summary scale. Given the length of the MID scale, an equally accurate but more efficient screening procedure could be performed using the MID subscale 'somatic symptoms' when applying a cut-off score of 13 for detecting DDs , and 15 for detecting DDNOS-I/DID. However, before a subscale should be carved out from the full scale to which it belongs, its reliability and validity as a stand-alone test should be examined.

Some of the DES, SDQ-20, and MID item inter-correlations were close to zero or even negative. An item-analysis revealed low item-total correlation (lower than .4) for 1 DES, 2 SDQ-20, and 6 MID items, indicating low consistency of these items with the dissociation construct measured by the scale.

A strength of this study is the evaluation of three different dissociation scales in the same sample, which permits a more stringent comparison of the scales compared to the investigation of each scale in a separate study. A further strength is the employment of a rigorous diagnostic characterization that included a SCID-D-R interview for every subject enrolled, including determination of inter-rater reliabilities. The consecutive recruitment by the service providers allows better generalization of our findings to the population of general psychiatric patients seeking treatment. A limitation is the application of the three dissociation scales in the same sequence, so that order effects cannot be excluded. Moreover, administration of all three scales within the same session might have inflated concordance among them. Eligible patients who refused to participate in this study, are a potential threat to the generalizability of the results. Finally, our results cannot be generalized to other populations than general psychiatric out- and day care-patients.

In summary, the DES, SDQ-20, and MID seem to be similar in their screening performance for DDs and DDNOS-I/DD in general psychiatric populations. However, suitable

cut-off scores in the DES seem to be substantially lower than previously suggested from studies with non-German versions of the DES. Regarding diagnostic accuracy, there is no advantage of DES and MID subscales over their corresponding summary scales. However, administering the DES subscales ‘absorption’ and the MID subscale ‘somatic symptoms’ instead of the entire DES and MID scale, respectively, could make a screening procedure more efficient without the loss of diagnostic accuracy.

Acknowledgments

The study was funded by the Center of Education and Research (COEUR), Psychiatric Services of the County of St. Gallen-North, Switzerland and the Fritz Rohrer Fonds, Zurich, Switzerland.

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Figure 1. Kernel density estimates of (A) the Dissociative Experiences Scale (DES), (B) Somatoform Dissociation Questionnaire (SDQ-20), and (C) Multidimensional Inventory of Dissociation (MID) in subjects without a dissociative disorder (*n* = 130), with any dissociative disorder (*n* = 30), and with a dissociative disorder not otherwise specified-I (DDNOS-I)/dissociative identity disorder (DID) (*n* = 22)

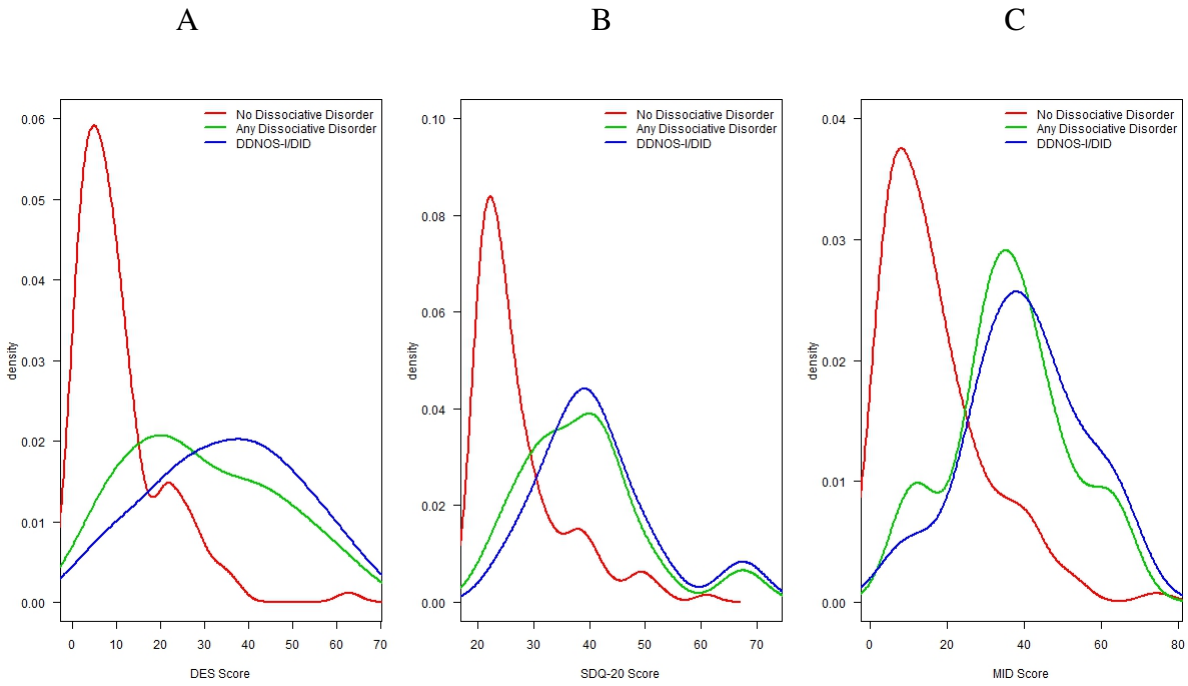

Figure 2. Receiver operating characteristics curves of the Dissociative Experiences Scale (DES), Somatoform Dissociation Questionnaire (SDQ-20), and Multidimensional Inventory of Dissociation (MID) in discriminating between subjects with versus without a dissociative disorder (A), and with versus without dissociative disorder not otherwise specified-I (DDNOS-I)/dissociative identity disorder (DID) (B)

A B

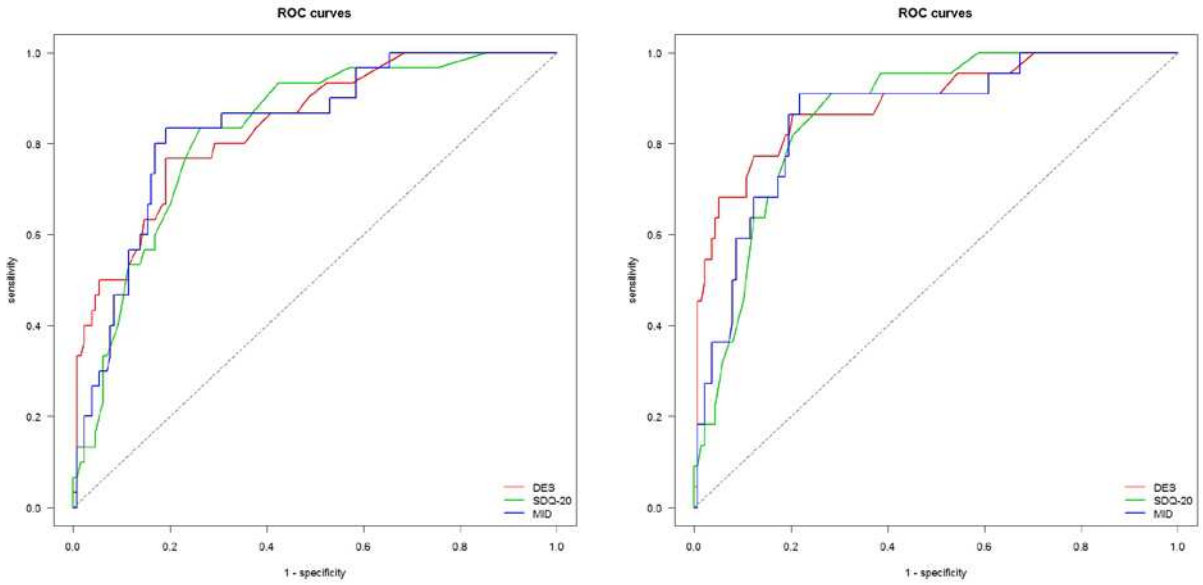

Table 1. Scores of the Dissociative Experiences Scale (DES), Somatoform Dissociation Questionnaire (SDQ-20), and Multidimensional Inventory of Dissociation (MID) in subjects without a dissociative disorder (Non-DD), any dissociative disorder (DD) and dissociative disorder not otherwise specified-I (DDNOS-I)/dissociative identity disorder (DID)

	Non-DD (n = 130)		DD (n = 30)		DDNOS-I/DID[a] (n = 22)	
Scale	Median	IQR	Median	IQR	Median	IQR
DES						
Summary	7.78	10.42	25.83	22.78	35.56	23.33
Absorption	12.22	17.22	40.56	30.28	46.11	32.78
Amnesia	1.88	6.25	8.75	24.38	15.63	29.38
Depersonalization/Derealization	2.50	11.25	23.33	29.17	28.33	26.67
SDQ-20						
Summary	25.00	8.00	39.00	11.00	39.00	11.25
MID						
Summary	13.72	16.50	35.57	16.86	40.33	20.21
Memory Problems	22.08	24.79	47.08	24.38	47.92	20.63
Depersonalization	15.00	23.96	44.58	21.88	44.58	25.00
Derealization	12.08	24.79	31.67	35.63	35.00	32.71
Flashbacks	14.17	30.21	48.75	38.96	46.67	38.75
Somatic Symptoms	6.67	10.83	24.17	25.21	27.50	27.50
Trance	11.67	16.46	28.75	27.92	38.33	31.46

All scales: DD, DDNOS-I/DID > Non-DD (ps < .001). IQR: interquartile range

[a]Note: The 22 DDNOS-I/DID subjects are a subset of the 30 DD subjects

Table 2. Inter-correlation matrix[a] among summary and dimension scores of the Dissociative Experiences Scale (DES), Somatoform Dissociation Questionnaire (SDQ-20), and Multidimensional Inventory of Dissociation (MID) in a sample of 160 psychiatric out- and day care-patients

Measure	1	2	3	4	5	6	7	8	9	10	11	12
DES												
1. Summary	-	.94	.80	.87	.74	.90	.68	.81	.78	.62	.82	.79
2. Absorption	.94	-	.64	.82	.74	.88	.64	.82	.78	.64	.77	.77
3. Amnesia	.80	.64	-	.64	.59	.69	.54	.55	.50	.46	.68	.52
4. Depersonalization/ Derealization	.87	.82	.64	-	.69	.83	.55	.80	.77	.56	.71	.73
SDQ-20												
5. Summary	-	-	-	-	-	.76	.56	.67	.63	.66	.79	.65
MID												
6. Summary	-	-	-	-	-	-	.75	.92	.86	.76	.86	.86
7. Memory Problems	-	-	-	-	-	.75	-	.63	.66	.49	.66	.61
8. Depersonalization	-	-	-	-	-	.92	.63	-	.88	.66	.77	.78
9. Derealization	-	-	-	-	-	.86	.66	.88	-	.60	.76	.76
10. Flashbacks	-	-	-	-	-	.76	.49	.66	.60	-	.66	.67
11. Somatic Symptoms	-	-	-	-	-	.86	.66	.77	.76	.66	-	.72
12. Trance	-	-	-	-	-	.86	.61	.78	.76	.67	.72	-

[a] Pearson r_s; all $p_s < .001$.

Table 3. Area under the curve (AUC) for the detection of any dissociative disorder (DD) and dissociative disorder not otherwise specified-I (DDNOS-I)/dissociative identity disorder (DID), respectively, by the Dissociative Experiences Scale (DES), Somatoform Dissociation Questionnaire (SDQ-20), and Multidimensional Inventory of Dissociation (MID)

	DD (n = 30)			DDNOS-I/DID (n = 22)		
Scale	AUC	95% CI		AUC	95% CI	
		Lower	Upper		Lower	Upper
DES						
Summary	.84	.74	.90	.89	.78	.95
Absorption	.84	.75	.91	.87	.77	.93
Amnesia	.75	.61	.85	.82	.66	.91
Depersonalization/Derealization	.83	.72	.90	.86	.74	.93
SDQ-20						
Summary	.82	.73	.89	.86	.78	.92
MID						
Summary	.84	.75	.90	.86	.76	.92
Memory Problems	.76	.64	.85	.83	.72	.90
Depersonalization	.82	.74	.89	.82	.72	.89
Derealization	.76	.65	.84	.78	.67	.87
Flashbacks	.81	.72	.87	.78	.67	.86
Somatic Symptoms	.84	.73	.90	.86	.77	.92
Trance	.81	.71	.88	.82	.72	.89

Table 4. Test performance of the Dissociative Experiences Scale (DES), the Somatoform Dissociation Questionnaire (SDQ-20), and the Multidimensional Inventory of Dissociation (MID) summary scales for the detection of any dissociative disorder (DD) and dissociative disorder not otherwise specified-I (DDNOS-I)/dissociative identity disorder (DID), respectively, at indicated cut-off scores providing a minimal sensitivity of .80 in a sample of 160 psychiatric out- and day care-patients

Scale	Cut-Off	Sensitivity	Specificity	PPV	NPV	PPV	NPV	PPV	NPV	CCR	Kappa
				Sample prevalence[a]		Prevalence = 10%		Prevalence = 1%			
DD (n = 30)											
DES	12	.80	.69	.38	.94	.22	.97	.03	1.00	.70	.33
SDQ-20	30	.83	.74	.42	.95	.26	.98	.03	1.00	.76	.42
MID	28	.80	.82	.51	.95	.33	.97	.04	1.00	.82	.51
DDNOS-I/DID (n = 22)											
DES	20	.82	.80	.40	.97	.32	.98	.04	1.00	.81	.43
SDQ-20	33	.82	.80	.39	.96	.31	.98	.04	1.00	.80	.42
MID	28	.86	.80	.40	.97	.32	.98	.04	1.00	.81	.45

[a]DD = 19%; DDNOS-I/DID = 14%. PPV: positive predictive value; NPV: negative predictive value; CCR: correct classification rate

Table 5. Agreement in the classification of dissociative disorder (DD) and dissociative disorder not otherwise specified-I (DDNOS-I)/dissociative identity disorder (DID), respectively, among the Dissociative Experiences Scale (DES), the Somatoform Dissociation Questionnaire (SDQ-20), and the Multidimensional Inventory of Dissociation (MID) at indicated cut-off scores providing a minimal sensitivity of .80 in a sample of 160 psychiatric out- and day care-patients

	DD (n = 30)			DDNOS-I/DID (n = 22)		
Scales	Kappa	95% CI		Kappa	95% CI	
		Lower	Upper		Lower	Upper
DES versus SDQ-20	.59	.45	.72	.62	.48	.75
DES versus MID	.63	.51	.75	.79	.67	.89
SDQ-20 versus MID	.61	.47	.73	.65	.52	.78

Supplemental Table 1. Item-total correlations[a] for the Dissociative Experiences Scale (DES), the Somatoform Dissociation Questionnaire (SDQ-20), and the Multidimensional Inventory of Dissociation (MID)

Item #	DES	SDQ-20	MID
1	.62	.40	.42[b]
2	.63	.58	.57
3	.67	.56	.61
4	.58	.46	.62
5	.59	.64	.66
6	.67	.51	.47
7	.55	.29	.53
8	.67	.52	.71
9	.73	.66	.69
10	.66	.45	.51[b]
11	.75	.41	.22[b]
12	.58	.47	.38[b]
13	.56	.53	.56
14	.62	.47	.63
15	.46	.57	.63
16	.56	.48	.65
17	.31	.30	.74

18	.62	.69	.50
19	.51	.61	.67
20	.46	.53	.49
21	.64	-	.35[b]
22	.47	-	.60
23	.70	-	.60
24	.53	-	.54
25	.66	-	.73
26	.70	-	.45[b]
27	.68	-	.60
28	.71	-	.71
29	-	-	.46[b]
30	-	-	.57
31	-	-	.69
32	-	-	.73
33	-	-	.56[b]
34	-	-	.73
35	-	-	.62[b]
36	-	-	.64
37	-	-	.64
38	-	-	.37[b]
39	-	-	.46

40	-	-	.45[b]
41	-	-	.74
42	-	-	.71
43	-	-	.51
44	-	-	.66
45	-	-	.72[b]
46	-	-	.45
47	-	-	.19[b]
48	-	-	.64
49	-	-	.64
50	-	-	.68
51	-	-	.16[b]
52	-	-	.39[b]
53	-	-	.41
54	-	-	.55[b]
55	-	-	.53[b]
56	-	-	.36
57	-	-	.63
58	-	-	.60
59	-	-	.40[b]
60	-	-	.47
61	-	-	.47

62	-	-	.58[b]
63	-	-	.21[b]
64	-	-	.46
65	-	-	.50[b]
66	-	-	.59
67	-	-	.27
68	-	-	.47[b]
69	-	-	.61
70	-	-	.40[b]
71	-	-	.41
72	-	-	.75
73	-	-	.61[b]
74	-	-	.64
75	-	-	.34[b]
76	-	-	.44
77	-	-	.58
78	-	-	.52
79	-	-	.50
80	-	-	.69
81	-	-	.61
82	-	-	.47
83	-	-	.71

84	-	-	.55
85	-	-	.62
86	-	-	.46
87	-	-	.61[b]
88	-	-	.42[b]
89	-	-	.72
90	-	-	.45
91	-	-	.62
92	-	-	.62
93	-	-	.29[b]
94	-	-	.38
95	-	-	.63
96	-	-	.48[b]
97	-	-	.54
98	-	-	.28[b]
99	-	-	.57
100	-	-	.59[b]
101	-	-	.59
102	-	-	.64
103	-	-	.71
104	-	-	.63
105	-	-	.52

106	-	-	.55
107	-	-	.66
108	-	-	.58
109	-	-	.54[b]
110	-	-	.38[b]
111	-	-	.61[b]
112	-	-	.72
113	-	-	.72
114	-	-	.69
115	-	-	.68
116	-	-	.69
117	-	-	.61
118	-	-	.59
119	-	-	.60
120	-	-	.68
121	-	-	.47[b]
122	-	-	.44
123	-	-	.50
124	-	-	.71[b]
125	-	-	.65
126	-	-	.36[b]
127	-	-	.62

128	-	-	.17[b]
129	-	-	.60
130	-	-	.45[b]
131	-	-	.63
132	-	-	.53[b]
133	-	-	.62
134	-	-	.50
135	-	-	.74[b]
136	-	-	.59
137	-	-	.56
138	-	-	.56
139	-	-	.56
140	-	-	.58
141	-	-	.69
142	-	-	.59[b]
143	-	-	.61
144	-	-	.55
145	-	-	.56
146	-	-	.67
147	-	-	.49
148	-	-	.72
149	-	-	.55

150	-	-	.52
151	-	-	.68
152	-	-	.57
153	-	-	.32[b]
154	-	-	.60
155	-	-	.49
156	-	-	.54
157	-	-	.36
158	-	-	.75
159	-	-	.57
160	-	-	.46
161	-	-	.73
162	-	-	.63
163	-	-	.25[b]
164	-	-	.56
165	-	-	.63
166	-	-	.58
167	-	-	.22[b]
168	-	-	.61
169	-	-	.60
170	-	-	.36
171	-	-	.59

172	-	-	.51
173	-	-	.49
174	-	-	.50
175	-	-	.57[b]
176	-	-	.43
177	-	-	.66
178	-	-	.27[b]
179	-	-	.48
180	-	-	.60
181	-	-	.50
182	-	-	.42[b]
183	-	-	.55
184	-	-	.55
185	-	-	.59
186	-	-	.51
187	-	-	.58
188	-	-	.66
189	-	-	.58
190	-	-	.63
191	-	-	.65
192	-	-	.52
193	-	-	.65

194	-	-	.53
195	-	-	.46
196	-	-	.60
197	-	-	.54
198	-	-	.62
199	-	-	.66
200	-	-	.68
201	-	-	.50
202	-	-	.62
203	-	-	.36
204	-	-	.45
205	-	-	.41
206	-	-	.39[b]
207	-	-	.66
208	-	-	.63
209	-	-	.65
210	-	-	.64
211	-	-	.60
212	-	-	.70
213	-	-	.57[b]
214	-	-	.59
215	-	-	.69

216	-	-	.44
217	-	-	.55
218	-	-	.56

[a]Pearson r_s; all $p_s < .05$. [b]item of validity scales

Supplemental Table 2. Cut-off scores and test performance of the Dissociative Experiences Scale (DES), the Somatoform Dissociation Questionnaire (SDQ-20), and the Multidimensional Inventory of Dissociation (MID) summary scales for the detection of any dissociative disorder (DD) and dissociative disorder not otherwise specified-I (DDNOS-I)/dissociative identity disorder (DID), respectively, at various selected cut-off scores in a sample of 160 psychiatric out- and day care-patients with a proportion of 18.8% (N = 30) dissociative disorders (DD) and 13.8% (N=22) dissociative disorder not otherwise specified-I (DDNOS-I)/dissociative identity disorder (DID)

	DD						DDNOS-I/DID					
Cut-Off[a]	Sensitivity	Specificity	PPV	NPV	CCR	Kappa	Sensitivity	Specificity	PPV	NPV	CCR	Kappa
						DES						
10	.87	.59	.33	.95	.64	.28	.91	.57	.25	.98	.62	.23
11	.80	.65	.34	.93	.66	.29	.86	.63	.27	.97	.66	.26
12[b]	**.80**	**.69**	**.38**	**.94**	**.70**	**.33**	.86	.67	.30	.97	.70	.30
13	.77	.72	.38	.93	.73	.36	.86	.70	.32	.97	.73	.33
14	.77	.75	.42	.93	.74	.37	.86	.74	.35	.97	.76	.37

15	.77	.78	.44	.94	.78	.42	.86	.76	.37	.97	.78	.40
16	.77	.78	.45	.94	.78	.43	.86	.77	.37	.97	.78	.41
17	.77	.79	.46	.94	.79	.44	.86	.78	.38	.97	.79	.42
18	.77	.80	.47	.94	.79	.46	.86	.78	.39	.97	.79	.43
19	.73	.81	.47	.93	.79	.44	.86	.80	.40	.97	.81	.45
20	.67	.81	.44	.91	.78	.4	**.82**	**.80**	**.40**	**.97**	**.81**	**.43**
21	.63	.83	.46	.91	.79	.41	.77	.83	.41	.96	.82	.44
22	.57	.86	.49	.90	.81	.40	.77	.87	.49	.96	.86	.51
23	.53	.88	.52	.89	.82	.41	.73	.89	.52	.95	.87	.53
24	.50	.89	.52	.89	.82	.40	.68	.90	.52	.95	.87	.51
25	.50	.89	.52	.89	.82	.40	.68	.90	.52	.95	.87	.51
26	.50	.91	.56	.89	.83	.42	.68	.91	.56	.95	.88	.54
27	.50	.92	.60	.89	.84	.45	.68	.93	.60	.95	.89	.58
28	.50	.95	.68	.89	.86	.50	.68	.95	.68	.95	.91	.63

29	.47	.95	.70	.89	.86	.48	.64	.96	.70	.94	.91	.62
30	.47	.95	.70	.89	.86	.48	.64	.96	.70	.94	.91	.62
31	.47	.95	.70	.89	.86	.47	.59	.96	.72	.94	.91	.60
32	.43	.96	.72	.88	.86	.43	.55	.96	.71	.93	.91	.56
33	.40	.96	.71	.87	.87	.47	.55	.98	.80	.93	.92	.60
34	.40	.98	.80	.88	.87	.47	.55	.98	.80	.93	.92	.60
35	.40	.98	.80	.88	.87	.47	.55	.98	.80	.93	.92	.60
						SDQ-20						
25	.93	.49	.30	.97	.58	.23	.95	.47	.22	.98	.54	.18
26	.93	.58	.34	.97	.64	.30	.95	.55	.25	.99	.61	.23
27	.87	.63	.35	.95	.68	.32	.95	.62	.28	.99	.66	.29
28	.83	.65	.36	.94	.69	.32	.91	.64	.29	.98	.68	.29
29	.83	.69	.38	.95	.72	.36	.91	.67	.31	.98	.71	.32
30	**.83**	**.74**	**.42**	**.95**	**.76**	**.42**	.91	.72	.34	.98	.74	.37

31	.77	.77	.43	.93	.77	.41	.86	.75	.36	.97	.74	.37
32	.77	.77	.43	.93	.77	.41	.86	.75	.36	.97	.77	.39
33	.67	.80	.43	.91	.78	.39	**.82**	**.80**	**.39**	**.96**	**.80**	**.42**
34	.63	.82	.44	.91	.78	.38	.77	.81	.40	.96	.81	.42
35	.60	.83	.45	.90	.79	.38	.73	.83	.40	.95	.81	.41
36	.57	.83	.44	.89	.78	.36	.68	.83	.38	.94	.81	.38
37	.57	.85	.47	.90	.80	.39	.68	.85	.42	.94	.83	.42
38	.53	.86	.47	.89	.80	.38	.64	.86	.41	.94	.83	.40
39	.53	.88	.52	.89	.82	.41	.64	.88	.45	.94	.84	.44
40	.40	.91	.50	.87	.82	.41	.45	.90	.42	.91	.84	.44
						MID						
10	.97	.36	.26	.98	.48	.16	.95	.34	.19	.98	.43	.11
11	.97	.42	.28	.98	.52	.19	.95	.39	.20	.98	.47	.13
12	.90	.46	.28	.95	.54	.19	.91	.44	.21	.97	.51	.14

13	.87	.48	.28	.94	.55	.19	.91	.46	.21	.97	.53	.16
14	.87	.53	.30	.95	.59	.23	.91	.51	.23	.97	.57	.19
15	.87	.56	.31	.95	.62	.25	.91	.54	.24	.97	.59	.21
16	.87	.60	.33	.95	.65	.29	.91	.58	.26	.98	.63	.24
17	.87	.62	.34	.95	.66	.30	.91	.59	.26	.98	.64	.25
18	.87	.64	.36	.95	.68	.33	.91	.62	.27	.98	.66	.27
19	.87	.68	.38	.96	.71	.37	.91	.65	.29	.98	.69	.30
20	.87	.69	.39	.96	.73	.38	.91	.67	.30	.98	.70	.31
21	.83	.71	.40	.95	.73	.38	.91	.69	.32	.98	.72	.34
22	.83	.72	.40	.95	.74	.39	.91	.70	.32	.98	.73	.34
23	.83	.74	.42	.95	.76	.42	.91	.72	.34	.98	.74	.37
24	.83	.76	.45	.95	.78	.45	.91	.74	.36	.98	.76	.39
25	.83	.78	.46	.95	.79	.47	.91	.75	.37	.97	.78	.41
26	.83	.78	.47	.95	.79	.48	.91	.76	.38	.97	.78	.42

27	.80	.81	.49	.95	.81	.49	.86	.78	.39	.97	.79	.43
28	**.80**	**.82**	**.51**	**.95**	**.82**	**.51**	**.86**	**.80**	**.40**	**.97**	**.81**	**.45**
29	.73	.84	.51	.93	.82	.49	.77	.81	.40	.98	.81	.42
30	.70	.84	.50	.92	.81	.47	.73	.81	.38	.98	.80	.39

[a]Values in the table are calculated for scores greater than or equal to the cut-off score.

[b]Values at the cut-off score providing a minimal sensitivity of .80 are presented in boldface

PPV: positive predictive value; NPV: negative predictive value; CCR: correct classification rate