

Exploration of the Diagnostic Classification of Orthorexia Nervosa: Distinct Disorder, Anorexia Nervosa or Obsessive-Compulsive Disorder?

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Research Article

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Abstract

Purpose

Orthorexia Nervosa (ON) is characterised as obsessional healthy eating that results in malnutrition and/or psychosocial impairment. Yet, its diagnostic classification remains uncertain, with theoretical overlap with Anorexia Nervosa (AN) and Obsessive-Compulsive Disorder (OCD). This study aimed to further understand appropriate diagnostic classification by assessing the ability of ON for detecting the presence/absence of AN and OCD.

Method

An observational survey was completed by 362 participants recruited through eating-disorder, dieting and mental health support groups. Receiver Operating Characteristics (ROC) curve analyses determined the predictive ability of ON symptoms (assessed by ORTO-15 and ORTO-9) for detecting AN (determined by EAT-26 cut-scores and BMI >17.5), and OCD and Obsessional thinking (assessed by the OCI-R).

Results

Results showed both ON measures are able to adequately predict AN, however ON was poor to moderate at detecting OCD and Obsessional thinking. Specificity for detecting AN was poor and ability to discriminate between AN and ON was low.

Conclusion

These results suggest that ON, as it is currently measured, may be more closely related to EDs than OCD, and that ON may represent a subtype or subset of AN; although results are limited by the lack of definitive ON diagnostic criteria and limitations of ON measures.

Level of evidence – Level V, cross-sectional descriptive study

What Is Already Known On This Subject?

It is clear that ON has theoretical overlap with both AN and OCD. While theorised as related to eating behaviour and often considered within the diagnostic classification of EDs, ON also has core features, such as obsessional thinking, which suggest that ON might also fit within the obsessive-compulsive spectrum of disorders. While evidence suggests ON might better be classified as an ED, findings remain mixed and it is also unclear if ON might represent a distinct disorder, or subtype of AN.

What This Study Adds?

This study adds to the uncertain findings regarding the diagnostic classification of ON. Our results suggest that ON is better at detecting AN than OCD and obsessional thinking, suggesting the ON has

more diagnostic overlap with AN and might better be classified as an eating disorder than an obsessive-compulsive disorder. The limited ability of ON to discriminate from AN suggest that ON might represent a subtype of AN and may also exist on the spectrum from healthy eating to AN. This study suggests that ED treatments might be more suitable for those presenting with ON.

Introduction

Orthorexia Nervosa (ON) is a proposed psychiatric disorder characterised by an obsessive preoccupation with “healthy” food that leads to malnutrition and/or psychosocial impairment [1]. Although not yet recognised as a formal diagnosis, health professionals consider ON to be a presentation of clinical relevance [2] that impinges on quality of life [3]. In order to move towards formal recognition of the disorder, there is a need to clarify the appropriate diagnostic classification of ON. However, there remains a lack of clarity regarding classification, as ON has theoretical overlap both with Anorexia Nervosa (AN) and Obsessive-Compulsive Disorder [OCD; 4]. It remains unclear how ON would best be classified, and whether ON represents a distinct disorder or a subtype of existing diagnoses [5]. Therefore, ongoing exploration of ON is needed in order to guide diagnostic classification.

There remains no agreed upon diagnostic criteria, however, an obsessional preoccupation with health, distress at non-adherence to self-imposed rules, and psychosocial impairments have been proposed [1]. Due to the lack of clear criteria and limited assessment tools [4, 6], prevalence estimates vary widely. More conservative estimates suggest a rate of around 6% [6, 7]. While the true prevalence remains difficult to ascertain, ON affects a proportion of the population and thus warrants further understanding to inform future diagnosis and treatment.

Debate remains as to whether ON constitutes a distinct ED or a subtype of AN. ON is frequently reported as being closely related to AN, with both characterised by restrictive diets, and feelings of guilt over food transgressions [4], impairments in psychosocial functioning, and malnutrition [8]. ON is also associated with perfectionism, appearance orientation, weight concerns, drive for thinness, and negative body evaluation; all of which are typical of AN [9-11]. However, the eating behaviours have been shown to be dissimilar between ON and AN [8]. In ON, the focus is on food quality rather than quantity, and the preoccupation is on maximising health rather than weight or shape [4]. Further, in ON, individuals typically flaunt their eating habits rather than conceal them [7]; all of which suggests that ON and AN may be related but distinct. The relationship between ON and AN appears complex and the literature is yet to adequately discern if ON is distinct from AN.

It has also been proposed that ON might better be classified within the obsessive-compulsive spectrum of disorders [5, 12]. ON appears to share as many symptoms with OCD as it does with AN, with ON characterised by obsessional thoughts, ritualised food preparation, and a focus on contamination [4]. However, ON theoretically differs from OCD in that individuals have ego-syntonic thoughts and tend not to exhibit obsessions and compulsions beyond food [4]. To date, ON research has largely focused on behaviour rather than cognitions [13], limiting understanding of the obsessional

features of ON that would help determine the overlap with OCD. The extent to which ON might be classified within OCD and related disorders thus remains unclear.

Of the few studies that have examined ON in relation to OCD and AN, ED symptoms have been shown to predict larger amounts of variance in ON than OCD symptoms [3] and ON is not related to OCD symptoms after adjustment for ED [8, 14]. While these findings suggest that ON might better fit within an ED framework, contrasts between ON and EDs as well as theoretical overlaps with OCD remain. ON is also characteristically different to EDs and obsessive-compulsive spectrum disorders, making diagnostic classification difficult to discern. Therefore, this study aims to further add to understanding around a) if ON is better classified as an ED or obsessive-compulsive spectrum disorder, and b) if ON may represent a distinct disorder. This will be achieved by determining if ON measures can adequately detect the presence/absence of AN and OCD, which would indicate diagnostic overlap or distinction.

Method

Participants

In total 362 participants aged 18 and over who self-identified as engaging in dieting behaviours and/or having experienced mental health symptoms took part in the study.

Measures

Demographic data including age, gender, highest education (high school, vocational training, graduate, postgraduate, other), geographic location (rural, remote, metropolitan), and self-reported height (cm) and weight (Kg) were collected. Body Mass Index was calculated by dividing self-reported weight by height in metres squared.

Orthorexia Nervosa

The ORTO-15 was used to measure ON [15]. It consists of 15 items that assess beliefs about the perceived effects of eating health food, attitudes governing food selection, habits of food consumptions and the extent to which food concerns influence daily life. Responses are recorded on a four-point Likert scale, with *lower* score indicating more severe symptoms. Various cut-scores have been proposed in the literature, including 40 and 35 [see 15, 16, 17]. Poor to adequate internal consistency has been reported previously [e.g., 18], consistent with this study ($\alpha = .402$). A shortened version, the ORTO-9, which uses nine of the original items has been proposed as an alternative, and is considered preferable for categorical diagnosis with a cut-score of 26 [19]. Internal consistency in the present study for ORTO-9 was $\alpha = .702$. Despite these psychometric limitations, the ORTO-15 is the most commonly used tool to measure ON [1, 7].

Anorexia Nervosa

The 26-item Eating Attitudes Test (EAT-26) was used to assess eating behaviours characteristic of AN and other EDs [20]. Responses are rated on a six-point Likert scale with higher scores indicating greater symptom severity (range 0-78). A cut-score of 20 is most commonly used and has high specificity [21]. The EAT-26 has good concurrent, criterion and discriminant validity [22], as well as high internal consistency [$\alpha = .900$; 20]; consistent with this sample ($\alpha = .928$).

Obsessive-Compulsive Disorder

The 18-item Revised Obsessive-Compulsive Inventory (OCI-R) was used to assesses OCD [23]. Frequency of experiencing symptoms are reported on a five-point Likert scale with higher scores indicating greater symptom severity. The measure was developed according to the DSM-IV criteria and includes Hoarding symptoms. To reflect the changes in DSM-5 with Hoarding now a distinct disorder [24], a 15-item version (OCI-OCD) that eliminates three items pertaining to Hoarding has been validated for assessing OCD, with a cut-score of 12 proposed [25]. In addition, the measure can produce subscales, including an Obsessional thinking scale (3 items), with a cut-score of 5 for this subscale [23]. The OCI-OCD has shown to have good convergent and discriminant validity [25]. The scale has excellent internal consistency ($\alpha = .929$), as does the Obsessions subscale ($\alpha = .903$).

Procedure

Ethics approval was granted by the University of New England Human Research Ethics Committee. Participants were recruited through social media sites of mental health foundations, eating disorder groups, OCD-support groups, dieting groups, and eating and mental health related support groups. Interested participants were directed to an online survey hosted by Qualtrics, which took approximately 20 minutes.

Data Analysis

To determine if ON measures are able to predict the presence/absence of AN and OCD in order to provide an indication of the diagnostic classification of ON, Receiver Operating Characteristics (ROC) curve analyses were conducted using SPSS version 26. The Area Under the Curve (AUC) was used to ascertain the predictive ability of the ORTO-15 for predicting presence of AN and OCD. A diagnosis of AN was determined as those with an EAT-26 score above clinical cut-off and a BMI less than 17.5 [as per DSM-5 criteria for low body weight; 24]. A diagnosis of OCD was determined as those scoring above cut-off on the OCI-OCD. Sensitivity, specificity, PPV and NPV are reported for the ORTO cut-scores established in the literature, in addition to the best cut-scores on the measures for predicting AN and OCD, as determined by the Youden Index [26]. Power for conducting ROC analyses, has been proposed as needing at least 10 participants with a diagnosis, 10 without a diagnosis, 10 false positives and 10 false negatives [27]. Due to a lack of agreed upon diagnostic criteria or validated diagnostic interview for ON, a final determination of false positives and negatives for ON was not possible. However, given that there were over 10 cases for presence and absence of each diagnosis (see Table 1), the large sample, and the study aims, it was considered appropriate to conduct the ROC analyses.

Due to the low internal validity and questionable psychometric properties of the ORTO-15, secondary analyses were conducted using the ORTO-9. Due to the core overlapping feature of ON and OCD being related to obsessions [4], secondary analyses were also conducted examining the predictive ability of the ORTO-15 and ORTO-9 for predicting Obsessional thinking. Not all respondents completed the OCI-R, however, data were missing at random and there were no significant demographic differences between those who did and did not complete each measure. Therefore, all available data were used for each analysis (OCI-OCD, $n=269$, obsessions subscale, $n=274$).

Results

A large proportion of the sample met threshold for ON, with higher rates of ON observed in the sample than AN and OCD (see Table 1). Participant age ranged from 18 to 65 ($M=32.87$, $SD=10.46$) and Body Mass Index ranged from 11.65 to 46.38 ($M=25.66$, $SD=6.05$).

Diagnostic Predictability

Anorexia Nervosa

The ORTO-15 showed an acceptable but modest [28] area under the curve (AUC) of .687, 95% CI [.533, .842]). The ORTO-9 displayed a good AUC of .756, 95% CI [.643, .840] (see Figures 1 and 2). No cut-scores on either measure provided an acceptable balance of sensitivity and specificity, with all Youden Index scores remaining below 50% (see supplementary information). A cut-score of 23 on the ORTO-9 achieved the best Youden Index, although this remained low, and specificity was poor (see Table 2). The conservative cut-score of 35 for the ORTO-15 had the highest Youden Index on the ORTO-15, however, sensitivity was low. Based on established cut-scores, of 26 and 40, both the ORTO-9 and ORTO-15 displayed good sensitivity and NPV for AN, however, specificity was poor and there was a large false positive rate.

Obsessive-Compulsive Disorder

For predicting OCD, the AUC for the ORTO-15 was modest [28] .651, 95% CI [.584, .718]. The ORTO-9 displayed a slightly higher AUC of .701, 95% CI [.638, .763] (see Figures 3 and 4). Overall, no cut-scores on the ORTO-9 or ORTO-15 showed an acceptable balance of sensitivity and specificity, with the ORTO-15 especially poor at classifying OCD (see supplementary information). On the ORTO-9 and ORTO-15, scores of 21 and 38, respectively, had the highest Youden Index. However, these cut-scores still performed poorly, especially on sensitivity, for detecting OCD (see Table 3). The ORTO-9 score of 26 and the ORTO-15 cut-score of 40 displayed good sensitivity and adequate NPV for OCD but poor specificity, while the ORTO-15 cut-score of 35 had low sensitivity.

Figures 5 and 6 display the ROC curves for the ORTO-15 and ORTO-9 predicting Obsessional thinking. For the ORTO-15, AUC was .579, 95% CI [.506, .652] and thus little better than chance. The ORTO-9 displayed

an acceptable but modest AUC of .643, 95% CI [.574, .711]. A cut-score of 23 on the ORTO-9 and 37 on ORTO-15 produced the highest Youden Index. However, neither measure had any cut-scores that balanced sensitivity and specificity (see supplementary information). Overall, the established cut-scores for ORTO-9 and the ORTO-15 displayed adequate sensitivity and NPV for Obsessional thinking (see Table 4), however, specificity and PPV were poor. The ORTO-15 cut-score of 35 was poor at predicting the presence of Obsessional thinking.

Discussion

This study aimed to contribute to the literature regarding the diagnostic classification for ON and builds on the limited research examining ON in relation to EDs and OCD. ON provided an acceptable ability to detect AN with high sensitivity for proposed cut-scores, whereas detection of OCD was moderate, and poor for Obsessional thinking. The marginally better ability to detect AN than OCD or Obsessional thinking suggests that ON may have more overlap with AN. The current findings build on prior correlational research [8, 14] and suggest that ON may be better classified as an ED rather than obsessive-compulsive spectrum disorder. However, the findings also suggest only limited ability for discriminating between ON and AN. The findings also provide further support for the improved consistency and predictive ability of the ORTO-9 over the ORTO-15 [19]. The findings contribute to the mixed research regarding possible diagnostic classification of ON.

In the present study, measures of ON were sensitive to detecting AN and the rate of false negatives was low, however, ON measures showed reduced specificity and a high rate of false positives. It appears that ON, as measured by the ORTO-15 and ORTO-9, has a moderate ability to predict the presence of AN, but lacks ability to discriminate ON from AN. While the ORTO-9 was better at detecting AN than the ORTO-15, and a possible cut-score of 23 rather than 26 on the ORTO-9 was preferable for detecting AN, low discrimination between ON and AN remained. This may reflect limitations of the ON measures, but might also suggest that ON is not actually distinct from AN and may represent a subtype or subset of AN. Therefore, while there are some theoretical and behavioural differences between ON and AN [4, 8], the observed similarities between the two [9] may be more central. Alternatively, an improved measure and refined diagnostic criteria of ON might better highlight distinction from AN.

Further, the ORTO-15 and -9 had very poor positive predictive ability with a high rate of false positives. Thus, ON measures appear to be poor at discriminating between pathological and nonpathological healthy eating; as has previously been argued [4]. It has been argued that definitions of ON typically lack consideration of impairment, and where an impairment criterion is applied, ON prevalence is notably lower [6, 7, 29]. Taken together, these results suggest the need for clearer consideration of functional impairment in diagnostic criteria and assessment of ON, supporting the criteria proposed by Cena et al. [1]. Sensitivity to detecting AN but inability to discriminate between pathological and non-pathological eating habits also indicate the possibility that ON may reside on the ED spectrum between healthy eating and AN. This is consistent with research that indicates ON as causing impairment only for non-ED samples [10, 11, 30], and the presence of ON symptoms during recovery from AN [31].

The ability for ON to detect OCD was above chance, and for the ORTO-9, AUC was within the recommended range for health research [28], suggesting some diagnostic overlap between ON and OCD. However, sensitivity and specificity were limited and no suitable cut-scores identified, suggesting limited ability to detect OCD. Notably, while the core overlapping feature of OCD and ON is Obsessional thinking, our findings suggested that assessment of ON was poor at detecting Obsessional thinking with AUC of close to chance. These results provide some support for previous studies suggesting that ON and OCD are distinct phenomena [4, 5] and might suggest that that ON is not aligned with the obsessive-compulsive spectrum. This finding also sheds some question over obsessional thinking as the defining characteristic of ON [32]. Conversely this finding may simply reflect limitations in the understanding of obsessional thinking style in ON, and that ON measures focus on behaviours at the expense of obsessional cognitions [33]. The moderate ability of the ON measures to detect OCD but poor sensitivity and specificity of any cut-scores may reflect that measures were detecting distress, as would be present in both disorders, or may also reflect the comorbidity rates between EDs more generally and OCD [34]. While it remains plausible that ON may overlap with OCD, ongoing research further exploring relationships with OCD and, in particular, obsessional thinking around food in ON is needed.

Strengths And Limitations

This study presents a novel exploration of ON in order to explore diagnostic classification with both AN and OCD. Interpretation of results should, however, be considered in relation to the limitations of this study. Assessment of ON is limited, partly due to a lack of agreed upon diagnostic criteria. Despite being the most commonly used tool for ON research [1], the psychometric properties of the ORTO-15 remain limited, with poor internal consistency observed. To further assess findings, secondary analyses were conducted with the ORTO-9, which showed stronger predictive ability. However, results observed here may simply reflect the quality of the ON assessment tools and what symptoms are assessed. McComb and Mills [35] argued that the ORTO-15 does not provide a measure of impairment and thus only assesses healthy eating behaviours, which might partially explain the high false positive rates observed with AN, rather than conceptual overlap between ON and AN.

Additionally, screening tools were used to determine the presence/absence of all disorders rather than gold standard diagnostic interview, again limiting the strength of conclusions. A lack of agreed upon diagnostic criteria for ON limits ability to examine a definitive ON diagnosis (and adequately assess power). The lack of agreed diagnostic criteria and assessment tools remains a limitation of ON research and underscores the need for ongoing attempts to better understand classification, improve assessment and agree on criteria. Lastly, there was a disproportionate number of females compared to males in the study, which may reflect that EDs are more prevalent amongst females, although gender differences for ON have been inconsistent [1].

Conclusion

The current study identified that ON, as it is currently conceptualised and assessed, can adequately predict the presence of AN more so than OCD and Obsessional thinking, suggesting ON may be better classified as an ED. Moreover, limited specificity and low PPV indicates that ON measures have poor ability to discriminate between ON and AN. This suggests that ON may represent a subset of AN, and also underscores the need for ON assessment to better measure impairment to differentiate ON from healthy eating. It is possible that the current conceptualisation of ON may reside on the ED spectrum between non-pathological healthy eating and AN, although, the exact placement as a distinct ED or AN subtype continues to remain unclear due to limitations of ON assessment tools. Results suggest that individuals presenting with ON would likely benefit from ED treatment more so than treatment tailored for OCD.

Declarations

Competing Interests

The authors have no conflicts of interest to declare that are relevant to the content of this article.

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Ethics approval and consent

Ethics approval was gained from the University of New England Human Research Ethics Committee. The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki. All participants provided informed consent.

Data Availability

The data are available from the authors upon request

Author contributions

All authors contributed to study conceptualisation, interpretation of results and preparation of the manuscript. SC complete study development, JO completed data collection. SC and JO undertook data analysis, with guidance from PT.

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Tables

Table 1

<i>Sample Characteristics</i>		
	M(SD)	N (%)
Gender		
Female		286 (79.4)
Male		70 (19.4)
Neither/withheld		6 (1.6)
Location		
Metropolitan		217 (59.9)
Rural		134 (37.0)
Remote		11 (3.0)
Education		
Postgraduate Studies		64 (17.7)
Graduate Studies		134 (39.5)
Vocational Training		68 (18.8)
High School		85 (23.5)
Did not complete High School		2 (0.6)
Orthorexia		
ORTO-15 <40	38.15 (4.67)	242 (66.9%)
ORTO-15 <35		103 (28.5%)
ORTO-9	22.80 (4.55)	286 (79.0%)
Anorexia Nervosa		
EAT-26	13.30 (14.17)	95 (26.2%)
EAT-26 and BMI <17.5		12 (3.3%)
Obsessive-Compulsive Disorder		
OCI-OCD	12.56 (11.65)	95 (26.2%)
Obsessions Subscale	3.58 (3.42)	94 (26%)

Table 2 <i>Sensitivity and Specificity for predicting AN</i>				
	ORTO-15 <40	ORTO-15 <35	ORTO-9 <26	ORTO-9<23
Anorexia Nervosa				
Sensitivity	83.3%	58.3%	100%	91.7%
1- Specificity	66.3%	27.4%	78.3%	50.6%
Youden Index	0.17	0.31	0.22	0.41
PPV	4.1%	6.8%	4.2%	5.9%
NPV	98.3%	98.1%	100%	99.4%
PPV = positive predictive value, NPV = negative predictive value				

Table 3 <i>Sensitivity and Specificity for predicting OCD.</i>					
	ORTO-15 <40	ORTO-15 <38	ORTO-15 <35	ORTO-9 <26	ORTO-9 <21
Sensitivity	81.7%	65.1%	44.0%	93.6%	56.9%
1- Specificity	66.9%	43.1%	25.6%	77.5%	26.9%
Youden Index	0.15	0.22	0.18	0.16	0.30
PPV	45.4%	50.7%	53.9%	45.1%	59.0%
NPV	72.6%	70.5%	66.1%	83.7%	71.3%
PPV = positive predictive value, NPV = negative predictive value					

Table 4
Sensitivity and Specificity for predicting Obsessions

	ORTO-15 <40	ORTO-15 <37	ORTO-15 <35	ORTO-9 <26	ORTO-9 <23
Obsessional Thinking					
Sensitivity	76.6%	52.1%	40.4%	89.4%	70.2%
1- Specificity	70.0%	37.2%	28.3%	79.4%	48.3%
Youden Index	0.07	0.15	0.12	0.10	0.22
PPV	36.4%	42.2%	42.7%	37%	43.1%
NPV	71.1%	71.5%	69.7%	78.7%	76.9%

PPV = positive predictive value, NPV = negative predictive value

Figures

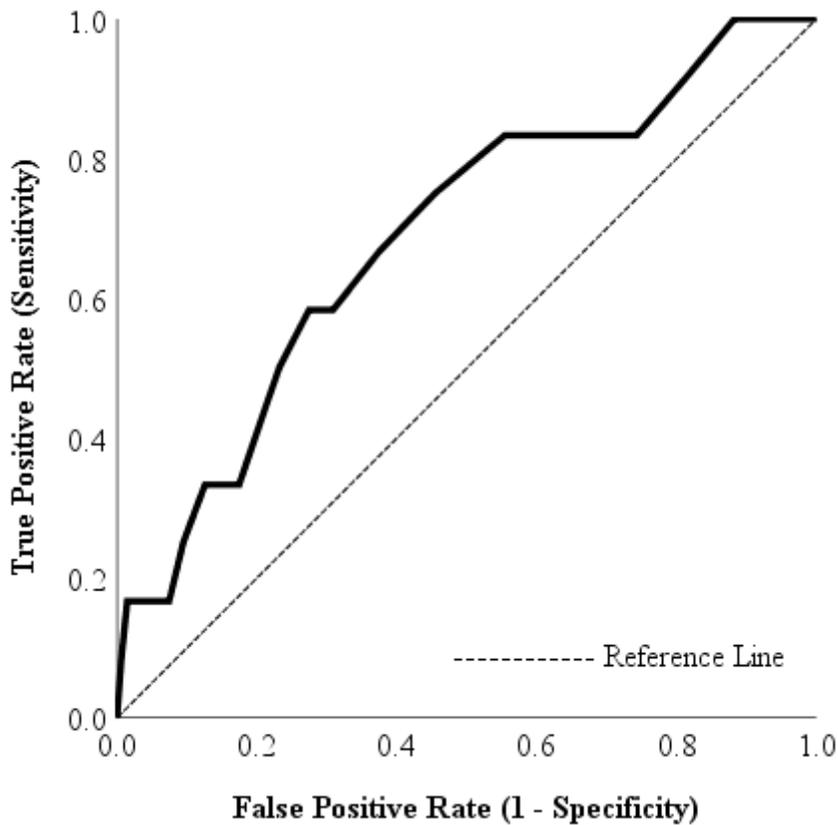


Figure 1

ORTO-15 Predicting AN

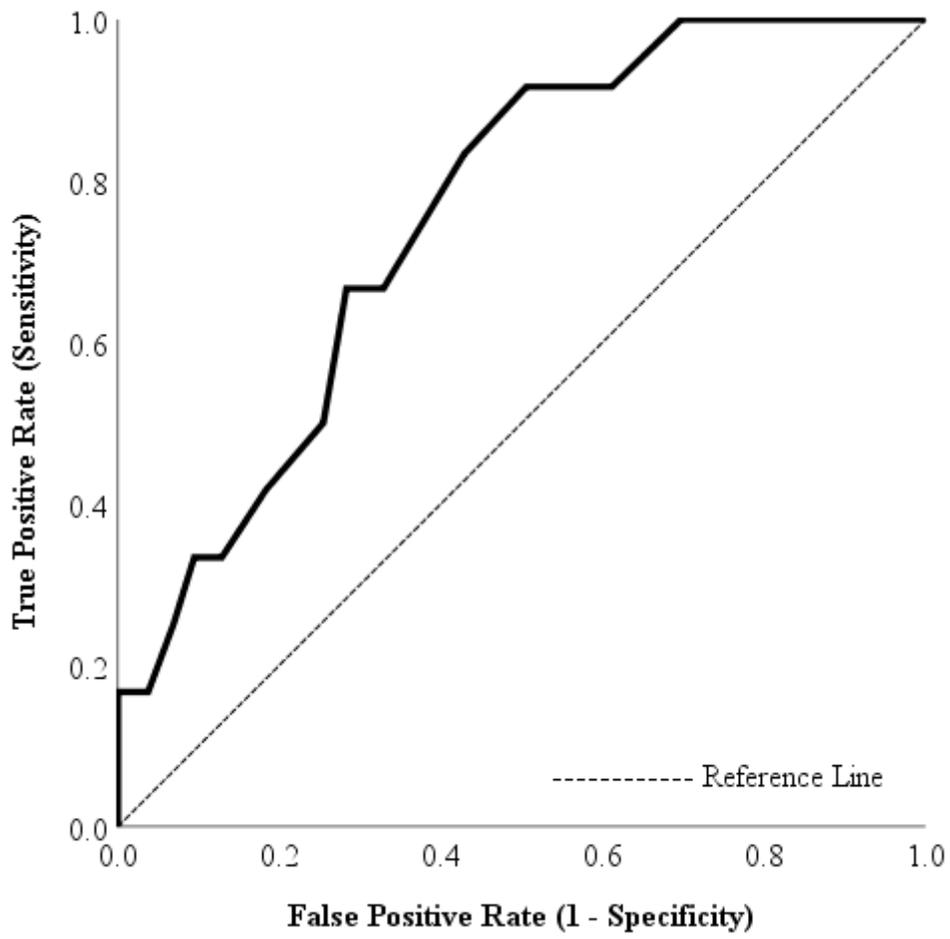


Figure 2

ORTO-9 Predicting AN

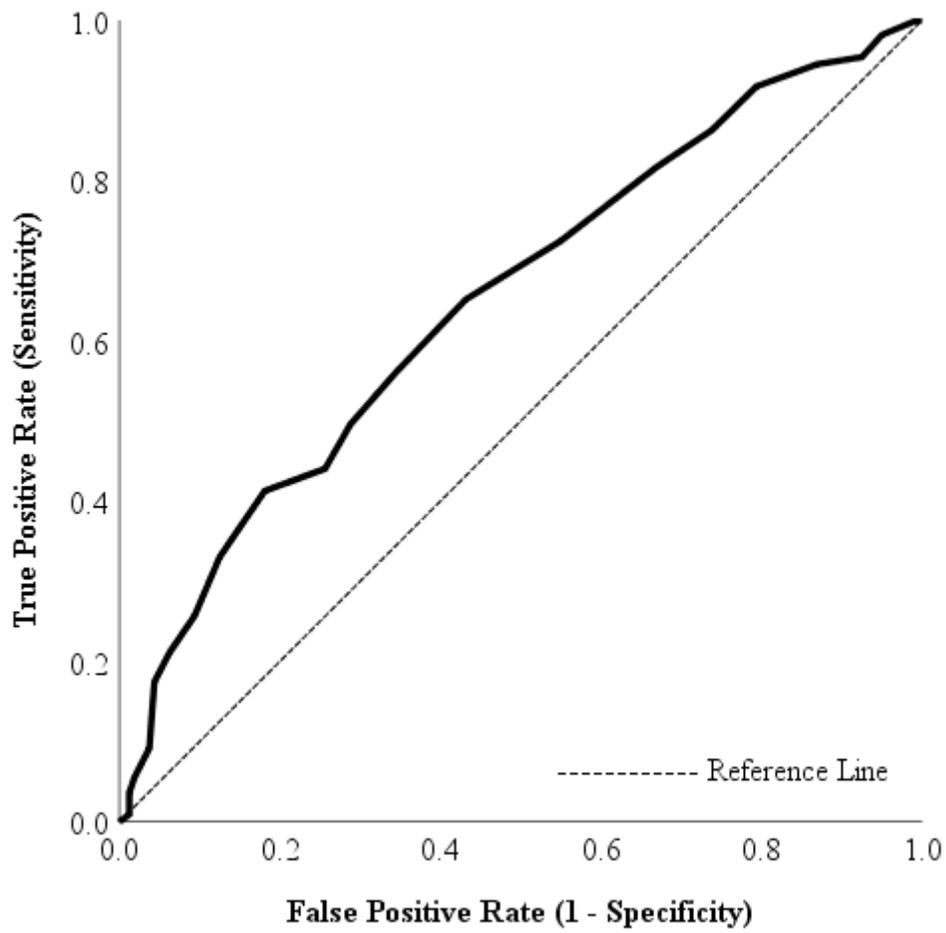


Figure 3

ORTO-15 Predicting OCD

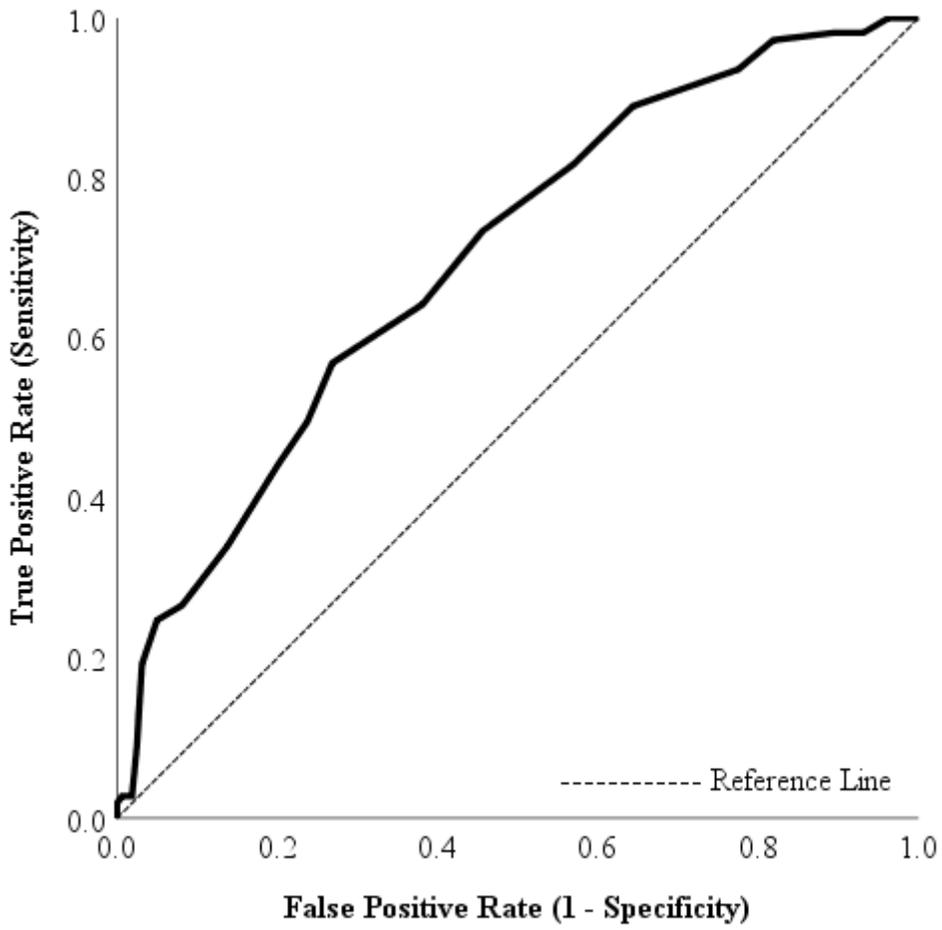


Figure 4

ORTO-9 Predicting OCD

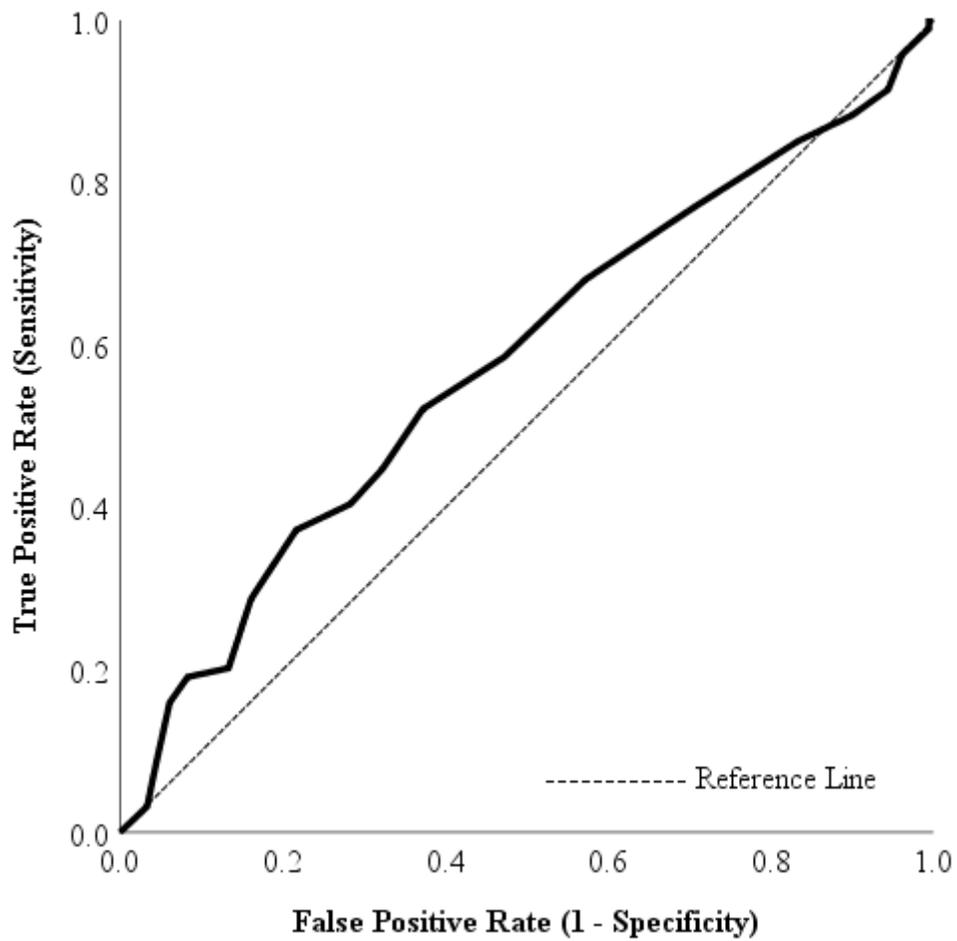


Figure 5

ORTO-15 Predicting Obsessions

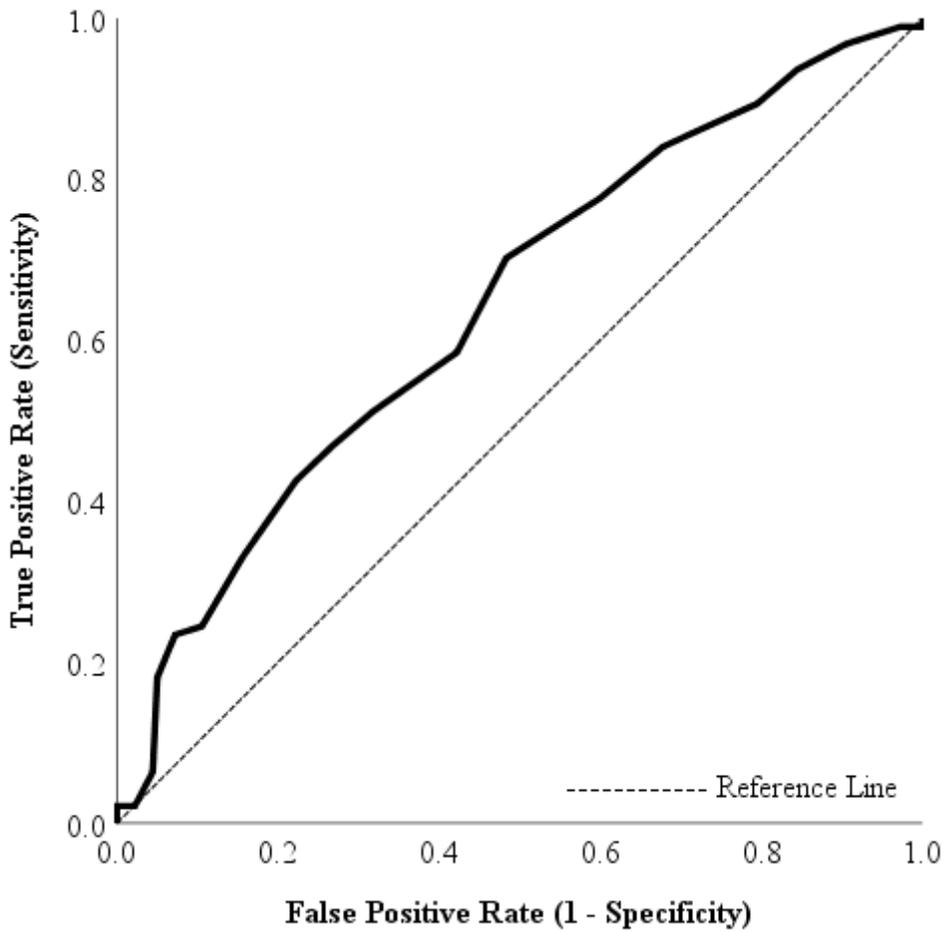


Figure 6

ORTO-9 Predicting Obsessions

Supplementary Files

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