The Obsessive Compulsive Symptom (OCS) Scale of the Child Behavior Checklist:

a comparison between Swedish children with Obsessive-Compulsive Disorder from a

specialized unit, regular outpatients and a school sample

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1

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Abstract

To evaluate the discriminative power of various items as reported by parents in the OCS-scale extracted from the Child Behavior Checklist (CBCL) problem scale and to compare findings with outcomes of previous validation studies.

Children referred to a specialized child psychiatric Obsessive-Compulsive Disorder (OCD) clinic (OCD group)(n=185) receiving a formal OCD diagnosis according to DSM IV criteria based on interviews with the Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS) were compared to a sample recruited from regular child and adolescent psychiatric outpatient clinics (CPO group) (n=177). Both samples were compared to a normative school sample (SS group) and all three groups were matched for age and gender.

Thirty seven CBCL items, mostly representing core internalizing symptoms and parts of the thought problem scale as well as physical and sleep problems, were first identified. Ten of these items (including all discriminative items in previous validation studies) could distinguish children with OCD from CPO patients. In a subsequent analysis, the results of a logistic regression showed that four CBCL items, "Obsessions," "Fearful and Anxious," "Compulsions," and "Worries" remained significant predictors. These four OCS items and previous used CBCL OCS-scales were further examined by means of ROC-analysis showing that the "Obsessions" and "Compulsions" CBCL items were the strongest predictors.

These two CBCL items performed well as screens for OCS symptoms in children and adolescents and the addition of similar CBCL items did not further increase sensitivity or specificity. It is suggested that parental responses on these two items could preferably be used as screen for OCD in children and adolescents in regular child psychiatric clinics.

Introduction

Although obsessions and compulsions are infrequent among children and adolescents in the general population, they are more prevalent than commonly anticipated. In a recent epidemiological survey about 0.5% of the children had clinical levels of OCD symptoms (Heyman et al., 2001), while other studies have indicated higher prevalence rates ranging from 1.5% to 3% (Flament et al., 1989; Valleni-Basile et al., 1994). Although these problems are likely to be much more common in clinical settings, one survey did not find a single OCD case in Child and Adolescent Psychiatry (CAP) outpatient units (Staller, 2006). Another survey from four different CAP units in Germany and Switzerland reported OCD diagnoses in 0.7-1.2% of the patients (Dopfner et al., 1997), i.e., identical or slightly higher prevalence rates to those reported for children in the general population.

An important task for clinicians is to diagnose OCD correctly although the disorder itself can impersonate many other symptoms in other psychiatric disorders (OCD has more than 60 specific obsessions and compulsions, many of which resemble other psycho-pathological symptoms) (Hanna, 1995; Rapoport, 1989). Many patients are also secretive about the sometimes bizarre and mostly irrational nature of their symptoms often believing that others will regard them as mad and experience feelings of shame. The possibility of non-identification of children suffering from OCD is therefore apparent.

A further diagnostic problem is due to the fact that about three quarters of OCD patients also report presence of other comorbid symptoms (Hanna, 1995; Geller et al.,

3

2000; Ivarsson et al., 2007). So, the practitioner might meet with a patient who actively hides his/her irrational OCD-symptoms, while being more forthcoming with depressive symptoms that appear to be more acceptable as the presenting problem.

A possible option for a busy practitioner is to utilize a screening measure filled out by the patient or parent before consultation. In a few validation studies (Geller et al., 2006; Hudziak et al., 2006; Storch et al., 2006), the widely used Child Behavior Checklist (CBCL) developed by Achenbach (1991), has been found to be able to identify obsessive-compulsive symptoms in children and adolescents as rated by parents. In the CBCL, a specific scale, the Obsessive-Compulsive Scale (OCS) (Nelson et al., 2001), has been extracted and found to be both reliable and valid. Nelson (2001) extracted eleven CBCL items "that were hypothesized to be the most pertinent to the diagnosis of OCD," mostly from the "Thought-problems" and the "Anxious/Depressed" sub-scales as they had shown elevated scores in patients with OCD in previous research (Hanna, 1995). Using factor analysis, eight of the eleven items could be shown to represent an OCD-scale with good internal consistency, and also proved to be able to differentiate between OCD-patients from those with other psychiatric disorders and from adolescents in the general population.

The aims of the present study were to extend and further validate outcomes of previous studies of the OCS scale of the CBCL in a different population and country (Sweden). The study also set out to examine whether the previously used OCS scale(s) (i.e., those of (Nelson et al., 2001; Geller et al., 2006) are optimal, or whether other symptom constellations would perform better.

Method

Subjects

 The Obsessive-Compulsive Disorder (OCD) group. This sample included 185 children (12 years or younger) and adolescents (13 years or older) (91 boys and 94 girls: age range 4-17) from two clinic samples in Gothenburg. The first one was gathered from an outpatient clinic housing an OCD-project starting in 1991 (n=86: girls/boys: 35/51; children/adolescents: 27/59). The second sample included all patients that were assessed and treated at a specialized OCD-unit starting in 2001 (n=99: girls/boys: 59/40; children/adolescents: 29/70). The two groups differed with regard to co-morbidity in that non-specialized group had more patients without co-morbid diagnoses (46.5%) as compared with the specialized group (20.4%), a statistically significant difference ($p<$ .0001). However, this is probably an artifact of the diagnostic assessment procedure for other diagnoses which for the non-specialized group was a clinical interview supported by self- and parental rating scales (among others, the CBCL) while the specialized groups was interviewed using the KSADS (Kaufman et al., 2000). Major co-morbidities like the Tourette's syndrome (28% versus 19%, n.s.), Major Depression (15% versus 15%, n.s.) and ADHD (11% versus 12%) differed less while for example Oppositional Defiant disorder (0 versus 9%, ($p<$ .003) differed more, however the gender and age differences across the groups had no influence.

Most patients had intact families (70.4%) with Swedish ethnicity; 7% were living with one parent and 12% had both parents of non-Swedish ethnicity. The socio-economic status of our families did not differ between the two samples, both being close to the mean SES in a recent study sample from the general population (Ivarsson, 2006). Thirty-eight outpatients

did not fulfill the diagnostic criteria for OCD, and an additional 19 individuals (7 girls and 12 boys) who were eligible for the study, declined to participate.

The child psychiatric outpatient group (CPO). This sample consisted of 177 subjects (girls/boys: 78/99; children/adolescents: 111/66; age range 7-16) who were referred to four regular outpatient clinics in central Sweden. The problem assessment was based on medical records and somewhat more than one in four asked for consultation for externalizing problems, somewhat less than one in four for internalizing problems and slightly less than one out of five for crises and conflicts within the family, a significant problem in many of these families according to an assessment of the "family emotional climate" (Nyberg et al., 2001). This is roughly in line with the CBCL data that indicate that somewhat less than 1/3 had Internalizing scores above the 95:th percentile in the normal group (score of 15 or above). However, significant externalizing symptoms (score of 16 or above that are found in less than 5% of the normal group) were present in 44% of these juveniles. Other problems, e.g., Attention problems were even more common (48% scored above 95th percentile), as might be expected from a general child psychiatric sample. As the assessment procedure was not based on (semi)structured interviews, we cannot give precise figures for any diagnoses, e.g., OCD (Nyberg et al., 2001). However, it seems probable (from the CBCL data) that OCD might have been present in a small minority of the cases (probably not less than three individuals and not more than 6 individuals), i.e., at comparable rates reported by Doepfner at al (1997).

School Sample (SS). This sample was selected from a school-based population study of children and adolescents aged 6-16 years (Larsson & Frisk, 1999). In the present study, subjects were randomly selected from this sample to equal the size of the two clinic groups. The distribution of sex and age of the final SS group consisting of 317 subjects

(girls/boys: 147/170; children/adolescents: 120/197) was not statistically different from the OCD group. However, it differed from the CPO group in that children in the CPO group were significantly (M=10.4 versus M=12.4; t(307.3)=-7.0, p= .0001) younger than those in the SS group, especially the boys.

Assessment

Measures

Child Behavior Checklist (CBCL). A Swedish version of the 1991 version of the CBCL was used for parents to assess emotional and behavioral problems among the children (Achenbach, 1991; Larsson & Frisk, 1999). It consists of two parts one addressing social competence and the other for assessing emotional and behavioral problems in children aged 4 to 18 years. In the study, only the latter part was used consisting of 118 problem items rated on a three-point scale: 0 ="Not true"; 1 ="Somewhat or sometimes true"; 2 ="Very true or often true". Parents are asked to rate current problems in the child or occurring in the last six months. Two broad-band dimensions, internalizing and externalizing syndromes can be formed. The internalizing broad-band syndrome consists of three narrow-band syndromes: Withdrawn, Somatic complaints and Anxious/depressed, and the broad-band externalizing syndrome includes the Aggression and Delinquent problem scales. In addition, Social, Thought, and Attention problem scales can be formed. Total scores range between 0 and 226.

In a review, Achenbach (2002) concluded that the CBCL has proved useful for various purposes. Although the 1991 version of the CBCL was used in the present study, several

new items in the most recent version of the CBCL have replaced about a third of the older OCD items (Achenbach & Rescorla, 2001).

Children's Yale-Brown Obsessive Compulsive Scale (*CYBOCS*). This is a semi-structured interview containing questions regarding obsessions and compulsions in the child. Scale scores for severity of obsessions and compulsions (range: 0-20) are added to form a total score (range: 0-40). Further, lack of insight, avoidance, indecisiveness, inertia and pathological doubt can be gauged with scores ranging from 0 to 4. Finally, based on all information gathered during the interview a global severity score is assigned. The checklists and the severity ratings were based on interviews with each child and parent/adult informant.

The first author diagnosed all patients with OCD in accordance with the DSM-IV criteria (American Psychiatric Association, 1994) based on all information gathered during the diagnostic work-up including the CYBOCS interviews.

The study group participants were included in the study after informed consent from the parents. The ethics committee of the Medical faculty in Gothenburg approved of the study.

Statistics

Chi-square test was used to analyze associations between various CBCL items and the three samples. Items emerging as significant in bivariate analyses were further examined in regard to predictive power using logistic regression analysis with clinical status (OCD versus non-OCD) as dependent variable and back wise elimination of predictors (table 3).

Receiver operating curves (ROC) were used to estimate optimal sensitivity and specificity of various models including the various sets of CBCL items.

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Insert table 1 about here

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Results

In a first analysis, the discriminative power of the OCS scale to distinguish OCD patients from children and adolescents in the SS group was examined. Results showed that thirty seven CBCL items most strongly associated with group condition could be identified (see table 1). In a second step, the discriminative power of these items to distinguish OCD patients from those in the CPO group was examined (see table 1).

Eleven CBCL items could distinguish OCD patients both from children and adolescents in the SS sample and from those in the CPO group, eight out of them being included in the Nelson OCS scale (table 1). However, another three items, out of which one, "Fearful and anxious" is closely related to anxiety disorder in general, one "Too cleanly and orderly" is OCD-like, and a third item "Depressed" were also significantly associated with OCD. However, the item "Too cleanly and orderly" was excluded in the analysis because its phrasing had been changed in the 2001 revision of the CBCL.

In subsequent logistic regression analysis, the power of the significant predictors obtained in the bivariate analyses was further examined (see table 2).

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Insert table 2 about here

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9

Overall, these four items could correctly classify 90.3% of all the patients with a sensitivity of 85.8 and a specificity of 94%. This significant model, Chi^2 (df 4)=269.6, p< .001, explained 78% of the variance (Nagelkerke R^2).

Using these variables in an OCS-scale (LogRegOCS) construed in the present study by multiplying the scores of each patient with the B-value and summarizing these scores, comparisons were made with the Geller OCS (Obsessions and Compulsions)(Geller et al., 2006) and the Nelson OCS (Obsessions, Compulsions, Fears think or do something bad, Thinks s/he must be perfect, Feels too guilty, Worries, Strange behaviors, Strange ideas) (Nelson et al., 2001) by means of ROC curves. The results indicated that the more complicated scales had little advantage over the Geller OCS scale only including the obsession and the compulsion items (see figure 1 and table 3)

Insert Figure 1 and Table 3 about here

As table 3 shows, the scales had very similar areas under the curve supporting the validity of the Geller OCS items also in this data set. Adding more items would decrease specificity as well as sensitivity although the differences were marginal. Using the short Geller OCS-scale with a cut-off of $\geq$ 3 points leads to a sensitivity of .79 and a specificity of .96 with a positive predictive (PP) value of 0.96 and a negative predictive value (NP) of .82. The LogReg OCS-scale could be used with a cut-off score of 1.7 leading to a sensitivity of .91, a specificity of .89, with a PP value of .88 and a NP of .92. Finally, using the Nelson OCS-scale in a Swedish population with a cut-off score of 4.5 would lead to a sensitivity of .89 and a specificity of .77 with a PP of .78 and a NP of .88.

Discussion

In the present study, the discriminative power of parent reports of various items in the OCS-scale extracted from the Child Behavior Checklist (CBCL) problem scale was examined and compared to findings of previous studies conducted in the USA. The present study compared outpatient children referred to a specialized OCD clinic with those in regular child psychiatric clinics, both samples contrasted with a normative sample of school-aged children.

Overall, our results were strikingly similar to those reported by Geller (2006), who proposed that parental reports on two specific OCD questions of the CBCL, i.e., the presence of obsessions and compulsions, might be sufficient to screen for OCD in school-aged children. Use of a more complicated OCS scale and the addition of more CBCL items seems to improve the validity only marginally (Nelson et al., 2001; Hudziak et al., 2006; Geller et al., 2006; Storch et al., 2006).

Stepwise sorting of the CBCL items should ensure that item selection was based on solid empirical rather than a priori grounds. The results of our logistic regression also produced an optimal and economical measure including as few items as possible. This analysis indicated that out of the ten items chosen for further analysis; only four of those extracted in the original Nelson OC-scale are needed. Further, the results of our analysis showed that one CBCL-item "Fearful and Anxious" was a negative predictor of an OCD diagnosis. Possibly, this item covers more "classical" anxiety symptoms related to social phobia, school phobia and generalized anxiety.

Overall, our results indicated that parental reports on the CBCL may serve as a valuable screening tool as it covers a wide range of emotional and behavioral problems in the child. In this respect, the CBCL is preferable and easy to use as a screen for OCD in

children and adolescents but also provides important and broad-based information on potential comorbid problems or symptoms.

However, in the interpretations and the practical use of our findings, the following limitations should be considered. Perhaps, the most serious challenge to our main result supporting the use and power of the simple Geller OC-scale depends on the settings in which our study samples were recruited. Parents of OCD-patients seeking help at a secondary unit specializing in the management of children and adolescents with OCD, are likely to already have identified the prime psychiatric problems in their children as OCD. Therefore, we cannot generalize our results to settings in non-specialized CAP-clinics, where parents might not yet have identified the child problem as having OCD. Even if they have observed typical obsessive-compulsive phenomena in the child, it is not certain that parents would find the specific OCD-items in the CBCL as correctly describing their child. Secondly, no specific diagnostic information on child OCD was available for our regular clinical outpatients and therefore a few patients with a formal OCD diagnosis might have been included. However, this potential bias is likely to underestimate the psychometric properties of the OCS scales, and our results are also very similar to those reported by other investigators and similar comparative studies (Nelson et al., 2001; Hudziak et al., 2006; Storch et al., 2006).

Limitations of the present study should caution the use of a cut down Geller OC-scale as a screen in non-specialized CAP-clinics. In such settings, either the original Nelson OC-scale or our LogRegOCS-scale is likely to perform better in terms of sensitivity. Using these scales with the recommended cut-off scores should be a valuable screening tool for OCD in regular child psychiatric service.

Somewhat surprisingly, our findings also showed that the Hoarding item of the CBCL was not helpful in the diagnosis of OCD in school-aged children. Although the item "Too cleanly and orderly" was identified in the first two steps as a powerful discriminator, it was replaced in the new CBCL version and could therefore not be included in our logistic regression or ROC analysis.

While extensive diagnostic information was gathered for our OCD-patients, we did not have access to such information for the regular child psychiatric outpatients, nor for the school children

Conclusion

The CBCL is a valuable tool in the assessment of various emotional and behavioral problems in child and adolescent psychiatric populations, and its versatility extends its use also to identify children with less common psychiatric problems such as OCD. The outcomes of the present and previous validation studies indicate that two specific CBCL items, i.e. obsessions and compulsions in the child as reported by parents, were sensitive and specific discriminators. These two items alone or together with the other six items in the Nelson OC scale, or the two items in our LogReg OCS-scale, should work well in regular clinical settings as a screen for obsessive-compulsive symptoms in children and adolescents.

Table 1

CBCL items distinguishing between OCD-patients and those in the CPO group as compared to those in the SS group. The number in the cells denotes percentages. Results of chi-square analysis with p-values.

CBCL item	CBCL Score	OCD %	SS %	Chi square-value p-value	CBCL Score	CPO %	Chi square-value p-value
Cannot concentrate	1	32.6	18.6	74.7	1	34.5	2.4
	2	24.3	3.5	***	2	29.9	n.s.
Obsessions$_N$	1	8.4	2.9	400.9	1	13.6	194.0
	2	84.3	1.0	***	2	12.4	***
Clinging or too dependent	1	33.2	4.1	97.5	1	24.9	4.6
	2	6.5	0.6	***	2	11.3	n.s.
Lonely	1	35.3	10.5	66.0	1	32.4	0.3
	2	9.8	2.2	***	2	10.2	n.s.
Confused	1	32.1	1.9	106.5	1	25.6	4.1
	2	4.9	0.6	***	2	2.39	n.s.
Cries a lot	1	31.0	3.5	91.1	1	25.4	1.4
	2	6.0	0.6	***	2	6.8	n.s.
Demands a lot of attention	1	42.4	17.1	108.4	1	39.0	0.6
	2	25.0	4.4	***	2	28.2	n.s.
Fears animals, situations etc.	1	27.9	16.2	64.8	1	15.9	11.7
	2	21.8	2.9	***	2	16.5	**

Fears go to school	1	16.3	1.3	63.2	1	13.6	1.0
	2	6.0	0.0	***	2	4.5	n.s.
Fears to think or do smth bad$_N$	1	35.7	24.5	124.6	1	34.1	33.1
	2	36.3	3.5	***	2	13.1	***
Thinks s/he must be perfect$_N$	1	31.9	24.4	93.6	1	27.8	23.5
	2	33.5	4.4	***	2	14.8	***
Feels nobody likes him/her	1	34.2	8.7	100.9	1	38.4	.9
	2	14.7	1.0	***	2	15.3	n.s.
Feels worthless	1	39.6	9.9	133.5	1	34.1	7.8
	2	18.7	1.0	***	2	10.8	*
Nervous and tense	1	45.1	9.2	197.3	1	39.2	10.2
	2	24.7	0.6	***	2	15.3	**
Nervous movements or twitches	1	15.5	1.0	82.2	1	10.2	11.3
	2	12.2	0.3	***	2	4.0	**
Nightmares	1	35.7	11.1	54.7	1	33.3	0.4
	2	5.5	1.3	***	2	6.8	n.s.
Fearful and anxious	1	45.3	8.5	224.2	1	31.3	51.3
	2	27.6	0.3	***	2	6.8	***
Dizzy	1	19.7	5.1	62.9	1	11.3	17.4
	2	9.8	0.0	***	2	1.7	***
Too strong guilt feelings$_N$	1	38.3	4.5	174.1	1	18.3	46.9
	2	19.4	0.6		2	4.6	***

Overly tired	1	32.1	6.3	89.0	1	16.9	16.9
	2	10.9	1.3	***	2	5.6	***
Physical spts: body aches	1	23.0	3.7	60.8	1	11.6	13.9
	2	8.0	1.0	***	2	2.9	**
Compulsions$_N$	1	19.3	1.3	356.1	1	5.1	212.5
	2	64.8	0.6	***	2	2.3	***
Hoards objects (of no use)	*1*	*12.7*	*14.1*	*11.5*	*1*	*14.1*	*1.5*
	2	*3.2*	*10.3*	***	*2*	*6.8*	*n.s.*
Odd behaviour$_N$	1	22.4	1.3	161.8	1	5.7	59.0
	2	24.1	0	***	2	4.0	***
Odd ideas$_N$	1	19.2	1.9	144.8	1	3.5	63.2
	2	24.9	0	***	2	3.5	***
Stubborn and irritable	1	42.9	42.2	53.8	1	44.0	2.5
	2	21.7	2.6	***	2	27.4	n.s.
Moody	1	44.6	21.8	104.1	1	40.7	0.56
	2	25.5	4.1	***	2	27.1	n.s.
Sulks a lot	1	31.0	9.8	51.4	1	28.8	1.1
	2	7.6	1.6	***	2	10.7	n.s.
Suspicious	1	21.9	4.4	68.8	1	23.7	2.7
	2	10.4	0.6	***	2	5.6	n.s.
Talks of suicide	1	63.2	1.9	109.7	1	19.9	8.5
	2	32.4	0.3	***	2	2.8	*
Has rages	1	28.8	19.7	70.1	1	34.5	4.2

	CBCL				CBCL		
	2	25.0	3.2	***	2	29.9	n.s.
Too cleanly & orderly	*1*	*18.8*	*6.9*	*61.9*	*1*	*8.5*	*41.8*
	2	*22.5*	*3.5*	***	*2*	*2.8*	***
Sleep problems	1	20.3	4.8	100.7	1	10.7	11.2
	2	20.3	0.6	***	2	13.6	**
Passive, no energy	1	23.8	3.5	70.7	1	13.1	9.6
	2	6.6	0.3	***	2	3.4	**
Depressed	1	46.1	6.6	202.2	1	44.3	21.6
	2	21.7	0.9	***	2	6.3	***
Unusually noisy	1	22.7	7.9	50.5	1	21.7	.78
	2	8.6	0.3	***	2	11.4	n.s.
Withdrawn	1	0.6	3.2	51.3	1	11.9	6.9
	2	4.4	20.8	***	2	2.3	*
Worries$_N$	1	39.7	14.1	275.7	1	41.1	71.1
	2	48.4	1.3	***	2	13.1	***

* p< .05, ** p< .01, *** p< .001,

Note. The OCS Nelson items are marked with a $_N$.

Some CBCL-items of particular interest are marked in italics.

OCD: *Obsessive-Compulsive Disorder (OCD) group.*

CPO: *Child Psychiatric Outpatient group.*

SS: *School Sample*.

A CBCL score of 1: "Somewhat or sometimes true"; 2: "Very often or often true"

Table 2

Results of logistic regression with backward elimination using clinical status (OCD versus clinical CPO) as dependent variable and the 10 CBCL items most strongly associated with OCD rather than with clinical CPO status.

CBCL item	B	SE	WALD	p-value	OR (CI $_{95\%}$)
Obsessions	1.5	.27	29.3	.001	4.5 (2.6-7.7)
Fearful & Anxious	- .7	.39	3.4	. 065	.49 (.23-1.0)
Compulsions	2.2	.32	49.0	.001	9.2 (5.0-17.2)
Worries	.6	.34	3.4	.065	1.9 (1.0-3.6)
Constant	-3.3	.42	62.8	.001	.04

Table 3

Area under the curve (AUC) in ROC analysis for the three study versions of the OCS-scales.

Study OC-scale	AUC	SE	p-value	95% Confidence Interval	
				Lower bound	Upper bound
Nelson OCS	.91	.02	.001	.87	.94
LogReg OCS	.96	.01	.001	.94	.98
Geller OCS	.95	.01	.001	.93	.98

ROC Curve

Source of the Curve
— NelsonOCS
— LogRegOCS
— GellerOCS
— Reference Line
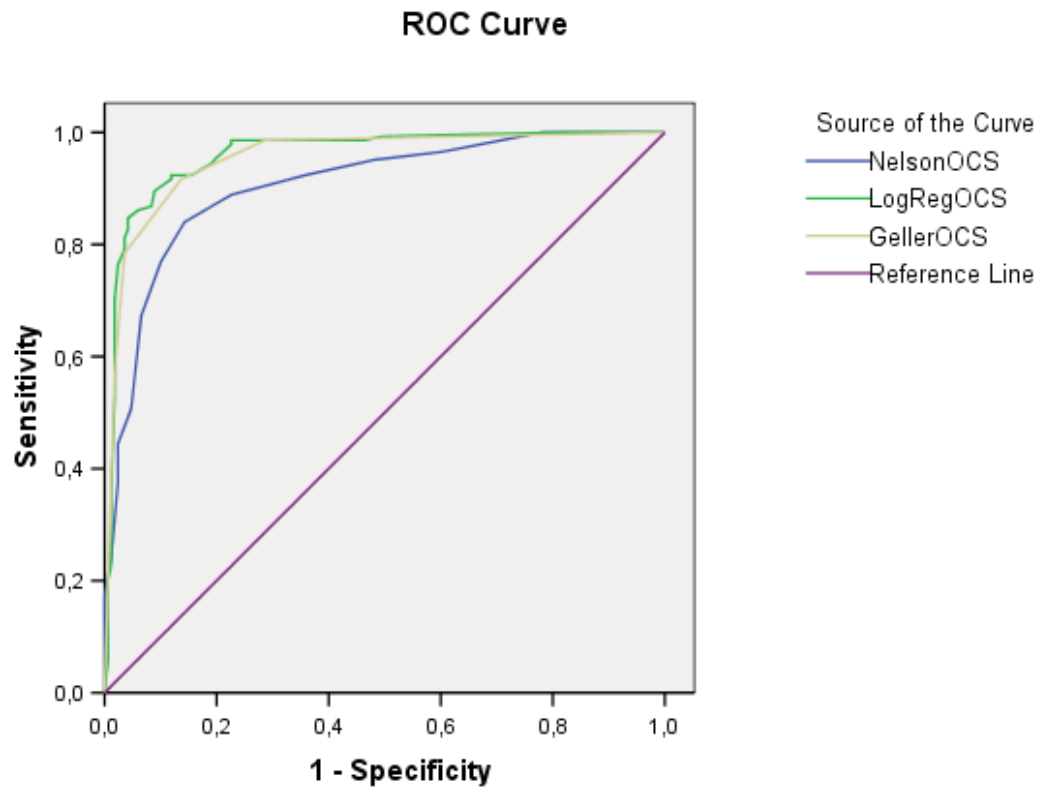
Diagonal segments are produced by ties.

Figure 1 ROC-curves for the three OCS-scales

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