

# Validity And Reliability Of The Indonesian Version Of The Conduct Disorder Rating Scale (CDRS)-Parent And Teacher As An Initial Screening For Conduct Disorders In Elementary School Children

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## ABSTRACT

**Background:** Conduct Disorders (CD) in children can lead to a four times higher risk of developing psychopathological mental disorders in adulthood. The survey results on 696 elementary school students from four provinces in Indonesia found that 33% experienced conduct disorders. It is very important to make a diagnosis of CD as early as possible so it is necessary to develop an easy and effective instrument as an initial screening tool for CD. CDRS for parent and teacher as a rating scale needs to be adopted into the Indonesian version. The aim of the study was to analyze the validity and reliability of the CDRS for parent and teacher as a screening tool in the child population for early detection of CD cases. **Method:** The research used cross sectional design. Parents and teachers assess elementary school children using the CDRS for parent and teacher questionnaire which has been translated into the Indonesian version. Confirmation of the diagnosis of CD in children classified as cases detected by a consultant psychiatrist. **Results:** The values for the Area Under Curve (AUC) of CDRS-parent and CDRS-teacher were 0.951 and 0.888 respectively; cut-off values of 2.5 and 1.5; sensitivity values of 96.97% and 85%; specificity values 89.95% and 75%; PPV values of 47.6% and 24.35%; NPV values of 99.68% and 98.12%; Cronbach's alpha values were 0.771 and 0.740. **Conclusion:** The Indonesian version of CDRS-parent and CDRS-teacher were valid and reliable instruments as a screening tool for conduct disorders in children.

**Keywords:** Conduct Disorders (CD), Conduct Disorder Rating Scale (CDRS) for parent and teacher, validity and reliability test, elementary school children

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## INTRODUCTION

Childhood Conduct disorders are often encountered in clinical practice and have a continuing risk of becoming mental disorders in adolescence and adulthood in the form of frequent truancy, stealing, threatening friends, worsening school performance, risk of drug abuse and other criminal activities, and problems related to recognition. early sexual activity such as unwanted pregnancy and sexually transmitted diseases [1]. In addition, the personality is one of the factors that affect academic achievement. The higher the personality score of student will decrease the index of student achievement [2].

Conduct disorders have a variable incidence. In a study in the United States in 1984-1998, the prevalence of conduct disorders was 9.5% based on the Diagnostic and Statistical Manual of Mental Disorders (DSM)-III and DSM-III-R criteria [3]. Meanwhile, in Indonesia there is no definite data for its prevalence. However, the results of a survey on 696 elementary school students from four provinces in Indonesia stated that 33% experienced conduct disorders [4].

Conduct disorders are significantly more common among boys (12.0%) than girls (7.1%) [5] [6][7]. In addition, conduct disorders are more frequently found in children who have parents with antisocial personality and alcohol dependence than the general population. CD prevalence and antisocial behavior are related to the socio-economic and psychopathological factors of parents (Akeswari, 2014). The financial behavior also has a positive effect on financial distress, and the effect is significant [8]. Meanwhile, child abuse by parents affects the child's self-confidence and affects the child's personality [9]. Therefore, good family support is needed to increase coping and perceived anxiety [10].

Additionally, the number of visits to the Child and Adolescent Psychiatric Polyclinic at Dr. Soetomo Hospital Surabaya tends to increase. Children are often brought by their parents with complaints from teachers and friends at

school because they often skip classes, steal, threaten friends, and deteriorate performance at school. The number of visits by patients with Conduct disorders who went to the Psychiatric Clinic for Children and Adolescents, Dr. Soetomo Surabaya has varied in the last 5 years with a slight downward trend. Firstly, the number of visits in 2014 was 8.870 then decreased significantly to 5.897 in 2015. In addition, the visit curve tends to be stable in 2016 with a visit number of 5.956 then slight decline in 2017 with 4.257 visitors. Finally, the prevalence of visits fell slight to 3.340 in 2018.

Diagnosis of Conduct disorders that came to the Child and Adolescent Psychiatric Clinic used the DSM-5 diagnostic criteria through interviews and psychiatric observations conducted by psychiatrists. However, until now there is no valid and reliable early detection measurement scale questionnaire.

Diagnosis of Behavioral Disorders is very important to do as early as possible so that parents and teachers in schools are very important in detecting cases of Behavioral Disorders. Therefore, it is necessary to develop instruments that are easy and effective in the early detection of behavioral disorders in elementary school children. The Conduct Disorder Rating Scale (CDRS) for parent and teacher has few questions, can only be measured for ages 6-12 years, and is specifically for checking for behavioral disorders. The questionnaire can screen for Behavioral Disorders more specifically in elementary school age children that can be done by teachers and parents. The Indonesian version of CDRS is a short questionnaire on the behavior of children aged 6-12 years consisting of 19 items for parents' CDRS and 13 items for teachers' CDRS. Each point of this statement must be answered by parents and teachers who describe the child's behavior every day within 12 months according to the DSM IV criteria.

Based on the above background, it can be concluded that the Indonesian version of the CDRS instrument is needed to

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facilitate parents and teachers as a screening instrument for early detection of Behavioral Disorders at home and at school so that validity and reliability testing is an urgent need.

**METHOD**

This study used a quantitative approach with a descriptive observational type with a cross sectional design. The research was conducted in seven Surabaya Elementary Schools representing areas in the city of Surabaya. The population in this study were all parents and teachers of elementary school children aged 6-12 years in Surabaya for the 2019/2020 school year.

**Methodology**

The sample in this study were parents or primary caregivers of children aged 6-12 years and homeroom teachers who taught children with positive inclusion criteria in the 2018-2019 school year elementary schools in Surabaya who met the research requirements with random sampling techniques. sampling conducted by the Education Authorities. A sample of 381 people.

Inclusion criteria: 1) Children aged 6-12 years, 2) Diagnosed with behavioral disorders (F91.1 / 312.81) by a child psychiatrist based on DSM-5 criteria (specifically for

research subjects, sample N1), 3) Children do not experience organic mental disorders (eg head trauma traffic accidents), psychosis, mental retardation, slow learner, and neurological disorders (epilepsy, CP), which are known from the results of interviews with psychiatrists ..

The variables in this study are Behavioral Disorders, Conduct Disorder Rating Scale (CDRS) -Parent and Conduct Disorder Rating Scale (CDRS) - Teacher.

**Statistical Analysis**

The validity test is determined through the Area Under Curve (AUC) using the Receiver Operating Characteristic (ROC) curve which is a curve that combines specificity and sensitivity. From this calculation, the Negative Predictive Value (NPV) and Positive Predictive Value (PPV) will also appear. Meanwhile, the instrument reliability test used the internal consistency method, which was carried out by measuring the reliability coefficient of Cronbach's Alpha, calculated by SPSS.

This research has been declared ethical by the Health Research Ethics Committee of the Faculty of Medicine, Airlangga University, Surabaya with No. 254 / E / C / KEPK / FKUA / 2019.

**RESULTS**

**Table 1. Profile of the demographic characteristics of Surabaya Elementary School children in 2019**

Children variable	Amount (n=381)	Percentage (%)
Gender		
Male	244	64,0
Female	137	36,0
Age		
6-8 years old	109	28,6
9-10 years old	141	37,0
11-12 years old	131	34,4
Ethnic		
Java	307	80,6
Madura	72	18,9
Other	2	0,5
Number of siblings		
None	38	10,0
1-2	247	64,8
>3	96	25,2
Family income per month (Rupiah)		28,3
<1 million	108	
1-5 million	252	66,2
>5 million	21	5,5
Diagnosed with CD by a Psychiatrist		
Yes	33	8,7
No	348	91,3

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Table 1 shows that the majority of respondents were male (64.0%). The 9-10 year age group was the most research subject (37.0%), most of the respondents were Javanese (80.6%) and the majority had 1-2 siblings (64.8%). In addition, the income of more than half a family is 1-5 million per month. The sample of undiagnosed CD by psychiatrists was below 10%.

Validity Test with the ROC Method (AUC, Sensitivity Value, Specificity, Cut Of, PPV, NPV) Conduct Disorder Rating Scale (CDRS) -Parent and Conduct Disorder Rating Scale (CDRS) -Teacher Indonesian Version

The validity test of the CDRS-parent and CDRS-teacher questionnaires used the ROC method based on the results of a behavioral disorder diagnosis conducted by a psychiatrist.

**ROC Curve**

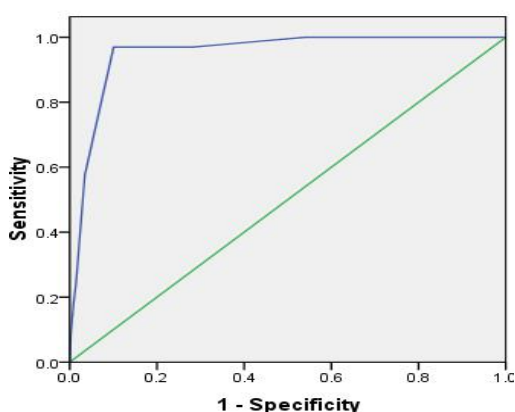


Figure 1. Validity Test with the ROC Method  
Figure 1 shows the green line representing the area under the combined sensitivity (Y axis) and 1-specificity (X) curve of the CDRS-parent.

**Table 2. CDRS-parent AUC values compared with CD diagnosis by psychiatrist**

AUC	Nilai P	Asymptotic 95% Confidence Interval	
		Lower Bound	Upper Bound
0,951	<0,001	0,923	0,980

The AUC value (95% confidence interval: 0.923-0.980) is 0.951 so this instrument is included in the very high validity category. From the combination of sensitivity and specificity, the new CDRS-parent cut off value was 2.5.

**Table 3. The CDRS-parent diagnosis value was compared with the CDRS diagnosis based on psychiatrists with a new cut off value (2.5)**

Diagnosis CDRS-parent	Diagnosed with CD by a Psychiatrist		
	Positive	Negative	
Positive ( $\geq 2,5$ )	32	35	67 (17,6%)
Negative ( $< 2,5$ )	1	313	314 (82,4%)
	33 (8,7%)	348 (91,3%)	381 (100%)

Table 3 shows 32 respondents with positive CDRS-parent results and a positive psychiatric-based CD diagnostic test (true positive). In addition, 313 people were true negative).

However, there is 1 respondent with false negative results.

a. The calculation of sensitivity =  $a / (a + c)$  was  $32 / (32 + 1) = 96.97\%$ , meaning that a positive CD based on a psychiatrist could be detected by 96.97% by a positive CDRS-parent. AUC Asymptotic P Value 95% Confidence Interval Lower Bound Upper Bound 0.951 <0.001 0.923 0.980

b. The calculation of specificity =  $d / (b + d)$ , then the calculation was  $313 / (35 + 313) = 89.95\%$ , with the meaning of a negative CD based on a psychiatrist that 89.95% can be detected by a negative CDRS-parent.

c. Calculating PPV =  $a / (a + b)$  then the calculation was  $32 / (32 + 35) = 47.76\%$  so that the probability of the subject actually having the risk of CD if the diagnostic test positive was 47.76%.

d. Calculating the NPV =  $d / (c + d)$  then the calculation was  $313 / (1 + 313) = 99.68\%$  so that the probability of the subject not having the risk of CD if the diagnostic test negative was 99.68%.

**ROC Curve**

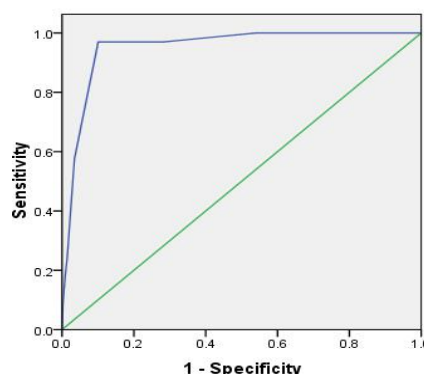


Figure 2. ROC value of CDRS-teacher diagnosis compared with CD diagnosis based on psychiatrist

The ROC curve in Figure 2 also shows the AUC which is the area under the curve, the combination of sensitivity (Y axis) and 1-specificity (X) of the CDRS-teacher.

**Table 4. CDRS-teacher AUC scores compared with psychiatric-based CD diagnoses**

AUC	P value	Asymptotic 95% Confidence Interval	
		Lower Bound	Upper Bound
0,888	,032	0,824	0,951

The AUC value (95% confidence interval: 0.824-0.951) is 0.888 so this instrument is included in the high validity category. In addition, the combination of sensitivity and specificity resulted in a new CDRS-teacher cut off value of 1.5.

**Table 5. The value of the CDRS-teacher diagnosis compared with the CDRS diagnosis based on psychiatrists with the new cut-off value (1.5)**

Diagnosis CDRS-teacher	Psychiatric-based diagnosis of CD		
	Positive	Negative	
Positive ( $\geq 1,5$ )	28	87	115 (30,2%)
Negative ( $< 1,5$ )	5	261	266 (69,8%)

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	33 (8,7%)	348 (91,3%)	381 (100%)
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CDRS-parent	0,740
CDRS-teacher	0,771

The table above shows that there are 25.34% of respondents with true positive CDRS-teacher results. However, there were 5 negative CDRS-teacher diagnostic test results with a positive psychiatric-based CD diagnostic test result (false negative). Then the sample with negative diagnostic test results on both the CDRS-teacher and CD based on psychiatrists was 261 people (true negative).

Sensitivity value =  $a / (a + c)$  obtained a calculation of  $28 / (28 + 5) = 85\%$  with the meaning of a positive CD based on a psychiatrist, 85% can be detected by a positive CDRS-teacher.

- Sensitivity value =  $a / (a + c)$  obtained a calculation of  $28 / (28 + 5) = 85\%$  with the meaning of a positive CD based on a psychiatrist, 85% can be detected by a positive CDRS-teacher.
- The calculation of specificity =  $d / (b + d)$ , then the calculation was  $261 / (87 + 261) = 75\%$ , with the meaning of a negative CD based on a psychiatrist that 75% can be detected by a negative CDRS-teacher.
- The PPV formula =  $a / (a + b)$  then the calculation was  $28 / (28 + 87) = 24.35\%$  so that the probability of the subject actually having a risk of CD if the diagnostic test is positive is 24.35%.
- The formula for NPV =  $d / (c + d)$  then the calculation iwa  $261 / (5 + 261) = 98.12\%$  so that the probability of the subject not having the risk of CD if the diagnostic test is negative was 98.12%.

**Table 6. Recapitulation of the validity of CDRS-parent and teacher**

	Parent	Teacher	Parent >> Teacher
Sensitifity	96,97 %	85%	81,8%
Spesifisitivity	89,95 %	75%	94,8%
PPV	47,76 %	24,35%	60%
NPV	99,68 %	98,12%	98,2%

Table 6 shows that the CDRS sensitivity value for both teachers and parents was 81.8, the specificity value was 94.8, the PPV value is 60, and the NPV value was 98.2.

**Table 7. The value of CDRS-parent and teacher diagnosis compared with the diagnosis of behavioral disorders based on psychiatrists**

CDRS - parent and teacher	Psychiatric-based diagnosis of CD		
	Yes	No	
Yes	27	18	45
No	6	330	336
	33	348	381

Table 7 shows that there were 27 respondents with a true positive CD diagnostic test result. In addition, 330 people with true negative results. However, there were 6 respondents with false negative results.

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**Table 8. Reliability test results**

Kuesioner	Cronbach's alpha
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Based on the table above, the results of the internal consistency reliability test showed that the Cronbach's alpha value of the CDRS-parent and CDRS-teacher questionnaires were 0.740 and 0.771, respectively, which means that this instrument is reliable.

**Discussion**

Validity Analysis with the ROC Conduct Disorder Rating Scale (CDRS) Method - Parent and Conduct Disorder Rating Scale (CDRS) - Indonesian Version as a Screening Tool for Behavioral Disorders in Elementary School Children

Validity test Diagnostic or prognostic measurements in the clinical realm can only be done by the ROC method [11]

**AUC, sensitivitas, spesifisitas**

In the criterion validity test for diagnostic purposes, the validity of a measuring instrument is seen from the AUC value, which is the cutoff point between sensitivity and specificity. The sensitivity of the CDRS-parent questionnaire was 96.97%, meaning that 96.97% succeeded in identifying true CD-risk positive cases, while the specificity value was 89.95%, meaning that 89.95% succeeded in excluding CD-risk negative cases. Meanwhile, the sensitivity of the CDRS-teacher questionnaire was 85%, meaning that 85% succeeded in identifying true CD-risk positive cases, while the specificity value was 75%, meaning that 75% succeeded in excluding CD-risk negative cases. According to the literature that classifies the AUC value into five levels of validity, the AUC value of 0.9-1 is the best (very high validity) [11]. In this study, the AUC CDRS-parent value was 0.951 (95% confidence interval: 0.923-0.980) and the CDRS-teacher was 0.888 (95% confidence interval: 0.824-0.951), so this instrument was included in the high validity category.

The level of sensitivity and specificity of an instrument quite often varies from one to another, can be influenced by the settings. Several studies have mostly used populations from clinics or primary health care centers. This is mainly so that it is easy to find a group of cases, so that the group of cases assessed are really psychiatric patients or patients who are experiencing mental health problems [12]. However, in a screening setting where the population is 'healthy' with no symptoms (asymptomatic), sensitivity is needed more than specificity in order to capture as many groups at risk as possible. In accordance with this theory, this study obtained a very high sensitivity value (100%).

The high sensitivity and specificity results in this study could also be due to CDRS which is a screening tool that has been tested for validity and reliability by using DISC as the gold standard [13]. In this study, a specificity value that was not 100% as well as sensitivity could occur because for the purposes of screening on the same data, increased sensitivity will lead to a decrease in specificity and vice versa [14]. This value will not interfere with the importance of diagnostic tests because the results of screening with a positive risk of CD will later be interviewed further so as to rule out false positive results, so the diagnosis can definitely be established.

**2. Optimum cut of point, NPV, PPV**

From the calculation of the ROC in this research, a new cut of point was also obtained, namely the limit value of positive and negative test results or the limit value between normal and abnormal. On the CDRS-parent and CDRS-teacher the cutoff points are 2.5 and 1.5 respectively, which means if a respondent has a score above 2.5 on the CDRS-parent questionnaire and a score above 1.5 on the CDRS-teacher ,

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then he tested positive for CD risk. Whereas based on the 2013 Diagnostic and Statistical Manual of Mental Disorders (DSM) guidelines, the subject is tested positive for CD if the behavior pattern is repeated and persists at least three of the 15 criteria during the last 12 months with at least one criterion having lasted for the last 6 months, which are classified into mild, moderate, and severe.

Positive Predictive Value (PPV) or positive predictive value is the probability of a person actually suffering from the disease if the diagnostic test result is positive. Negative Predictive Value (NPV), also known as negative predictive value, is the probability of a person not suffering from the disease if the test result is negative. In daily practice, PPV in particular is the most important statistic in diagnostic testing. If a doctor carries out an examination, for example for certain infectious diseases and the results are positive, the next question is how likely it is that the patient is really suffering from the infectious disease in question [15].

In this study, the PPV values of the CDRS-parent and CDRS-teacher were 47.6% and 24.35%, respectively, so the probability of the subject actually having a CD risk if the diagnostic test was positive was 47.6% and 24, 35%. Then the results of the NPV value of the CDRS-parent and CDRS-teacher were 99.68% and 98.12%, respectively. It can be interpreted that the probability of the subject not having CD risk if the test results are negative is 99.68% and 98.12%.

The difference in the value of the intersection point in various studies is a normal phenomenon. These differences can be caused by the type of measuring instrument used as the gold standard, the type of population and subject, local cultural conditions, and other sociodemographic backgrounds. Likewise, the level of the NPV and a PPV instruments quite often vary from one another.

In a screening setting where the population is asymptomatic in mental health, sensitivity is needed more than specificity in order to capture as many groups at risk as possible, thus the cutoff value will also decrease. In line with this theory, in this study with a 10: 1 proportion of the non-patient and patient population, the cutoff value was lower (2.5 and 1.5) than the standard value of CDRS with a clinical population, namely patients with mild to severe mental disorders. in the World population (> 3).

This can also occur because the culture of Indonesian society is still not sufficiently aware of mental health, including in this case Behavioral Disorders in children and adolescents. The religious factor of course also affects Indonesian society, which is mostly religious. In the five recognized religions in Indonesia, all instill the teachings to love all creatures so that an individual's belief in God can act as a risk protective factor for CD [16].

Meanwhile, cultural factors may be the cause of not filling this questionnaire. Indonesian society has the belief that everything related to the ugliness that exists in individuals and their families is taboo to tell. Being open and honest about what is felt is still CDtized, so being repressive or closed to the presence or absence of CD disorders is a common thing. CD in family with psychiatric disorder felt by all family member and affect their quality of life [17]. Additionally, An emotional burden is felt by almost all family members such as sadness and shame due to the uncontrolled patient behavior, fearing that the patients can be harmful to the environment and worrying about the future of the patients [18]. In addition, factors of poor family relationships can also affect the filling of this questionnaire. Additionally, the resilience of patient related to family support [19]. Based on the results of research from Canino and Algeria (2008) that family relationships compared

between one region and another can affect the level of diagnosis of behavior disorders in that area [20].

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Internal consistency reliability shows the correlation between one item and another item in an instrument. The internal consistency reliability test on the CDRS-parent and CDRS-teacher instruments obtained Cronbach's alpha values of 0.771 and 0.740, respectively. This value is slightly lower than the previous CDRS reliability test research conducted by Daniel A. Waschbusch and Frank J. Elgar in 2007 in Canada, the cronbach's alpha value was 0.78 to 0.83.

Reliabilitas is actually a measuring tool for measuring a questionnaire which is an indicator of a variable or construct. A construct or variable is reliable if it provides a Cronbach's alpha value > 0.7 so that the values of 0.771 and 0.740 mean that the questionnaire has good reliability. According to Dahlan, 2017, in the questionnaire reliability test, if the cronbach's alpha value on the instrument is to be increased, then some question items can be removed and re-analyzed, but in this study, although some questions were removed and re-analyzed, there was no significant increase in the value of cronbach's alpha. The high Cronbach's alpha value from the CDRS can be caused by this instrument that has been translated well so that it can be understood by all people.

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