

Original Article

Validity and Reliability of the Turkish Version of the Adult ADHD Self-Report Screening Scale for DSM-5

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Background: Approximately half of the children with Attention-deficit/hyperactivity disorder (ADHD) continue to meet diagnostic criteria in adulthood. The prevalence of adult ADHD is reported between 2.5% and 4.4% and is associated with significant impairment in quality of life and increased psychiatric comorbidity. ADHD in adults remains mostly undiagnosed and/or untreated despite the availability of effective treatments. Majority of people who do not receive necessary treatment are in the non-clinical, or non-psychiatric clinical population. Screening is an important step for diagnosing adults with ADHD. Yet there are no valid and reliable screening questionnaires calibrated for DSM-5 in Turkish.

Aims: We aimed to test the reliability and the validity of the ASRS-5 screening questionnaire designed according to DSM-5 in the Turkish population.

Study Design: Methodological and cross-sectional study

Methods: The translation was carried on according to the WHO-CIDI translation guide using a linguistic adaptation approach. We used a convenience sampling method to recruit an adult ADHD group (n=68) and a control group (n=68). The participants completed a sociodemographic form, six items ASRS-5 and a previous version 18 items ASRS v1.1 for the concurrent validity analysis. For the diagnostic validity clinical diagnosis made by psychiatrists according to DSM-5 criteria was used. Internal consistency and item-total correlation coefficients, exploratory factor analyses, correlation with ASRS v1.1 and ROC curve analysis were conducted.

Results: The internal consistency measured by Cronbach alpha was 0.869. Item-total correlation coefficients were calculated to be between 0.602 and 0.717 and the correlations were statistically significant ($p < 0.0001$). The ASRS-5 showed to have a unidimensional factor structure explaining the 60.54% of the variance. The correlation between ASRS-5 and ASRS v1.1 total score was calculated as 0.992 ($p < 0.0001$), between ASRS-5 and ASRS v1.1 attention deficit sub-dimension as 0.868 ($p < 0.0001$). In the ROC analysis of ASRS-5, the area under the curve was found to be 0.916. The cut-off score was calculated as 9/10 with a sensitivity of 85.2% and specificity as 89.7%.

Conclusion: Our data suggests that ASRS-5 is a valid and reliable self-report measure to assess and screen ADHD in Turkish population. It may be useful for both clinical and population studies.

Keywords: ADHD, adults, ASRS, reliability, validity, screening

Attention-deficit/hyperactivity disorder (ADHD) is the most common neurodevelopmental disorder of the childhood, characterized by inattentiveness, hyperactivity and impulsivity. ADHD was, until recently, perceived as a childhood disorder with symptoms typically remitting by adulthood (1, 2). The worldwide prevalence of ADHD in childhood is around 5.9%, while the estimated adult prevalence is reported to range from 2.5 to 4.4%

in recent reviews (3, 4). Approximately 40-60% of children with ADHD continue to meet the criteria for the disorder even when they become adults, and present with significant impairment in academic, occupational and social functioning as well as high psychiatric comorbidity (5). The most common comorbid psychiatric disorders in adult ADHD are reported to be mood disorders, anxiety disorders, and substance use disorders (3, 4). Adults with ADHD are more likely to suffer from occupational difficulties, unemployment, risky behaviors, criminality (especially in the presence of comorbid antisocial personality disorder), interpersonal problems, alcohol and substance misuse, motor vehicle accidents, increased healthcare expenses and premature death (6, 7). Mortality rates have been shown to be higher in people with adult ADHD, with accidents being the most common leading cause (8). Being associated with significant impairment in quality of life, increased psychiatric comorbidity and disability rates, ADHD in adults remains mostly undiagnosed and/or untreated despite the availability of effective treatments (3, 9-11). Majority of people who do not receive necessary treatment are in the non-clinical, or non-psychiatric clinical population. The burden of adult ADHD is further increased by the limited access to treatment, which largely results from underdiagnosis.

The diagnosis of adult ADHD is made through a comprehensive psychiatric assessment, which involves a thorough identification of symptoms and behavior problems consistent with DSM-5 criteria; as well as the evaluation of the level of impairment by ruling out other psychiatric disorders that may contribute to the symptoms. Before implementing such comprehensive assessments, brief and efficient screeners that work in both clinical and non-clinical population for adult ADHD, are needed in terms of feasibility. Therefore, the use of solid screening instruments appears to be as crucial as the implementation of more elaborate diagnostic procedures.

Among the valid screening scales that are currently in use, most are calibrated to DSM-IV criteria. With DSM-5, however, the required number of symptoms has been reduced from 6 to 5 and the age of onset has been increased from 7 to 12. The Adult ADHD Self-Report Scale (ASRS-v1.1) is a valid tool assessing adult ADHD symptoms and has recently been updated according to DSM-5. The DSM-5 ASRS Screening scale (ASRS-5) has been tested in both clinical and population samples and has shown great concordance with blinded clinical diagnostic interviews. With its 6 items derived from a pool of 29 items, using a machine learning algorithm, the DSM-5 ASRS screening scale has 91.4% sensitivity and 96% specificity in the population setting, and 91.9% sensitivity and 74% specificity in the clinical sample (12). The adult ADHD prevalence in Turkey is currently unknown, which points out to the need for reliable and valid screening questionnaires that are developed based on the DSM-5 criteria and may operate in both population and clinical samples. In this study, we aimed to test the reliability and the validity of the DSM-5 ASRS screening questionnaire in the Turkish population.

METHODS

For the adaptation of ASRS-5 into Turkish, written permission has been obtained from the developers of the original scale. The translation has been carried on according to the WHO-CIDI translation guide. The translation process involved following steps: parallel translations, expert panel review, pretesting and cognitive interviewing, final version and documentation. The initial translations were separately made by psychiatrists who had at least 2 years of clinical experience. These separate versions were then reviewed and finalized by the expert panel, which comprised of senior psychiatrists working in the field. In the "cognitive interviewing step" of the adaptation process, the final revised version of the scale, was applied to a heterogenous group of ten people of various ages, genders and educational levels; each interview was then reported. Following the approval of the translation report containing requested information about the process by the corresponding author/developer, the Turkish version of the scale was published at <https://www.hcp.med.harvard.edu/ncs/asrs.php>.

A non-probability, convenience sampling method was used. A power analysis using the mean values of the same scale from a previous study (18) revealed a total sample size of 40 (20 participants for each group) with a power of 0.80. Although we have recruited every possible participant in the duration of the study. Patients who applied consecutively to the psychiatry outpatient clinics of the two university hospitals and received an ADHD diagnosis according to DSM-5 criteria ($n = 68$), were assigned to the ADHD group. The control group ($n=68$) consisted of participants who applied to the outpatient units of the two university hospitals other than psychiatry, and did not have a previous diagnosis of ADHD, as also confirmed by a DSM-5 based diagnostic interview. The recruitment of the control group has been made using a snowball sampling method and the participants were asked to inform others for the participation to the study. The inclusion criteria were being between 18-44 years of age and having enough literacy to fill in the study questionnaires. Individuals with chronic physical and neurological diseases, intellectual disability or a diagnosis of genetic syndrome were excluded.

Structured Clinical Interview for DSM-5 Disorders (SCID-5)

SCID-5 is a semi-structured clinical interview for making the DSM-5 diagnoses. SCID-5 and earlier versions have been used frequently to make diagnoses and select samples for research in the literature and have been utilized as a gold-standard instrument to assess psychiatric disorders in clinical research (13, 14). Validity and reliability study of the Turkish version of SCID-5 has been performed by Elbir et al. (15). The authors were trained for the application of the SCID-5 and held a preliminary meeting before the interviews were initiated. In the current study, ADHD module of SCID-5 was used. The interrater reliability analysis of the different versions

of the SCID-5 ADHD module revealed kappa coefficient values ranging between 0,80 and 1,00, suggesting excellent interrater reliability (15, 16).

DSM-5 ASRS Screening Scale (ASRS-5)

ASRS-5 is an ADHD screening scale developed by the WHO in line with DSM-5 diagnostic criteria. It is a five-point Likert-type scale consisting of six items. The validity study of the ASRS-5 has been conducted by Üstün et al. and revealed excellent psychometric properties. The sensitivity of the original form of ASRS-5 was 91.4%, specificity was 96%, and the area value under the curve was 0.94. It has been demonstrated that it is correlated with clinical diagnoses in both population and clinical samples (12).

Adult Attention Deficit Hyperactivity Disorder Self-Report Scale (ASRS v1.1)

ASRS v1.1 is an 18-item scale that questions ADHD symptoms based on DSM-IV criteria in adults. It is a five-point Likert scale. The first nine items of the scale question the symptoms of attention deficit and the next nine items the symptoms of hyperactivity and impulsivity. In the Turkish validity and reliability study of ASRS v1.1 in 2009, the Turkish form of ASRS has been shown to be a valid and reliable tool for screening adult ADHD symptoms (17).

Statistical analyses

Data analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 26 (Chicago, IL, USA). Kolmogorov-Smirnov tests were used to explore normality distribution of the parametric data. Independent samples t-test for parametric values and chi-square test for categorical variables were applied to compare sociodemographic variables such as age, gender, and educational level. Cronbach's alpha internal consistency coefficient and item-total score correlation coefficients were calculated for reliability analyses. To test the construct validity, principal factor analyses were conducted. The factors with an eigenvalue higher than 1 were assessed and the items with a factor loading higher than 0.4 were taken into consideration in statistical analyses. For criterion validity, a receiver operating characteristics (ROC) analysis was performed by calculating the specificity and sensitivity between those who received a diagnosis using SCID-5 and those who did not. Pearson correlation analysis was performed to assess the simultaneous validity of ASRS-5 with ASRS v1.1. A probability level of $p \leq .05$ was used to indicate statistical significance.

The local ethics committee of the medical faculty approved the study, which was conducted in accordance with the ethical standards set out in the 1964 Declaration of Helsinki and the relevant regulations of the U.S. Health Insurance Portability and Accountability Act (HIPAA). Informed written consent was obtained from all individuals who volunteered to participate in the study.

RESULTS

The sociodemographic properties, such as gender, age, socioeconomic status and education level were similar between groups (Table 1).

The internal consistency measured by Cronbach's alpha was 0.877. Item-total correlation coefficients were calculated to be between 0.616 and 0.728 and the correlations were statistically significant ($p < 0.0001$) (Table 2). The ASRS-5 showed to have a unidimensional factor structure and the eigenvalue was calculated to be 3.632. The unidimensional factor structure explained the 60.54% of the variance. The factor loadings of the items were ranging between 0.721 and 0.816 (Table 2).

The correlation between the ASRS-5 and the total and the sub-dimensions of ASRS v1.1 were examined. The correlation between ASRS-5 and ASRS v1.1 total score was calculated as 0.935 ($p < 0.0001$), between ASRS-5 and ASRS v1.1 attention deficit sub-dimension as 0.887 ($p < 0.0001$), between ASRS-5 and ASRS v1.1 hyperactivity / impulsivity sub-dimension as 0.893 ($p < 0.0001$).

In order to examine the discrimination between ASRS-5 patient and healthy volunteer groups, the total scores obtained by the groups were compared. The score obtained by the ADHD group (14.37 ± 4.30) was higher than the score obtained by the healthy control group (5.89 ± 3.57) ($F = -12.321$, $p < 0.0001$) (Table 3).

In the ROC analysis of ASRS-5, which covers the ADHD group and the control group, the area under the curve (AUC) was found to be 0.913 (Figure 1), The specificity-sensitivity analysis of the scale was calculated according to the ROC analyses and revealed the cut-off score as 10, which means scores lower than 10 indicates the absence of an ADHD diagnosis and scores equal or higher than 10 indicates a probable ADHD diagnosis (Figure 2). The sensitivity of this cutoff score was calculated as 85.1% and specificity as 89.5%. The positive predictive value was 90.5% and the negative predictive value was 83.6%.

DISCUSSION

Despite the well-recognized overall burden associated with the disease, and the availability of effective treatments, ADHD remains often underdiagnosed and undertreated during adulthood (18). To overcome this shortcoming, the use of practical screening tools appropriate for both clinical and non-clinical settings is crucial. Existing self-report scales for ADHD in Turkish language are problematic in this regard given that (1) they lack screener versions, which limits their widespread clinical use (2) none of them are based on DSM-5 criteria. The need for a brief, effective and DSM-5 based screening tool being considered, this study was set out with the aim of assessing the reliability and validity of the Turkish version of the ASRS-5, which has proven to be a valuable tool to screen ADHD in adults with excellent psychometric properties (12). With respect to the research

question, we investigated the association between the ASRS-5 score with clinical diagnoses and ASRS v1.1 score. The results of our reliability and validity study of the Turkish version of the ASRS-5 indicates that ASRS-5 is a valid and reliable tool which can be used in Turkish population in order to screen ADHD in adults.

Reliability analyses

Both the internal consistency (Cronbach's alpha= 0.87) and item total correlation coefficients (between 0.721 and 0.816) were found to be high. The internal consistency values of other ADHD symptom rating scales are 0.88 and 0.93 for ASRS v1.1 and Wender Utah Rating Scale (WURS), respectively (17, 19). The item total correlation coefficients of ASRS-5 were found ranging from 0.72 and 0.82, which indicates an increased reliability and homogeneity compared to other relevant scales. The same range for ASRS v1.1 was not analyzed and for WURS was 0.31-0.75. According to our findings, ASRS-5 has satisfactory reliability values.

Validity analyses

The factor analyses to investigate the construct validity of the ASRS-5 revealed a single factor, and items have been shown to represent a single structure. According to single factor structure, no further Varimax rotation was conducted. This one factor structure explains the 60.4% of the variance. The factor analyses of old version of the ASRS screener also revealed a single factor structure (20, 21).

To demonstrate the content validity of the ASRS-5, we ran correlation analyses with ASRS v1.1. The correlation coefficients were found between 0.868 and 0.929, which represent very strong correlation between the 18-item full-scale and the 6-item screener. The comparison analyses, which aimed to show the differentiation capacity of the ASRS-5 between ADHD and healthy individuals, showed that people with ADHD have significantly higher scores than non-ADHD people and ASRS-5 is adequate to differentiate that. We also conducted ROC analyses to investigate the content validity and found an AUC value higher than 0.9. While an AUC value higher than 0.7 is deemed acceptable for many scales, a value higher than 0.9 is considered outstanding. Our finding is comparable with the original version of the ASRS-5, where the AUC value was found 0.94. The AUC value of the previous screener was ranging between 0.75-0.85, which also points out to the necessity and the superiority of the updated version (21, 22). The results of our validity analyses are comparable with those of the original study, where the specificity and sensitivity values were 96% and 91.4%, respectively. Taken together, Turkish version of the ASRS-5 is suggested to be a valid and reliable tool to assess and screen ADHD.

The study has several limitations. First, performing a detailed and time-taking diagnostic interview with all participants may have resulted in a relatively small sample size, which nevertheless allowed to properly perform the pre-planned statistical analyses. Second, we did not make language validity analyses, which would have affected the validity and the reliability of the scale positively. Finally, the study was conducted in a clinical sample and did not include a population sample and further research in a community based sample would be needed for establishing the use of ASRS for screening purposes; still, the original scale has been reported to have similar psychometric properties in general population and clinical samples (12).

Turkish version of the ASRS-5 stands out as a valid, reliable and promising tool to assess and screen ADHD in Turkish population. Considering its effectiveness and practicality, it may be useful for both clinical and population studies.

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REFERENCES

1. Hill JC and Schoener EP. Age-dependent decline of attention deficit hyperactivity disorder. *Am J Psychiatry* 1996;153:1143-6.
2. Shaffer D. Attention deficit hyperactivity disorder in adults. *Am J Psychiatry* 1994;151:633-8.
3. Fayyad J, De Graaf R, Kessler R, Alonso J, Angermeyer M, Demyttenaere K, et al. Cross-national prevalence and correlates of adult attention-deficit hyperactivity disorder. *Br J Psychiatry* 2007;190:402-9.
4. Kessler RC, Adler L, Barkley R, Biederman J, Conners CK, Demler O, et al. The prevalence and correlates of adult ADHD in the United States: results from the National Comorbidity Survey Replication. *Am J Psychiatry* 2006;163:716-23.
5. Barkley RA, Fischer M, Smallish L, Fletcher K. The persistence of attention-deficit/hyperactivity disorder into young adulthood as a function of reporting source and definition of disorder. *J Abnorm Psychol* 2002;111:279-89.
6. Biederman J, Faraone SV, Spencer TJ, Mick E, Monuteaux MC, Aleardi M. Functional impairments in adults with self-reports of diagnosed ADHD: A controlled study of 1001 adults in the community. *J Clin Psychiatry* 2006;67:524-40.

7. Faraone SV, Silverstein MJ, Antshel K, Biederman J, Goodman DW, Mason O, et al. The Adult ADHD Quality Measures Initiative. *J Atten Disord* 2019;23:1063-78.
8. Dalsgaard S, Østergaard SD, Leckman JF, Mortensen PB, Pedersen MG. Mortality in children, adolescents, and adults with attention deficit hyperactivity disorder: a nationwide cohort study. *Lancet* 2015;385:2190-6.
9. Newcorn JH, Weiss M, Stein MA. The complexity of ADHD: diagnosis and treatment of the adult patient with comorbidities. *CNS Spectr* 2007;12:1-14
10. Retz W, Retz-Junginger P, Thome J, Rösler M. Pharmacological treatment of adult ADHD in Europe. *World J Biol Psychiatry* 2011;12:89-94.
11. Surman CB, Hammerness PG, Pion K, Faraone SV. Do stimulants improve functioning in adults with ADHD? A review of the literature. *Eur Neuropsychopharmacol* 2013;23:528-33.
12. Ustun B, Adler LA, Rudin C, Faraone SV, Spencer TJ, Berglund P, et al. The World Health Organization Adult Attention-Deficit/Hyperactivity Disorder Self-Report Screening Scale for DSM-5. *JAMA Psychiatry* 2017;74:520-7.
13. Rogers R. *Handbook of Diagnostic and Structured Interviewing*. New York, NY: Guilford Press; 2001.
14. APA Work Group on Psychiatric Evaluation. *Practice Guideline for Psychiatric Evaluation of Adults*. Arlington, VA: American Psychiatric Association; 2016.
15. Elbir M., Alp Topbaş Ö, Bayad S, Kocabaş T, Topak OZ, Çetin Ş, et al. Adaptation and Reliability of the Structured Clinical Interview for DSM-5-Disorders - Clinician Version (SCID-5/CV) to the Turkish Language. *Turk Psikiyatri Derg* 2019;30:51-6.
16. Osório, F. L., Loureiro, S. R., Hallak, J. E. C., Machado - de - Sousa, J. P., Ushirohira, J. M., Baes, C. V., ... & Fracon, V. S. (2019). Clinical validity and intrarater and test-retest reliability of the Structured Clinical Interview for DSM - 5-Clinician Version (SCID - 5 - CV). *Psychiatry and Clinical Neurosciences*, 73(12), 754-760.
17. Dogan S, Öncü B, Varol-Saraçoğlu G, Küçükgöncü S. Validity and reliability of the Turkish version of the Adult ADHD Self-Report Scale (ASRS-v1. 1). *Anadolu Psikiyatri Derg* 2009;10:77-87.
18. Fayyad J, Sampson NA, Hwang I, Adamowski T, Aguilar-Gaxiola S, Al-Hamzawi A et al. The descriptive epidemiology of DSM-IV Adult ADHD in the World Health Organization World Mental Health Surveys. *Atten Defic Hyperact Disord* 2017;9:47-65.
19. Oncu B, Olmez S, Senturk V. Validity and reliability of the Turkish version of the Wender Utah Rating Scale for attention-deficit/hyperactivity disorder in adults. *Turk Psikiyatri Derg* 2005;16:252-9.
20. Sanchez-Garcia M, Fernandez-Calderon F, Carmona-Marquez J, Chico-Garcia M, Velez-Moreno A, Perez-Gomez L. Psychometric properties and adaptation of the ASRS in a Spanish sample of patients with substance use disorders: Application of two IRT Rasch models. *Psychol Assess* 2015;27:524-33.
21. Somma A, Borroni S, Fossati A. Construct validity and diagnostic accuracy of the Italian translation of the 18-Item World Health Organization Adult ADHD Self-Report Scale (ASRS-18) Italian translation in a sample of community-dwelling adolescents. *Psychiatry Res* 2019;273:753-8.
22. Takeda T, Tsuji Y, Kurita H. Psychometric properties of the Japanese version of the Adult Attention-deficit hyperactivity disorder (ADHD) Self-Report Scale (ASRS-J) and its short scale in accordance with DSM-5 diagnostic criteria. *Res Dev Disabil* 2017;63:59-66.

TABLES

TABLE 1. Comparison of the sociodemographic variables of the participants

	ADHD group	Control group	p
Age (mean ± SD)	29.22 ± 8.80	31.11 ± 6.13	0.155
Sex (n (%))			
Female	37 (54.4%)	37 (54.4%)	1.000
Male	31 (45.6%)	31 (45.6%)	
Socioeconomic status (n (%))			
Low	9 (13.2%)	6 (8.8%)	0.819
Moderate	46 (67.6%)	48 (70.6%)	
High	13 (19.1%)	14 (20.6%)	
Educational level (n (%))			
Elementary	2 (2.9%)	9 (13.2%)	0.150
High school	19 (27.9%)	15 (22.1%)	
University	47 (69.1%)	44 (64.7%)	
<i>Pearson Chi-square tests, ADHD: Attention-deficit/hyperactivity disorder</i>			

TABLE 2. Item total correlation coefficients and factor loadings of the ASRS-5

Item	Item total correlation coefficients	Component
Item 1	0.678	0.784
Item 2	0.616	0.731
Item 3	0.644	0.755
Item 4	0.725	0.820
Item 5	0.728	0.826
Item 6	0.702	0.803

TABLE 3. Comparison of ASRS v1.1 and ASRS-5 mean scores between groups

	ADHD group (n=68) Mean \pm SD	Control group (n=68) Mean \pm SD	p
ASRS v1.1 IA subdimension	23.53 \pm 6.64	9.97 \pm 4.94	<0.0001
ASRS v1.1 HI subdimension	21.01 \pm 6.48	8.36 \pm 6.18	<0.0001
ASRS v1.1 total	44.54 \pm 11.74	18.33 \pm 9.99	<0.0001
ASRS-5 total	14.37 \pm 4.30	5.89 \pm 3.57	<0.0001

ADHD: Attention-deficit/hyperactivity disorder, ASRS: Adult ADHD Self-Report Scale, IA: Inattention, HI: hyperactivity

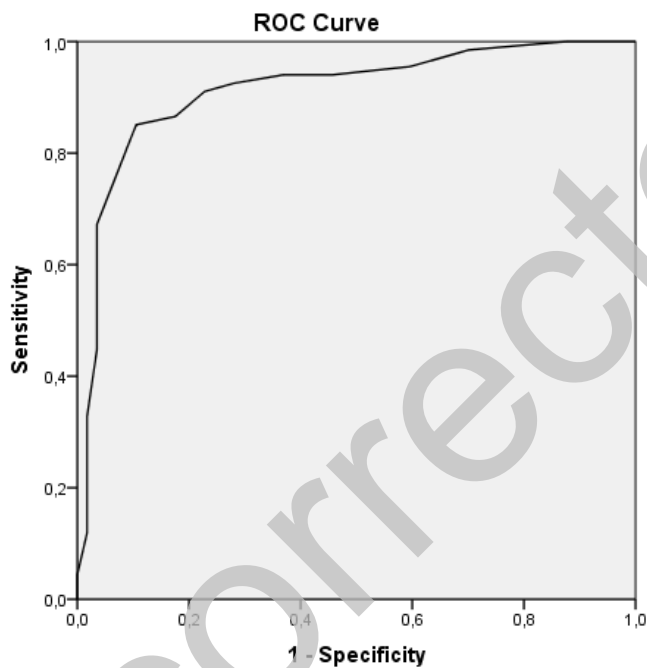


FIG. 1. Receiver operating characteristic curve (ROC) of the ASRS-5 total scores and sensitivity-specificity analyses of the ASRS-5 according to the ROC analysis.

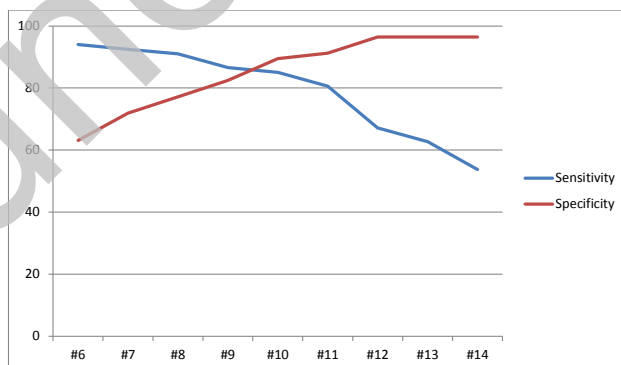


FIG. 2. Determination of optimal cut-off point according to the receiver operating characteristic analysis of the ASRS-5.

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