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Validity and Reliability of the Turkish Version of the Weiss Functional Impairment Rating Scale- Self Report Form (WFIRS-S-TR)

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SUMMARY

Objective: The aim of this study was to demonstrate the validity and reliability of the WFIRS-S-TR, Turkish version of the Weiss Functional Impairment Rating Scale-Self Report form.

Method: The study comprised two groups of participants of 15-18 years of age, one consisting of 35 children diagnosed with attention deficit and hyperativity disorder (ADHD) based on the DSM-IV criteria and the other, 510 healthy volunteers attending high school. Apart from the WFIRS-S-TR, the Health Questionnaire for Children and Adolescents (KIDSCREEN-10 Index) which is a general quality of life and functionality measurement instrument, was used to check the concurrent validity of the WFIRS-S-TR.

Results: The Cronbach's alpha coefficient for the total scale was 0.939. The test-retest reliability assessed by repeated measurements two weeks apart gave a high correlation between the results (r=0.804, p<0.0001). Total mean score of the WFIRS-S-TR showed significant correlation with the KIDSCREEN-10 Index total mean score (r=-0.467, p<0.0001). Confirmatory factor analysis was carried out for the construct validity of the WFIRS-S-TR. The RMSEA and the CFI values were found to be 0.065 and 0.68, respectively.

Conclusion: The WFIRS-S-TR can be used as a valid and reliable tool both in clinical practice and for research purposes.

Keywords: ADHD, functional impairment, Weiss Functional Impairment Rating Scale

INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder with symptoms of inattentiveness, hyperactivity, and impulsiveness (APA 2013). The prevalence of ADHD in the whole worldwas determined to be5.29% (Polanczyk and Jensen2008).A comprehensive study conducted in our country, the prevalence rate was reported as 12.4% (Ercan et al. 2019). Given its high prevalence, frequent comorbidity with other psychiatric disorders and extremely negative effects on peer and family relations and academic functions ADHD is considered as an important worldwide public health problem (Wolraich et al. 2011).

ADHD is a clinical diagnosis without any laboratory or specific diagnostic tests to confirm the diagnosis. The clinician's diagnostic tools are interviews with the family and the child, clinical observation, physical and neurological examinations, scales completed by the children, families and teachers, and cognitive tests (Pliszka et al. 2007). In the evaluation of ADHD, the main disease symptoms of inattention, hyperactivity, and impulsivity are queried in detail. These symptoms are necessary but not adequate for the diagnosis of ADHD. Diagnosis can be made only if these symptoms cause psychosocial dysfunction (APA 2013).

It is known that ADHD involves functional impairment (FI) in many respects and that this could persist in adulthood. The

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FI experienced by individuals with ADHD at school, in social skills and family relations adversely affect themselves, their families and the society (Haack and Gerdes 2011). Studies have shown that the number ofthe children diagnosed with ADHDdramatically decreases when re-evaluated on the criteria for impairment of functionality (Mota and Schachar 2000). Whereas the prevalence of ADHD was computed as 21.8% in terms of the symptoms, it decreased to 12.7% when evaluated together with the functionalimpairment criteria (Ercan et al. 2015). FI is also important in the evaluation of treatment outcome. Studies have shown that the improvement in symptoms is not matched by theimprovement in functionality (Karpenko et al. 2009, O'Connoret al. 2015). In a meta-analysis on the correlation between ADHD symptoms and functionality levels, the correlation coefficient was found to be between 0.16-0.54 (Willcutt et al. 2012). Since the disease symptoms and the FI did not match, it was proposed that these were different concepts and that both should be taken into account in evaluating the difficulties experienced by the child with ADHD (Danckaerts et al. 2010; Park et al. 2011). Also, it was pointed out that, instead of the multi-dimensional general functionality scales, disease-specific scales should be used to investigate ADHD (Epstein and Weiss 2012).

The Weiss Functional Impairment Rating Scale, which measures ADHD-specific functional impairment, was developed by M. Weiss (CADDRA 2011). There is a parent form and a self report form. The Weiss Functional Impairment Rating Scale-Parent Form (WFIRS-P) was adapted to the Turkish language and its reliability-validity was demonstrated (Tarakçıoğlu et al. 2015) but there is not anyself-report scale that can be used currently. One of the self-report scales for ADHD is the Weiss Functional Impairment Rating Scale- Self-Report Form (WFIRS-S) (Weiss et al. 2018a). WFIRS-S is a 69-item self-report scale that provides 4-grade Likert-type assessment. It consists of the seven subdimensions on family, work, school, life skills, self-concept, social activities and risky activities.

In this study, it was aimed to evaluate the validity and reliability of the Weiss Functional Impairment Rating Scale-Self-Report form for use in our country.

METHOD

Translation Process

In order to evaluate the Turkish validity and reliability of the Weiss Functional Impairment Rating Scale-Self-Report Form, written permission was received from Margaret Weiss who developed this scale. The scale was translated into Turkish by two child and adolescent psychiatrists. The final form was given to the scale after evaluation on language usage, cultural relevance and concept relevance. Subsequently, it was translated back to English by a linguist. The translation was compared with the original version of the scale, and it was checked whether there were any alterations in the meaning and the final Turkish language version of the scale as the WFIRS-S-TR was formed. In order to review the comprehensibility of the scale, the WFIRS-S-TR was initially used on 10 adolescents diagnosed with any psychiatric disorder when consulting Celal Bayar University Child and Adolescent Psychiatry Outpatient Clinic and problems were not detected.

Participants

Patients with ADHD and healthy volunteers were included in the study.

The clinical study group consisted of 35 patients diagnosed with ADHD on the basis ofthe Schedule for Affective Disorders and Schizophrenia for School-Age Children Present and Lifetime Version (KSADS-PL) for children of school age. The inclusion criteria of the study were the diagnosis of ADHD on the DSM-IV criteria and being between the ages of 15-18. Patients diagnosed with any comorbid psychiatric disorder, having additional organic disorderand not having the mental capacity to follow the research guidelines and to fill the necessary scales were excluded from the study.

The community (healthy control) group included a total of 510 volunteering students without any known mental or physical illness and attending the same high school in Manisa. All students at the school are included. Clinical interviews were not conducted with the healthy controls. Instead, the presence of any mental or physical illness was determined on the basis of the declarations of the children and their parents on a sociodemographic data. On the basis of research statistics, the number of volunteers in the study group needs to be 5-10-fold greater than the number of items on the scale used. For this purpose, the number of the participants in the control group was determined to be at least 345.

Ethics committee approval of the study was given by Manisa Celal Bayar University Faculty of Medicine Clinical Research Evaluation Committee (Decision date/ Number: 06.03.2014 / 20478486-135). The youth and families were informed about the study and written informed consent was obtained.

Evaluation Tools

The Weiss Functional Impairment Rating Scale- Self-Report Form (WFIRS-S-TR): The self-report form of the scale consisted of 69 items distributed in seven subdimensions on family, school, work, life skills, self concept, social activities and risky activities. In the scale's directive, considering the emotional and behavioral problems experienced by the individual, it is required to mark the option that best describes how these emotional and behavioral problems effected each of the items in the scale duringthe last 1 month. Each item in the scale is evaluated on a 4-point scale. (0 = Never; 1 = Sometimes; 2 = Often; 3 = Very often). Individuals can select ''inappropriate" for questions that they think are not suitable for them. In the evaluation of the scale, total score, average score or number of items marked as 2 and 3 are used. Presence ofone 3 (very often) or at least two items scored as 2 (often) in the sub- dimensions indicates that the functionality related to that sub- dimensions was impaired. Total score and average

total score can be calculated for both the sub-dimensions and the whole scale. Items marked as " inappropriate" are scored as 0 when calculating the total score. When calculating the average score, the calculation is made after subtracting items marked as inappropriate.

The health questionnairefor children and adolescents (KIDSCREEN-10 Index-TR): The scale was developed in a multidisciplinary project supported by the European Union. It is a 10-item self-report scale and questions the general health status with a single question. It provides a five-point Likert-type assessment. The higher the score, the better the quality of life perception. It was adapted for Turkish and the reliability-validity study was completed (Bayduret al. 2016).

Statistical Evaluation

Cronbach's alpha internal consistency coefficient, item-total score and sub-dimension-total score correlation coefficients of both total and sub-dimensions of the scale were studied in reliability analyses. In the study, 33 volunteers from the clinical group were retested on the WFIRS-S-TR two weeks after the first testing and the test-retest reliability was determined by calculating the correlation coefficient between the two applications.

Confirmatory factor analysis was used for the construct validity of the scale. In the confirmatory factor analysis, different types of goodness-of-fit indices were used to evaluate the model fit and the stability model of the data: root mean square error of approximation (RMSEA) and comparative fit index (CFI). RMSEA is an absolute index of compliance. RMSEA values below 0.05 show good compliance with the data, values of 0.05-0.08 have acceptable compliance, the 0.08-0.1 range indicates poor compliance and values above 0.1 indicate unacceptable compliance. CFI value can range from 0 to 1 but must be greater than 0.9. The concurrent validity of the WFIRS-S-TR was assessed by analyzing the correlation between its scores and those of theKIDSCREEN-10 INDEX-TR.

RESULTS

The study participants consisted of a clinical group of 35 children with ADHD and 510 healthy volunteering school children. The group diagnosed with ADHD had been on treatment for more than 1 year and were on methylphenidate when they were included in the study. The sociodemographic data and the scale scores of the participants are presented in Table 1.

Reliability Analysis

The Cronbach's alpha coefficient for the whole scale of the WFIRS-S-TR was 0.939. Cronbach's alpha coefficient for the subdimensions were 0.795 for family, 0.788 for work, 0.789 for school, 0.785 for life skills, 0.821 for self-concept, 0.791 for social activities, and 0.827 for risky activities. (Table 2). The correlation coefficient between the subdimensions and the WFIRS-S-TR total score was between 0.586 and 0.767 (Table 3). Item- total score correlation coefficients were determined to be between 0.049-0.558. The item-total score correlation coefficients of item 3 in the family subdimension and items 8, 10, 11, and 12 in the risky activities subdimension were less than 0.20.

The scale was retested on 33 volunteers from the clinical group 2 weeks after the first testing. The correlation coefficient between the total scores of the two tests was 0.804 ($p<0.0001$) and the correlation coefficients between the subdimensions were 0.733 for family ($p<0.0001$), 0.657 for work ($p<0.0001$), 0.673 for school ($p<0.0001$), 0.785 for life skills ($p<0.0001$) and 0.788 for self-concept ($p<0.0001$), 0.693 for social activities ($p<0.0001$), and 0.391 for risky activities ($p=0.024$) (Table 2).

Table 1. The Sociodemographic Characteristics, Mean Scores of Weiss Functional Impairment Rating Scale-Self Report's Total and Subdomains and Health Questionnaire For Children and Adolescents of the Sample

		ADHD group N=35 Mean (SD)	Community group N=510 Mean (SD)	P
Age		17.6 (075)	16.8 (0.66)	0.001
Gender	Female	10	271	0.005
	Male	25	239	
WFIRS-S family		1.14 (0.59)	0.85 (0.54)	0.002
WFIRS-S work		0.90 (0.59)	0.75 (0.58)	0.133
WFIRS-S school		1.06 (0.70)	0.79 (0.62)	0.013
WFIRS-S life skills		0.83 (0.56)	0.67 (0.49)	0.068
WFIRS-S self concept		1.25 (0.82)	1.07 (0.78)	0.201
WFIRS-S social activities		0.54 (0.53)	0.50 (0.49)	0.714
WFIRS-S risky activities		0.37 (0.48)	0.35 (0.49)	0.835
WFIRS-S total score		0.81 (0.42)	0.68 (0.40)	0.055
Kidscreen total score		32.3 (6.50)	33.9 (6.20)	0.161

WFIRS-S: Weiss Functional Impairment Rating Scale-Self Report Form; Kidscreen: Health questionnaire for children and adolescents

Table 2. Cronbach Alpha Coefficient and Test-retest Correlation Coefficient Results of Weiss Functional Impairment Rating Scale-Self Report Form and its Subdomains

	Cronbach alpha coefficient	Test-retest correlation coefficient
Family	0.795	0.733*
Work	0.788	0.657*
School	0.789	0.673*
Life skills	0.785	0.785*
Self concept	0.821	0.788*
Social activities	0.791	0.693*
Risky activities	0.827	0.391**
WFIRS-S total	0.939	0.804*

*p<0.001; **p=0.024
WFIRS-S: Weiss Functional Impairment Rating Scale-Self Report Form

Table 3. Subdomains and Total Score Correlations of Weiss Functional Impairment Rating Scale-Self Report Form

	Family	Work	School	Life skills	Self concept	Social activities	Risky activities
Family							
Work	0.493*						
School	0.450*	0.601*					
Life skills	0.430*	0.520*	0.519*				
Self concept	0.417*	0.422*	0.329*	0.477*			
Social activities	0.395*	0.401*	0.443*	0.564*	0.520*		
Risky Activities	0.361*	0.238*	0.366*	0.333*	0.068 P=0.113	0.387*	
WFIRS-S total	0.682*	0.707*	0.767*	0.765*	0.586*	0.700*	0.589*

*p<0.0001
WFIRS-S: Weiss Functional Impairment Rating Scale-Self Report Form

Table 4. Correlation Between Subdomains and Total Score of Weiss Functional Impairment Rating Scale-Self Report Form and Health Questionnaire For Children and Adolescents

	Kidscreen total score
Family	-0.313 p<0.0001
Work	-0.346 p<0.0001
School	-0.315 p<0.0001
Life skills	-0.407 p<0.0001
Self concept	-0.598 p<0.0001
Social activities	-0.479 p<0.0001
Risky activities	-0.053 p=0.218
WFIRS-S total score	-0.467 p<0.0001

WFIRS-S: Weiss Functional Impairment Rating Scale-Self Report Form; Kidscreen: Health questionnaire for children and adolescents

Validity Analysis

The KIDSCREEN-10 Index-TR was used for the concurrent validity analysis of the WFIRS-S-TR. The correlation coefficient between the total scores of two scales was -0.467 and it was statistically significant (Table 4).

Confirmatory factor analysis was used for the construct validity of the WFIRS-S-TR. The RMSEA value was found to be 0.065 and the CFI value was 0.68.

DISCUSSION

In this study, the reliability and validity of the WFIRS-S-TR, the Turkish language version of the original WFIRS-S form, was investigated.

The Cronbach's alpha coefficient for the WFIRS-S-TR was found to be 0.939 for the whole scale and 0.788-0.827 for the subdimensions. In psychometric evaluations, the closer the Cronbach's alpha coefficient is to 1, the more reliable the scale is (Aydemir 2012, Kılıç 2016). The Cronbach's alpha coefficient of the WFIRS-S in the French language (WFRIS-S-Fr) was found to be 0.91 for the whole scale and 0.73-0.84 for the subdimensions (Micoulaud-Franchi et al. 2019). The respective Cronbach's alpha values for the WFIRS-S in the Iranian language (WFIRS-S-Ir) were found to be 0.94 for the whole scale and 0.72-0.90 for the subdimensions (Hadianfard et al. 2017). In the study of Canu et al. (2016), it was found to be 0.96 for the whole scale and 0.85-0.94 for the subdimensions. In Japan, the Cronbach's alpha coefficients for the WFIRS-S-J ranged between 0.82-0.90 (Takeda et al. 2017). The results of our study were evaluated as highly reliable and were found to be compatible with the results reported by other studies.

In the present study, the coefficients of the correlations between the WFIRS-S-TR subdimensionscores and the total scale score were found to range between 0.586 and 0.767.The corresponding correlations between subdimensions and total scale score were 0.55-0.80 for the WFIRS-S-Ir(Hadianfard et al. 2017) and 0.56-0.78 for the WFIRS-S-Fr (Micoulaud-Franchi et al. 2019). In our study, self-concept and risky activities subdimensions of the WFIRS-S-TR had the lowest subdimension-total score correlation coefficients. The item-total score correlation coefficients for the 8th, 10th, 11th and 12th items of therisky activities subdimension specifically related to narcotic drug use and sexual acts were below 0.20. Most of the participants marked these items as ''never", which may be due to low contribution by the participants as narcotics use is illegal and sexual acts are difficult topics in Turkey.It is also seen that these items evaluate the impairment of functionality resulting from serious behavioral disorders comorbid with ADHD. Severe behavioral problems and comorbid behavioral disorders related to ADHD are seen more frequently in patients with ADHD who have not

been diagnosed and treated in time. It is, therefore,expected that these items would be marked less by our participants diagnosed with ADHD who had been on long term therapy and follow up. Considering that each item in the risky activities subdimension has important clinical value and can give rise to different results in different groups ofparticipants, it was decided that theseitems remain in the WFIRS-S-TR. More than half of the items in risky activities subdimension of the WFIRS-S-J showed floor effects and it was stated that they should be taken into consideration in the interpretation (Takeda et al. 2017). In the studies conducted in Iran and France, the lowest subdimension-total score correlations were found in the self-concept subdimension of the WFIRS-S (Hadianfard et al. 2017, Micoulaud-Franchi et al. 2019). FI is taken as an objective measure of the negative deviation in functional areas relative to the normal. The fact that items in the self-concept subdomain included more subjective evaluation may have caused a lower correlation coefficient.

Our result on the test-retest correlation coefficient was r=0.804, which was also high and statistically significant. The test-retest correlation coefficients for all the subdimensions were statistically significant and of moderate and high strength except for the risky activities subdimension which had a low level of correlation.

Concurrent validity analysis of the WFIRS-S-TR was assessed on the correlation with the scores on the KIDSCREEN-10 Index-TRyielded moderate and negative correlation for the whole scale. There was also low and negative correlation were found between family, school and work subdimensions.A significiant correlation was not demonstrated between the risky activities subdimension and the KIDSCREEN-10 Index-TR. The concurrent validity of the WFRIS-S-Ir assessed by its correlation with the Paediatic Quality of Life Inventory (PedsQL) and a significant negative correlation was reported. The lowest correlation was found in the risky activities subdimension (Hadianfard et al. 2017). All domains except the work subdomain of the WFIRS-S-Fr showed moderate-low negative correlations with the European quality of life EuroQol (EQ-5D) (Micoulaud-Franchi et al.2019). The concurrent validity of the WFIRS-S-J was based on analysis of the correlations with the general functionality scale (GAF) and the subdimensions of WFIRS-S-J scores andmoderate-highnegative correlations were detected for all subdimensions except with the risky activities subdimension (Takeda et al. 2017). The results of our study are similar to those reported in other countries. The KIDSCREEN-10 Index is not a disease-specific index and its lack of detailed queries may underlie the low-moderate values obtained for the coefficients of the correlation with the WFRIRS-S-TR.

As a result of confirmatory factor analysis, the RMSEA and CFI values for the WFIRS-S-TR were 0.065 and 0.68, respectively. The corresponding results were 0.08 and 0.60, respectively, for RMSEA and CFI values of the WFIRS-S-Ir (Hadianfard et al.2017) and 0.06 and 0.67 , respectively, for RMSEA and CFI values of theWFIRS-S-Fr(Micoulaud-Franchi et al.2019). It was seen that the fitting indexes in these studies are acceptable but not optimal. The CFI value obtained in studies can range from 0 to 1 but should be greater than 0.9 (Aydemir 2012). Baseline effect was also found in some items in the WFIRS-Parent-TR and it was reported that in the explanatory factor analysis some items were placed in different sub-dimensions as compared to the original version of the WFIRS (Tarakçıoğlu et al 2015). The results of our study were similar to those reported in other countries. Studies with different participant groups are needed in order to evaluate whether the results of this study are specific to our participant groups. In the clinical group with ADHD diagnoses, the scores on the WFIRS-S-TR school and family subdimensions were significantly higher as compared to the community group. Other sub-dimension scores are not significant, but higher than the community group.

In the validation study of the WFIRS-Parent- TR the scores of the patients were significantly higher compared to the controls and increased with the severity of the disorder. Patients diagnosed for the first time and not previously treated were included in the adaptation study of the WFIRS-P form (Tarakçıoğlu et al.2015). In a study by Weiss et al. (2018b), methylphenidate treatment was initiated in patients diagnosed with ADHD, and after an 11-week treatment, a significant improvement was found in all WFIRS-Parent formtotal scores and subdimensions. In our study, the participants of the clinical group had been treated for more than 1 year and this was thought to underlie the absence of significant differences between the scores in some subdimensions.

It is important to get information from different sources in the assessment of ADHD in children but it is not enough to to query only the parents or only the teachers (Conners et al 1997, Kuhn et al. 2017). In a review examining different studies investigating parent and child reports, it was found that children reported emotional functionality and somatic symptoms more than their parents (Hemmingsson et al. 2017).It was reported that parents had information about their children using substance, but they were not aware of the difficulties associated with substance use disorders, and that it was, therefore, important to evaluate the adolescents directly (Fisher et al. 2006). In the psychometric study of Conners-Wells Adolescent Self-Report Scale, which assesses mental symptoms and especially ADHD symptoms in adolescents, correlation with conners parents and teacher rating scale was examined.In different subscales, adolescent parents' consistency was low and moderate (r=0.10-0.59), adolescent teacher consistency (r=0.08-0.26) was low.In the same study, consistency between parent and teacher evaluations of adolescents in subscales related to internalising symptoms was found to be lower than the consistency in subscales related to externalising symptoms and the results are in agreement with the literature (Kaner et al. 2011). The low consistency of child and parent and teacher notifications supports the

importance of evaluating each source of information in the context of the whole since the different sources of information in the literature contribute differently to diagnosing and may evaluate the same individual in different contexts (Kaner et al. 2012). It is seen that the WFIRS-S-TR will make an important contribution to the evaluation of patients as a whole in clinical research and treatment processes.

The first limitation of this study is including in the clinical group of participants only patients who had been diagnosed in the past and had been treated for more than 1 year, not including any newly diagnosed cases, and not checking the ADHD symptom severity. It is, therefore, important to repeat the study and evaluate the outcome with newly diagnosed participants, with and without comorbidity diagnoses, before starting treatment with stimulants and checking the change in ADHD symptom severity after treatment. The second limitation is not using structured clinical interview in the community group for diagnostic research purposes. The third limitation is the age and gender differences between the clinical and the community groups.

In this study, the original WFIRS-S was adapted to the Turkish language, and the reliability and validity of the WFIRS-S-TR form was investigated. It was shown that the WFIRS-S-TR could be used in evaluating functional impairment in ADHD patients.

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