Data Article

Psychometric data and versions of the Wender Utah Rating Scale including the WURS-25 & WURS-45

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ARTICLE INFO

ABSTRACT

Our associated paper presented a psychometric evaluation of the Wender Utah Rating Scale (WURS) and its abbreviated version, the WURS-25. Instead of actual factors scores, we employed "item averages" calculated by the average score of each item comprising that factor. We did not present a factor analysis of the WURS-25. Herein we identify items of the full WURS that are redundant or not part of any of the scale's five factors. Removing these items produced a shortened version, the WURS-45.

We performed a logistic regression using actual factor loadings as well as factors based on item averages, and compared major depressive disorder (MDD) to generalized anxiety disorder (GAD) patients in the same analysis. We performed exploratory factor analysis with the WURS-45 items. We then performed logistic regressions and Receiver Operating Characteristics (ROC) analyses with the WURS-45 and WURS-25 factors.

No increase in specificity or sensitivity arose when actual factors scores were used as opposed to factor scores from item averages. MDD and GAD ROC curves were very similar, supporting combining MDD with GAD patients into

a single group. WURS-45 factors paralleled those derived from the full WURS. ROC curves, logistic regression and confusion tables showed the WURS-45 preserved the excellent diagnostic separation produced by the full WURS. Similar analyses showed WURS-25 scoring using its three factors improved its diagnostic utility.

The WURS-45 has reduced redundancy with minimal loss in discriminatory power. Analysis of the WURS-25 using factor scores boosts its performance. Both versions of the scale provide clinical information describing childhood ADHD and are useful in separating adult patients with ADHD from those with MDD or GAD.

Specifications Table

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Subject	Psychology
Specific subject area	Clinical Psychology
Type of data	Table
	Graph
	Figure
	Spreadsheet
How data were acquired	The data were acquired from patients evaluated by our clinic as part of normal clinic procedures prior to consent for clinical trials.
Data format	Raw
	Analyzed
Parameters for data collection	All patients were reviewed by several clinicians. 137 patients had a primary diagnosis of ADHD. All met criteria for adult and childhood ADHD. None met criteria for MDD or GAD. 230 patients had a primary diagnosis of either MDD or GAD. None met criteria for adult or childhood ADHD. Patients with incomplete or contradictory information were excluded.
Description of data collection	Patients completed an intake questionnaire dealing with current emotional symptoms, use of psychotropic medications, past & current psychiatric symptoms, behavioral/academic problems in childhood, current social adjustment, legal problems, and use of substances of abuse. This information was reviewed by an intake worker and a clinic psychiatrist in separate intake interviews. These charts were subsequently reviewed by three of the authors several years after intake. 120 individuals constituting a community control sample are included in the analysis of sensitivity and specificity.
Data source location	Psychiatric and Behavioral Solutions LLC
	Salt Lake City, UT 84105
	USA
Data accessibility	Data are attached in an Excel workbook fully de-identified.
Related research article	Gift, T.E., Reimherr, M.L., Marchant, B.K., Steans, T.A., Reimherr, F.W. Wender Utah Rating Scale: Psychometrics, Clinical Utility and Implications Regarding the Elements of ADHD. Journal of Psychiatric Research. 2021 March;135:181–188, https://doi.org/10.1016/j.jpsychires.2021.01.013. Epub 2021 Jan 14

Value of the Data

• These data describe aspects of childhood associated with ADHD and persistence of ADHD into adulthood. The factor structure of these WURS versions demonstrates differences between the childhood histories of adults with ADHD versus adults with MDD or GAD.

- These data support the value and utility of a new abbreviated version of the WURS, the WURS-45.
- These data allow replication and comparison of our results to cohorts collected by other clinics both in the US and worldwide.
- These data support the methodology to calculate factors used in our associated paper based on item averages. This method is simpler to calculate and allows a more straight forward assessment of the severity of the symptoms identified by each factor.
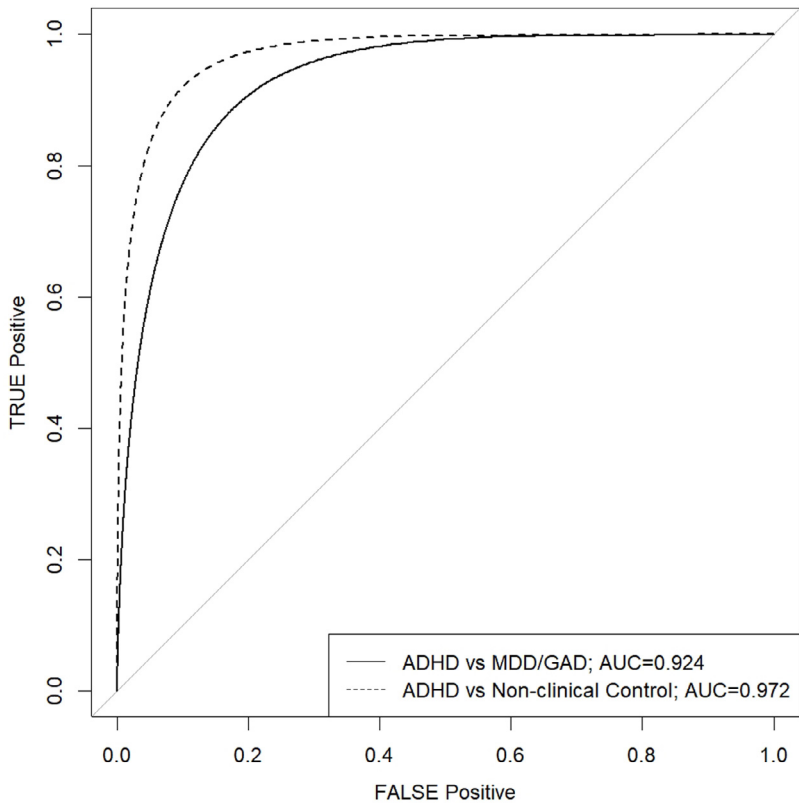
1. Data Description

Fig. 1: ROC curves and AUC calculations comparing ADHD patients with GAD, MDD and non-clinical controls. This used a conventional scoring procedure to calculate the actual 5 factors of the WURS-60 as opposed to using factors calculated with item averages. This method produced an AUC for MDD patients of 0.961 and for GAD patients 0.951. The AUC for combined GAD & MDD patients using item averages is 0.955.

Fig. 2: ROC curves and AUC calculations comparing ADHD patients with GAD/MDD (0.924) using the WURS-25 factors. This used the item average procedure to calculate the factor scores of the WURS-25. In comparison the total WURS-25 scores generated an AUC= 0.838 [2].
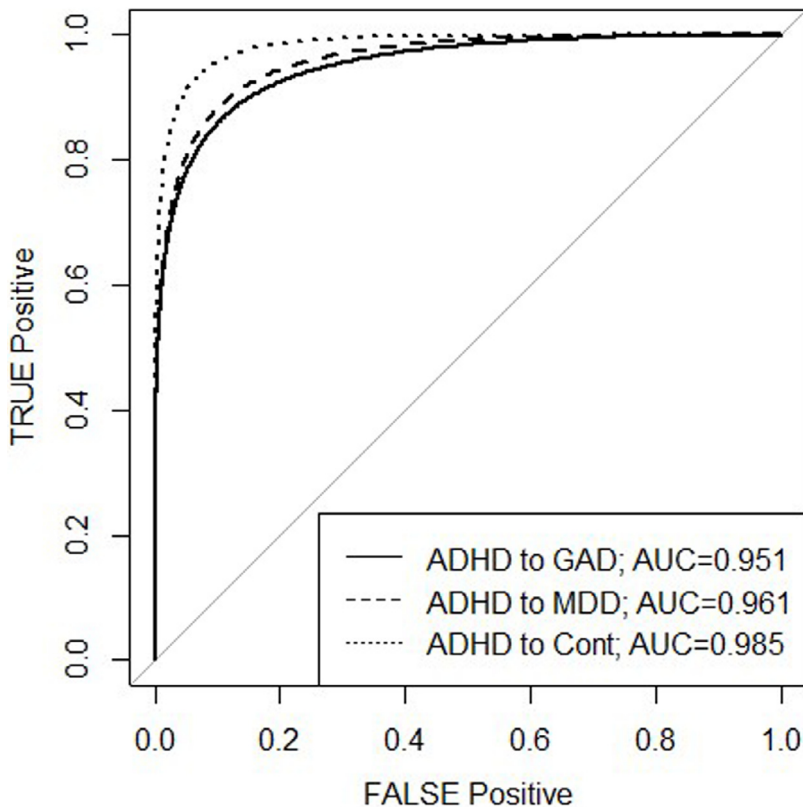
Fig. 1. Three ROC Curves and AUC Calculations Comparing ADHD Patients with GAD, MDD and Nonclinical Controls Using a Conventional Procedure to Calculate Factor Scores for the Full WURS.

Fig. 2. Two ROC Curves and AUC Calculations Comparing ADHD Patients with GAD/MDD and Nonclinical Controls Using WURS-25 Factor Scores.

Fig. 3: ROC curves and AUC calculations comparing ADHD patients with GAD/MDD and non-clinical controls using the WURS-45. This used the item average procedure to calculate the factor scores of the WURS-45. The AUC for the WURS-45 comparing adults with ADHD to those with MDD/GAD is 0.942. For the WURS-60, in a similar calculation the AUC=0.955.

Table 1: Factor loading scores are given for items in the WURS-25. Items are arranged by factors. Readers can use this table to compute factor scores from their own data. These data can be used to compare our factor analysis to later replications.

Table 2: The total WURS-25 [1] and factor scores (using item averages) for three patient groups are presented. This table is helpful in noting the extent to which a factor is associated with ADHD specifically or psychiatric disorders in general.

Table 3: Factor loading scores are given for items in a 45 item version of the WURS (WURS-45). Items are arranged by factors. These data can be used to compare our factor analysis to later replications. Readers can also use this table to apply factor scores to their own data.

Table 4: Factor scores for the WURS-45 for the 3 patient groups are contrasted. This table is helpful in noting the extent to which a factor is associated with ADHD specifically or psychiatric disorders in general.

Table 5: Basic data from logistic regression analysis of both the WURS-25 and WURS-45 are displayed.

Table 6: Confusion Matrix resulting from logistic regression of both the WURS-25 and WURS-45 are displayed. Sensitivity, Specificity, PPV and NPP are also presented. The reader can compare

Table 1

WURS-25 Items and Factor Loadings Ordered to Show Factor Membership Using Patients with ADHD, GAD, or MDD.

	Disruptive mood/behavior	ADHD	Anxiety/dysphoria
Eigenvalue, percent of variance	9.3, 37.2%	2.4, 9.6%	2.0, 7.9%
Disruptive mood/behavior			
7. Hot- or short-tempered, low boiling point	**.813**	.123	.073
9. Temper outbursts, tantrums	**.799**	.164	.114
11. Stubborn, strong-willed	**.653**	.077	.081
15. Disobedient with parents, rebellious, sassy	**.636**	.352	−.030
17. Irritable	**.732**	.157	.408
20. Moody, ups and downs	**.613**	.100	.515
21. Angry	**.704**	.042	.439
27. Losing control of myself	**.592**	.409	.299
28. Tendency to be or act irrational	**.525**	.515	.230
40. Trouble seeing things from someone else's point of view	**.606**	.236	.151
41. Trouble with authorities, trouble with school, visits to principal's office	**.544**	.322	−.130
ADHD			
3. Concentration problems, easily distracted	.222	**.800**	.140
5. Nervous, fidgety	.400	**.473**	.344
6. Inattentive, daydreaming	.170	**.721**	.201
10. Trouble with stick-to-itiveness, not following through, failing	.243	**.778**	.194
24. Acting without thinking, impulsive	.460	**.560**	.038
25. Tendency to be immature	.388	**.620**	.126
51. Overall a poor student, slow learner	.081	**.660**	.115
56. Trouble with mathematics or numbers	.041	**.533**	−.024
59. Not achieving up to potential	.090	**.678**	.046
Anxiety/dysphoria			
12. Sad or blue, depressed, unhappy	.189	.000	**.763**
16. Low opinion of myself	.011	.151	**.727**
26. Guilty feelings, regretful	.098	.200	**.675**
4. Anxious, worrying	.125	.090	**.746**
Not connected items			
29. Unpopular with other children, didn't keep friends for long, didn't get along with other children	.163	.305	.288

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization, Rotation converged in 6 iterations

Primary factor loadings are in bold.

Numbers preceding the item text indicate the order in which items appear in the full WURS
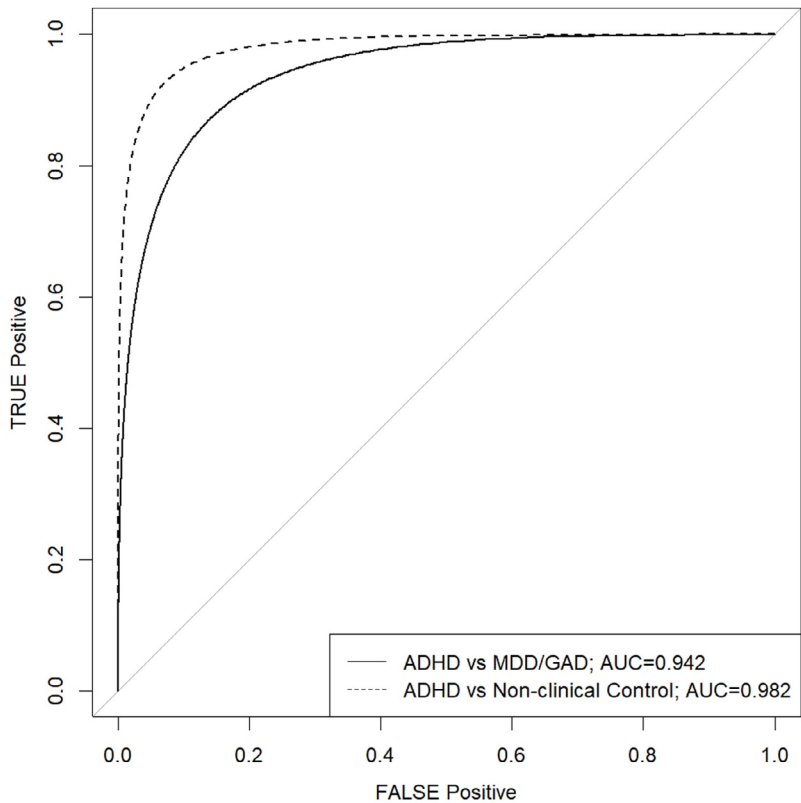
Fig. 3. Two ROC Curves and AUC Calculations Comparing ADHD Patients with GAD/MDD and Nonclinical Controls Using the WURS-45 Factor Scores.

Table 2
WURS-25 Total and Factor Scores for Each Group.

	ADHD	MDD/GAD	Non-clinical controls	ANOVA statistic
Total WURS-25	51.47±15.71	29.2±18.0	14.51±9.99	$F_{(2,482)}=136.3$, p < .0001.
Three factors of the WURS-25 *				
Disruptive mood/behavior	1.85±0.84	1.02±0.80	0.54±0.44	$F_{(2,482)}=69.1$, p < .0001
ADHD	2.52±0.70	1.17±.077	0.74±0.63	$F_{(2,482)}=152.1$, p < .0001
Anxiety/dysphoria	1.80±0.98	1.78±1.01	0.66±0.69	$F_{(2,482)}=44.1$, p < .0001

* Factor scores generated using item average calculations

the results from the WURS-25 total score [1] with the WURS-60, WURS-45 and the WURS-25 factor scores.

Excel Workbook: Age, Gender, Diagnosis and WURS item scores for all patients in this analysis are given. WURS Items are identified using the numbering system in the original WURS. Seven items are repeated and the second column (i.e. 18r) has been reverse scored. This reverse scoring is identified by use of the "insert comment" function.

Table 3

WURS-45 Items and Factor Loadings Ordered to Show Factor Membership Using Patients with ADHD, GAD, or MDD.

	Disruptive mood/behavior	ADHD	Academic problems	Social	Anxiety/ dysphoria
Eigenvalue, percent of variance	6.0, 7.9%	20.6, 27.3%	3.3, 4.4%	7.0, 9.3%	2.9, 3.8%
Disruptive mood/behavior					
7 Hot- or short-tempered, low boiling point	**1.04**	.12	.12	−.01	.19
9 Temper outbursts, tantrums	**1.03**	.15	.00	.10	.14
11 Stubborn, strong-willed	**.77**	.16	.02	−.37	.30
13 Incautious. dare-devilish, involved in pranks	**.67**	.49	.29	−.44	−.11
15 Disobedient with parents, rebellious, sassy	**.83**	.46	.15	−.20	.04
17 Irritable	**.90**	.24	−.09	.19	.45
20 Moody, ups and downs	**.73**	.17	−.06	.12	.58
21 Angry	**.89**	−.01	.05	.26	.45
27. Losing control of myself	**.73**	.44	.09	.10	.35
28 Tendency to be or actirrational	**.68**	.55	.12	.04	.30
34. Running away from home	**.62**	.12	−.04	.10	−.04
35 Getting into fights	**.76**	.14	.09	.02	.12
36 Teasing other children	**.48**	.11	.08	−.07	.03
40 Trouble seeing things from someone else's point of view	**.63**	.31	−.12	−.07	.19
41 Trouble with authorities, trouble with school, visits to principal's office	**.85**	.29	.20	−.08	−.14
61 Suspended or expelled	**.45**	.12	.34	.03	−.06
ADHD					
3 Concentration problems, easily distracted	.38	**1.16**	.47	−.13	.23
6 Inattentive,daydreaming	.29	**1.10**	.31	.06	.26
10. Trouble with stick-to-itiveness, not following through, failing	.46	**1.19**	.24	.22	.07
19 Sloppy, disorganized	.38	**1.14**	.12	.07	.04
24 Acting without thinking, impulsive	.56	**.76**	.08	−.36	.29
25 Tendency to be immature	−.09	**-.90**	.19	−.08	.19
59 Not achieving up to potential	.21	**.99**	.28	.20	−.07

Table 3 (*continued*)

	Disruptive mood/behavior	ADHD	Academic problems	Social	Anxiety/ dysphoria
Academic					
51. Overall a poor student, slow learner	.25	.44	**.73**	.25	.02
53 Slow reader	.17	.17	**.99**	.08	−.08
54 Trouble reversing letters	−.05	.05	**.65**	−.11	.07
55 Problems with spelling	.01	.09	**1.18**	.03	.04
56 Trouble with mathematics or numbers	.07	.41	**.68**	−.01	.06
57 Bad handwriting	.07	.66	**.70**	−.01	.12
58 Able to read pretty well but never really enjoyed reading	.15	.11	**.56**	.08	−.38
Social					
1 Active, restless, always on the go	.53	.40	.24	**-.87**	.23
8 Shy, sensitive	.00	−.27	.04	**.87**	.35
16 Low opinion of myself	.20	.20	.03	**.75**	.49
18 Outgoing, friendly, enjoyed company of people	.14	.12	.14	**-1.00**	−.01
29 Unpopular with other children, didn't keep friends for long, didn't get along with other children	.31	.39	−.07	**.60**	−.03
30 Poorly coordinated, did not participate in sports	−.05	.28	.21	**.63**	.33
39 Follower, led around too much	.03	.23	.17	**.58**	.10
Anxiety/dysphoria					
2 Afraid of things	−.10	.10	.14	.35	**.71**
4 Anxious, worrying	.08	.20	−.05	.13	**1.03**
5 Nervous, fidgety	.44	.67	.13	−.23	**.79**
12 Sad or blue, depressed, unhappy	.30	−.03	.05	.53	**.68**
26 Guilty feelings, regretful	.22	.27	.01	.24	**.66**
31 Afraid of losing control of self	.37	.13	−.03	.05	**.46**
43 Headaches	.18	−.18	−.02	−.08	**.58**
44 Stomachaches	.18	.09	−.30	.13	**.42**

Items contained in the WURS-25 are underlined
Primary factor loadings are in bold.
Numbers preceding the item text indicate the order in which items appear in the full WURS

Table 4

Average Factor Scores for Each Group on the WURS-45.

	ADHD	MDD/GAD	Non-clinical controls	ANOVA statistic
5 factors of the WURS-45*				.
Disruptive mood/behavior	1.63±0.75	0.85±0.69	0.49±0.40	$F_{(2,482)}$=107.5, p < .0001
ADHD	2.76±0.72	1.25±0.85	0.72±0.60	$F_{(2,482)}$=189.8, p < .0001
Academic problems	1.58±0.92	0.68±0.66	0.65±0.63	$F_{(2,482)}$=26.2, p < .0001
Social	1.84±0.58	1.56±0.58	1.07±0.41	$F_{(2,482)}$=48.1, p < .0001
Anxiety/dysphoria	1.35±0.76	1.24±0.81	0.56±0.49	$F_{(2,482)}$=101.0, p < .0001

* Factor scores generated using item average calculations.

Table 5

Logistic Regression Comparing ADHD with MDD/GAD: WURS-25 and WURS-45.

	Estimate	Std. Error	z value	p-value
Three factor solution for the WURS-25*				
(Intercept)	−3.9016	0.4835	−8.069	p < .0001
Disruptive mood/behavior	0.7289	0.2229	3.270	p = .001
ADHD	2.5088	0.2787	9.003	p < .0001
Anxiety/dysphoria	−1.2386	0.2177	−5.690	p < .0001
Five Factor Solution for the WURS-45*				
(Intercept)	−4.3925	0.6225	−7.056	p < .0001
Disruptive mood/behavior	1.0297	0.2826	3.644	p = .0003
ADHD	2.2661	0.2863	7.915	p < .0001
Academic problems	1.0406	0.2620	3.972	p < .0001
Social	−0.8559	0.3851	−2.223	p = .026
Anxiety/dysphoria	−1.3073	0.2886	−4.529	p < .0001

* Factor scores generated using item average calculations

Table 6

Diagnostic Accuracy of the Confusion Matrix Comparing ADHD with MDD/GAD.

True Diagnosis	Diagnosis Predicted by Regression	
Three factor solution of the WURS-25		
	ADHD	MDD/GAD
ADHD	102	35
MDD/GAD	27	201
Results with WURS-25 factors: Sensitivity = 74%; Specificity = 88%; PPV = 79%; NPV = 85%		
Results with WURS-25 total: Sensitivity = 62%; Specificity = 86%; PPV = 73%; NPV = 79%		
Five factor solution of the WURS-45		
ADHD	110	27
MDD/GAD	22	206
Results with WURS-45: Sensitivity = 80%; Specificity = 90%; PPV = 83%; NPV = 88%		
Results with WURS-61: Sensitivity = 84%; Specificity = 94%; PPV = 88%; NPV = 91%		

2. Experimental Design, Materials and Methods

The Methods are described fully in our associated publication in Psychiatry Research [2]. We collected 137 adult ADHD patients, 121 patients with major depressive disorder (MDD); and 107 patients with generalized anxiety disorder (GAD) from 22 clinical trials. 120 individuals constituted a community control. The intake package contained the WURS. These charts were reviewed by three of the authors several years after intake. Patients experiencing comorbidity between ADHD and MDD/GAD were excluded from this analysis. In addition patients with a complicated psychiatric presentation (substance dependence/abuse, psychotic symptoms, etc.) were excluded. Both the full WURS and the WURS-25 were subjected to factor analysis. Given

that some items of the full WURS were either redundant or had low loading scores with all 5 factors, a shorter version (WURS-45) was created that retained the factor structure of the full WURS. Factor scores were calculated based on the items that loaded over 0.4 for each factor. In case an item loaded above 0.4 on more than one factor, it was counted only on the most heavily loaded factor. Factor scores were calculated as the average of all such heavily loading items. Data were then subjected to logistic regression creating ROC curves and confusion matrices. The confusion matrices were used to calculate sensitivity, specificity, positive predictive value (ppv) and negative predictive value (npv).

Ethics Statement

These investigations were carried out in accordance with the latest version of the Declaration of Helsinki, and informed consent of the participants was obtained after the nature of the procedures had been fully explained for each study. Ethical approval was granted for this later re-examination by the University of Utah IRB (IRB_00115316).

CRediT Author Statement

Frederick W. Reimherr: Conceptualization, Writing, Methodology, Data collection; **Barrie K. Marchant:** Conceptualization, Writing, Methodology, Data analysis; **Thomas E. Gift:** Conceptualization, Writing; **Tammy A. Steans:** Data collection; **Matthew L. Reimherr:** Data analysis.

Declaration of Competing Interest

Funding

Supplementary Materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.dib.2021.107232.

References

[1] M.F. Ward, P.H. Wender, F.W. Reimherr, The Wender Utah Rating Scale: An aid in the retrospective diagnosis of childhood attention deficit hyperactivity disorder, Am. J. Psychiatry 150 (1993) 885–890, doi:10.1176/ajp.150.6.885.
[2] T.E. Gift, M.L. Reimherr, B.K. Marchant, T.A. Steans, W. Frederick, F.W. Reimherr, Wender Utah Rating Scale: Psychometrics, Clinical Utility and Implications Regarding the Elements of ADHD, J. Psychiatr. Res. 135 (2021) 181–188 Associated Research Article, doi:10.1016/j.jpsychires.2021.01.013.