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Psychometric Properties of the Children's Depression Rating Scale–Revised in Adolescents

Taryn L. Mayes, M.S.,[1] Ira H. Bernstein, Ph.D.,[2] Charlotte L. Haley, Ph.D.,[1]
Betsy D. Kennard, PsyD,[1] and Graham J. Emslie, M.D.[1]

Abstract

Objective: The aim of this study was to present the reliability and validity of the Children's Depression Rating Scale–Revised (CDRS-R) in the adolescent age group.

Method: Adolescents with symptoms of depression were assessed using the CDRS-R and global severity and functioning scales at screening, baseline, and after 12 weeks of fluoxetine treatment. Global improvement was also assessed at week 12 (or exit). Reliability and validity were analyzed using Classical Test Theory (item-total correlations and internal consistency) and correlations between the CDRS-R and other outcomes.

Results: Adolescents ($n = 145$) were evaluated at screening; 113 (77.9%) met criteria for major depressive disorder, 8 (5.5%) had subthreshold depressive symptoms, and 24 (16.6%) had minimal depressive symptoms. Ninety-four adolescents had a baseline visit after 1 week, and 88 were treated with fluoxetine. Internal consistency for the CDRS-R was good at all three visits (screening: 0.79; baseline: 0.74; exit: 0.92), and total score was highly correlated with global severity ($r = 0.87$, 0.80, and 0.93; $p < 0.01$). Only exit CDRS-R score was significantly correlated with global functioning (Children's Global Assessment Scale; $r = -0.77$; $p < 0.01$). Reductions on the CDRS-R total score were highly correlated with improvement scores at exit (Clinical Global Impressions–Improvement; $r = -0.83$; $p < 0.01$).

Conclusions: The results demonstrate good reliability and validity in adolescents with depression.

Introduction

The Children's Depression Rating Scale–Revised (CDRS-R) (Poznanski and Mokros 1996) has become the most widely used rating scale for assessing severity of depression and change in depressive symptoms for clinical research trials in children and adolescents with depression. The CDRS-R, which was based on the adult Hamilton Depression Rating Scale, was originally developed as a rating scale for children aged 6–12 years. It is a 17-item scale, with items ranging from 1 to 5 or 1 to 7 (possible total score from 17 to 113), rated by a clinician via interviews with the child and parent. A score of $\geq$40 is indicative of depression, whereas a score $\leq$28 is often used to define remission (minimal or no symptoms).

The psychometric properties of the scale are strong for the child age group (Poznanski and Mokros 1996). The internal consistency (Crobach's α) in children is good ($\alpha = 0.85$), and item-total correlations range from 0.28 to 0.78, with the depressed feelings (0.78), difficulty having fun (0.77), depressed facial affect (0.74), and self-esteem (0.70) showing the strongest correlation with total score. Convergent validity with a global depression rating has been also shown to be highly correlated (0.92) (Poznanski and Mokros 1996). However, despite the robust psychometric data available for the child age group (ages 6–12 years), there are currently no reports on the psychometric properties of the scale in the adolescent age group. Given the widespread use of the CDRS-R in clinical trials of adolescent depression, information on the psychometric properties of the scale in this age group is important.

Methods

Data for this study were derived from a continuation treatment trial for children and adolescents with major depressive disorder (MDD) (R01 MH39188), the results of which have been previously published (Emslie et al. 2008). The clinical trial was approved by the Institutional Review Board (IRB) of the University of Texas Southwestern Medical Center at Dallas, and all participants and their parents gave written informed assent and consent in accordance with local IRB regulations.

Children and adolescents (aged 7–18 years; $n = 331$) with depressive symptoms (based on an initial telephone screening) were evaluated for MDD for inclusion in a relapse prevention study (Emslie et al. 2008) at the University of Texas Southwestern Medical Center. Following the initial telephone screen, youth experiencing at least some symptoms of depression were evaluated by an experienced research clinician using the Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS)–Present and

Departments of [1]Psychiatry and [2]Clinical Sciences, University of Texas Southwestern Medical Center, Dallas, Texas.
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Lifetime (Kaufman et al. 2000), which was then reviewed through clinical interview with the participant and parent (independently) by a child psychiatrist on the same day. The child psychiatrist also completed the CDRS-R to assess depression severity. At baseline (within 2 weeks of screening), the CDRS-R was rated again by a child psychiatrist. Youth who did not meet criteria for MDD were given treatment recommendations and referred out. Those meeting MDD who agreed to continue participation in the treatment study entered 12 weeks of open treatment with fluoxetine. Specific details on the acute treatment portion of the study have been described previously (Emslie et al. 2008; Tao et al. 2009). Visits during acute treatment were weekly for the first 4 weeks and then every other week through week 12. The psychiatrist rated the CDRS-R at each visit, although for these analyses we report only on the CDRS-R ratings at week 12 (or exit if the participant discontinued treatment prior to week 12). The Clinical Global Impressions–Severity (CGI-S) (Guy 1976) and the Children's Global Assessment Scale (CGAS) (Shaffer et al. 1985) were also rated at each visit.

We report here on the psychometric properties of the CDRS-R in the adolescent subgroup (ages 12–18 years; $n = 145$). Ratings from all available CDRS-R scores were examined at each of three visits: Initial screening, baseline, and exit. Classical Test Theory analyses were used to infer reliability and consistency of the CDRS-R in this population. Item means, item-total correlations (r_{it}), and Cronbach's coefficient α (which measures internal consistency) were generated for the scale. Correlations between the CDRS-R, CGI, and CGAS were also obtained.

Results

Of 152 adolescents consented and screened for the study, 145 had a completed CDRS-R at the initial screening. Of these, 113 (77.9%) met criteria for MDD, 8 (5.5%) had subthreshold depressive symptoms, and 24 (16.6%) had minimal or no depressive symptoms. Nearly half of the participants were female (46.9%; 68/145). Most participants were Caucasian (75.2%; 109/145), followed by Hispanic (12.4%; 18/145), African American (10.3%; 15/145), and other (2.1%; 3/145). Mean CDRS-R total score at screening was 53.0 ± 10.4 (range, 26–79). Mean CGI-S at initial screening was 4.4 ± 1.0 (range, 1–7), and mean CGAS was 53.5 ± 7.4 (range, 41–78).

Ninety-four adolescents had a baseline visit, and 88 met study entry criteria and were entered into acute treatment. Those not continuing with the study assessments beyond initial screening were withdrawn primarily for not meeting MDD criteria and withdrawing consent.

Internal consistency and item-total correlations

Internal consistency (Cronbach's α) was good at all three visits: Initial screening (0.79), baseline (0.74), and exit (0.92), largely reflecting differences in variability among patients, as would be expected. At initial screening, depressed mood showed strong item-total correlation ($r_{it} = 0.71$), with item-total correlations for all items ranging from 0.12 to 0.71. Overall, depressed mood, difficulty having fun, social withdrawal, depressed facial affect, and decreased self-esteem tended to be among items on the CDRS-R with the greatest item/total correlation (r_{it}); however, during screening and baseline, the r_{it} even for these items was generally only moderate, with the exception of depressed mood at screening. Item-total correlations were much stronger at exit and ranged from 0.24 to 0.82. Table 1 provides the item-total correlations at each visit.

Construct validity (global functioning and severity)

The initial screening visit was the only visit to include participants with and without a diagnosis of MDD, and the CDRS-R total score at screening was correlated with a diagnosis of MDD obtained on the K-SADS ($r = 0.64$; $p < 0.01$). CDRS-R total scores at screening, baseline, and exit were highly correlated with depression severity (CGI-S) at each of the corresponding visits ($r = 0.87$, 0.80, and 0.93; $p < 0.01$). CDRS-R score was significantly correlated with global functioning (CGAS) only at exit ($r = -0.77$; $p < 0.01$). Correlations between each of the measures are provided in Table 2.

Table 1. Internal Consistency and Item-Total Correlations

	First evaluation n = *145*		*Baseline* n = *94*		*Exit* n = *88*	
	Mean	r_{it}	*Mean*	r_{it}	*Mean*	r_{it}
Impaired school work	3.9 ± 1.4	0.15	4.2 ± 1.3	0.33	2.6 ± 1.3	0.63
Difficulty having fun	3.9 ± 1.4	0.48	4.5 ± 1.1	0.60	2.0 ± 1.3	0.82
Social withdrawal	3.0 ± 1.4	0.35	3.8 ± 1.2	0.51	1.7 ± 1.0	0.78
Sleep disturbance	3.7 ± 1.4	0.36	3.8 ± 1.2	0.14	1.9 ± 1.2	0.57
Appetite disturbance	2.8 ± 1.3	0.40	2.9 ± 1.2	0.19	1.6 ± 1.0	0.49
Excessive fatigue	4.1 ± 1.6	0.43	4.6 ± 1.3	0.51	2.0 ± 1.3	0.72
Physical complaints	3.0 ± 1.5	0.37	3.2 ± 1.5	0.14	1.6 ± 0.9	0.28
Irritability	4.4 ± 1.2	0.12	4.4 ± 1.0	0.11	2.2 ± 1.3	0.56
Excessive guilt	2.3 ± 1.4	0.35	2.5 ± 1.3	0.29	1.2 ± 0.5	0.24
Low self-esteem	4.0 ± 1.3	0.46	4.2 ± 1.1	0.44	2.3 ± 1.2	0.77
Depressed feelings	4.2 ± 1.2	0.71	4.7 ± 0.9	0.49	2.1 ± 1.2	0.83
Morbid ideation	2.3 ± 1.3	0.25	2.4 ± 1.2	0.36	1.4 ± 0.8	0.64
Suicidal ideation	2.3 ± 1.4	0.31	2.1 ± 1.3	0.14	1.2 ± 0.7	0.53
Excessive weeping	3.0 ± 1.7	0.34	2.8 ± 1.5	0.43	1.3 ± 0.7	0.57
Depressed facial affect	2.7 ± 1.0	0.50	3.1 ± 1.1	0.39	1.8 ± 0.9	0.78
Listless speech	1.7 ± 0.6	0.39	2.1 ± 0.8	0.23	1.4 ± 0.6	0.70
Hypoactivity	1.9 ± 0.9	0.36	2.4 ± 1.0	0.22	1.4 ± 0.7	0.67
Total score	53.0 ± 10.4		57.9 ± 8.8		29.7 ± 11.4	
Cronbach's α	0.79		0.74		0.92	

TABLE 2. CONSTRUCT VALIDITY

Scale	*Mean*	*Screen CDRS-R*	*Screen CGAS*	*Screen CGI-S*	*Base CDRS-R*	*Base CGAS*	*Base CGI-S*	*Exit CDRS-R*	*Exit CGAS*	*Exit CGI-S*	*Exit CGI-I*	*Change in CDRS-R*
Screen CDRS-R	53.0 ± 10.4	1.00	-0.54^a	0.87^a	0.42^a	-0.15	0.40^a	0.02	0.09	0.02	-0.06	0.30^a
Screen CGAS	53.3 ± 7.6	-0.54^a	1.00	-0.65^a	-0.30^a	0.47^a	-0.30^a	-0.08	0.27	-0.09	-0.06	-0.12
Screen CGI-S	4.4 ± 1.0	0.87^a	-0.65^a	1.00	0.34^a	-0.15	0.45^a	0.05	0.01	0.07	0.01	0.18
Base CDRS-R	57.9 ± 8.8	0.42^a	-0.30^a	0.34^a	1.00	-0.52^a	0.80^a	0.06	0.03	0.05	-0.08	0.53^a
Base CGAS	51.7 ± 6.2	-0.15	0.47^a	-0.15	-0.52^a	1.00	-0.46^a	-0.12	0.25	-0.15	-0.03	-0.14
Base CGI-S	4.8 ± 0.7	0.40^a	-0.30^a	0.45^a	0.80^a	-0.46^a	1.00	0.06	0.08	0.07	-0.01	0.37^a
Exit CDRS-R	27.7 ± 11.4	0.02	-0.09	0.05	0.06	-0.12	0.06	1.00	-0.77^a	0.93^a	0.92^a	-0.82^a
Exit CGAS	66.3 ± 11.5	0.09	0.27^b	0.01	0.03	0.25^b	0.08	-0.77^a	1.00	-0.77^a	-0.77^a	0.67^a
Exit CGI-S	2.4 ± 1.2	0.02	-0.09	0.07	0.05	-0.15	0.07	0.93^a	-0.77^a	1.00	0.91^a	-0.76^a
Exit CGI-I	1.9 ± 1.1	-0.06	-0.06	0.01	-0.08	-0.03	-0.01	0.92^a	-0.77^a	0.91^a	1.00	-0.83^a
Change in CDRS-R	-28.9 ± 13.4	0.30^a	-0.12	0.18	0.53^a	-0.14	0.37^a	-0.82^a	0.67^a	-0.76^a	-0.83^a	1.00

[a] $p < 0.01$.
[b] $p < 0.05$.
CDRS-R = Children's Depression Rating Scale–Revised; CGAS = Children's Global Assessment Scale; CGI-I = Clinical Global Impressions-Improvement; CGI-S = Clinical Global Impressions–Severity.

Correlation between CDRS-R and depression improvement

Among participants entering acute treatment ($n = 88$), the mean CDRS-R change score from baseline to exit was -28.9 ± 13.4, and most (77.3%; $n = 68$) were considered responders to treatment based on a CGI-Improvement (CGI-I) ≤ 2 and at least a 50% reduction on the CDRS-R. There was no correlation between screening or baseline CDRS-R score and global improvement (CGI-I) or CDRS-R change score from baseline to exit. However, exit CDRS-R total score was highly correlated with global improvement ($r = 0.92$; $p < 0.01$), as well as change in total score from baseline to exit ($r = -0.82$; $p < 0.01$). Change in CDRS-R total score was also highly correlated with CGI-I ($r = -0.83$; $p < 0.01$).

Conclusions

Findings from this study of 145 adolescents with depressive symptoms indicate that the psychometric properties for the CDRS-R in adolescents are similar to those previously reported for the child age group (Poznanski and Mokros 1996). Specifically, the scale showed good internal consistency at screening, baseline, and exit. Similar to earlier data on the CDRS-R (Poznanski and Mokros 1996), depressed mood, difficult having fun, depressed facial affect, and self-esteem tended to be among the items with the greatest item-total correlations; however, item-total correlations were much stronger at exit than at screening or baseline. Because symptoms of depression overlap with other psychiatric disorders (e.g., anxiety disorders, attention-deficit hyperactivity disorder), it is possible that the modest item-total correlations at screening and baseline reflect the presence of other non-MDD psychiatric disorders.

The total score on the CDRS-R was highly correlated with global severity across all visits. Although global severity (a single number rating) is easier measure for clinicians to use, the CDRS-R allows for the assessment of each of the depressive symptoms at baseline and over time. In addition, exit CDRS-R total score and change in CDRS-R total score from screening to exit were correlated with CGI-I, suggesting that the CDRS-R is a good measure of symptom change. Although clinicians may choose to use a single improvement score method, the CDRS-R provides more detail about specific symptom changes. More specifically, utilizing the CDRS-R or similar depression symptom severity scale allows clinicians and researchers to identify which remaining symptoms to target for additional intervention.

Although this study provides psychometrics on an expanded age group, there are some limitations that warrant consideration. First and foremost, these analyses are conducted *post hoc* from ratings completed as part of a treatment study. As such, there were relatively few other rating scales with which to examine construct validity. However, the findings are consistent with the earlier report by Poznanski and colleagues (1996), which showed good construct validity compared with global depression severity. Second, all adolescents included in the study were being evaluated for depression, as they demonstrated at least some symptoms of depression through a telephone screen. Therefore, this study did not include healthy controls or adolescents with other primary psychiatric disorders, potentially inflating the correlation between CDRS-R total score and MDD diagnosis. Thus, because most teens had some symptoms of depression, the more depressive symptoms reported, the higher the total score on the CDRS-R, and the more likely they would be to meet five of the nine criteria symptoms on the K-SADS. Further, because of the common overlap between depressive symptoms and symptoms of other disorders (e.g., decreased concentration in depression, ADHD), CDRS-R scores in youth with other psychiatric disorders are likely to be somewhat elevated. Thus, it is unclear in this sample if including teens with other nondepression psychiatric illnesses may have led to better or poorer correlation with MDD diagnosis. Finally, the majority of those entering acute treatment were responders to the treatment, which may have inflated the item-total correlations and construct validity at exit.

Despite these limitations, the results for the reliability and validity of the CDRS-R in the adolescent age group are consistent with those previously found in the child age group, and the CDRS-R appears to be an appropriate measure of outcome for clinical research trials. Its utility in clinical settings, though highly useful for detecting change in symptoms of depression, remains unclear because of the length of time involved in conducting the CDRS-R interview. Although a global improvement scale such as the CGI is highly correlated with improvement on the CDRS-R and is easier for clinicians to quickly rate, the CDRS-R may be more clinically useful during initial stages of treatment given that it can identify which specific residual symptoms need to be targeted to achieve remission.

Disclosures

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Address correspondence to:
Taryn L. Mayes, M.S.
Department of Psychiatry
University of Texas Southwestern Medical Center
5323 Harry Hines Blvd.
Dallas, TX 75390-8589

E-mail: taryn.mayes@utsouthwestern.edu