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Psychometric Properties Of Two Adolescent Depression Scales in a Colombian Community Sample: ADRS and RCADS-Major Depression

Propiedades psicométricas de dos escalas de depresión para adolescentes en una muestra comunitaria colombiana: ADRS y RCADS-depresión mayor

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Abstract: Depression can occur at all ages; however, when it begins early in life, prognosis is less favorable. Early identification and treatment provision need valid and reliable tools to assess depression in children and adolescents. The present study aimed at analyzing, in a Colombian community sample, the psychometric properties of two brief depression scales, using Classical Test Theory methods: The Adolescent Depression Rating Scale (ADRS) self-report version and the Revised Child Anxiety and Depression Scale (RCADS) – Major Depression Subscale. Analyses of both scales showed most item-scale and item-item correlations to be moderate and significant. Internal consistency was significant and adequate for both, ADRS (.67) and RCADS–Major Depression (.71). For ADRS, a two-factor solution explained 37.39% of variance while a one-single factor explained 25.99%. For RCADS-Major Depression, a two-factor solution explained 41.81% of variance while a one-single factor explained 29.14%. Construct validity was satisfactory, as both scales showed moderate and significant correlations with the convergent (RCADS-Generalized Anxiety) and the discriminant (KADS-11) criteria; yet, correlations with the former were stronger. Results provide further evidence in favor of the ADRS and the RCADS-Major Depression as effective tools to assess depressive symptoms in children and adolescents.

Keywords: Depression; psychometric properties; ADRS; RCADS.

Resumen: La depresión puede presentarse a cualquier edad; sin embargo, cuando ocurre en etapas tempranas de la vida el pronóstico es menos favorable. La identificación y el tratamiento tempranos necesitan herramientas válidas y confiables para evaluar la depresión en niños y adolescentes. El presente estudio analizó, en una muestra comunitaria colombiana, las propiedades psicométricas de dos escalas breves de depresión, utilizando métodos de la Teoría Clásica de los Test: Escala de Valoración de Depresión Adolescente (ADRS) versión de auto-reporte y la Escala de Ansiedad y Depresión Infantil Revisada (RCADS)– Subescala de Depresión Mayor. El análisis de las dos escalas mostró correlaciones ítem-ítem e ítemescala, moderadas y significativas. La consistencia interna fue significativa y adecuada para ambas escalas, ADRS (0.67) y RCADS-Depresión Mayor (0.71). Para ADRS, dos factores explicaron 37.39% de la varianza, mientras que la solución de un solo factor explicó 25.99% de la varianza. Para RCADS-Depresión Mayor, dos factores explicaron el 41.81% de varianza y un factor único explicó 29.14%. La validez de constructo fue satisfactoria, ambas escalas mostraron correlaciones moderadas y significativas con el criterio convergente (KADS-11) y el criterio discriminante (RCADS-Ansiedad Generalizada); aunque más fuertes en el primer caso. Los resultados evidencian que ADRS y RCADS-Depresión Mayor son herramientas efectivas para la valoración de síntomas depresivos en niños y adolescentes.

Introduction

Depression is the most common mental health disorder affecting up to 5% of world population, the leading cause of disability worldwide and a major contributor to the overall global burden of disease (Ferrari, Somerville, et al., 2013; World Health Organization, 2018). Reports on depression tend to focus on adult populations (e.g. Ferrari, Charlson, et al., 2013; Ferrari, Somerville, et al., 2013) but major depressive disorder can occur at all ages. Furthermore, when comparing childhood onset with later in life onset, the former presents a more severe course with longer and recurrent depressive episodes, more suicidality and more frequent hospitalization (Boden & Foulds, 2016; Kutcher et al., 2017; Pine, Cohen, Cohen, & Brook, 1999; Weidman, Augustine, Murayama, & Elliot, 2015; Wesselhöft, 2016).

Beyond the characteristic sadness and loss of interest in usually enjoyable activities, children with depression may find it difficult to concentrate at school, show irritability, excessive crying, changes in their appetite and sleeping patterns. Younger children may lose interest in play, whereas older children may present high risk behaviors (Masi et al., 2000; World Health Organization, 2017). Depression in children and adolescents is associated with poor psychosocial functioning, high psychiatry comorbidity, and risk of recurrent episodes or onset of bipolar disorder (Purper-Ouakil, Michel, & Mouren-Siméoni, 2002). In some cases, individuals may not fully meet clinical criteria for a major depressive episode but still have relevant depressive symptoms, a condition referred as sub-threshold depression. Literature supports that sub-threshold depression, although less severe, also requires clinical attention, as it presents analogous comorbidity and symptom patterns in children and adolescents, causing poor outcomes like psychopathology, functional impairment and high use of health service, and it is a major precursor of major depressive episodes (Wesselhöft, 2016). Children and adolescents experiencing depressive symptoms, at clinical or sub-threshold levels, are at a high risk. They are likely to miss days at school, and are susceptible to substance abuse, bingeing and suicidal ideation and attempt (Gied & Pine, 2002). It is estimated that about 40% of children with depression experience a recurrent attack, a third of affected children will make a suicide attempt, and 3-4% will die from suicide (Hazell, 2009).

Estimated prevalence of major depression in children is approximately 2% and 4-8% in adolescents. Preadolescent boys and girls are affected equally by the condition, but in adolescents, depression is more common among girls than boys (Hazell, 2009). In Colombia, the Minister of Health carried out a national survey on mental health in 2005. Results revealed an estimated major depressive disorder prevalence of 0.04% and 0.01% during the previous 30 days and 12 months, respectively, for in children from 7 to 11 years of age, according to their parents' reports. Regarding adolescents (12 to 17 years of age), self-reports revealed a major depressive disorder life prevalence of 2.0%, and of 0.1% and 0.8%

during the previous 30 days and 12 months, respectively (MINSALUD & COLCIENCIAS, 2015). Low self-esteem, negative mood and anhedonia –all depressive symptoms– have been found related to suicide ideation in Colombian adolescents (Carretta, Burgess, & Welner, 2015; González, Castilla, Retamoza, & Bolaños, 2013; Pérez-Olmos, Téllez-Cruz, Vélez-Traslaviña, & Ibáñez-Pinilla, 2012). In fact, suicidal behavior has been associated to depressive-anxiety symptoms and to major depressive disorder (Abello et al., 2016; Ceballos, Suárez, Arenas, & Salcedo, 2013; González et al., 2013; Vásquez & Quijano, 2013). According to the National Institute of Legal Medicine and Forensic Sciences, in 2017, there has been an increase of 11.30% in the annual suicide rate, thus, the earlier the anxiety and depressive symptoms could be identified, the faster clinicians and psychologists may treat the groups of symptoms and avoiding the possibility of suicidal behavior.

Early identification of those children and adolescents experiencing clinical or sub-threshold depression would allow immediate intervention, and reduce the likelihood of negative outcomes. Thus, development and validation of depressive symptom screening instruments have become necessary tasks for both, research and clinical practice. A systematic review on this topic (Brooks & Kutcher, 2001) identified two main withdraws. First, some instruments designed for adults (e.g. the Beck Depression Inventory) are applied to adolescents, although they are rarely validated in this population and/or do not take into consideration their profile. Second, those instruments for children/adolescents are designed for the use of highly trained clinicians (e.g. the Schedule for Affective Disorders and Schizophrenia for School-Age Children). Depression is occurring on earlier ages, with poorer outcomes and prognosis. There is a need for parsimonious, quickly, valid and reliable tools particularly designed for the assessment of depression in children and adolescents.

The Adolescent Depression Rating Scale (ADRS) and The Revised Child Anxiety and Depression Scale (RCADS) are self-report questionnaires that measure symptoms of depression in adolescents, in short time, and have shown good psychometric properties in diverse cultural groups. The ADRS was originally developed in French and English to measure the intensity of depression among adolescents. It includes 10 items to be self-responded as True or False, concerning the two weeks preceding completion. It has been used in clinical (Benarous, Guedj, Braitman, Gallois, & Lana, 2014; El Malki, Echerbaoui, Mammad, El Madhi, & Ahami, 2018) and general populations (Andreou & Svoli, 2013; Benarous, Hassler, Falissard, Consoli, & Cohen, 2015; Chéron-Launay, Baha, Mautrait, Lagrue, & Le Faou, 2011; Revah-Levy et al., 2011). Psychometric analyses report good internal consistency and concurrent validity (Revah-Levy et al., 2007).

The RCADS includes 47 items to assess social phobia, panic disorder, major depression, separation anxiety, generalized anxiety, and obsessive-compulsive disorder. Responses range from 0 (“never”) to 3 (“always”) (Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000). The RCADS has shown good psychometric properties in Dutch (Kösters, Chinapaw,

Zwaanswijk, van der Wal, & Koot, 2015), Danish (Esbjørn, Sømhovd, Turnstedt, & Reinholdt-Dunne, 2012), Polish (Skoczeń, Rogoza, Rogoza, Ebesutani, & Chorpita, 2017), Turkish (Gormez et al., 2017), French (Bouvard, Denis, & Roulin, 2015), Irish (Donnelly, Fitzgerald, Shevlin, & Dooley, 2018), and Spanish (Sandín, Valiente, & Chorot, 2009) populations, among others; in clinical (Chorpita, Moffitt, & Gray, 2005) and non-clinical (Bouvard et al., 2015; Donnelly et al., 2018) samples. Recently, a meta-analysis of 146 studies (Piqueras, Martín-Vivar, Sandin, San Luis, & Pineda, 2017) found the RCADS to have robust internal consistency reliability in different assessment settings, countries, and languages. Also, a cross-sectional study (Stevanovic et al., 2017) performed in societies with different socioeconomic, cultural, and religious backgrounds from 11 countries located in Europe, America, Asia and Africa, found only a small number of RCADS items to be non-invariant. Evidence suggests RCADS is a sound, valid and suitable instrument for cross-cultural use and comparisons (Piqueras, Martín-Vivar, Sandin, San Luis, & Pineda, 2017; Stevanovic et al., 2017). However, to the best of our knowledge, no data from Colombian samples is still available.

The present study aimed at analyzing the psychometric properties of these two brief depression scales, the Adolescent Depression Rating Scale (ADRS) selfreport version and the Revised Child Anxiety and Depression Scale (RCADS) – Major Depression Subscale, in a community sample of Colombian adolescents, in an effort to further substantiate the psychometric properties of these practical self-report instruments for children and adolescents.

Methods

Design and Participants

Partial data were used from a cross-sectional study on the impact of examination on students', parents' and teachers' depression and anxiety in Colombian children (VICECT+I 0262016). The study was performed in 17 schools randomly selected from the district of Sucre, Colombia. The protocol was approved by the Research and Ethical Committee of the "Corporación Universitaria del Caribe CECAR". From a total of 861 students invited to participate, 710 (82.5%) agreed to collaborate handing over consent forms signed by parents and themselves. Final sample included 422 (59.4%) males and 288 (40.6%) females. Ages ranged from 9 to 13 years (mean=10.29, SD=0.74); females (mean=10.41, SD=0.86) were significantly older than males (mean=10.21, SD=0.64), ($t(708)=3.59, p\leq 0.001$).

Translation and Adaptation Process of the Scales

This study followed the recommendations found in the literature related to the adaptation of psychological tests (Cardoso Ribeiro, Gómez-Conesa, & Hidalgo Montesinos, 2010; Muñiz, Elosua, & Hambleton, 2013). A direct and reverse translation methodology as the specialized scientific literature recommends (Sousa & Rojjanasrirat, 2011) was applied. First, two interpreters translated the scales from English to Spanish. Subsequently, two other persons translated the text back into English and finally the two versions were compared.

Adolescent Depression Rating Scale (ADRS) SelfReport Version

Total score can range from 0 (none reported depressive symptom) to 10 (all listed symptoms present). Authors propose to interpret a score 0 to 2 as “not depressed”, 3 to 5 as “sub-threshold depression”, and 6 or more as “depressed” (Revah-Levy, Birmaher, Gasquet, & Falissard, 2007).

Revised Child Anxiety and Depression Scale (RCADS) – Major Depression Subscale

For this study the major depression subscale (10 items) was selected, from the RCADS full 47-item youth Spanish version provided by the UCLA (University of California, Los Angeles) (UCLA, 2018). Total score could range from 0 (none reported depressive symptom) to 30 (all symptoms are always present).

Validity Criterion Instruments

Kutcher Adolescent Depression Scale (KADS). It was developed for diagnosing and monitoring over time depressive symptoms in adolescents. By self-report respondents are questioned with 16 Likert-type items about their experiencing of common depressive symptoms (e.g. mood changes, sleep difficulties). Responses can range from 0 (“hardly ever”) to 3 (“all the time”) (LeBlanc, Almudevar, Brooks, & Kutcher, 2002). For the purpose of this study the short version with 11 items, which has shown good internal consistency and sensitivity (Brooks, Krulewicz, & Kutcher, 2003; Brooks, 2004) was used as a convergent validity criterion.

Revised Child Anxiety and Depression Scale (RCADS) – Generalized Anxiety. The RCADS generalized anxiety subscale (6 items) was selected as discriminant validity criterion. Responses range from 0 (“never”) to 3 (“always”).

Statistical Analyses

.Using the SPSS v.20 statistical package, a series of analyses were run for each individual scale: 1) sample size adequacy (Kaiser-Meyer-Olkin [KMO] index) and data normal distribution (Kolmogorov-Smirnov [KS] test, skewness and kurtosis) for each scale; 2) correlations between each item with its corresponding total scale score and with other individual scale items; 3) internal consistency of each scale with Cronbach's α ; 4) construct validity, with an exploratory principal component analysis with orthogonal varimax rotation, retaining factors with an eigenvalue > 1 and a communality ≥ 0.40 , and 5) construct validity was assessed by correlating the total ADRS and RCADS-Major Depression scores with the RACDS-Generalized Anxiety total score (discriminant validity) and the KADS-11 score (convergent validity)

Results

Sample Size Adequacy and Data Normal Distribution KMO statistics is a measure of the pattern of correlations, which could vary from 0 (disperse pattern) to 1 (compressed pattern). A minimum of 0.5 is recommended; yet, the closer the value is to 1 the factor analysis would be presumed to be reliable. KMO values for sample adequacy were 0.79 for ADRS and 0.80 for RCADS-Major Depression. As both scales yielded good KMO values, it was assumed that sample was adequate for factor analyses to proceed. The KS test showed that mean ADRS ($D(710)=0.24$, $p \leq 0.001$) and RCADS Major Depression ($D(710)=0.11$, $p \leq 0.001$) scores were not normally distributed. Kurtosis levels for ADRS ($z=16.14$) and RCADS-Major Depression ($z=3.56$) were both significant ($p \leq 0.001$). Skewness was significant for ADRS ($z=17.62$, $p \leq 0.001$) but not for RCADS-Major Depression ($z=8.88$, $p > 0.05$). These results must be interpreted cautiously; when sample sizes are very large, small standard errors are common; thus, significant z values may arise from even small deviations from normality. Results are summarized in Table 1. Figure 1 shows that the distribution for both, ADRS and RCADS-Major Depression, had high frequencies for low scores. Thus, correlational analyses were run with the Spearman non-parametric test.

	Mean(SD)	KMO	KS	Skewness z	Kurtosis z
Adolescent Depression Rating Scale (ADRS) self-report version	1.37 (1.70)	.79	.24***	17.62 ***	16.14 ***
Revised Child Anxiety and Depression Scale (RCADS) – Major Depression Subscale	6.74 (4.43)	.80	.11***	8.88 ***	3.36 ***

KMO: Kaiser-Meyer-Olkin index of sample size adequacy

KS: Kolmogorov-Smirnov test of normal distribution

*** $p \leq .001$

Table 1. Sample size adequacy and data normal distribution

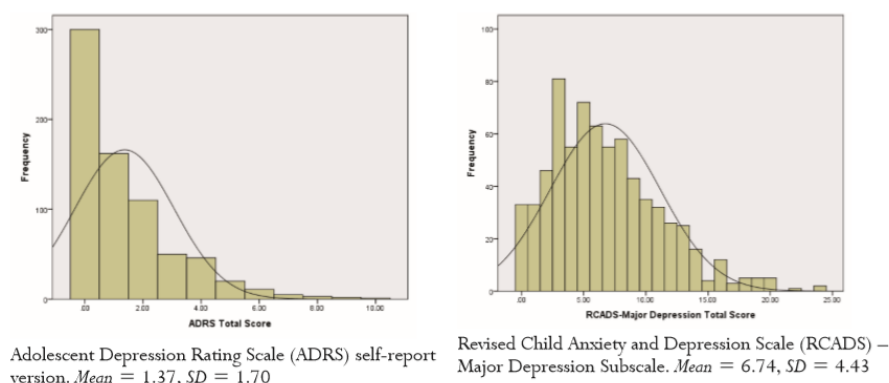


Figure 1. Distributions of ADRS and RCADS-Major Depression total scores (N=710)

Item-Scale and Item-Item Correlations

All item-scale Spearman correlations were significant ($p \leq 0.001$). For ADRS, correlations ranged from 0.30 to 0.55 (mean = .45), and for RCADS-Major Depression from 0.45 to 0.58 (mean = .52). Although values slightly decreased, Spearman correlations using corrected scores (e.g. ADRS item 1 is correlated with the total score obtained by adding up all ADRS items excluding number 1) yielded also significant correlations ($p \leq .001$). For ADRS corrected correlations ranged from 0.19 to 0.36 (mean = .30), and for RCADS from 0.26 to 0.44 (mean = .37). Considering that item-scale correlations were all significant ($p \leq 0.05$), moderate ($r_s \geq .30$ and $r_s < .70$) and no extreme values were present ($r_s \leq .30$ or $r_s \geq .90$), all items were considered for the following analyses.

Item to item correlations for each scale yielded mostly significant results. All ADRS correlations were significant ($p \leq .05$) and ranged from 0.07 to .30, except from item 9-item10 correlation ($r_s = .02$, $p = .29$). RCADS correlations were significant ($p \leq .05$) and ranged from .06 to .41, except from item 2-item10 correlation ($r_s = -0.01$, $p = .38$). Bartlett's tests of sphericity yielded significant results for both scales ($p \leq .001$), meaning that items were related and thus, factor analysis was suitable. R-matrix determinant values suggest that multicollinearity was not a problem ($p < 0.00001$) for any scale: ADRS, .382; RCADS-Major Depression, .253. Given that items were fairly related but not too much, the factor analysis continued.

Internal Consistency and Factor Analysis

Alpha (α) values were .67 for ADRS (95% CI: .63 – .71), and .71 (95% CI: .68 – .74) for RCADS-Major Depression. After rotation, two factors resulted for ADRS, explaining 37.39% of variance, and for RCADSMajor Depression, two factors explained 41.81% of variance. When analyses were set to extract one single factor, total variance explained for ADRS was 25.99% and for RCADS 29.14% (Table 2).

ADRS	Factor 1	Factor 2	Single factor
I have no energy for work/school .138		.650	.454
I have trouble thinking	.563	.105	.536
I feel overwhelmed by sadness and listlessness	.564	.172	.572
Nothing really interests me or entertains me	.157	.465	.375
What I do is useless	.546	.228	.585
When I feel this way I wish I were dead	.602	.030	.531
Everything annoys me	.554	.217	.586
I feel downhearted and discouraged	.460	.321	.560
I sleep badly	.594	-.110	.452
School/work doesn't interest me just now; I can't cope	-.023	.796	.391
RCADS-Major Depression	Factor 1	Factor 2	Single factor
I feel sad or empty	.585	.197	.608
Nothing is much fun anymore	-.028	.726	.323
I have trouble sleeping	.586	.150	.587

Table 2. Factor loadings for the Adolescent Depression Rating Scale (ADRS) and the Revised Child and Anxiety Depression Scale (RCADS)-Major Depression

ADRS	Factor 1	Factor 2	Single factor
I have problems with my appetite	.538	.127	.533
I have no energy for things	.164	.683	.471
I am tired a lot	.601	.072	.562
I cannot think clearly	.215	.703	.525
I feel worthless	.621	.231	.656
I feel like I don't want to move	.657	.085	.618
I feel restless	.554	-.117	.431

Note. Loadings $\geq .400$ in bold.

Convergent and Discriminant Validity

KADS-11 total score was used as a convergent validity criterion. Spearman correlations were moderate and significant for both, ADRS ($r_s = .575$, $p \leq .001$) and RCADS-Major Depression ($r_s = .498$, $p \leq .001$). RCADS-Generalized Anxiety total score was used as a discriminant validity criterion. Spearman correlations were low but significant for both, ADRS ($r_s = .089$, $p \leq .05$) and RCADS-Major Depression ($r_s = .180$, $p \leq .000$). That is, both scales significantly correlated with both, the convergent and the discriminant criteria; yet, correlations with the former were stronger

Discussion

Childhood and adolescence are characterized by intensive physical, cognitive and socio-emotional growth. These stages are conceptualized as full of joy, illusions, vitality and liveliness. However, in some cases, depressive symptoms may begin even in these early stages of life and interfere in the social, academic, and emotional development of the individual. Depression in youngsters not only relates to a poorer lifetime

prognosis (Dekker et al., 2007), but it has the inconvenience of usually being unrecognized, and so, it can go on untreated (Costello, Erkanli, & Angold, 2006; Hazell, 2002). Most times the youngster does not receive treatment until clearly negative outcomes have occurred, for instance, school failure, involvement with drugs, suicide attempt or self-harming (Hazell, 2002).

Immediate provision of treatment to prevent unfavorable outcomes relies on timely detection. Reliable and easy to use instruments to assess depressive symptoms would allow effective screening in youngster population, to be followed by comprehensive diagnosis and treatment. This study analyzed, in a sample of youngsters from Colombia, the psychometric properties of two brief and self-reported scales specifically designed to assess depressive symptoms in children and adolescents: ADRS and RCADS-Major Depression.

Item-scale and item-item correlations were mostly significant and moderate; given that correlations were all below .70, redundancy seemed not a problem. Although some correlations were very low, in most cases they were still significant.

Internal consistency was significant and satisfactory for both scales. ADRS alpha value (.67) was slightly lower than the ones obtained in the original study for three differentiated groups (.74 - .79) (Revah-Levy et al., 2007). Similarly, RCADS-Major Depression alpha value (.71) was slightly lower than in the original study (0.76) (Chorpita et al., 2000), although some studies have found values even above 0.90 (Esbjörn, Sømhovd, Turnstedt, & Reinholdt-Dunne, 2012; Piqueras et al., 2017).

Factor analysis of ADRS produced two factors with item distribution pattern resembling the one from the “not depressed” group from the original study (Revah-Levy et al., 2007); that is, an “internal negative state” (items 2,3,5,6,7,8,9) and a “external manifestation” (items 1,10). Item 4 in the original study loaded into the “internal negative state”, whereas in this study loaded into “external manifestation”. RCADS-Major Depression factor analysis also yielded a two factor solution; however, as this is a subscale itself, background literature does not provide equivalent data to compare. For both scales, total explained variance was higher when considering a two factor solution rather than a one factor solution; however, given that the main purpose of short self-report instruments is screening of symptoms in large populations, the use of a single global score is recommended.

Both scales showed satisfactory concurrent and discriminant validity features. Global scores were significantly related with those of another short depressive symptom instrument (i.e. KADS-11) and of an anxiety scale (i.e. RCADS-General Anxiety). Given that correlations with KADS were stronger than correlations with RCADS-General Anxiety, it can be concluded that the two analyzed scales had satisfactory convergent and discriminant validity.

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