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Validation of the Kutcher Adolescent Depression Scale in a Caribbean Student Cohort

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Abstract:	Research on depression among Caribbean children has been limited by the lack of valid and reliable measures of depression. This study fills this gap. Objective: This project addresses this problem by exploring the internal consistency reliability and the concurrent and discriminant validity of the Kutcher Adolescent Depression Rating Scale using a wide cross-section of the student population attending elementary schools in Jamaica and Barbados. Method: Students enrolled in grade six during the fall semesters of the 2014/2015 academic year (n = 759; 50.9% females 49.1% males; mean age = 10.7 yrs + 0.66) were administered the Kutcher Adolescent Depression Scale (KADS) along with the Adolescent Depression Rating Scale (ADRS), the Major Depression Scale (MDS), the Visual Analogue Scale – State Anxiety (VAS-SA), and the Visual Analogue Scale – Trait Anxiety (VAS-TA). Results: Overall, the KADS was found to have an acceptable degree of reliability (α = 0.76). The scale also had reasonably good concurrent validity as evidenced by high correlations with scores on the ADRS

	(r=0.62) and the MDS (r=-0.61), and acceptable discriminant validity as demonstrated through moderate correlations with the VAS-SA (r=0.21) and the VAS-TA (r=0.18). This pattern of results suggests that the majority of the variance underlying the KADS assesses depression (38%) while a smaller degree of the variability (3% to 4%) measures a conceptually similar but distinct concept. Conclusion: The KADS is a reliable and valid measure for assessing depressive symptoms among Jamaican and Barbadian primary school students. The sample may not be representative of all Caribbean children

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TITLE: Validation of the Kutcher Adolescent Depression Scale in a Caribbean Student Cohort

Study Type: Reliability and Agreement

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Validation of the Kutcher Adolescent Depression Scale in a Caribbean Student Cohort

Short title:

Validation of the KADS

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Abstract

Research on depression among Caribbean children has been limited by the lack of valid and reliable measures of depression. This study fills this gap.

Objective: This project addresses this problem by exploring the internal consistency reliability and the concurrent and discriminant validity of the Kutcher Adolescent Depression Rating Scale using a wide cross-section of the student population attending elementary schools in Jamaica and Barbados.

Method: Students enrolled in grade six during the fall semesters of the 2014/2015 academic year (n = 759; 50.9% females 49.1% males; mean age = 10.7 yrs $\pm$ 0.66) were administered the Kutcher Adolescent Depression Scale (KADS) along with the Adolescent Depression Rating Scale (ADRS), the Major Depression Scale (MDS), the Visual Analogue Scale – State Anxiety (VAS-SA), and the Visual Analogue Scale – Trait Anxiety (VAS-TA).

Results: Overall, the KADS was found to have an acceptable degree of reliability (α = 0.76). The scale also had reasonably good concurrent validity as evidenced by high correlations with scores on the ADRS (r=0.62) and the MDS (r=-0.61), and acceptable discriminant validity as demonstrated through moderate correlations with the VAS-SA (r=0.21) and the VAS-TA (r=0.18). This pattern of results suggests that the majority of the variance underlying the KADS assesses depression (38%) while a smaller degree of the variability (3% to 4%) measures a conceptually similar but distinct concept.

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Conclusion: The KADS is a reliable and valid measure for assessing depressive symptoms among Jamaican and Barbadian primary school students. The sample may not be representative of all Caribbean children.

Keywords: Depression, Caribbean Children, Validation Study, School-Age Population

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Validation of the Kutcher Adolescent Depression Rating Scale (KADRS) in a Caribbean Student Cohort

Major depression was ranked fourth in the world as the most important determinant of human disease in 1990 and is expected to rank second by the year 2020.(1) It is one of the most common psychiatric disorders of school age children and its consequences may include psychiatric morbidity, academic and social derailment.(2) Longitudinal follow-up studies of children with depressive disorders have documented high rates of recurrence, progression into chronicity, and of conversion into adolescent and adult affective disorders.(2)

Children with depressive disorders may have a chronic disorder made up of periods of time in which they experience symptoms of depression interspersed with periods of normal mood between the depressive episodes.(3) Because "mood swings" and other emotional changes are considered a normal part of growing up, depression often goes unrecognised in children and adolescents.(2) A gender difference in depressive symptoms emerges in early adolescence (4-6) such that in childhood there is no gender difference in depressive symptoms, while by the age of 15 to 16 years a 2 to 1 female to male gender difference becomes evident and persists into adulthood. Some research has attributed these trends to hormonal changes that occur around the time of puberty.(7)

Across the world, between 10% to 20% of children and adolescents have significant mental health problems. Previous research has focused on depression among children and adolescents (8-11) for several reasons. First, elementary school children with depression are more at risk for attempted and completed suicide (12) than their healthy peers. Second, depressive disorders which occur during childhood and adolescence have documented high rates of substance abuse, teen age pregnancy and delinquency.(13-16) While the research done in

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North America is informative and worthwhile, few investigations have been performed on West Indian elementary school students and even less on Jamaican and Barbadian students. (17) Research by Lowe & Lipps (18-25) found that a relatively large percentage of adolescents in Caribbean secondary schools reported high symptoms of depression, little research has been done with pre-adolescents in this region. One factor that has limited research is the lack of valid measures of depressive symptoms for Caribbean children. This study attempts to fill this gap in the research by presenting evidence for the reliability and validity of one measure of depressive symptoms – The Kutcher Adolescent Depression Scale (KADS) – that may be used with this population.

The Jamaican society

While Jamaican society shares many similarities with North American and European societies, there are several factors which may place Jamaican elementary school students at an elevated risk for depression. Jamaican society is strongly stratified by social class.(26) This social stratification has a significant impact on the social environment, especially the educational system.(27) The types of schools that students attend are strongly associated with social class. Children of parents from lower social classes predominately are enrolled in less well staffed and resourced government managed, elementary and non-traditional high schools while those from middle and higher social classes go to privately run, and better resourced preparatory and traditional high schools.(21;23;25;27) Repeated critical competency examinations within the educational system such as the Grade Six Achievement Test (GSAT), high levels of poverty, high levels of unemployment and limited opportunities for social mobility may also elevate the risk of depression for students.(28) Given this enhanced risk, it is important to determine the characteristics and prevalence of depression among Jamaicans elementary school students.

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The Barbadian society

The Barbadian education system, like Jamaica, bears marked similarities to the colonial British model whereby all students at 11 years of age sit a secondary school entrance examination. These students are then streamed based on their performance on this high stakes test, known as the Common Entrance Examination (CEE). The practice of streaming has arguably served to maintain the rigid stratification of social classes within the Barbadian context.(29) For example, Lobera, (30) argues that in Barbados, "children of educated parents tend to obtain higher secondary school entrance grades than children from working-class backgrounds" (p. 143). This is primarily because working class children tend to have inadequate parental encouragement, resources and are more likely to speak the local dialect. Hence, children of working class parents are less likely to obtain a place at the older more prestigious secondary schools (formerly grammar schools).

Given the degree to which the practice of high-stakes entrance examinations is entrenched within the fabric of Jamaican and Barbadian culture and the societal pressures placed on children to succeed in examinations, the failure to achieve a place at a prestigious school, can have detrimental psychological consequences for children. Some parents have described their child's experience of the CEE and GSAT as "traumatic" and many children who took the CEE or GSAT were labelled by it; either as successes or failures, which in the case of the latter undermined their self-esteem.(27;31) Perceived failure can also result in "alienation from parents, family and past school friends" (32) all of which can increase the predisposition for depression among this demographic group.

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To better understand the issues surrounding depressive symptoms among school children in the Caribbean, it important to establish the psychometric properties of a scale such as the Kutcher Adolescent Depression Scale, (KADS).(33) The KADS is designed to screen for depressive symptoms among pre-adolescents and adolescents. This scale has been standardized and and evidence of validity obtained for depressive symptoms in several North American and Middle Eastern countries.(34;35) As such, it is important to obtain evidence of validity for the KADS within other cultural contexts such as the Caribbean. It is therefore hypothesised that the KADS will achieve concurrent and discriminant validity in a sample of the Jamaican and Barbadian students. Consistent with past literature (4-6) we hypothesize that there will be no gender difference in pre-adolescents' scores.

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Method

Participants

Students attending a cross section of elementary schools in Jamaica and Barbados were used to obtain preliminary evidence for the validity of the Kutcher Adolescent Depression Scale. Schools were chosen such that they included a balance of government funded public schools and privately funded preparatory schools in both Jamaica and Barbados. The public schools principally have larger numbers of students and larger class sizes, as well as enrolling students whose parents are from the lower social classes. Public schools do not charge tuition fees. Preparatory schools tend to have smaller numbers of students, smaller classes, a lower student to teacher ratio, and enrol students whose parents are from the middle and upper social classes. Preparatory schools charge tuition between $1,500 to $4,800 US per year. In all, 759 children (50.9% females 49.1% males; age 10-11 years, median = 11.0 yrs mean = 10.7 yrs $\pm$ 0.66) took

part in this study. Students were enrolled in the sixth grade of the 2014/2015 academic year. Ethical approval for the study was obtained from University of the West Indies (Mona and Cave Hill) Ethics Committees (Approval Number: ECP 173, 13/14). In particular, all parents and children were asked to provide their written informed consent and assent prior to collection of data.

Measures

Kutcher Adolescent Depression Scale (KADS). The KADS (33) is an 11 item measure designed to assess the cognitive, behavioural, affective and somatic symptoms of depression among students 12 to 17 years of age. It was developed at Dalhousie University, in Canada. Participants were asked to record their responses to each item using a series of Guttman rank ordered statements. Statements were assigned a score of 0 to 3 depending on the severity of the symptom they described. Students were asked to circle the number associated with the statement that most accurately described their feelings. Depression scores were calculated by summing the numbers associated with the circled statements. Within this sample of adolescents the KADS appeared to have a reasonable degree of internal consistency reliability ($\alpha = 0.76$). Past research suggests that the measure has adequate concurrent validity as indicated by a correlation of 0.69 with the Children's Depression Rating Scale.(33)

The Adolescent Depression Rating Scale (ADRS). The Adolescent Depression Rating Scale (36) is a 10 item measure of depressive symptoms for use with adolescents. Adolescents are asked to indicate whether each item is true or false for them. Revah-Levy et al (36) developed the scale using a three step procedure. First, a review of the literature on adolescent depression was conducted to conceptualize the manifestation of depression among adolescents.

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Second, separate interviews with child psychiatrists and with depressed adolescents were conducted to identify the depressive symptoms and how they clustered. From this an initial 44 item self-report depression measure was created for adolescents. A factor analysis of the measure was used to create a ten item, unidimensional measure of depression. The ADRS has been found to have acceptable levels of internal consistency reliability (alpha = 0.74 to 0.79) as well as good concurrent validity as demonstrated by large correlations with the Hamilton Depression Rating Scale (0.56), the Beck Depression Inventory - 13 (0.82) and the Clinical Global Impression Severity Scale (0.52).(36)

Major Depression Disorder Sub-Scale Revised Child Anxiety and Depression Scale (RCADS - MDD). The RCADS is a 47 item measure which assesses symptoms of anxiety and major depressive disorder developed at the University of California, Los Angeles. The 10 item major depression disorder subscale has an internal consistency reliability of 0.80 for clinical samples and 0.79 for school based samples of children 6 to 18 years of age.(37) As well, the measure was able to successfully distinguish students diagnosed with an affective disorder from those without.(37)

Visual Analogue Scale (*VAS)-Anxiety.* The VAS-Anxiety scale (38) is a 100 mm horizontal line which has the two endpoints labelled “no anxiety or fear” and “worst possible anxiety or fear”. Children report on their current level of anxiety by simply marking the spot on the horizontal line between the two endpoints. The VAS-Anxiety measure correlated 0.62 to 0.69 with established measures of anxiety (State-Trait Anxiety Scale – Children, State-Trait Anxiety Scale – Youth and the Yale Pre-Operative Anxiety Scale) suggesting that it has adequate

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concurrent validity.(39) Students were asked to rate their current level of anxiety (state anxiety) as well as their level of anxiety during the last six months (trait anxiety).

Procedure

Research assistants provided a brief introduction to the project at the start of participants' regular class. The project was described as an investigation into the psychosocial factors associated with mood and social relationships. Participants were informed that their participation was completely voluntary and they could withdraw from the project at any time. Questionnaires were then distributed for completion. Completed questionnaires were returned to one of the investigators at the end of the class. The data obtained from the questionnaires was entered into a SPSS version 11.5 and analyzed using Pearson Product-Moment correlations, inter-item reliability statistics, t-tests, and principal components analysis.

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Results

A two stage approach was used to establish the reliability and validity of the Kutcher Adolescent Depression Scale (KADS). First, the internal consistency reliability of the KADS was examined using Cronbach's Coefficient Alpha.(40) Following this, the concurrent and discriminant validity of the KADS was examined using Pearson's product moment correlations. Prior to conducting all analyses the mean score, rounded to the nearest whole number, was substituted for missing values on individual KADS items, and ADRS, RCADS – MDD, VAS-TA and VAS –SA items.

The KADS was found to have an acceptable degree of internal consistency reliability (α = 0.76). As well, the RCADS – MDD was also found to have an acceptable level of internal

consistency reliability (α = 0.71). However, the ADRS had a borderline level of internal consistency (α = 0.58). Overall, results of the validity analyses suggest that the KADS has an acceptable degree of concurrent and discriminant validity (Table 1). Scores on the KADS correlated (r = 0.62) with the RCADS - MDD and with the ADRS (r = 0.61), suggesting that the KADS has a moderate degree of concurrent validity. In contrast, scores on the KADS correlated weakly with scores on the VAS-SA and VAS-TA scales (r = 0.21 and 0.17 respectively) suggesting the KADS has an acceptable degree of discriminant validity. This pattern of scores suggests that a large part of the stable variance underlying the KADS assesses depression (37%) while a smaller degree of the variability (3% to 4%) measures a conceptually similar but distinct construct.

INSERT TABLE ONE HERE

Consistent with our expectations, there was no significant gender (t (737) = 1.42, p > 0.05) difference in depression scores on the KADS .Girls had a mean score of 10.76 $\pm$ 6.66 while boys had a score of 10.10 $\pm$ 5.93 on the KADS.

Principal Components Analysis of the KADRS

A principal components analysis of the KADRS was conducted using a varimax rotation. Based on several criteria (eigenvalues greater than 1, scree plot, total variability, simple structure, and psychological meaningfulness) two clear components emerged that accounted for 39.2% of the total variability in children's scores. Component one consists of cognitive-somatic symptoms of depression while component two consisted of affective symptoms (Table 2).

INSERT TABLE TWO HERE

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Discussion

The KADS was found to have an acceptable level of concurrent and discriminant validity in this population of respondents. It also had an acceptable level of internal consistency reliability.

Depression has both affective and cognitive manifestations, with the affective symptoms appearing in the earlier stages of the illness while the cognitive symptoms appear later. Thus, cognitive symptoms are indicative of more severe levels of depression.(41) As a measure of depressive symptoms, the KADS contains five items assessing the cognitive symptoms of depression and only 3 items that assess the somatic symptoms and 3 items that assess the affective symptoms of depression. For this reason, the KADS may play a particularly important role in monitoring the progress of clinically depressed patients from the population sampled in this paper.

As we expected, we did not a gender difference in KADS depression scores. Mean differences between male and female participants were non-significant, ($p > 0.05$). Based on this sample of pre-adolescent children, many of whom may not have attained the hormonal changes of puberty, we can conclude that the lack of a gender differences seem to hold true on the KADS scores such that girls reported similar scores to boys. Future research will examine the role that parenting practices, academic school performance and neighbourhood factors and socioeconomic status may play in levels of KADS depression.

Our principal components analysis of the Kutcher Adolescent Depression Rating Scale (KADRS) identified two underlying dimensions – a cognitive-somatic dimension and an affective dimension. This pattern of findings is somewhat consistent with past research on the

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KADS and other measures of depression. Several studies have found a clear somatic as well as an affective component. It appears there may be some slight differences in the component structure in this study. In contrast to our findings, a PCA of the Persian version of the KADRS found two components – a core depressive (affective) symptomatic component and a suicidal-physical (somatic) component.(35) It is possible that linguistic, socio-cultural factors may explain the differences between our findings and those of Shahidi.

Limitations

One limitation of the current project is the use of elementary school students in the sixth grade as a sample. This population is not representative of the full range of children and adolescents in Jamaica. Future studies will be conducted using a broader and more representative sample of the Jamaican population. However, the current study provides some preliminary evidence for the concurrent and discriminant validity of the KADS.

Conclusion

The KADS is a reliable and valid measure of adolescent depressive symptoms that may be used to screen Jamaican and Barbadian youth, and the children of the Caribbean diaspora.

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Declaration of Conflicting Interests

The Authors declare that there is no conflict of interest.

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Table 1

Concurrent and Discriminant Validity Coefficients for the Kutcher Adolescent Depression Rating Scale.

	KADRS	RCADS	ADRS	VAS-S	VAS-T
KADRS	1.00				
RCADS	0.62	1.00			
ADRS	0.61	0.63	1.00		
VAS-S	0.21	0.19	0.14	1.00	
VAS-T	0.17	0.27	0.16	0.31	1.00

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Table 2

Rotated Component Matrix from a Principal Components Analysis of the Kutcher Adolescent Depression Scale.

	Component	
	1	2
Feelings of worthlessness	.707	
Feeling tired	.620	
Physical feelings of worry	.568	
Trouble concentrating	.545	
Feeling worried, nervous, panicky, tense	.523	
Feeing that life is not very much fun	.453	
Sleep difficulties	.429	
Feeling decreased interest		.823
Low mood, sadness, feeling blah, depressed, just can't be bothered		.541
Thoughts, plans or actions about suicide or self-harm		.503
Irritable, losing your temper easily, feeling pissed off, losing it		.426

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GRRAS checklist for reporting of studies of reliability and agreement

Version based on Table I in: Kottner J, Audigé L, Brorson S, Donner A, Gajeweski BJ, Hróbjartsson A, Robersts C, Shoukri M, Streiner DL. Guidelines for reporting reliability and agreement studies (GRRAS) were proposed. J Clin Epidemiol. 2011;64(1):96-106

Section	Item #	Checklist item	Reported on page #
Title/Abstract	1	Identify in title or abstract that interrater/intrarater reliability or agreement was investigated.	1
Introduction	2	Name and describe the diagnostic or measurement device of interest explicitly.	4, 7
	3	Specify the subject population of interest.	6-8
	4	Specify the rater population of interest (if applicable).	NA
	5	Describe what is already known about reliability and agreement and provide a rationale for the study (if applicable).	9
Methods	6	Explain how the sample size was chosen. State the determined number of raters, subjects/objects, and replicate observations.	9-10
	7	Describe the sampling method.	9
	8	Describe the measurement/rating process (e.g. time interval between repeated measurements, availability of clinical information, blinding).	12
	9	State whether measurements/ratings were conducted independently.	NA
	10	Describe the statistical analysis.	12
Results	11	State the actual number of raters and subjects/objects which were included and the number of replicate observations which were conducted.	12
	12	Describe the sample characteristics of raters and subjects (e.g. training, experience).	12
	13	Report estimates of reliability and agreement including measures of statistical uncertainty.	12-13
Discussion	14	Discuss the practical relevance of results.	14, 15
Auxiliary material	15	Provide detailed results if possible (e.g. online).	NA

Contributor's Statement

All authors of the paper have seen, reviewed and approved this manuscript. Professor Lipps and Dr. Lowe were involved in all aspects of this paper. Professor Lipps and Dr. Lowe shared in the conception and planning of the research project, collected the data in Jamaica, conducted the statistical analyses and interpreted the findings. Professor Lipps and Dr. Lowe wrote the method, results and discussion sections for this paper. Dr. Gibson and Dr. Jules composed the introduction. Professor Kutcher developed the Kutcher Adolescent Depression Scale, and assisted with the conceptualization of the paper, as well as reviewed draft versions of the manuscript. Dr. Jules assisted with the collection and recruitment of participants as well as the editing and capture of data in Barbados. We all reviewed and approved the manuscript prior to this submission.

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