Psychometric Properties of the Generalized Anxiety Disorder 7-item Scale in Adolescents: An Effective Screening Tool for School and Community Settings

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Objective: Anxiety disorders are prevalent among children and adolescents. Identifying anxiety symptoms in primary care, school, and community settings has implications for service planning, resource allocation, and prevention and treatment programming. The Generalized Anxiety Disorder 7-item (GAD-7) scale is a commonly used instrument for evaluating anxiety symptoms. Still, it has yet to be validated in vulnerable groups, such as Spanish-speaking adolescents who are at risk due to socioeconomic disadvantages.

Methods: This study aimed to examine the psychometric properties of the Spanish version of the GAD-7 for adolescents in a sample of middle and high school students in Puerto Rico. Secondary data from 566 students in fifth to twelfth grade in Puerto Rico were collected as part of a school-based services program.

Results: A confirmatory factor analysis evidenced the 1-factor structure of the GAD-7, while a test of invariance supported the equality of the factor loadings across gender and school level. The scores of the GAD-7 showed positive and significant correlations with the 8-item Patient Health Questionnaire depression scale—providing evidence of convergent validity—and the reliability estimates of the GAD-7 were adequate.

Conclusion: Thus, the GAD-7 has optimal psychometric properties in terms of construct and convergent validity and internal consistency. It is a useful instrument for assessing anxiety in Spanish-speaking youth in Puerto Rico. [*P R Health Sci J 2022;41(4):226-232*]

Key words: Adolescents, Anxiety, Assessment, GAD-7, Hispanics

Anxiety is one of the most common mental health problems, affecting about 7 to 25% of all children and adolescents at some point in their lives (1, 2, 3). The median age of onset of adult anxiety disorders is age 11 (4, 5), with generalized anxiety disorder (GAD) being the most common anxiety disorder. Additionally, GAD is strongly comorbid with other anxiety, mood, and substance use disorders (6, 7). Anxiety disorders are also associated with less favorable prognoses and poorer outcomes of mental illness, including social maladjustment and higher rates of suicidal behavior (8).

Kroenke and collaborators called attention to the fact that "although increasing attention has been paid to anxiety, it still lags far behind depression in terms of research as well as clinical and public health efforts in screening, diagnosis, and treating affected individuals" (9). Nevertheless, its effects on children and adolescents are long-lasting. For example, a longitudinal study by Essau, Lewinsohn, Olaya, and Seeley (10) revealed that adolescent anxiety was associated with unemployment, maladjustment, poor coping skills, and chronic stress and stressful life events at age 30 than was/were experienced during adolescence. Additionally, in Essau et al.'s study, adolescent anxiety predicted major depression disorder (MDD), substance use disorders, and alcohol abuse/dependence in adulthood. Since GAD can be a significant predictor of the subsequent onset of MDD and other mental health disorders, the question of whether the early intervention and treatment of primary GAD might help prevent the subsequent onset of other adverse mental health problems is raised.

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There are several well-known measures for anxiety, such as the Multidimensional Anxiety Scale for Children (with 39 items) (11,12), the Screen for Child Anxiety Related Emotional Disorders (SCARED) (with 41 items), and the Spence Children's Anxiety Scale (SCAS) (with 44 items) (13). These scales are usually used to assess anxiety symptoms and follow the treatment progress of children and adolescents. Although they present favorable psychometric properties, fewer instruments are available for youth in primary care, school, and community centers (14); in particular, there are few brief instruments aimed at Latino groups who are at risk due to socioeconomic disadvantages (15, 16). Low socioeconomic status has been associated with adverse effects on mental health and limited access to care (17, 18). For example, Patel and Kleinman (19) argued that factors such as the experience of insecurity and hopelessness, the risks of violence, and physical ill-health may account for the greater vulnerability of the poor to common mental disorders.

The 7-item GAD (GAD-7) scale is a brief tool that is widely used to assess GAD and has been translated into numerous languages, including Spanish (20, 21). The GAD-7 consists of 7 items that query anxiety-related symptoms experienced during the 2 weeks prior to a given participant's completing the questionnaire and requires approximately 1 to 2 minutes to be administered. The instrument is also sensitive to treatment-related changes in adults with GAD. However, only a few studies have used the GAD-7 scale to evaluate adolescents, and in those studies, most of the participants were white (up to 85% of a given sample) (22, 14).

High indicators of emotional problems such as anxiety and depression are related to poor academic outcomes (e.g., dropout intentions) (23). Given the challenges associated with the rapid identification of GAD in schools and the primary care sector and the limited number of brief screening tools currently available for adolescents in these settings, there is a need for valid instruments to assess GAD in this population. The early and efficient identification of GAD among adolescents will facilitate early interventions for this emotional condition and help to prevent the subsequent onset of other mental-health difficulties.

The objective of this study was to examine the internal consistency reliability, construct validity, and structural invariance (based on gender and school grade) of the Spanish version of the GAD-7 for use with adolescents (GAD-7-A) in Puerto Rico. Previous studies have found a unidimensional factor structure in both the Spanish and English versions (24). Thus, we expect a 1-factor solution to be the best fit for the Spanish version of the GAD-7-A. We also expect invariance of the factorial structure across gender and school levels. Finally, we assessed convergent validity using the 8-item Patient Health Questionnaire (PHQ-8) (25). We expected strong correlations between the GAD-7-A and PHQ-8 scores since both measures are similar in that they both measure comorbid anxiety and depression. Previous studies indicate that PHQ-8 correlates with measures of anxiety (16). In addition, the PHQ-8 has 8 items with response options that are identical to those of the GAD-7-A and therefore each can be scored as continuous variables, with higher scores representing more severe clinical symptomatology.

Method

Participants and procedure

The Albizu University Institutional Review Board approved the study. We used secondary data from the service program titled "Eventos Traumáticos en la Niñez: Modelo de Cuidado Escalonado Basado en Evidencia como Alternativa para su Manejo y Mitigación" (in English: Traumatic Events in Children: An Evidence-Based Stepped-Care Model as Alternative for Its Management and Mitigation), which was supported by the Victim Compensation Grant Program. The principal directors of this service program granted us authorization to use this data set. The sample consisted of the de-identified information of 566 students from fifth to twelfth grade that attended participating schools located in the southern area of Puerto Rico. Scores of the GAD-7-A were examined to evaluate its psychometric properties, while depression measures were used to analyze construct and convergent validity.

Measures

The Generalized Anxiety Disorder 7-item scale

The GAD-7 is a brief, self-administered 7-item scale designed to assess anxiety symptoms (26). Answers are based on the frequency of symptoms; total scores of 5, 10, and 15 correspond to mild, moderate, and severe symptoms of anxiety, respectively. This scale has presented good reliability and validity in samples. The scale's internal consistency was also excellent, resulting in a Cronbach's α of .92 (26). The Spanish version of the scale has shown good psychometric properties in Hispanics samples (24, 14) and favorable sensitivity and specificity values in adolescents in the United States (14). Studies with adolescents (using the GAD-7) have shown a unidimensional structure with good internal consistency (α = .91) and correlations with depression and anxiety, supporting using the GAD-7 construct validity (27).

Patient Health Questionnaire-8

The scale consists of 8 items for assessing depression symptoms; the items are based on the criteria of the Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition (DSM-IV). The lowest possible total score is zero, and the highest possible score is 24; a score of from 0 to 9 indicates mild depression, from 10 to 14, a moderate degree of depression, from 15 to 19, moderate to severe depression, and from 20 to 24, severe depression (25, 28). The instrument was previously validated with the same sample of participants and presented a Cronbach's α above .70 in both male and female participants (29).

Data analysis

Analyses were conducted using SPSS (v. 23) and AMOS (v. 23). Missing values were also examined through descriptive data analysis, which resulted in less than 5% of missing values. Missing data were at random (Little's missing completely at random test: $\chi^2 = 57.635$; degrees of freedom = 52; P = .275), and thus were established with direct maximum likelihood estimation. We performed a confirmatory factor analysis (CFA) to test the 1-factor structure of the GAD-7-A. We then conducted a multi-group CFA (MG-CFA) to test for gender and school-level invariance. All factor analyses were conducted using AMOS (v. 23) (30). For the MG-CFA, a baseline model was examined to test the best-fitting models among the groups (male/female; middle school/high school). Then a configural model was fitted in which no equality constraints were imposed. Subsequently, a metric invariant model was fitted. All the factor loadings were constrained equally across groups, and a scalar invariant model constrained the factor loadings and intercepts to be equal (31). It should be noted that a strict indicator such as scalar invariance is highly constrained and rarely achieved in practice. In scalar invariance, evidence of the non-invariance of intercepts could be due to potential measurement bias and the significant influence of cultural and developmental factors that affect the answers of participants across multiple test administrations. Finally, all the tests for equivalence were compared against the configural model.

We evaluated the goodness-of-fit of the models using absolute and relative indexes. The following absolute goodness-of-fit indexes were calculated: chi-square (χ^2), the root mean square error of approximation (RMSEA), the standardized root mean square residual. Additionally, we computed relative indexes: the comparative fit index (CFI), and the Tucker–Lewis index (TLI). Values greater than .90 for the CFI and TLI are indicative of a good fit. Values below .08 and .05 for the RMSEA suggest a reasonable and good fit, respectively. Standardized root means square residual values lower than .08 are also indicative of a good fit (32).

We looked at changes in the values of χ^2 and the related degrees of freedom to compare differences in fit among the nested models. Significant differences in the χ^2 ($\Delta\chi^2$) values between 2 nested models suggest that the constraints that were specified did not hold in the more restrictive models (33). Since χ^2 depends on the sample size, we also evaluated the difference in the values of CFI (ΔCFI) to determine invariance, where values not exceeding .01 indicate the invariance of the model (34).

Validity and reliability

Based on similar research (28, 24, 35, 27), the PHQ-8 and GAD-7-A scores were correlated using Pearson's correlation to test for convergent validity. We also performed an independent sample t test to examine gender and school-level differences in the GAD-7-A scores. Finally, the Cronbach's alpha coefficient and composite reliability test (36) were estimated to assess the reliability of the GAD-7-A. Reliability coefficients greater than 0.70 are recommended (37, 38).

Results

Socio-demographic characteristics of participants

The sample consisted of 566 (47.0% male and 52.5% female) students from fifth to twelfth grade from schools located in the southern area of Puerto Rico (see Table 1). Most of the participants (50.2%) were in high school, with most of the rest (46.5%) being in middle school.

Confirmatory factor analysis of the GAD-7-A

We first conducted a CFA to test the 1-factor structure of the GAD-7-A. As can be seen in Table 2, this model presented a good fit for the data. To establish a baseline model for the MG-CFA, we tested the structure independently for the male and female sub-samples as well as for middle and high school students, and it presented a good fit for each sub-sample. All

Table 1. Socio-demographics characteristics of the participants

Variable	*f*	%
Gender		
Female	297	47.0
Male	266	52.5
No response	3	0.5
Grade		
5th grade	25	4.4
6th grade	58	10.2
7th grade	96	17.0
8th grade	84	14.8
9th grade	76	13.4
10th grade	87	15.4
11th grade	68	12.0
12th grade	53	9.4
No response	19	3.4
School Level		
Middle school	263	46.4
High school	284	50.2
No response	19	3.4

Table 2. GAD-7-A baseline models

Model	*n*	χ^2	*df*	*RMSEA*	*RMSEA 90% CI LL*	*UL*	*CFI*	*TLI*	*AIC*
GAD-7-A	566	46.24	14	.06	.044	.085	.976	.952	88.24
GAD-7-A Female	297	54.73	14	.09	.072	.127	.950	.901	96.73
GAD-7-A Male	266	14.39	14	.01	.000	.061	.999	.998	56.39
GAD-7-A Middle School	263	19.62	14	.03	.000	.077	.988	.976	61.62
GAD-7-A High School	284	49.73	14	.09	.067	.124	.95	.905	91.73

Note: χ^2 = chi-square; AIC = Akaike information criterion; CFI = comparative fit index; CI = confidence interval; df = degrees of freedom; LL = lower limit (of RMSEA); RMSEA = root mean square error of approximation; TLI = Tucker–Lewis index; UL = upper limit (of RMSEA)

the items loaded significantly ($P < .05$), with scores from .57 to .78 (females: .60–.78; males: .44–.74; middle school students: .54–69; high school students: .54–.69).

Multi-group confirmatory factor analysis

Once the 1-factor structure baseline model was established, an MG-CFA was conducted to test model invariance by gender (Table 3). Results of the MG-CFA evidenced the metric invariance of the GAD-7-A between female and male samples, with a non-significant (n.s.) value of $\Delta\chi^2$ and a ΔCFI value lower than .01. The results of the scalar invariance model compared to those of the metric invariance model were significant ($\Delta\chi^2 = 30.58$; $P < .01$), and the value of ΔCFI was greater than .01. However, scalar invariance is considered a strict indicator (39).

An MG-CFA was also implemented to test the factor structure invariance of the GAD-7-A across school levels (Table 4). Similar to the invariance test across gender, the results evidenced a metric invariance across school levels (middle school and high school) ($\Delta\chi^2 = 9.32$, n.s., and ΔCFI = .003). Additionally, the scalar invariance compared to the metric invariance model was significant ($\Delta\chi^2 = 48.29$; $P < .01$), with a value of ΔCFI greater than .01.

Considering these results and recommendations, the GAD-7-A shows metric invariance across females and males and across middle and high school students, but item intercepts seem not to be equivalent across groups. Although scalar invariance was not met in either of the groups, this indicator is considered to be too strict (39, 40).

The validity, reliability, and score differences of the GAD -7-A

The GAD-7-A scores were positive and significantly correlated to the PHQ-8scores (r = .762; $P < .01$), thereby supporting convergent validity. These correlations were also positive and significant across female (r = .792; $P < .01$) and male (r = .702; $P < .01$) samples and across middle school (r = .722; $P < .01$) and high school (r = .768; $P < .01$) samples. A Cronbach's alpha of the GAD-7-A showed estimates above the recommended value of .70, considering both the whole sample and the gender and school-level sub-samples (⌜females = .86; ⌜males = .83). Additionally, the estimates of composite reliability were also above .70 (Table 5). Finally, the results from an independent sample t test showed that females (M = 5.50; SD = 4.92) scored significantly higher on the GAD-7-A than did males (M = 3.88 SD = 3.81), and high school students (M = 5.56; SD = 4.73; t(536.61) = -4.476 $P < .001$; d = .375) reported significantly higher scores compared to middle school students (M = 3.87; SD = 4.02; t(539.75) = -4.501; $P < .001$; d = .383).

Table 3. Goodness-of-fit statistics for the test of invariance of the GAD-7-A, by gender.

Model	χ^2	df	RMSEA	RMSEA LL	90% CI UL	CFI	TLI	AIC	$\Delta\chi^2$	Δdf	ΔCFI
M1: Unconstrained Model	69.12	28	.051	.036	.067	.967	.93	153.12			
M2: Metric Invariance	78.74	34	.048	.034	.063	.964	.94	150.74	9.62 n.s.	6	.003
M3: Scalar Invariance	109.33	41	.055	.042	.067	.945	.92	167.33	30.58 **	7	.02

Note: n = 566; χ^2 = chi-square; AIC = Akaike information criterion; CFI = comparative fit index; CI = confidence interval; df = degrees of freedom; LL = lower limit (of RMSEA); RMSEA = root mean square error of approximation; TLI = Tucker–Lewis index; UL = upper limit (of RMSEA); $\Delta\chi^2$ = difference in χ^2; ΔCFI = difference in CFI; *$p < .05$; **$p < .01$

Table 4. Goodness-of-fit statistics for the test of invariance of the GAD-7-A, by school level.

Model	χ^2	df	RMSEA	RMSEA LL	90% CI UL	CFI	TLI	AIC	$\Delta\chi^2$	Δdf	ΔCFI
M1: Unconstrained Model	69.34	28	.052	.037	.068	.966	.932	153.34			
M2: Metric Invariance	78.67	34	.049	.035	.063	.963	.940	150.67	9.32 n.s.	6	.003
M3: Scalar Invariance	126.96	41	.062	.050	.070	.930	.904	184.96	48.29 **	7	.033

Note: n = 566; χ2 = chi-square; AIC = Akaike information criterion; CFI = comparative fit index; CI = confidence interval; df = degrees of freedom; LL = lower limit (of RMSEA); RMSEA = root mean square error of approximation; TLI = Tucker–Lewis index; UL = upper limit (of RMSEA); Δχ2 = difference in χ2; ΔCFI = difference in CFI; *$p < .05$; **$p < .01$

Discussion

This study aimed to examine the psychometric properties of the Spanish version of the GAD-7-A in a sample of adolescent students in Puerto Rico. Confirmatory and multi-group factor analyses were performed to explore construct validity and invariance by gender and school level. The associations with PHQ-8scores were analyzed to examine convergent validity. The results confirmed the 1-factor structure of the GAD-7-A. A test of invariance supported the equality of the factor loading across gender and school level. The scores of the GAD-7-A presented positive and significant correlations to the scores

Table 5. Mean, standard deviation, correlation, and reliability estimates.

	GAD-7-A		
	Mean (SD)	α	CR
Female	5.50 (4.92)	.87	.87
Male	3.88 (3.81)	.78	.81
Middle school students	3.87 (4.02)	.83	.82
High school students	5.56 (4.73)	.86	.86
Total sample	4.76 (4.53)	.85	.86

Note: α = Cronbach's alpha; CR = composite reliability; SD = standard deviation

of the PHQ-8, indicating convergent validity. These findings are compatible with those of previous studies indicating that the GAD-7-A is correlated with measures of depression and other common anxiety disorders (16). Finally, the analyses showed that the GAD-7-A presented adequate reliability estimates. Thus, the GAD-7-A evidenced adequate psychometric properties in terms of construct and convergent validity and internal consistency. In addition, it presented metric invariance across gender and school level as a proxy of developmental stages. Though scalar invariance was not confirmed, Marsh et al. recently stated that "the model of complete scalar invariance based on the confirmatory factor analysis approach to measurement invariance is an unachievable ideal that in practice can only be approximated" (40).

Our results are in line with those of previous evaluation of psychometric properties of the GAD-7 in Hispanic adults, children, and adolescents. For example, Mills et al. (24) explored the psychometric properties of the Spanish language version of the GAD-7 with a self-identified Hispanic adult population living in the United States, the members of which spoke Spanish and English. This study indicated that there was a unidimensional factor structure, but different variances, across language preference groups. The internal consistency of the scale was good for both English- and Spanish-language preference groups. The GAD-7 also evidenced good convergent validity as demonstrated by significant correlations with the PHQ-9.

In a recent study with adolescents with GAD, Mossman et al. (14) confirmed that the GAD-7-A presented acceptable specificity and sensitivity in terms of detecting clinically significant symptoms of anxiety. The authors indicated that the GAD-7-A was more efficient than the Pediatric Anxiety Rating Scale at differentiating between mild and moderate GADs among adolescents. One limitation of these studies is that most have been conducted with Hispanic samples (children, adolescents, and adults) living in the United States. Thus, the generalizability of the finding is limited to that context (24). However, the present study fills a specific gap by providing evidence of the psychometric properties of the GAD-7-A in a sample of children and adolescents living in Puerto Rico.

Previous studies indicate that female participants report higher anxiety levels than do their male counterparts (41, 42). Additionally, high school students tend to present higher anxiety levels due in part to changes in school grade levels, increasing course load, interpersonal-relationship challenges, and changing roles, and expectations (43). Differences in scores for these groups and scalar non-invariance results might suggest that the members of this group endorse the scale's items differently, even when the participants present similar levels of anxiety. Additional studies with larger sample sizes and using diverse analytical techniques would provide a clearer understanding of these differences and the invariance of the test.

Although additional research must be conducted, validated, easy-to-use scales are necessary for screening anxiety symptoms in vulnerable populations. This is especially relevant since anxiety problems increase dramatically during adolescence (44, 45), and the increasing prevalence of mental health symptoms in Hispanic adolescent tends to be found in those who live in violent and low-income communities. Identifying early anxiety symptoms in children and adolescents is crucial since anxiety has been associated with school dropout, unemployment, maladjustment, poor coping skills, and more chronic stress and stressful life events at age 30 than was/were experienced during adolescence (10, 46, 47). Recent evidence reveals the notion that anxiety and depression are comorbid, being a combination that may have detrimental effects on children and adolescents' mental health (48). Although there are general guidelines for assessing adolescents with anxiety, these guidelines tend to lump together children with adolescents (49). Early screening and detection may inform the implementation of preventive evidence-based intervention programs and lead, as well, to appropriate referrals, in more severe cases.

Research on GAD with Hispanic subjects is limited, which may be because there are relatively few scales for measuring GAD, especially in the population of interest: predominantly Spanish-speaking Hispanic youths. Although this study presents evidence of the validity and reliability of the GAD-7-A for a sample of children and adolescents in Puerto Rico, it has some limitations. First, the data represented only students at specific schools in the south of Puerto Rico and were from a secondary data set, which reduces the generalizability of the findings. However, offsetting that, the results showed that the scale's psychometric properties were good and replicated the results of previous studies in the Hispanic/Latino population. Further research should be conducted with a representative sample of children and adolescents in Puerto Rico and from other Hispanic/Latino contexts to establish cross-cultural invariance evidence for this instrument.

Second, even though our sample consisted of middle school and high school students, we could not examine the invariance structure considering different age groups, separately. Instead, we used the school level as a proxy developmental stage. Despite this limitation, evidence suggests metric invariance and good psychometric properties for both groups.

Third, the data from the GAD-7-A scale were insufficient to determine sensitivity and specificity in this sample. Future studies designs should include these analyses to establish contextual and sensible cut-off diagnostic criteria.

Having reliable and valid assessment tools to identify anxiety in youth will help provide early intervention services and prevent the social, academic, and emotional consequences of otherwise unidentified anxiety in Hispanic youth. Our study provides evidence that the GAD-7-A scale is a reliable and valid screening instrument for assessing anxiety in Hispanic adolescents.

The GAD-7-A, a brief self-report that is a valid and reliable measure of anxiety, is an excellent screening tool that can be used in primary care, school, and community settings.

Resumen

Objetivos: Los trastornos de ansiedad son prevalentes entre niños y adolescentes. Identificar síntomas de ansiedad en entornos de cuidado primario, escolares y comunitarios tiene implicaciones en la planificación de servicios, distribución de recursos, prevención y planes de tratamiento. La escala de 7 ítems del trastorno de ansiedad generalizada (GAD-7, por sus siglas en inglés) es un instrumento comúnmente utilizado para evaluar síntomas de ansiedad. No obstante, aún no ha sido validado entre las poblaciones más vulnerables como adolescentes hispanohablantes, quienes están en riesgo debido a desventajas socioeconómicas. Método: Este estudio tiene como objetivo examinar las propiedades psicométricas de la escala del (GAD-7) para adolescentes en una muestra de estudiantes de escuela intermedia y superior en Puerto Rico. Se recolectaron datos secundarios de 566 estudiantes de quinto a duodécimo grado en Puerto Rico como parte de un programa de servicios ofrecido en sus escuelas. Resultados: Un análisis de factores confirmatorio demuestra la evidencia de un factor único en el GAD-7, mientras que los resultados de invarianza respaldan la equidad en cargas factoriales a través de género y nivel escolar. Las puntuaciones del GAD-7 mostraron estimados de confiabilidad adecuados, así como correlaciones positivas y estadísticamente significantes con la escala de depresión del Cuestionario de Salud del Paciente de 8 ítems, proveyendo evidencia de validez convergente. Conclusiones: El GAD-7 presenta propiedades psicométricas óptimas en términos de constructo, validez convergente y consistente interna. Es un instrumento útil para medir síntomas de ansiedad entre jóvenes hispanohablantes en Puerto Rico.

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References

1. Beesdo K, Knappe S, Pine DS. Anxiety and anxiety disorders in children and adolescents: developmental issues and implications for DSM-V. Psychiatr Clin North Am. 2009;32(3):483-524. doi:10.1016/j.psc.2009.06.002
2. Costello EJ, Egger H, Angold A. 10-year research update review: the epidemiology of child and adolescent psychiatric disorders: I. Methods and public health burden. J Am Acad Child Adolesc Psychiatry. 2005;44(10):972-986. doi:10.1097/01.chi.0000172552.41596.6f
3. Kessler RC, Avenevoli S, Costello EJ, et al. Prevalence, persistence, and sociodemographic correlates of DSM-IV disorders in the National Comorbidity Survey Replication Adolescent Supplement. Arch Gen Psychiatry. 2012;69(4):372-380. doi:10.1001/archgenpsychiatry.2011.160
4. Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication [published correction appears in Arch Gen Psychiatry. 2005 Jul;62(7):768. Merikangas, Kathleen R [added]]. Arch Gen Psychiatry. 2005;62(6):593-602. doi:10.1001/archpsyc.62.6.593
5. Merikangas KR, He JP, Burstein M, et al. Lifetime prevalence of mental disorders in U.S. adolescents: results from the National Comorbidity Survey Replication--Adolescent Supplement (NCS-A). J Am Acad Child Adolesc Psychiatry. 2010;49(10):980-989. doi:10.1016/j.jaac.2010.05.017
6. Kaufman J, Charney D. Comorbidity of mood and anxiety disorders. Depress Anxiety. 2000;12 Suppl 1:69-76. doi:10.1002/1520-6394(2000)12:1+<69::AID-DA9>3.0.CO;2-K
7. Prior K, Mills K, Ross J, Teesson M. Substance use disorders comorbid with mood and anxiety disorders in the Australian general population. Drug Alcohol Rev. 2017;36(3):317-324. doi:10.1111/dar.12419
8. Rohde P, Lewinsohn PM, Seeley JR, Klein DN, Andrews JA, Small JW. Psychosocial functioning of adults who experienced substance use disorders as adolescents. Psychol Addict Behav. 2007;21(2):155-164. doi:10.1037/0893-164X.21.2.155
9. Kroenke K, Spitzer RL, Williams JB, Monahan PO, Löwe B. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. Ann Intern Med. 2007;146(5):317-325. doi:10.7326/0003-4819-146-5-200703060-00004
10. Essau CA, Lewinsohn PM, Olaya B, Seeley JR. Anxiety disorders in adolescents and psychosocial outcomes at age 30. J Affect Disord. 2014;163:125-132. doi:10.1016/j.jad.2013.12.033
11. March, JS. Multidimensional Anxiety Scale for Children, 2nd ed. (MASC 2). Multi-Health Systems, Inc.; 2013. https://documents.acer.org/MASC-2-Assessment-Report-Self-Report-Sample.pdf
12. March JS, Parker JD, Sullivan K, Stallings P, Conners CK. The Multidimensional Anxiety Scale for Children (MASC): factor structure, reliability, and validity. J Am Acad Child Adolesc Psychiatry. 1997;36(4):554-565. doi:10.1097/00004583-199704000-00019
13. Spence SH. A measure of anxiety symptoms among children. Behav Res Ther. 1998;36(5):545-566. doi:10.1016/s0005-7967(98)00034-5
14. Mossman SA, Luft MJ, Schroeder HK, et al. The Generalized Anxiety Disorder 7-item scale in adolescents with generalized anxiety disorder: Signal detection and validation. Ann Clin Psychiatry. 2017;29(4):227-234A.
15. Anderson ER, Mayes LC. Race/ethnicity and internalizing disorders in youth: a review. Clin Psychol Rev. 2010;30(3):338-348. doi:10.1016/j.cpr.2009.12.008
16. Pagán-Torres OM, González-Rivera JA, Rosario-Hernández E. Psychometric Analysis and Factor Structure of the Spanish Version of the Eight-Item Patient Health Questionnaire in a General Sample of Puerto Rican Adults. Hisp J Behav Sci. 2020;42(3):401-415. doi:10.1177/0739986320926524
17. Balluz L, Okoro C, Strine T. Access to Health Care and Preventive Services Among Hispanics and Non-Hispanics-United States, 2001–2002. Am J Epidemiol. 2006;163(suppl_11):S145-S145 doi: 10.1093/aje/163.suppl_11.S145-a.
18. Wagstaff A. Poverty and health sector inequalities. Bull World Health Organ. 2002;80(2):97-105.
19. Patel V, Kleinman A. Poverty and common mental disorders in developing countries. Bull World Health Organ. 2003;81(8):609-615.
20. García-Campayo J, Zamorano E, Ruiz MA, et al. Cultural adaptation into Spanish of the generalized anxiety disorder-7 (GAD-7) scale as a screening tool. Health Qual Life Outcomes. 2010;8:8. Published 2010 Jan 20. doi:10.1186/1477-7525-8-8
21. Kroenke K, Spitzer RL, Williams JB, Löwe B. The Patient Health Questionnaire Somatic, Anxiety, and Depressive Symptom Scales: a systematic review. Gen Hosp Psychiatry. 2010;32(4):345-359. doi:10.1016/j.genhosppsych.2010.03.006
22. Dumont IP, Olson AL. Primary care, depression, and anxiety: exploring somatic and emotional predictors of mental health status in adolescents. J Am Board Fam Med. 2012;25(3):291-299. doi:10.3122/jabfm.2012.03.110056
23. Sánchez-Cardona I, Pérez-Pedrogo C, López-Torres S, Sánchez-Cesáreo M. Vulnerabilities and academic outcomes among students in Puerto Rico. Prev Sch Fail. 2022;66(1):77-88. doi:10.1080/1045988x.2021.1972920

24. Mills SD, Fox RS, Malcarne VL, Roesch SC, Champagne BR, Sadler GR. The psychometric properties of the generalized anxiety disorder-7 scale in Hispanic Americans with English or Spanish language preference. Cultur Divers Ethnic Minor Psychol. 2014;20(3):463-468. doi:10.1037/a0036523
25. Dhingra SS, Kroenke K, Zack MM, Strine TW, Balluz LS. PHQ-8 Days: a measurement option for DSM-5 Major Depressive Disorder (MDD) severity. Popul Health Metr. 2011; 9:11. Published 2011 Apr 28. doi:10.1186/1478-7954-9-11
26. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch Intern Med. 2006;166(10):1092-1097. doi:10.1001/archinte.166.10.1092
27. Tiirikainen K, Haravuori H, Ranta K, Kaltiala-Heino R, Marttunen M. Psychometric properties of the 7-item Generalized Anxiety Disorder Scale (GAD-7) in a large representative sample of Finnish adolescents. Psychiatry Res. 2019;272:30-35. doi:10.1016/j.psychres.2018.12.004
28. Kroenke K, Strine TW, Spitzer RL, Williams JB, Berry JT, Mokdad AH. The PHQ-8 as a measure of current depression in the general population. J Affect Disord. 2009;114(1-3):163-173. doi:10.1016/j.jad.2008.06.026
29. López-Torres S, Pérez-Pedrogo C, Sánchez-Cardona I, Sánchez-Cesáreo M. Psychometric Properties of the Patient Health Questionnaire-8: A multigroup analysis for depression symptoms among a sample of children and adolescents residing in Puerto Rico. Curr Psychol. 2022;41:90-98. doi: 10.1007/s12144-019-00468-7
30. Arbuckle JL. Amos 23.0 User's Guide. Chicago: IBM SPSS; 2014.
31. Byrne B. Testing instrument equivalence across cultural groups: Basic concepts, testing strategies, and common complexities. In: Zane N, Bernak G, Leong FTL. eds. Evidence-Based Psychological Practice with Ethnic Minorities: Culturally Informed Research and Clinical Strategies. American Psychological Association; 2016:125-143.
32. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Struct Equ Modeling. 1999;6(1):1-55. https://doi.org/10.1080/10705519909540118
33. Byrne BM. Testing for multigroup equivalence of a measurig instrument: a walk through the process. Psicothema. 2008;20(4):872-882.
34. Cheung GW, Rensvold RB. Evaluating Goodness-of-Fit Indexes for Testing Measurement Invariance. Struct Equ Modeling. 2002;9(2):233-255. https://doi.org/10.1207/S15328007SEM0902_5
35. Ryan TA, Bailey A, Fearon P, King J. Factorial invariance of the Patient Health Questionnaire and Generalized Anxiety Disorder Questionnaire. Br J Clin Psychol. 2013;52(4):438-449. doi:10.1111/bjc.12028
36. Raykov T, Shrout PE. Reliability of Scales With General Structure: Point and Interval Estimation Using a Structural Equation Modeling Approach. Struct Equ Modeling. 2002;9(2):195-212. https://doi.org/10.1207/S15328007SEM0902_3
37. Hair JF, Black WC, Babin BJ, Anderson RE, Tatham RL. Multivariate Data Analysis. 3rd ed. Pearson Prentice Hall; 2006.
38. Nunnally JC, Bernstein IH. Psychometric Theory. 3rd ed. McGraw-Hill, Inc.; 1994.
39. Byrne BM, Shavelson RJ, Muthén B. Testing for the equivalence of factor covariance and mean structures: The issue of partial measurement invariance. Psychol Bull. 1989;105:456-466. doi: 10.1037/0033-2909.105.3.456
40. Marsh HW, Guo J, Parker PD, et al. What to do when scalar invariance fails: The extended alignment method for multi-group factor analysis comparison of latent means across many groups. Psychol Methods. 2018;23(3):524-545. doi:10.1037/met0000113
41. Ohannessian CM, Milan S, Vannucci A. Gender Differences in Anxiety Trajectories from Middle to Late Adolescence. J Youth Adolesc. 2017;46(4):826-839. doi:10.1007/s10964-016-0619-7
42. Raknes S, Pallesen S, Bjaastad JF, et al. Negative Life Events, Social Support, and Self-Efficacy in Anxious Adolescents. Psychol Rep. 2017;120(4):609-626. doi:10.1177/0033294117699820
43. Swan AJ, Kendall PC, Olino T, et al. Results from the Child/Adolescent Anxiety Multimodal Longitudinal Study (CAMELS): Functional outcomes. J Consult Clin Psychol. 2018;86(9):738-750. doi:10.1037/ccp0000334
44. Negriff S, Susman EJ. Pubertal timing, depression, and externalizing problems: A framework, review, and examination of gender differences. J Res Adolesc. 2011;21:717-746. https://doi.org/10.1111/j.1532-7795.2010.00708.x
45. Telzer EH, Fuligni AJ. Positive daily family interactions eliminate gender differences in internalizing symptoms among adolescents. J Youth Adolesc. 2013;42(10):1498-1511. doi:10.1007/s10964-013-9964-y
46. Jennings WG, Maldonado-Molina M, Fenimore DM, Piquero AR, Bird H, Canino G. The linkage between mental health, delinquency, and trajectories of delinquency: Results from the Boricua Youth Study. J Crim Justice. 2019;62:66-73. doi:10.1016/j.jcrimjus.2018.08.003
47. Khoddam R, Jackson NJ, Leventhal AM. Internalizing symptoms and conduct problems: Redundant, incremental, or interactive risk factors for adolescent substance use during the first year of high school? Drug Alcohol Depend. 2016;169:48-55. doi:10.1016/j.drugalcdep.2016.10.007
48. Melton TH, Croarkin PE, Strawn JR, McClintock SM. Comorbid Anxiety and Depressive Symptoms in Children and Adolescents: A Systematic Review and Analysis. J Psychiatr Pract. 2016;22(2):84-98. doi:10.1097/PRA.0000000000000132
49. Grant DM. Anxiety in Adolescence. In: O'Donohue W, Benuto L, Woodward Tolle L, eds. Handbook of Adolescent Health Psychology. Springer; 2013:507-519. https://doi.org/10.1007/978-1-4614-6633-8_32