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Psychometrics of the Screen for Adult Anxiety Related Disorders (SCAARED)- A New Scale for the Assessment of DSM-5 Anxiety Disorders.

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Abstract

Objective:

To examine the psychometrics of the Screen for Adult Anxiety Related Disorders (SCAARED).

Methods:

The SCAARED was adapted from the Screen for Child Anxiety Related Emotional Disorders. Participants (N=336) ages 18-27 years old were evaluated using the Structured Clinical Interview for DSM-IV Disorders (SCID). The SCAARED was completed at or within two-weeks before the SCID. The psychometrics of the SCAARED were analyzed using standard statistical analyses including principal components, and Receiver Operant Curve analyses. A replication was performed in an age/sex matched independent sample (N=158).

Results:

The SCAARED showed four factors: somatic/panic/agoraphobia, generalized anxiety, separation anxiety, and social anxiety. The total and each factor scores demonstrated good internal consistency ($\alpha = 0.86 - 0.97$) and good discriminant validity between anxiety and other disorders and within anxiety disorders for generalized and social anxiety. Area Under the Curve for the total and each of the factor scores ranged between 0.72 and 0.84 ($p < 0.0001$). These results were replicated in the independent sample. **Conclusions:** The SCAARED showed excellent psychometric properties supporting its use to screen adults for anxiety disorders, longitudinal studies following youth into adulthood and studies comparing child and adult populations. Further replication studies in larger community and clinical samples are indicated.

Keywords: anxiety disorders, adults, rating scales, psychometrics.

1. Introduction

Anxiety disorders are prevalent psychiatric disorders (up to 25%) among adults (Remes et al., 2016) negatively impacting their psychosocial functioning, physical and mental health, social and family relationships, and quality of life (Barlow, 2002; Kessler et al., 2007; Olatunji et al., 2007). Anxiety disorders are also associated with increased service utilization and increased risk for comorbid disorders such as major depression and substance abuse (Khan et al., 2002; Leon et al., 1995).

Despite their perniciousness, anxiety disorders are often underdiagnosed and undertreated in primary care and psychiatric settings (Combs and Markman, 2014; Kroenke et al., 2007; Shear et al., 2000; Zimmerman and Mattia, 1999) because they are frequently accompanied by other conditions whose symptoms may overlap or obscure the symptoms of anxiety (Brown, 1994; Brown et al., 2001; First, 1996). Thus, reliable and easy to use instruments are needed to

screen for anxiety disorders and alert clinicians to further evaluate for the presence of these disorders.

There are structured interviews that reliably diagnose anxiety disorders in adults such as the Anxiety Disorders Interview Schedule (ADIS) (Brown, 1994) and the Structured Clinical Interview for DSM-IV (SCID-IV) (First, 1996). However, these interviews require extensive training and are time consuming, and as a consequence are mainly used for research purposes (Antony and Rowa, 2005; Lawyer and Smitherman, 2004). Also there are self-reports that measure anxiety symptoms (Derogatis and Unger, 2010; Lowe and Reynolds, 2004; Monga et al., 2000; Muris et al., 1998a; Muris et al., 1998b; Reynolds, 2003; Reynolds and Richmond, 1978; Spitzer et al., 1999; Zimmerman and Mattia, 2001) or symptoms of specific anxiety disorders (e.g., generalized anxiety and social anxiety disorders) (Boyd et al., 2003; Crocetti et al., 2009; Hale et al., 2011; Plummer et al., 2016; Spitzer et al., 2006; Su et al., 2008; Wren et al., 2007). However, to our knowledge, with the exception of the Adult Manifest Anxiety Scale Adult Version (AMAS-A) (Lowe and Reynolds, 2004; Reynolds, 2003), an adaptation from the Revised Children's Manifest Anxiety Scale (Reynolds and Richmond, 1978), there are no other rating scales that evaluate anxiety in youth and adults using a similar scale. The existence of such instruments is important because they can be utilized to compare anxiety symptoms between child and adult populations and for prospective studies that follow participants from childhood into adulthood.

Thus, given the lack of similar self-reports that screen for specific DSM anxiety disorders in youth and adults, a self-report for adults based on the Screen for Child Anxiety Related Emotional Disorders (SCARED) (Birmaher et al., 1997) was constructed. The SCARED is a 41-item self-report widely used in clinical and research settings. The SCARED was developed based on the DSM-IV (American Psychiatric Association, 1994); however, the symptoms also correspond to those in DSM-5 (American Psychiatric Association, 2013). Scale construction and psychometric characteristics have been described elsewhere (Birmaher et al., 1999; Birmaher

et al., 1997; Boyd et al., 2003; Canals et al., 2012; Cosi et al., 2010; Crocetti et al., 2009; Hale et al., 2011; Monga et al., 2000; Muris et al., 1998a; Muris et al., 1998b; Su et al., 2008; Vigil-Colet et al., 2009; Wren et al., 2007). The SCARED has excellent psychometric properties and screens for Generalized Anxiety Disorder (GAD), Social Anxiety, Panic Disorder (PD) and Separation Anxiety Disorder (SAD). SAD was recently recognized in adults (American Psychiatric Association, 2013; Silove et al., 2015) and as expected, it is not included in any of the existing anxiety self-reports for adults.

The main goal of this study of this study was to construct and analyze the psychometric properties of the Screen for Adult Anxiety Related Disorders (SCAARED) to have a comparable scale that could be used to follow children into adulthood instead of changing to a different anxiety scale when the children became older than 18. In addition, we wanted to build an adult scale similar to the one utilized for youth in order to compare anxiety symptoms between children and adults.

2. Methods and materials

To achieve the goals of this study, instead of building a scale “de novo”, we modified the language used to in the SCARED for language and/or situations appropriate for adults. For example: “I get headaches when I am at school” was modified to “I get headaches when I am at school, at work or in public places.” In addition, 4 GAD items that are part of the DSM-5 criteria for adulthood were added and 1 item from the child scale was eliminated: “I follow my mother or father wherever they go.” The items for each scale are presented in detail in the supplemental eTable1 that compares the child and adult scales. Before administering the SCAARED, research assistants and other investigators read the scale for understandability and items were rewritten accordingly.

The adult adaptation of the SCARED resulted in a 44-item scale that includes questions assessing symptoms of Agoraphobia, PD, GAD, Social Anxiety, and SAD (Supplemental eTable

1). Severity of each symptom is rated over the past 3 months using a 0 (Not True or Hardly Ever True) to 2 (Very True or Often True) rating scale.

Psychiatric disorders were ascertained using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID) (First, 1996). Since the SCID does not include SAD and Attention Deficit Hyperactive Disorder (ADHD), symptoms for these disorders were ascertained through the Kiddie Schedule for Affective Disorders and Schizophrenia Present and Lifetime (K-SADS-PL) (Kaufman et al., 1997).

Research interviewers with at least a bachelor's degree trained for good reliability conducted the interviews. All interviews were presented to psychiatrists who were ultimately responsible for the final diagnoses. Methods and reliability of these interviews had been described elsewhere (Birmaher et al., 2009; Goldstein et al., 2010). This study was approved by the Institutional Review Board of the University of Pittsburgh.

2.1 Sample

The sample for this study was derived from the Bipolar Offspring Study (BIOS) (Birmaher et al., 2009; Goldstein et al., 2010). Only subjects 18 years old and older who completed the SCAARED within two weeks preceding the assessment with the SCID were included. We used the BIOS sample because it includes well-characterized adults with a variety of psychiatric disorders as well as healthy adults. In fact, about 50% of the controls have psychiatric disorders other than bipolar disorder and 27.3 % of those with bipolar disorder have a variety of comorbid anxiety disorders, which enabled us to study the psychometric properties of the instrument across anxiety disorders.

A total of 336 participants were included in this study, of which 326 completed the SCAARED at the same time they completed the SCID. The mean age was 20.2 ± 1.9 years (range 18 to 27 years old), 51.5% (N=173) were female, and 83% (N=279) Caucasian (Table 1). Fifty-five participants had anxiety disorders (PD=8, GAD=36, social anxiety=27, and anxiety NOS=10)

and 16 (29%) had more than one anxiety disorder. Of the 281 participants without anxiety disorders, 43 (15.3%) had past history of anxiety disorders that were in remission at the time of the study. Participants with anxiety disorders showed significantly more bipolar, depressive, and substance use disorders and history of ADHD and disruptive behavior disorders than those without anxiety disorders.

To replicate the findings obtained through the BIOS sample, similar analyses were carried out using an age/sex matched group from the Course and Outcome of Bipolar Disorder in Youth (COBY) Study (Axelson et al., 2006; Birmaher et al., 2006), a study aimed to characterize the longitudinal course of youth with bipolar disorder. Anxiety disorders were assessed at intake using the KSADS-PL and over follow-up with the Longitudinal Interval Follow-Up Evaluation (LIFE) (Keller et al., 1987). Participants (N=158) had a mean age of 19.5 ± 1.07 years, 57.6% female (N=91), and 81% Caucasian (N=128) (Supplemental eTables 2). Of these, 27 had anxiety disorders (8 PD, 17 GAD, 11 social anxiety, and 4 agoraphobia).

3. Data analysis

First, the data was analyzed using item and principal components analysis (PCA) with varimax rotation. The number of factors was selected via inspection of the scree plot as well as Horn's parallel analysis, and items were assigned to factors with loadings exceeding 0.30. When an item loaded in more than one factor it was assigned to the most clinically appropriate factor. Factor analyses were also completed using principal axis factoring with oblique rotation (Costello, 2005). With the exception of one item, similar results were found. Thus, we include in this paper only the results of the PCA factor analysis. Internal consistency within each factor was measured by Cronbach's α . Second, comparisons between participants with anxiety disorders versus participants without anxiety disorders were made using one-way ANOVA models with a random effect for family membership to account for within-family correlations. The optimal Box Cox transformation was applied to highly non-normal variables prior to model

fitting. Comparisons between individuals with anxiety disorders and those with only depressive disorders but no anxiety disorders were made using Wilcoxon Rank Sum tests. Third, discriminant validity was assessed via receiver operating characteristic (ROC) analysis of the SCAARED total anxiety score and individual factor scores. Optimal cutoff scores and their respective sensitivity and specificity for diagnosing anxiety disorders were derived for the total anxiety score and the individual factor scores. For comprehensiveness, two ROC curve-based methods were used to calculate the cutoff scores: the “Euclidean method” and the “Youden index”. The Euclidean method (Perkins and Schisterman, 2006) finds the cutoff of the classifier where the distance between the ROC curve and the upper left corner (0,1) (which corresponds to perfect prediction) is minimized. The Youden indicates the cutoff of the classifier that minimizes the vertical distance between the ROC curve and the 45-degree line (Li et al., 2013; Youden, 1950); this cutoff maximizes: $Sensitivity + Specificity - 1$. Both methods yielded similar cutoffs for all factors. A range of cutoffs including those chosen via the Euclidean and Youden methods are presented to provide solutions that favor specificity over sensitivity, or vice versa. Finally, using similar analyses as described above, the cutoffs obtained from the BIOS sample were evaluated in participants with and without anxiety disorders in the COBY sample. Categorical variables are reported as frequency and quantitative variables are reported as means (standard deviation). All reported significant p-values are two-sided and ≤ 0.05 .

4. RESULTS

Scale Internal Consistency. The 44-items had factor coefficients ranging from 0.35 to 0.81 and exhibited excellent internal consistency (Cronbach’s $\alpha = 0.97$).

Factor Structure. The most clinically sound factor solution included four factors: somatic/panic/agoraphobia, GAD, SAD, and social anxiety (Table 2). All factors had eigenvalues > 1 and good to excellent internal consistency with coefficient values ranging from 0.86 (separation anxiety) to 0.94 (generalized anxiety). The four factor solution accounted for

57% of the total variance, and yielded a Kaiser-Meyer-Olkin value of 0.96, indicating that the BIOS data is well suited for factor analysis. Estimated Pearson correlations among factors ranged from 0.54 for social anxiety and separation anxiety factors to 0.79 for generalized anxiety and somatic/panic factors (all p -values <0.0001). Items adapted from the school phobia factor of the child scale loaded in the somatic/panic factor of the adult SCAARED. The four new GAD items loaded in the generalized anxiety factor.

Demographic Comparisons. Females had significantly higher total and individual anxiety scores than males in all anxiety factors (all p -values <0.0001). There were no other between-group significant differences in the demographic variables.

Discriminant Validity.

Comparison of participants with any anxiety disorder versus no anxiety disorders (Table 3a).

The total score and scores for each factor of the SCAARED significantly differentiated between anxiety disorders and non-anxiety psychiatric disorders ($p <0.0001$). Adjusting for significant group demographic differences showed similar results.

Comparisons between specific Anxiety Disorders (Table 3b). Participants with GAD ($N=36$) showed significantly higher scores on the GAD factor compared to participants with other non-GAD anxiety disorders ($N=19$) ($Z=2.39$, $p=0.02$). Participants with social anxiety ($N=27$) showed significantly higher scores in the social anxiety factor than participants with other non-social anxiety disorders ($N=28$) ($Z=2.50$, $p=0.01$).

Comparison of participants with any Anxiety versus participants with Depressive Disorders without Anxiety (Supplemental eTable 3). There were significant differences in total and individual factor scores between participants with any anxiety disorders ($N=55$) and participants with depression and no anxiety ($N=21$) ($Z= 2.14$, $p=0.03$, for total score).

Receiver Operator Curve Analysis: Sensitivity and Specificity. The AUCs for the total anxiety score were 0.83 for GAD, 0.82 for panic/somatic, 0.77 for social anxiety and 0.72 for SAD (all p -values <0.0001). Since some studies may require greater sensitivity (e.g., screening general

population), whereas others more specificity (e.g., biological studies), three cutoff scores and their sensitivity and specificity are provided in Table 4.

Replication Study using the COBY sample. To replicate the instrument's ability to discriminate between participants with and without anxiety disorders and within the subtypes of anxiety disorders, the factors obtained through the analysis of the BIOS sample were assessed using participants recruited through the COBY study. As shown in the Supplemental eTable 4, similar results were obtained. The SCAARED significantly separated participants with anxiety versus non-anxiety disorders ($Z=6.52$, $p<0.0001$). Furthermore, the Panic and Social Anxiety factors discriminated between participants with corresponding disorders and participants with other anxiety disorders (Panic total: $Z=2.44$, $p=0.01$ and SP: $Z=2.11$, $p=0.03$). Finally, using the BIOS cutoff scores, the sensitivities and specificities using the COBY data were similar to those reported in BIOS.

5. DISCUSSION

In this study, we assessed the psychometrics of the SCAARED, a self-report instrument for the screening of anxiety disorders in adult populations. The SCAARED showed good internal consistency and four robust factors: Somatic/Panic/Agoraphobia, GAD, SAD, and social anxiety. These factors corresponded to their respective diagnostic categories in the DSM-5 including SAD, which is currently recognized as an anxiety disorder across the lifespan (Bogels et al., 2013; Silove et al., 2015). Moreover, the SCAARED factor solution showed high correspondence with the factor analysis of the SCARED (Birmaher et al., 1999; Birmaher et al., 1997) and Supplemental eTable1). In fact, corresponding items from the SCARED and SCAARED loaded onto the same factors (Somatic/Panic/Agoraphobia, General Anxiety, Separation Anxiety, Social Anxiety). Also, the factor loadings for each item from the SCAARED ranged from 0.35 to 0.81, while the factor loadings for each item from the SCARED ranged from 0.34 to 0.67. The SCAARED showed good discriminant validity between participants with and without anxiety and within anxiety disorders in two independent samples. Also, despite the

common coexistence of anxiety and depression, the SCAARED discriminated between participants with anxiety and those with only depression. Total and individual factor scores were significantly higher in females. SCAARED total and individual factor scores also showed stability over time. The above results indicate that the SCAARED is an appropriate instrument to screen for anxiety disorders in adult populations. Moreover, since both the SCAARED and the SCARED have similar factors, these instruments could be used to compare child and adult populations, parents and their children, and is suitable for studies following youth into adulthood. Before discussing our findings in more detail, it is important to consider some limitations. First, the psychometrics of the SCAARED were evaluated using convenience samples of participants from two ongoing studies, warranting further studies in other populations. Second, for the construction of the scale no focus groups or studies of items' understandability were done. Nevertheless, research assistants and other investigators read the scale for understandability and items were rewritten accordingly. Moreover, the SCAARED has been used in all our studies without any problems with the understandability of the items. Third, similar to numerous anxiety and depression studies (Bramley et al., 1988; Bystritsky et al., 1993; Clark and Watson, 1991; Feldman, 1993; Wetzler and Katz, 1989; Zimmerman and Chelminski, 2003), there were few participants with anxiety without depression, which precluded the use of the SCAARED to compare participants with "pure" anxiety and "pure" depression. Fourth, the maximum age of the participants was 27 years old. Thus, psychometric studies with older adults are warranted. Fourth, the number of participants with each individual anxiety disorder was relatively small indicating the need to replicate our findings with larger samples. Finally, the SCAARED does not include specific phobias and all participants with agoraphobia included in this study also had panic disorder. This may explain why the symptoms of agoraphobia and panic disorder grouped together in one factor. However, given that agoraphobia without panic is much less prevalent than agoraphobia with panic (Kessler et al., 2006), the SCAARED is useful to screen participants with either disorder. For participants with high scores in the panic/agoraphobia

factor it is recommended that clinicians read the items that are associated with agoraphobia (Bramley et al., 1988; Olatunji et al., 2007; Reynolds, 2003; Zimmerman and Mattia, 1999) to determine whether the patient has only agoraphobia or both, panic and agoraphobia.

Compared to other adult anxiety measures, the SCAARED represents a cost-effective and time-efficient instrument. Existing self-reports have proven to be good measures for anxiety disorders (Lawyer and Smitherman, 2004). However, although useful, most of these instruments measure global anxiety symptoms such as worries and somatic complaints and the others only measure individual anxiety disorders such GAD or social anxiety disorder. Therefore, the SCAARED is a useful addition to the existing adult anxiety self-reports because it assesses both symptoms and key specific DSM-5 categorical anxiety disorders, including separation anxiety disorder. Additionally, except for one instrument, the AMAS-A (Lowe and Reynolds, 2004) which evaluates anxiety symptoms in youth and in adults, the SCAARED is the only existing instrument that evaluates both anxiety symptoms and DSM anxiety disorders in adults that has a companion scale for children and adolescents.

Pending future studies, the SCAARED can be used for screening of anxiety disorders in primary care and psychiatric settings, particularly because it can be completed in approximately 5-7 minutes. Participants with scores higher than the cut-off scores should be more extensively assessed to confirm the presence of anxiety disorders. However, it is important to note that cut-off scores depend on the aims of the study, with some studies aiming for more sensitivity than specificity, and others more specificity (Table 4). The SCARED for youth is sensitive to treatment response (Compton et al., 2014; Compton et al., 2010) and biological changes in brain circuitry (Perlman et al., 2014). Thus, studies to evaluate the usefulness of the SCAARED for these types of studies are warranted.

In summary, the SCAARED is a new instrument with excellent psychometric properties for use in clinical practice and research. It is also a promising screen for anxiety disorders in a variety of settings. Together with the child scale, the SCAARED can be used for longitudinal studies

following youth into adulthood and for studies that compare child and adult populations. Further replication studies in larger diverse community and clinical samples and with a larger range of age are indicated.

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References

- American Psychiatric Association, 1994. Diagnostic and Statistical Manual of Mental Disorders 4th ed. American Psychiatric Association, Washington, DC.
- American Psychiatric Association, 2013. Diagnostic and statistical manual of mental disorders (5th ed.). American Psychiatric Publishing, Arlington, VA.
- Antony, M.M., Rowa, K., 2005. Evidence-based assessment of anxiety disorders in adults. *Psychol Assess* 17 (3), 256-266.
- Axelson, D., Birmaher, B., Strober, M., Gill, M.K., Valeri, S., Chiappetta, L., Ryan, N., Leonard, H., Hunt, J., Iyengar, S., Bridge, J., Keller, M., 2006. Phenomenology of children and adolescents with bipolar spectrum disorders. *Arch Gen Psychiatry* 63 (10), 1139-1148.
- Barlow, D.H., 2002. Anxiety and its disorders: the nature and treatment of anxiety and panic, 2nd ed. Guilford Press, New York.
- Birmaher, B., Axelson, D., Monk, K., Kalas, C., Goldstein, B., Hickey, M.B., Obreja, M., Ehmann, M., Iyengar, S., Shamseddeen, W., Kupfer, D., Brent, D., 2009. Lifetime psychiatric disorders in school-aged offspring of parents with bipolar disorder: the Pittsburgh Bipolar Offspring study. *Arch Gen Psychiatry* 66 (3), 287-296.
- Birmaher, B., Axelson, D., Strober, M., Gill, M.K., Valeri, S., Chiappetta, L., Ryan, N., Leonard, H., Hunt, J., Iyengar, S., Keller, M., 2006. Clinical course of children and adolescents with bipolar spectrum disorders. *Arch Gen Psychiatry* 63 (2), 175-183.
- Birmaher, B., Brent, D.A., Chiappetta, L., Bridge, J., Monga, S., Baugher, M., 1999. Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): a replication study. *J Am Acad Child Adolesc Psychiatry* 38 (10), 1230-1236.
- Birmaher, B., Khetarpal, S., Brent, D., Cully, M., Balach, L., Kaufman, J., Neer, S.M., 1997. The Screen for Child Anxiety Related Emotional Disorders (SCARED): scale construction and psychometric characteristics. *J Am Acad Child Adolesc Psychiatry* 36 (4), 545-553.
- Bogels, S.M., Knappe, S., Clark, L.A., 2013. Adult separation anxiety disorder in DSM-5. *Clin Psychol Rev* 33 (5), 663-674.
- Boyd, R.C., Ginsburg, G.S., Lambert, S.F., Cooley, M.R., Campbell, K.D., 2003. Screen for Child Anxiety Related Emotional Disorders (SCARED): psychometric properties in an African-American parochial high school sample. *J Am Acad Child Adolesc Psychiatry* 42 (10), 1188-1196.
- Bramley, P.N., Easton, A.M., Morley, S., Snaith, R.P., 1988. The differentiation of anxiety and depression by rating scales. *Acta Psychiatr Scand* 77 (2), 133-138.
- Brown, T., DiNardo, P., Barlow, D., 1994. Anxiety Disorders Interview Schedule for DSM-IV: Lifetime Version (AIDIS-IV-L). Oxford University Press, New York.
- Brown, T.A., Campbell, L.A., Lehman, C.L., Grisham, J.R., Mancill, R.B., 2001. Current and lifetime comorbidity of the DSM-IV anxiety and mood disorders in a large clinical sample. *J Abnorm Psychol* 110 (4), 585-599.
- Bystriksky, A., Stoessel, P., Yager, J., 1993. Psychometric discrimination between anxiety and depression. *J Nerv Ment Dis* 181 (4), 265-267.
- Canals, J., Hernandez-Martinez, C., Cosi, S., Domenech, E., 2012. Examination of a cutoff score for the Screen for Child Anxiety Related Emotional Disorders (SCARED) in a non-clinical Spanish population. *J Anxiety Disord* 26 (8), 785-791.
- Clark, L.A., Watson, D., 1991. Tripartite model of anxiety and depression: psychometric evidence and taxonomic implications. *J Abnorm Psychol* 100 (3), 316-336.
- Combs, H., Markman, J., 2014. Anxiety disorders in primary care. *Med Clin North Am* 98 (5), 1007-1023.
- Compton, S.N., Peris, T.S., Almirall, D., Birmaher, B., Sherrill, J., Kendall, P.C., March, J.S., Gosch, E.A., Ginsburg, G.S., Rynn, M.A., Piacentini, J.C., McCracken, J.T., Keeton,

- C.P., Suveg, C.M., Aschenbrand, S.G., Sakolsky, D., Iyengar, S., Walkup, J.T., Albano, A.M., 2014. Predictors and moderators of treatment response in childhood anxiety disorders: results from the CAMS trial. *J Consult Clin Psychol* 82 (2), 212-224.
- Compton, S.N., Walkup, J.T., Albano, A.M., Piacentini, J.C., Birmaher, B., Sherrill, J.T., Ginsburg, G.S., Rynn, M.A., McCracken, J.T., Waslick, B.D., Iyengar, S., Kendall, P.C., March, J.S., 2010. Child/Adolescent Anxiety Multimodal Study (CAMS): rationale, design, and methods. *Child Adolesc Psychiatry Ment Health* 4, 1.
- Cosi, S., Canals, J., Hernandez-Martinez, C., Vigil-Colet, A., 2010. Parent-child agreement in SCARED and its relationship to anxiety symptoms. *J Anxiety Disord* 24 (1), 129-133.
- Costello, A., Osborne, J., 2005. Best Practices in Exploratory Factor Analysis: Four Recommendations for Getting the Most From Your Analysis. *Practical Assessment, Research and Evaluation* 10 (7).
- Crocetti, E., Hale, W.W., 3rd, Fermani, A., Raaijmakers, Q., Meeus, W., 2009. Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED) in the general Italian adolescent population: a validation and a comparison between Italy and The Netherlands. *J Anxiety Disord* 23 (6), 824-829.
- Derogatis, L.R., Unger, R., 2010. Symptom Checklist-90-Revised, *The Corsini Encyclopedia of Psychology*. John Wiley & Sons, Inc.
- Feldman, L.A., 1993. Distinguishing depression and anxiety in self-report: evidence from confirmatory factor analysis on nonclinical and clinical samples. *J Consult Clin Psychol* 61 (4), 631-638.
- First, M., Spitzer, R.L., Gibbon, M., Williams, J.B.W., 1996. *Structured Clinical Interview for DSM-IV Axis I Disorders, Clinician Version (SCID-CV)*. American Psychiatric Press Inc, Washington, D.C.
- Goldstein, B.I., Shamseddeen, W., Axelson, D.A., Kalas, C., Monk, K., Brent, D.A., Kupfer, D.J., Birmaher, B., 2010. Clinical, demographic, and familial correlates of bipolar spectrum disorders among offspring of parents with bipolar disorder. *J Am Acad Child Adolesc Psychiatry* 49 (4), 388-396.
- Hale, W.W., 3rd, Crocetti, E., Raaijmakers, Q.A., Meeus, W.H., 2011. A meta-analysis of the cross-cultural psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED). *J Child Psychol Psychiatry* 52 (1), 80-90.
- Kaufman, J., Birmaher, B., Brent, D., Rao, U., Flynn, C., Moreci, P., Williamson, D., Ryan, N., 1997. Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL): initial reliability and validity data.[see comment]. *Journal of the American Academy of Child & Adolescent Psychiatry* 36 (7), 980-988.
- Keller, M.B., Lavori, P.W., Friedman, B., Nielsen, E., Endicott, J., McDonald-Scott, P., Andreasen, N.C., 1987. The Longitudinal Interval Follow-up Evaluation. A comprehensive method for assessing outcome in prospective longitudinal studies. *Arch Gen Psychiatry* 44 (6), 540-548.
- Kessler, R.C., Amminger, G.P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., Ustun, T.B., 2007. Age of onset of mental disorders: a review of recent literature. *Curr Opin Psychiatry* 20 (4), 359-364.
- Kessler, R.C., Chiu, W.T., Jin, R., Ruscio, A.M., Shear, K., Walters, E.E., 2006. The epidemiology of panic attacks, panic disorder, and agoraphobia in the National Comorbidity Survey Replication. *Arch Gen Psychiatry* 63 (4), 415-424.
- Khan, A., Leventhal, R.M., Khan, S., Brown, W.A., 2002. Suicide risk in patients with anxiety disorders: a meta-analysis of the FDA database. *J Affect Disord* 68 (2-3), 183-190.
- Kroenke, K., Spitzer, R.L., Williams, J.B., Monahan, P.O., Lowe, B., 2007. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Ann Intern Med* 146 (5), 317-325.

- Lawyer, S.R., Smitherman, T.A., 2004. Trends in Anxiety Assessment. *J Psychopathol Behav Assess* 26 (2), 101-106.
- Leon, A.C., Portera, L., Weissman, M.M., 1995. The social costs of anxiety disorders. *Br J Psychiatry Suppl*(27), 19-22.
- Li, D.L., Shen, F., Yin, Y., Peng, J.X., Chen, P.Y., 2013. Weighted Youden index and its two-independent-sample comparison based on weighted sensitivity and specificity. *Chin Med J (Engl)* 126 (6), 1150-1154.
- Lowe, P.A., Reynolds, C.R., 2004. Psychometric Analyses of the Adult Manifest Anxiety Scale—Adult Version among Young and Middle-Aged Adults. *Educational and Psychological Measurement* 64 (4), 661-681.
- Monga, S., Birmaher, B., Chiappetta, L., Brent, D., Kaufman, J., Bridge, J., Cully, M., 2000. Screen for Child Anxiety-Related Emotional Disorders (SCARED): convergent and divergent validity. *Depress Anxiety* 12 (2), 85-91.
- Muris, P., Merckelbach, H., Mayer, B., van Brakel, A., Thissen, S., Moulart, V., Gadet, B., 1998a. The Screen for Child Anxiety Related Emotional Disorders (SCARED) and traditional childhood anxiety measures. *J Behav Ther Exp Psychiatry* 29 (4), 327-339.
- Muris, P., Merckelbach, H., Schmidt, H., Mayer, B., 1998b. The revised version of the Screen for Child Anxiety Related Emotional Disorders (SCARED-R): Factor structure in normal children. *Personality and Individual Differences* 26 (1), 99-112.
- Olatunji, B.O., Cisler, J.M., Tolin, D.F., 2007. Quality of life in the anxiety disorders: a meta-analytic review. *Clin Psychol Rev* 27 (5), 572-581.
- Perkins, N.J., Schisterman, E.F., 2006. The inconsistency of "optimal" cutpoints obtained using two criteria based on the receiver operating characteristic curve. *Am J Epidemiol* 163 (7), 670-675.
- Perlman, S.B., Hein, T.C., Stepp, S.D., 2014. Emotional reactivity and its impact on neural circuitry for attention-emotion interaction in childhood and adolescence. *Dev Cogn Neurosci* 8, 100-109.
- Plummer, F., Manea, L., Trepel, D., McMillan, D., 2016. Screening for anxiety disorders with the GAD-7 and GAD-2: a systematic review and diagnostic metaanalysis. *Gen Hosp Psychiatry* 39, 24-31.
- Remes, O., Brayne, C., van der Linde, R., Lafortune, L., 2016. A systematic review of reviews on the prevalence of anxiety disorders in adult populations. *Brain Behav* 6 (7), e00497.
- Reynolds, C., Richmond, B.O., Lowe, P.A., 2003. The Adult Manifest Anxiety Scale-Adult Version (AMAS-A). Western Psychological Services, Los Angeles.
- Reynolds, C.R., Richmond, B.O., 1978. What I think and feel: a revised measure of children's manifest anxiety. *J Abnorm Child Psychol* 6 (2), 271-280.
- Shear, M.K., Greeno, C., Kang, J., Ludewig, D., Frank, E., Swartz, H.A., Hanekamp, M., 2000. Diagnosis of nonpsychotic patients in community clinics. *Am J Psychiatry* 157 (4), 581-587.
- Silove, D., Alonso, J., Bromet, E., Gruber, M., Sampson, N., Scott, K., Andrade, L., Benjet, C., Caldas de Almeida, J.M., De Girolamo, G., de Jonge, P., Demyttenaere, K., Fiestas, F., Florescu, S., Gureje, O., He, Y., Karam, E., Lepine, J.P., Murphy, S., Villa-Posada, J., Zarkov, Z., Kessler, R.C., 2015. Pediatric-Onset and Adult-Onset Separation Anxiety Disorder Across Countries in the World Mental Health Survey. *Am J Psychiatry* 172 (7), 647-656.
- Spitzer, R.L., Kroenke, K., Williams, J.B., 1999. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. *Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. JAMA* 282 (18), 1737-1744.
- Spitzer, R.L., Kroenke, K., Williams, J.B., Lowe, B., 2006. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med* 166 (10), 1092-1097.

- Su, L., Wang, K., Fan, F., Su, Y., Gao, X., 2008. Reliability and validity of the screen for child anxiety related emotional disorders (SCARED) in Chinese children. *J Anxiety Disord* 22 (4), 612-621.
- Vigil-Colet, A., Canals, J., Cosi, S., Lorenzo-Seva, U., Ferrando, P.J., Hernandez-Martinez, C., Jane, C., Vinas, F., Domenech, E., 2009. The factorial structure of the 41-item version of the Screen for Child and Anxiety Related Emotional Disorders (SCARED) in a Spanish population of 8 to 12 year-old. *Int J Clin HealthPsychol* 9 (2), 313-327.
- Wetzler, S., Katz, M.M., 1989. Problems with the differentiation of anxiety and depression. *J Psychiatr Res* 23 (1), 1-12.
- Wren, F.J., Berg, E.A., Heiden, L.A., Kinnamon, C.J., Ohlson, L.A., Bridge, J.A., Birmaher, B., Bernal, M.P., 2007. Childhood anxiety in a diverse primary care population: parent-child reports, ethnicity and SCARED factor structure. *J Am Acad Child Adolesc Psychiatry* 46 (3), 332-340.
- Youden, W.J., 1950. Index for rating diagnostic tests. *Cancer* 3 (1), 32-35.
- Zimmerman, M., Chelminski, I., 2003. Clinician recognition of anxiety disorders in depressed outpatients. *J Psychiatr Res* 37 (4), 325-333.
- Zimmerman, M., Mattia, J.I., 1999. Psychiatric diagnosis in clinical practice: is comorbidity being missed? *Compr Psychiatry* 40 (3), 182-191.
- Zimmerman, M., Mattia, J.I., 2001. A self-report scale to help make psychiatric diagnoses: the Psychiatric Diagnostic Screening Questionnaire. *Arch Gen Psychiatry* 58 (8), 787-794.

Table 1. Demographic and Clinical Characteristics between participants with Anxiety Disorders and No-Anxiety Disorders

	Anxiety (n=55)	No anxiety (n=281)	Test Stat (t, χ^2)	p-value
Age	20 ± 1.6	20.3 ± 2	1.09	0.28
Sex (Female)	70.9% (n=39)	47.7% (n=134)	9.93	0.002
Race (Caucasian)	90.9% (n=50)	81.5% (n=229)	2.89	0.09
<i>Anxiety Disorders*</i>				
General Anxiety Disorder	65.5% (n=36)	-	-	-
Separation Anxiety	1.8% (n=1)	-	-	-
Panic Disorder	14.6% (n=8)	-	-	-
Agoraphobia	0% (n=0)	-	-	-
Social Phobia	49.1% (n=27)	-	-	-
> 1 Anxiety Disorder	29.1% (n=16)	-	-	-
<i>non-Anxiety Disorders</i>				
Bipolar	27.3% (n=15)	4.3% (n=12)	32.93	<0.0001
Depressive Disorders	18.2% (n=10)	7.5% (n=21)	6.30	0.01
Substance Use Disorder	23.6% (n=13)	10.7% (n=30)	6.92	0.01
ADHD	16.4% (n=9)	8.9% (n=25)	2.82	0.09
Disruptive Behavior	1.8% (n=1)	1.1% (n=3)	Fisher	0.5

Depressive disorders: Major Depressive Disorder, Dysthymia, or Depression NOS.

Disruptive behavior disorders: Conduct Disorder and Oppositional Defiant Disorder

* present at the time or within one month preceding the completion of the SCAARED

Table 2. Screen for Adult Anxiety Related Disorders (SCAARED) - Factor Analysis

	Factor I	Factor II	Factor III	Factor IV
FACTORS	Somatic/Panic/agora phobia	General anxiety	Separation anxiety	Social anxiety
Cronbach's Alpha	0.92	0.94	0.86	0.91
1. When I feel nervous, It is hard for me to breathe	0.60			
2. I get headaches when I am at school, at work or in public places	0.51			
3. I don't like to be with people I don't know well				0.63
4. I get nervous if I sleep away from home			0.61	
5. I worry about people liking me		0.65		
6. When I get anxious, I feel like passing out	0.73			
7. I am nervous		0.50		
8. It is hard for me to stop worrying		0.73		
9. People tell me that I look nervous	0.47			
10. I feel nervous with people I don't know well				0.69
11. I get stomachaches at school, at work, or in public places	0.63			
12. When I get anxious, I feel like I'm going crazy	0.57			
13. I worry about sleeping alone			0.68	
14. I worry about being as good as other people		0.69		
15. When I get anxious, I feel like things are not real	0.63			
16. I have nightmares about something bad happening to my family			0.63	
17. I worry about going to work or school, or to public places	0.47			
18. When I get anxious, my heart beats fast	0.42			
19. I get shaky	0.48			
20. I have nightmares about something bad happening to me			0.61	
21. I worry about things working out for me		0.70		
22. When I get anxious, I sweat a lot	0.39			
23. I am a worrier		0.65		
24. When I worry a lot, I have trouble sleeping		0.57		
25. I get really frightened for no reason at all	0.43			
26. I am afraid to be alone in the house			0.72	
27. It is hard for me to talk with people I don't know well				0.79
28. When I get anxious, I feel like I'm choking	0.75			
29. People tell me that I worry too much		0.62		
30. I don't like to be away from my family			0.55	
31. When I worry a lot, I feel restless		0.57		
32. I am afraid of having anxiety (or panic) attacks	0.59			
33. I worry that something bad might happen to my family			0.57	
34. I feel shy with people I don't know well				0.81
35. I worry about what is going to happen in the future		0.69		
36. When I get anxious, I feel like throwing up	0.73			
37. I worry about how well I do things		0.75		
38. I am afraid to go outside or to crowded places by myself	0.35			
39. I worry about things that have already happened		0.59		
40. When I get anxious, I feel dizzy	0.76			
41. I feel nervous when I am with other people and I have to do something while they watch me (for example: speak, play a sport.)				0.57
42. I feel nervous when I go to parties, dances, or any place where there will be people that I don't know well				0.64
43. I am shy				0.79
44. When I worry a lot, I feel irritable		0.43		
Factor 1: Items 1, 2, 6, 9, 11, 12, 15, 17, 18, 19, 22, 25, 28, 32, 36, 38, 40;				
Factor 2: Items 5, 7, 8, 14, 21, 23, 24, 29, 31, 35, 37, 39, 44;				
Factor 3: Items 4, 13, 16, 20, 26, 30, 33;				

Factor 4: Items 3, 10, 27, 34, 41, 42, 43.

Tables 3a and 3b. Comparison of the SCAARED total and each factor score between participants with:
a. Anxiety Disorders vs. No Anxiety Disorders and b. Specific Anxiety Disorders

a. Any Anxiety Disorders

Factors	Anxiety (n = 55)	No-Anxiety (n = 281)	Test Stat (t)	p-value
Total score	39.6 ± 21.5	14.7 ± 13.8	11.01	<0.0001
Somatic/Panic/Agoraphobia	12.1 ± 8.8	3.6 ± 4.8	10.15	<0.0001
Generalized anxiety	15.1 ± 7.5	5.8 ± 5.6	10.48	<0.0001
Separation anxiety	4.5 ± 4.4	1.4 ± 2.1	7.72	<0.0001
Social anxiety	8 ± 4.1	3.8 ± 3.6	7.50	<0.0001

b. Specific Anxiety Disorders

Factors	Respective specific anxiety disorder (n)	Other anxiety disorders (n)	Factor score (with specific anxiety disorder)	Factor score (without specific anxiety disorders)	Test Stat (Z)	p-value
Somatic/Panic/ Agoraphobia	8	47	10 ± 5.9	12.5 ± 9.2	0.43	0.67
Generalized anxiety	36	19	16.9 ± 6.3	11.5 ± 8.3	2.39	0.02
Social anxiety	27	28	9.3 ± 4.1	6.6 ± 3.6	2.50	0.01

Table 4. Receiver Operating Characteristic (ROC) Analysis. Sensitivity and Specificity for different cutoff scores

Total SCAARED (Maximum: 88)			Somatic/Panic/ Agoraphobia (Maximum: 34)			Generalized anxiety (Maximum: 26)			Separation anxiety (Maximum:14)			Social anxiety (Maximum: 14)		
Cutoff	SI	SP	Cutoff	SI	SP	Cutoff	SI	SP	Cutoff	SI	SP	Cutoff	SI	SP
26	0.67	0.79	7	0.64	0.81	14	0.62	0.87	5	0.42	0.90	9	0.36	0.91
23 ^{a,b}	0.76	0.77	5 ^b	0.73	0.77	12 ^a	0.67	0.82	3 ^a	0.56	0.80	7 ^a	0.62	0.83
20	0.80	0.70	3 ^a	0.85	0.67	10 ^b	0.73	0.75	2 ^b	0.65	0.68	5 ^b	0.75	0.67

a=cutoff selected via Youden Method, b=cutoff selected using Euclidean Method

SI= Sensitivity. SP= Specificity.

Highlights

- The Screen for Adult Anxiety Related Disorders (SCAARED) showed excellent psychometrics.
- It has four factors: somatic/panic/agoraphobia, generalized anxiety, separation anxiety, and social anxiety that are useful to screen for the respective anxiety disorders.
- Together with its child counterpart, it can also be use for longitudinal studies following youth into adulthood and studies comparing child and adult populations.
- Further replication studies in larger community and clinical samples are indicated.