



The Parent Sensitivity to Child Anxiety Index

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Abstract

Anxiety sensitivity (AS) is the perception that anxiety symptoms and experiences have negative consequences, and has been identified as a risk factor for the development of anxiety disorders. AS has been measured in adults and in children, but to date, the construct of parent's sensitivity to their children's anxiety symptoms has not been identified, measured, or evaluated. The current study presents a novel measure of this construct, the Parent Sensitivity to Child Anxiety Index (PSCAI), and an initial evaluation of its psychometric properties. Factor analysis revealed a three-factor structure consisting of parents' concern for physical symptoms, concern of social evaluation, and fear of anxiety symptoms. The PSCAI demonstrated good internal consistency, and was positively correlated with relevant parental constructs such as parental accommodation, anxiety sensitivity, and trait anxiety. This new measurement system opens new avenues for researching the early development of anxiety disorders and the possibility for novel targeted interventions.

Keywords Anxiety · Parent–child relationships · Measure

Introduction

Anxiety disorders are the most common form of mental illness in children [1, 2]. These disorders often begin early in development and can result in chronic impairment [3–9]. It is therefore important to identify risk factors for the development of anxiety disorders in children, particularly those that may lead to the development and implementation of targeted interventions.

Anxiety sensitivity (AS), originally identified by Reiss and McNally [10] as a risk factor for anxiety, is the belief or perception that anxiety symptoms and experiences have negative consequences. For example, individuals high in AS are characterized by increased sensitivity to interoceptive cues (e.g., heart rate, blushing, or difficulty concentrating) and often associate these sensations with threat or negative outcomes (e.g., social evaluation of sweating or the fear that one will have a heart attack when their heart races).

Reiss et al. [11] found that AS is factually and functionally independent from other anxiety measures, a finding that has been replicated in multiple studies [12–16]. AS is currently evaluated in clinical and research settings using the

Anxiety Sensitivity Index-3 [15]. This measure has demonstrated high internal consistency and factorial validity, as well as convergent, discriminant, and criterion-related validities [15]. Taylor et al. found a stable 3-factor structure in the ASI-3, which distinguishes between measures of physical, cognitive, and social AS subtypes, as well as providing a global measure of AS.

A large body of literature has linked heightened AS to concurrent anxiety [17–19]. Furthermore, AS has been shown to prospectively predict the onset of anxiety disorders [20, 21]. Anxiety sensitivity has been associated with a number of anxiety disorders, suggesting that high AS may be a transdiagnostic risk factor [22, 23]. Importantly, some work suggests that AS may be a promising target for novel intervention strategies [24–31].

Considering that anxiety disorders typically begin early in development [1, 5] and are the most common form of psychopathology in children [32], extending work on AS to younger populations is an important direction of research. Silverman et al. [33] developed and validated the Childhood Anxiety Sensitivity Index (CASI) to measure anxiety sensitivity in children. The CASI, a child self-report measure, demonstrates high test–retest reliability and internal reliability. Work in children and adolescents suggests that high AS is associated with clinical anxiety [34–36]. For example, in a 4-year prospective study in over 2000 adolescents, AS predicted the onset of

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panic symptoms across development, even after controlling for other risk factors [37].

Considering evidence suggesting that AS may be an important early risk factor for anxious outcomes, work has begun to focus on characterizing the environmental and genetic factors that contribute to AS. For example, environmental factors (e.g., experiential learning and interpersonal relationships) have been linked to AS [38, 39], along with genetic factors [40]. Studies have found associations between parent and child AS [41–43] (however, see [44–46]). Additionally, some studies have found associations between both parental accommodating behaviors [47] and specific parenting styles [48–50] with AS in children.

While differences in parenting styles and parents' accommodating behaviors have been studied in relation to their children's AS, the reasons why these differences exist remains unclear. Researchers have suggested that parents with high levels of AS may be more likely to display reactivity to their own symptoms, and to communicate catastrophic outcomes related to their own anxiety sensations and experiences to their children [42, 48, 51]. It is possible that parents high in trait anxiety and/or AS may be more fearful of exposing their children to anxiety-provoking situations, and may therefore disseminate their own fearful beliefs regarding anxiety symptoms to their children through specific behavioral patterns.

It stands to reason that parents who display hyper-reactivity to their own anxiety symptoms (i.e., high AS parents), may also display hyper-reactivity to *their children's anxiety symptoms*. For example, a high AS parent may react negatively if they notice their child is flushed or notice that their child's heart is beating rapidly. Moreover, parents' reactivity to their child's anxiety symptoms or sensations may be more important to the development of child AS, than parent AS alone.

Despite this possibility, no study has focused on measuring this construct, i.e., parent sensitivity to child anxiety. In the current study, we present a novel measure of this construct, the Parent Sensitivity to Child Anxiety Index (PSCAI). Such a measure will enable researchers to investigate potential mechanisms whereby parents may impact children's anxiety sensitivity, and thereby risk for anxiety across development. We administered the PSCAI to parents with children early in development, between the ages of 5–7 years-old. We present reliability analyses and factor analyses, along with measures of convergent and divergent validity for the PSCAI.

Method

Participants

Participants included 101 parent and child dyads recruited from the Tallahassee community. Parents included 10 males

and 90 females, 1 parent identified as “other” for gender. Parent age ranged from 25 to 58 years-old, $M = 36.94$, $SD = 6.35$. In terms of parent education: 3% of parents reported having a high school diploma, 31% reported having some college, 29% reported having a college degree, and 38% reported having a graduate degree. For annual family income, 3% reported less than \$10,000, 9% reported \$10,000–25,000, 10% reported \$25,000–40,000, 37% reported \$40,000–75,000, and 42% reported over \$75,000. Ten percent of parents identified as Hispanic or Latin; and 8% identified as Asian, 20% as Black, 65% as White, 2% as American Indian, and 6% as “Other”.

Children included 52 males and 49 females between the ages of 5 and 7 yrs-old, $M = 5.74$, $SD = .76$. Parents reported that 11% of the children were Hispanic or Latino; and 7% were Asian, 18% were Black, 67% were White, 1% was American Indian, and 7% identified as “Other”.

Materials

The Parent Sensitivity to Child Anxiety Index (PSCAI)

The Parent Sensitivity to Child Anxiety Index (PSCAI) is an 18-item scale, which was created based on the ASI-3. The PSCAI was designed to measure parents' sensitivity to their child's anxiety symptoms and experiences. For example: “When my child complains about aches and pains, I worry there is something terribly wrong with her/him”, “It scares me when my child appears to be afraid”, and “I think it would be horrible for my child to faint”. The items are rated on a scale ranging from: *Very little* (0), *A little* (1), *Some* (2), *Much* (3), and *Very much* (4).

Items were developed by adapting items from the ASI-3 to be applicable to parents' sensitivity to their children's anxiety symptoms, instead of their own anxiety symptoms. For example, the ASI-3 item “When I feel pain in my chest, I worry that I'm going to have a heart attack” was adapted to “When my child complains about having pain in her/his chest, I worry that she/he may be having a heart attack” in the PSCAI. Similarly, the ASI-3 item “When I begin to sweat in a social situation, I fear people will think negatively of me” was adapted to “When my child sweats in a social situation, I fear people will think negatively of her/him” in the PSCAI. The adapted items were designed to be a consistent as possible with the original items on the ASI-3.

The Anxiety Sensitivity Index (ASI-3)

The Anxiety Sensitivity Index-3 (ASI-3) is an 18-item scale that measures how sensitive individuals are to their own anxiety symptoms and experiences [15]. Participants rated items on a 5-point scale, ranging from “very little” (0) to “very much” (4). The ASI-3 is comprised of three

subscales, six items each, regarding physical, cognitive, and social concerns.

Family Accommodation Scale-Anxiety (FASA)

The Family Accommodation Scale-Anxiety (FASA) is a 9-item questionnaire [52]. The FASA measures the extent to which parents accommodate children's anxiety. Family accommodation consists of the behavior of family members (usually parents) designed to limit or decrease distress caused by a disorder [53]. For example, accommodation can include altering family routines to avoid situations a child fears. Accommodating behaviors have demonstrated detrimental effects on long-term mental health outcomes of children with anxiety disorders [52]. The items are rated on a 5-point scale ranging from "never" (0) to "daily" (4), and participants are prompted to select their answers based on frequency within the past month.

The State-Trait Anxiety Inventory (STAI)

The State-Trait Anxiety Inventory (STAI) is a 40-item questionnaire containing two separate self-report scales, 20 items each, used to measure state anxiety (A-State) and trait anxiety (A-Trait) [54]. The STAI is intended to distinguish between an individual's state anxiety and trait anxiety. The STAI A-State scale is used to measure how the respondents feel in the current moment. The STAI A-Trait scale is used to measure how the respondents feel generally. On both scales, the items are rated on a 4-point scale with answer options ranging from: "not at all" (0) to "very much so" (3).

The Child Report of Parental Behavior Inventory (CRPBI)

The current study utilized an adapted version of the Child Report of Parental Behavior Inventory (CRPBI) that has been shortened and modified for completion by the parent [55]. It measures three factors of parenting styles: acceptance (e.g., enjoys doing things with child), control (e.g., I often tell my child how to behave), and firmness (e.g., I am strict with my child). Items are rated on a three-point scale with answer options ranging from "not like" (1) to "a lot like" (3), which indicate the extent to which a parent feels a particular description is representative of their relationship with their child.

Statistical Approach

For statistical analyses, we used SPSS (Version 17.0) General Linear Model software. Cronbach's alpha was calculated as a measure of internal consistency for the total measure. A principal axis factor analyses was conducted with oblique rotation (direct oblimin) to identify factors in the PSCAI.

Related constructs such as anxiety sensitivity, parental accommodation, and trait anxiety were measured with the ASI-3, FASA, and STAI-trait, respectively, and were hypothesized to positively correlate with the PSCAI. Other constructs were hypothesized to not correlate with the PSCAI, such as state anxiety and parenting styles (e.g., acceptance, control, and firmness) as measured by the STAI-state and CRPBI, respectively.

Results

Factor Analysis

A principal axis factor analysis was conducted for the 18 items with oblique rotation (direct oblimin). The Kaiser–Meyer–Olkin measure verified the sampling adequacy for the analysis, $KMO = .79$ (minimum criteria = .50 [56]). An initial analysis was run to obtain eigenvalues for each factor in the data and the scree plot showed an inflexion that would justify retaining 3 factors. Three factors had the following eigenvalues: 6.15, 1.81, and 1.66, and together, explained 53.42% of the variance. Table 1 shows the factor loadings after rotation. The first factor had high loadings ($> .50$) on items related to reactivity surrounding children's physical symptoms or experiences (Factor 1: Physical Concerns; e.g., "it scares me when my child is flushed"). Three items were excluded based on low loadings on this factor ($< .50$). The second factor had high loadings on items related to concerns about social evaluation of children's anxiety symptoms or experiences (Factor 2: Social Concerns; e.g., "when my child sweats in a social situation, I fear people will think negatively of her/him"). The third factor had high loadings on items related to parental fear of child's anxiety (Factor 3: Fear of Anxiety; e.g., "it scares me when my child appears to be afraid"). Four items were excluded based on low loadings on this factor ($< .50$). Internal consistency was acceptable for all three factors: Factor 1, $\alpha = .84$, Factor 2, $\alpha = .77$, and Factor 3, $\alpha = .74$.

The total mean score on the PSCAI, once items were excluded (7 items were excluded), was 18.06, $SD = 6.59$, with a range of 4–38. The Cronbach's alpha for the final 11 items was .84, suggesting the measure obtained good internal consistency. Neither total scores on the PSCAI nor the 3 factors related to child age, all p 's $> .50$. However, older parents reported lower total scores on the PSCAI, $r(99) = -.20$, $p < .05$. While Factor 1: Physical Concerns and Factor 2: Social Concerns did not relate to parent age, Factor 3: Fear of Anxiety related to parent age, such that older parents reported lower total fear of child anxiety, $r(99) = -.25$, $p < .05$. Total scores on the PSCAI did not relate to parent or child gender, both $ps > .50$. Additionally, neither of the

Table 1 Item factor loadings on the Parent Sensitivity to Child Anxiety Index

Item	Rotated factor loadings		
	Factor 1 physical concerns	Factor 2 social concerns	Factor 3 fear of anxiety
It scares me when my child is flushed	.82	.04	-.02
When I notice my child is sweaty, I worry that there is something seriously wrong with her/him	.81	.11	-.06
When my child complains about aches and pains, I worry there is something terribly wrong with her/him	.77	-.02	.03
When my child complains about having pain in her/his chest, I worry that she/he may be having a heart attack	.74	.02	-.02
When my child is out of breath, I get scared that something is really wrong with her/him	.58	.02	.16
When my child cannot focus on a task, I worry that she/he might be going crazy ^a	<i>.41</i>	.38	-.28
When my child seems “spacey” I worry that she/he may be mentally ill ^a	<i>.38</i>	-.15	.17
It scares me when my child’s heart beats rapidly ^a	<i>.36</i>	.23	.24
When my child sweats in a social situation, I fear people will think negatively of her/him	<i>.07</i>	.69	.04
I worry that other people will notice my child’s anxiety	-.00	.66	.26
When my child shakes or appears nervous, I fear what people might think of her/him	<i>.36</i>	.50	.14
It scares me when my child appears to be afraid	<i>.05</i>	.05	.71
It is distressing for me when my child appears nervous	-.11	.30	.52
When my child has to do something she/he is afraid of, I feel distressed	<i>.04</i>	.33	.50
When my child feels warm, I worry there is something wrong with her/him ^a	<i>.37</i>	-.33	<i>.47</i>
When my child’s stomach is upset, I worry she/he might be seriously ill ^a	<i>.25</i>	.03	<i>.43</i>
I think it would be horrible for my child to faint ^a	<i>.08</i>	-.05	<i>.38</i>
When my child coughs, I worry that she/he could choke to death ^a	<i>.23</i>	.17	<i>.24</i>
Eigenvalues	6.15	1.81	1.66
% of variance	34.12	1.05	9.19
α	.84	.77	.74

Bold item factor loadings indicate that the respective item loaded sufficiently onto the respective factor, and was included in the final version of the index

Italicized item factor loadings indicate the highest factor loadings for items that did not load sufficiently onto any of the factors, and were not included in the final version of the index

^aInsufficient factor loadings for inclusion in the final version of the index

3 factor scores on the PSCAI differed by parent or child gender, all $ps > .50$.

Related Constructs

To examine constructs that were hypothesized to be either related or not related with the novel measure, we compared the total score on the PSCAI, as well as factor scores, to the parent-report on the Anxiety Sensitivity Index [15], the Family Accommodation Scale—Anxiety [52], the State-trait Anxiety Inventory [54], and the adapted version of the Child Report of Parental Behavior Inventory [55]. As can be seen in Table 2, total scores on the PSCAI were moderately correlated to the ASI-3 total and all three factors of the ASI-3 (Physical Concerns, Cognitive Concerns, and Social Concerns) rs between .36 and .47. In terms of the relationships between the PSCAI factors and the ASI-3 factors: PSCAI Factor 1: Physical Concerns had the highest correlation

with the ASI-3 factor related to Physical Concerns, $r = .39$, PSCAI Factor 2: Social Concerns had the highest correlation with the ASI-3 factor related to Cognitive Concerns, $r = .58$, and PSCAI Factor 3: Fear of Anxiety had the highest correlation with the ASI factor related to Social Concerns, $r = .34$. Overall, the PSCAI and ASI-3 display moderate correlations between both global and relevant factor scores.

As depicted in Table 2, total scores on the FASA were moderately correlated to the total scores on the PSCAI ($r = .34$, $p < .01$), as well as the physical concerns factor ($r = .30$, $p < .01$), social concerns factor ($r = .36$, $p < .01$) and fear of anxiety factor ($r = .19$, $p < .05$). We also examined the relationship between the PSCAI and the STAI. Trait anxiety (STAI Trait) was related to total PSCAI scores ($r = .32$, $p < .05$), social concerns factor ($r = .38$, $p < .05$), and fear of anxiety factor ($r = .27$, $p < .05$). However, as can be seen in Table 2, state anxiety (STAI State; $r = .11$, $p > .05$), CRPBI acceptance ($r = .13$, $p > .05$), CRPBI control ($r = .10$, $p > .05$),

Table 2 PSCAI, ASI-3, FASA, STAI and CRPBI correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Total PSCAI	–												
2. PSCAI Factor 1. Physical concerns	.84**	–											
3. PSCAI Factor 2. Social concerns	.64**	.35**	–										
4. PSCAI Factor 3. Fear of anxiety	.76**	.50**	.27**	–									
5. ASI-3 total	.47**	.34**	.55**	.32**	–								
6. ASI-3. Physical concerns	.44**	.39**	.43**	.27**	.84**	–							
7. ASI-3. Cognitive concerns	.36**	.27**	.58**	.15	.76**	.53**	–						
8. ASI-3. Social concerns	.38**	.21*	.38**	.34**	.86**	.57**	.44**	–					
9. FASA	.34**	.30**	.36**	.19*	.45**	.35**	.38**	.38**	–				
10. STAI. Trait	.32**	.17	.38**	.27**	.72**	.56**	.66**	.57**	.42**	–			
11. STAI. State	.11	.06	.05	.19*	.31**	.24*	.21*	.29**	.30**	.54**	–		
12. CRPBI acceptance	.13	.06	–.03	.23*	–.13	–.08	–.12	–.11	.07	–.10	–.03	–	
13. CRPBI control	.10	.03	.10	.13	.23*	.21	.20*	.17	.19*	.32**	.18	–.05	–
14. CRPBI firmness	.03	.08	–.05	.01	.08	.08	.01	.10	.01	.03	.14	.02	.31**

* $p < .05$; ** $p < .01$

and CRPBI firmness ($r = .03$, $p > .05$) were *not* related to the PSCAI. Thus, both FASA and STAI trait anxiety scores display meaningful correlations with the PSCAI, while CRPBI subscale and STAI state anxiety scores do not.

Discussion

To our knowledge, this is the first study to identify parent's sensitivity to their children's anxiety as a measurable construct. The measure developed in the current study can be used in future studies investigating the development of anxiety sensitivity and anxiety disorders in the context of parent–child relationships.

The PSCAI showed good internal consistency, and the factor analysis revealed a stable three-factor structure, describing parents' concern for their child's physical health, concern of social evaluation, and fear of anxiety. Seven out of the original eighteen items were eliminated through this process, some of which were unexpected (Table 1). For example, some of the items directly applied from the physical subscale of the ASI-3 that seemed conceptually consistent with the physical health factor in the current scale (i.e. "When my child's stomach is upset, I worry that she/he might be seriously ill") did not meet inclusion criterion. In fact, three of these items loaded more heavily on the fear of anxiety factor than concerns for physical health. The discrepancy between parents' reactivity to their own physical symptoms of anxiety and to those of their children may be a future area of research interest.

As expected, the PSCAI showed meaningful correlations with the ASI-3, FASA, and STAI-Trait, but not with CRPBI subscales or the STAI-State, thereby supporting

the hypotheses that the novel measure would be positively related to constructs of anxiety sensitivity, parental accommodation, and trait anxiety, but not with the constructs of state anxiety or more general parenting styles. Additionally, the physical health concerns, social evaluation concerns, and fear of anxiety factors showed moderate positive correlations with the physical, cognitive, and social subscales of the ASI-3, respectively. This is consistent with the notion that parents who are highly sensitive to their own anxiety are likely to be sensitive to their child's anxiety. Because scores on the FASA indicate the extent to which parents accommodate children's anxiety, it stands to reason that a parent who is highly sensitive to their child's anxiety (reflected in the PSCAI score), may also participate in more accommodation (reflected in the FASA score). Results from the current study provide support for this association. Additionally, we examined the relationship of PSCAI scores with STAI trait and state anxiety scores. While we expected trait anxiety to relate to the PSCAI (i.e., anxious parents are likely to be more sensitive to their child's anxiety), we expected that state anxiety should not relate to the PSCAI (i.e., the level of parent anxiety during the lab visit should not necessarily relate to their general sensitivity to their child's anxiety). Additionally, we hypothesized that PSCAI scores would not correlate to the parenting styles measured by the CRPBI. These hypotheses were all supported by the current results.

It is interesting to note that the fear of anxiety factor on the PSCAI, instead of the social evaluation concerns factor, related to the social subscale of the ASI-3. There may be a link between the discomfort parents experience when they think their own anxiety symptoms are noticed by others, and the fear they experience when they notice anxiety in their children. Because anxiety symptoms are typically

internal experiences, being aware that those symptoms have been externally communicated or observed could result in additional anxiety and discomfort. Additionally, no cognitive concern factor was revealed from the factor analysis. The most likely explanation is that these symptoms are oftentimes unobservable in others, and that it is unlikely that young children would report these types of symptoms to their parents. Parents cannot be sensitive to anxiety symptoms in their children if they do not know that they are present.

The current study had some limitations. For example, the sample was limited to parents of children aged 5–7. Therefore, future studies could extend the PSCAI to a broader age-range, particularly adolescents. The current study focused on validating a novel self-report measure in parents and young children. Considering the moderate sample size of the current study, replication in a larger or independent sample is an important next step to confirm findings from the current study. Also, the validation of the PSCAI was limited solely to an assessment of self-report scales, but should enable future application of multi-modal assessment strategies such as fMRI, behavioral tasks, and electroencephalography (EEG) to the exploration of this novel construct. Additionally, future studies should expand upon the psychometric properties of the PSCAI evaluated in the current study. Such studies could focus on properties such as parent–child agreement, test–retest reliability, and predictive validity. Specifically, this scale could be used to investigate the role of parents' sensitivity to their children's anxiety in predicting future changes in child anxiety symptom severity, children's anxiety sensitivity, and future onset of children's anxiety disorders.

The measurement of parents' sensitivity to their children's anxiety opens new avenues for researching the early development of anxiety disorders and, therefore, the possibility for novel targeted interventions. For example, although literature shows that specific parenting styles [48–50] and parental behaviors in response to their children's anxiety [52] are linked to negative long-term mental health outcomes for their children, we don't know why some parents and not others engage in them. Identifying an underlying construct that contributes to these detrimental behaviors could lead to behavioral interventions that would potentially target aspects of parent–child relationships that put children at risk for the development of anxiety disorders.

Summary

The current study presented the novel construct of *parents' sensitivity to their children's anxiety*, as well as a self-report measure of this novel construct, the Parent Sensitivity to Child Anxiety Index (PSCAI), and an initial evaluation of

its psychometric properties. Items were developed by adapting items from the ASI-3 to apply to parents' sensitivity to their *children's* anxiety symptoms instead of their sensitivity to their *own* anxiety symptoms. Factor analysis revealed a three-factor structure consisting of parents' concern for physical symptoms, concern of social evaluation, and fear of anxiety symptoms. Due to the item development strategy of adapting existing validated items from the ASI-3, some of the items that were eliminated due to low factor loadings were surprising, as were some of the factor correlations with the ASI-3. These results suggest that the discrepancy between parents' reactivity to their own symptoms of anxiety and to those of their children may be a future area of research interest.

The PSCAI demonstrated good internal consistency, and was positively correlated with relevant parental constructs such as parental accommodation, anxiety sensitivity, and trait anxiety. Additionally, the PSCAI did not show significant correlations with unrelated constructs such as state anxiety and specific parenting styles, indicating that the PSCAI showed good construct validity. Future studies should apply this construct to other age ranges, particularly adolescents. Other important future directions to consider are confirmatory factor analysis of the three-factor structure demonstrated in the current study, and further evaluation of psychometric properties such as parent–child agreement, test–retest reliability, and predictive validity. This new measurement system opens new avenues for researching the early development of anxiety disorders, such as the role of parents' sensitivity to their children's anxiety in predicting future changes in child anxiety symptom severity, children's anxiety sensitivity, and future onset of children's anxiety disorders, as well as the possibility for novel targeted interventions.

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