



HHS Public Access

Author manuscript

Parent Sci Pract. Author manuscript; available in PMC 2021 July 13.

Published in final edited form as:

Parent Sci Pract. 2017 ; 17(2): 124–142. doi:10.1080/15295192.2017.1304784.

Mother and Child Ratings of Child Anxiety: Associations With Behavioral Avoidance and the Role of Family Accommodation

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SYNOPSIS

Objective.—This study compared mother and child ratings of child anxiety to each other and to an objective measure of the child’s avoidant behavior, using a novel motion-tracking paradigm. The study also examined the moderating role of family accommodation for the link between mother ratings of child anxiety and child behavioral avoidance.

Design.—Participants were 98 children (7- to 14-years-old) and their mothers. Children met criteria for a primary anxiety disorder. Measures included parent and child versions of the Multi-Dimensional Anxiety Scale for Children and the Screen for Child Anxiety Related Emotional Disorders. Children also completed the Spider Phobia Questionnaire for children and the Family Accommodation Scale for Anxiety–Child Report. The Yale Interactive Kinect Environment Software platform was used to measure children’s behavioral avoidance of spider images.

Results.—Mother and child ratings of child anxiety were moderately correlated. Only child ratings of child anxiety were associated with child behavioral avoidance. Child-rated family accommodation moderated the association between parent ratings and child avoidance. When accommodation was low parent ratings correlated with child avoidance, but not when accommodation was high.

Conclusions.—The findings contribute to understanding commonly reported discrepancies between mother and child ratings of child anxiety symptoms.

INTRODUCTION

Anxiety disorders are among the most common disorders in children and adolescents (Costello, Egger, & Angold, 2005). Anxiety disorders cause significant impairment to multiple domains of individual and family functioning, due in part to the avoidant behavior they engender (Essau, Conradt, & Petermann, 2000). When not treated successfully, anxiety disorders contribute to long-term negative impacts on functioning and well-being and predict additional psychopathology (Compton et al., 2004; Greenberg et al., 1999). As such, there is a need for accurate and evidence-based assessment of child anxiety symptoms. However, several challenges hinder accurate assessment, including commonly reported discrepancies

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Ethical Principles: The author affirms having followed professional ethical guidelines in preparing this work. These guidelines include obtaining informed consent from human participants, maintaining ethical treatment and respect for the rights of human or animal participants, and ensuring the privacy of participants and their data, such as ensuring that individual participants cannot be identified in reported results or from publicly available original or archival data.

between parent ratings and child ratings of child anxiety symptoms (Mash & Hunsley, 2005). This study aimed to shed new light on these discrepancies, first, by comparing subjective ratings of child anxiety symptoms from both parent and child to an objective measure of child avoidant behavior, using a novel motion-tracking assessment paradigm, and, second, by building on the examination of the association between parent ratings and objectively measured avoidance in the child, to investigate the role of parent involvement in childhood anxiety symptoms, through the process of family accommodation.

Discrepancies Between Parent and Child Ratings of Child Anxiety

Implementing a multiple-informant assessment strategy, relying on children, one or both parents, and possibly other informants, such as teachers, provides richer data than relying on a single informant. But multiple informants also introduce conflicting information. The clinician or researcher is faced with uncertainty as to how to resolve these conflicts (Mash & Hunsley, 2005). Child and parent ratings of child anxiety, using a variety of assessment measures including questionnaires and interviews, differ from each other and only moderately correlate (Achenbach, McConaughy, & Howell, 1987; Affrunti & Woodruff-Borden, 2015; Birmaher et al., 1997; Choudhury, Pimentel, & Kendall, 2003; Comer & Kendall, 2004; DiBartolo, Albano, Barlow, & Heimberg, 1998; Grills & Ollendick, 2002; Lebowitz, Scharfstein, & Jones, 2015; Wren, Bridge, & Birmaher, 2004).

Several studies have aimed to identify factors that influence agreement between parent and child ratings of child anxiety symptoms. These factors have included both child and parent variables, but the data on each have tended to be inconsistent. Some studies have pointed to higher agreement between parents and older children (Grills & Ollendick, 2003; Wren et al., 2004), whereas others have reported higher agreement with younger children (Safford, Kendall, Flannery-Schroeder, Webb, & Sommer, 2005), or no effect of age at all (Choudhury et al., 2003). One study comparing composite parent and child semi-structured diagnostic interviews to parent-only interviews (conducted over the phone) for children aged 6- to 12-years-old reported a high level of agreement between the two. This study did not include an evaluation of child-only assessment (Lyneham & Rapee, 2005).

Likewise, some studies have found greater agreement between parents and girls (Safford et al., 2005), parents and boys (Grills & Ollendick, 2003), or no effect of child gender (Choudhury et al., 2003). Parent anxiety and related psychopathology have also been associated with parent-child agreement regarding child anxiety symptoms, although here too, results have been inconsistent. Some studies found that anxious and depressed parents showed more disagreement with their children (Lagattuta, Sayfan, & Bamford, 2012; Manassis, Tannock, & Monga, 2009); other studies reported the opposite effects, or no effects of parent psychopathology (Krain & Kendall, 2000). In a study comparing mother and child ratings of 73 children, children reported higher anxiety levels overall. Maternal depression predicted lower mother ratings, whereas maternal anxiety predicted higher mother ratings (Affrunti & Woodruff-Borden, 2015). Clearly, making sense of discrepant severity ratings from multiple informants is a daunting challenge for the clinician and researcher alike.

The informant discrepancies common in child anxiety (and ubiquitous across other domains of child and adolescent psychopathology research) have historically been treated as artifacts of unreliable reporting, bias, or measurement error (Mcguire, 1969). More recently, theoretical frameworks have been proposed that treat these discrepancies as meaningful information and emphasize the social and cognitive factors that contribute to them (Achenbach et al., 1987; De Los Reyes, 2011; De Los Reyes & Kazdin, 2005; Panichelli-Mindel, Flannery-Schroeder, Kendall, & Angelosante, 2005). For example, the actor-observer bias (Jones & Nisbett, 1987), the tendency to attribute the behavior of others to dispositional causes and one's own behavior to situational causes, could lead to parents and children having different perspectives on avoidant behaviors exhibited by a child. Much of the research on informant discrepancies has focused on externalizing symptoms (Dirks, De Los Reyes, Briggs-Gowan, Cella, & Wakschlag, 2012; Hartley, Zakriski, & Wright, 2011), but internalizing symptoms, which are frequently less observable than externalizing behaviors, may be particularly vulnerable to factors that contribute to meaningful informant discrepancies.

For example, clinically anxious children rely heavily on parents for family accommodation of their anxiety symptoms, or changes that parents make to their own behavior to help the child avoid or alleviate distress related to their anxiety symptoms (Jones, Lebowitz, Marin, & Stark, 2015; Lebowitz, Panza, et al., 2016; Lebowitz, Panza, & Bloch, 2016; Lebowitz et al., 2013; Norman, Silverman, & Lebowitz, 2015). Such patterns of parental involvement in the child's anxiety symptoms could plausibly impact both child and parent ratings, leading to meaningful and non-random informant discrepancy of anxiety and other internalizing symptoms. For example, the need to accommodate an anxious child could increase the parents' perception of the child's anxiety leading to higher parent ratings of child anxiety. More accommodating parents may be decreasing the child's need to actively confront anxiety provoking situations, potentially contributing to lower anxiety ratings by the child. Additionally, family accommodation is associated with significant distress to the parents, which could further contribute to reporter bias by making parents more sensitive to the child's anxiety symptoms, and more incentivized to access treatment for the child. Despite the rapidly mounting evidence for the importance of family accommodation in childhood anxiety, and its links to measures of symptom severity, there is no research yet examining how family accommodation impacts parental ratings of child anxiety or the association between these ratings and more objective measures of childhood anxiety.

The dearth of "objective" measures of anxiety against which to compare subjective severity ratings of child anxiety from different informants compounds the challenge of informant discrepancies, and makes it harder to test theory-driven hypotheses relating to them. Clinician severity ratings, based on structured or semi-structured interviews with multiple informants, are currently the gold standard of anxiety assessment and may provide more reliable data than a single rating provided by parent or child. Ultimately, however, clinician ratings are also based on subjective information provided by parents and/or children. No single set of rules exists to guide clinicians in integrating the discrepant information provided during interviews, and there is no clear evidence as to whose report tends to be more accurate. Some studies have suggested that parents provide more reliable information than children (Edelbrock, Costello, Dulcan, Kalas, & Conover, 1985). Other studies have

found the opposite, and there is some evidence that the domains or context in which the anxiety is expressed have meaningful impact on informant discrepancies (Comer & Kendall, 2004; Silverman & Eisen, 1992). Furthermore, despite moderate to good inter-rater reliability and agreement between clinicians on structured interviews, it is plausible that individual differences between clinicians influence their severity ratings (Edelbrock et al., 1985; Silverman & Eisen, 1992; Silverman & Nelles, 1988).

One potentially valuable strategy for enhancing understanding of discrepancies in parent and child ratings of child anxiety is to compare them to each other (or to additional informants) and to an anxiety-related marker that can be objectively quantified and is less open to individual interpretation. Both physiological and behavioral responses to anxiety provoking stimuli or situations could potentially provide such objective markers. One study, focused on externalizing symptoms of children, compared ratings from parents and children to observations of children's behavior in various contexts (De Los Reyes, Henry, Tolan, & Wakschlag, 2009). Each informant's report was most strongly associated with behavioral problems exhibited in the context of that informant. Another study, in the area of childhood anxiety disorders, compared ratings of social anxiety symptoms to a measure of psychophysiological flexibility (heart rate variability) in adolescents who were clinically referred for social anxiety and in normal controls (De Los Reyes et al., 2012). Correlations between self-ratings and the psychophysiological measure were low, but both measures discriminated between clinically referred adolescents and normal controls. Alongside such psychophysiological measures, another possibility is to compare subjective ratings to an objective measure of behavioral avoidance.

Avoidance is the major behavioral response to fear and anxiety. Behavioral Avoidance Tests (BATs) have been used for decades as objective and quantifiable indices of avoidance (Lang & Lazovik, 1963). In contrast to physiological measures of autonomic biological functioning, measures of avoidance focus on volitional behavior and can provide a unique perspective on the expression of this core aspect of anxiety disorders. Studies using a variety of behavioral paradigms have linked avoidant behavior to specific fears, as well as to broader trait anxiety (Tsao & McKay, 2004). Technological advances in recent years have allowed for the development of sophisticated BATs for studying avoidance and its relation to anxiety. Heuer, Rinck, and Becker (2007) used a computerized BAT in which the participant moved a joystick forward or backward in response to stimuli, and they found that individuals high in social anxiety and trait anxiety showed greater avoidance of smiling or angry faces compared to non-anxious controls. Similarly, self-rated fear of spiders predicted avoidance of spider (but not neutral) images in both adults (Rinck & Becker, 2007) and children (Klein, Becker, & Rinck, 2011).

Motion tracking technology has enabled the development of BATs to accurately track the motor function of subjects who are engaged in active game-like activities. The Yale Interactive Kinect Environment Software (YIKES) provides the researcher with accurate information regarding a participant's movement over the course of an entire experiment, rather than focusing on a single data point or on small hand movements in an otherwise stationary subject, as in the joystick paradigm. Measuring avoidance in a participant who is exposed to stimuli while playing a game, rather than being explicitly asked to respond to the

stimulus, reduces the risk of demand characteristics and provides a more natural behavioral observation. In a study with 86 adult women, self-rated fear of spiders significantly predicted behavioral avoidance of spider images, explaining approximately 25% of total variance in observed avoidant behavior (Lebowitz, Shic, Campbell, MacLeod, & Silverman, 2015). In another study using the YIKES paradigm, children with anxiety disorders were found to exhibit behavioral avoidance of spider images, and the avoidance was moderated by self-rated anxiety sensitivity (Lebowitz, Shic, Campbell, Basile, & Silverman, 2015).

The current study utilized the motion-tracking YIKES paradigm to examine parent and child ratings of child anxiety in relation to the objective index of child behavioral avoidance and to examine how parental involvement in the child's symptoms through family accommodation impacted the link between parent ratings and child behavioral avoidance. Behavioral avoidance of spider images was measured because spiders have frequently been used as the stimuli in studies of behavioral avoidance, and a wealth of data using a wide variety of paradigms and measures shows that trait anxiety, and not only fear of spiders, correlates with response to spider stimuli. For example, Arntz, Rauner, and Van Den Hout (1995) presented scripts describing a variety of anxiety provoking situations from several domains (including spiders) to samples of spider phobic patients and to other anxiety patients, including those with generalized anxiety, social anxiety, and panic disorder, as well as to non-anxious controls. Ratings indicated that all the clinical groups showed elevated response to the scripts, regardless of the specific domain of content they related to. In fact, when examining the effect of information provided in the script about the response to the situation (e.g., "suddenly you become very anxious"), the effect of information describing an anxious response was greater for the other anxiety patients than for the spider phobic patients. Muris, Mayer, and Merckelbach (1998) found robust correlations between trait anxiety and response to spiders, including negative correlations with approach behavior on a behavioral assessment task and positive correlation with self ratings of fear of spiders. Higher trait anxiety also predicted poorer treatment response for spider phobia. Thorpe and Salkovskis (1998) obtained ratings of fear and disgust toward pictures of various animals including slugs, spiders, and centipedes from participants who were either spider phobic, phobic but not spider phobic, or normal controls. Both spider phobic and other phobic participants had higher fear and disgust ratings toward all images (including the spider images), compared with non-phobic controls. Renaud, Bouchard, and Proulx (2002) used virtual reality and head tracking to measure behavioral avoidance of spider stimuli in spider phobic and non-spider phobic participants. In both groups, higher trait anxiety as well as fear of spiders correlated with avoidance of the virtual spider stimulus. Lipp and Derakshan (2005) reported positive correlations between fear of spiders and measures of trait anxiety and general fearfulness. Taken together, these findings provide ample support for increased avoidance of spider stimuli in the broader anxiety phenotype, and for measures of overall anxiety as predictors of avoidance of spider stimuli.

The current study hypothesized that, in line with earlier research, parent and child ratings of child anxiety would differ from each other and only moderately correlate with each other, and that both parent and child ratings would be associated with behavioral avoidance in the child. Given the inconsistent findings in earlier research, no specific hypothesis was formulated as to whose ratings (parent or child) would more strongly correlate with child

behavioral avoidance. The impact of parental involvement in childhood anxiety symptoms on parent ratings of childhood anxiety was investigated by examining whether family accommodation moderates the association between the parent ratings and objectively measured behavioral avoidance. It was hypothesized that parents whose children reported higher levels of family accommodation would provide ratings that were less associated with observed behavioral avoidance due to the influence of accommodation and of the distress that it causes.

METHOD

Participants

Ninety-eight children (41% male), between the ages of 7- to 14-years-old ($M = 10.35$, $SD = 2.5$), and their mothers ($M = 45.41$, $SD = 5.9$), participated. Children were recruited from an anxiety disorders clinic at a large medical center in the eastern United States and met criteria for at least one Diagnostic and Statistical Manual 5th Edition (DSM-5) anxiety disorder. Children were enrolled in a regular educational setting, and all participants were fluent English speakers. All mothers had at least partial high school education, and 47% had completed higher education at the college level at least. Participants were predominantly European American (81%). Others were either African American (5%), or either did not identify their ethnicity or reported more than one ethnicity.

Children met DSM-5 (American Psychiatric Association, 2013) criteria for a primary diagnosis of either generalized anxiety disorder (32%), separation anxiety disorder (31%), social phobia (19%), specific phobia (12%), or panic disorder (6%). The average number of anxiety diagnoses was 2.1 ($SD = 1.04$) and ranged from 1 to 5. Non-anxiety disorder comorbidity included: depression (18%), obsessive compulsive disorder (6%), attention deficit hyperactivity disorder (15%), and oppositional defiant disorder (9%).

Procedure

Participants first completed the diagnostic interviews (ADIS C/P) and written measures. Trained personnel aided youth in completion of study forms, if necessary. Children then participated in the motion tracking YIKES task which took approximately 10 min, including instructions and a 1-min practice. Mothers and children were not compensated for their participation in the study, which was done as part of their larger evaluation of childhood anxiety disorders. The study was approved by the University Institutional Review Board. Upon arrival, study procedures were explained and signed consent and assent were obtained from mothers and children, respectively. This was done before any other study procedures.

Measures

Anxiety Disorders Interview Schedule for DSM-5—Children and Parent (ADIS C/P).—The presence of a primary DSM-5 anxiety disorder diagnosis was established using the ADIS C/P (Silverman & Nelles, 1988), administered separately to the child and the mother. The ADIS C/P is a semi-structured interview with good to excellent reliability for establishing diagnoses and strong correspondence with anxiety questionnaire ratings (Silverman, Saavedra, & Pina, 2001; Wood, Piacentini, Bergman, McCracken, & Barrios,

2002). The ADIS C/P was administered by graduate level clinicians or licensed psychologists, trained in its use by one of the instrument's authors. Training included observing live and videotaped samples, supervised administration, and discussion of initial discrepancies. In line with earlier research, in cases of discordance between parent and child reports the clinician considered both informants' views to derive a final diagnosis (Silverman et al., 1999; Silverman, Kurtines, Jaccard, & Pina, 2009).

Screen for Childhood Anxiety Related Emotional Disorders (SCARED).—The SCARED (Birmaher et al., 1997) is a 41-item questionnaire that screens for childhood anxiety and includes items that tap into a variety of domains of anxiety and are rated on a 3-point scale ranging from *not true/hardly ever true* to *very true/often true*. Children completed the child version and mothers completed the parent version of SCARED. Sample child items include “I get scared if I sleep away from home.” and “I worry about being as good as other kids,” with corresponding parent items (e.g., “My child worries about being as good as other kids”). The SCARED has demonstrated good internal consistency (α coefficients of .90; Birmaher et al., 1999, 1997) and test-retest reliability (α coefficients from .70 to .90; Muris, Merckelbach, Van Brakel, & Mayer, 1999). Internal consistency in the current sample was high for both children and mothers ($\alpha = .92$, and $\alpha = .91$, respectively).

Multi-Dimensional Anxiety Scale for Children, 2nd Edition (MASC2).—The MASC2 (March, 2013) is a revision of MASC (March, 1997), a 50-item questionnaire covering various domains of child anxiety symptoms. Items are rated on a 4-point scale from *never* to *often*. Children completed the child version, and mothers completed the parent version, of MASC2. Sample child items include “I feel tense or uptight.” and “I get shaky or jittery.” with corresponding parent items (e.g., “My child gets shaky or jittery”). The MASC2 has demonstrated good psychometric properties (Baldwin & Dadds, 2007; March, 1997) and internal consistency in the current sample was high for both children and mothers ($\alpha = .95$, and $\alpha = .91$, respectively).

Spider Phobia Questionnaire—Child Version (SPQC).—Children completed the SPQC (Kindt, Brosschot, & Muris, 1996) which includes 29 statements to which participants respond *yes* or *no* (e.g., “I dislike looking at pictures of spiders in a magazine.”). The SPQC has good internal consistency (Kindt et al., 1996), with scores calculated as the sum of positive responses (after correcting for reverse coded items). Internal consistency in the current sample was high ($\alpha = .90$).

Family Accommodation Scale Anxiety—Child Report (FASA-CR).—Children completed the FASA-CR (Lebowitz, Scharfstein, Jones, 2015) which includes 9 items that query the frequency of various forms of accommodation including participation in symptom driven behavior (e.g., “How often did your parent help you avoid things that make you feel anxious?”), and modification of family routines and schedules (e.g., “How often did your parent change his/her work schedule because of your anxiety?”). Children rate each item on a 5-point scale ranging from *never* to *daily*, and the sum of these responses provides the overall accommodation score. The FASA-CR includes additional items that assesses the degree to which the accommodations causes distress to parents, children's reactions when

not accommodated, and children's beliefs relating to the accommodation, but these are not included in the accommodation score. Previous research demonstrated the validity of FASA-CR for children between the ages of 6- to 17-years-old and good psychometric properties including internal consistency (Lebowitz, Panza, et al., 2016; Lebowitz et al., 2015; Lebowitz, Scharfstein, & Jones, 2014). Internal consistency for the 9 accommodation items in the current sample was good ($\alpha = .88$).

Behavioral Measure: YIKES.—YIKES pairs an accurate motion-sensing input device (the Kinect system™ from Microsoft™) with experimentation software, making it feasible to accurately track human movement and to subject it to quantitative analysis. Numerous studies in various fields have utilized the highly accurate Kinect sensor (Chang, Han, & Tsai, 2013; Clark, Bower, Mentiplay, Paterson, & Pua, 2013; Luna-Oliva et al., 2013; Scherer, Wagner, Moitzi, & Muller-Putz, 2012; Stone & Skubic, 2013). The YIKES software component allows researchers to flexibly design experiments in which participants see themselves on a screen and engage in tasks that involve actually walking around, while interacting with various on-screen elements (see Figure 1 for illustration). Participant motion is captured and recorded with high spatial and temporal resolution.

The YIKES task was conducted in a rectangular windowless room, with the participant standing approximately 2 m away from the Kinect sensor and facing a large 55" liquid crystal display (LCD) display. Participants were able to clearly see themselves on-screen, overlaid on the "game" environment (Figure 1). Participants could move 1.5 m to either side of the midline creating a total experimental area 3 m wide. Participants engaged in a ball-catching task using YIKES that required them to move from side to side to correctly position themselves to catch objects (small images of the planet Earth) that dropped from the top of the screen (Figure 1). The locations for the 600 falling "Earths" was determined using a randomly generated uniform distribution and counterbalanced for right and left sides such that every sequence was repeated as a mirror image of itself. Figure 1 illustrates what a participant might see at one point in the experiment. Spider images and non-spider images were presented on alternating sides of the screen such that at any given time a participant would either be moving toward a spider image and away from a neutral image, or vice versa (or standing still). Six consecutive sets of spider/neutral images were displayed over the 6 min of the experiment. Pilot studies using a standardized system of picture rating (Ito, Cacioppo, & Lang, 1998) indicated the neutral images did not evoke significant affect. Participant movement throughout the experiment was recorded as a series of time and horizontal location pairs, with spatial resolution of >1 cm and temporal resolution of 20 data points per s.

Analysis of Behavioral Data.—Avoidance was operationalized as participants maintaining greater distance from spider images (i.e., turning back away sooner when approaching them) compared to neutral images. To measure this behavioral avoidance, we calculated the average position at which participants turned back away when moving toward spider images and the average position at which participants turned back away when moving toward neutral images, and compared the two to achieve the avoidance metric. Thus, for

each participant we were able to ascertain whether and how much, they avoided the spider images.

Identifying the average location at which participants turn back while moving toward an image is achieved by estimating extreme points of the location–time curve. These points were estimated by fitting the position–time points by a set of 3rd B-spline basis functions, plus an intercept, slope, and quadratic term, to yield an accurate representation of the position–time points by a smooth continuous function and identifying the locations where the derivative of the estimated curve is equal to zero (Figure 2). We then focus on the average of the points where the participant is changing direction toward the center, calculated separately for spider and neutral image-sides.

Data Analytic Plan

Data were analyzed using SPSS version 21. Correlations between mother and child ratings of child anxiety on SCARED and MASC2 were examined using bivariate Pearson r correlations, and paired sample t -tests were used to examine differences between mother and child ratings, controlling for the multiple tests. Bivariate correlation was used to examine the relation between behavioral avoidance and mother and child ratings as well as demographic variables including the child's age and gender. Partial correlations were used to examine the association between ratings of anxiety and behavioral avoidance, while controlling for fear of spiders.

To test the hypothesis that family accommodation moderates the association between mother ratings of child anxiety and child behavioral avoidance, we conducted a hierarchical multiple linear regression, with behavioral avoidance as the dependent variable. In the first step we included the mother's total MASC2 score. In the second step we added the interaction term equal to the product of the mother's total MASC2 score and the FASA-CR accommodation score. Variables were centered to decrease collinearity (Aiken & West, 1991). Significant change in explained variance in the child's behavioral avoidance when the interaction term is included in the analysis indicates moderation. Simple slopes can then be calculated for the association between mother ratings and child behavioral avoidance, at different levels of family accommodation.

RESULTS

Overall, children exhibited a significant degree of avoidance of the spider images. Average approach to the spider images was lower than to neutral images, meaning that children turned back away sooner when approaching a spider image, $t(97) = 3.02, p < .01, d = .26$. Males and females did not differ on any of the study variables. Behavioral avoidance was not correlated with child age or gender. Age and gender of the child also did not moderate the association between mother and child ratings of child anxiety, or between anxiety ratings and behavioral avoidance. Table 1 summarizes descriptive statistics on mother and child ratings of anxiety and child ratings of fear of spiders and family accommodation.

Comparing Mother and Child Ratings of Child Anxiety

Mother and child total anxiety severity scores on SCARED were significantly but weakly correlated, and total scores on the MASC2 were not correlated. The strongest correlations between mother and child ratings were for the separation anxiety indices of both scales and for the school phobia index of SCARED. On the SCARED, only the panic disorder subscale was not correlated between mother and child ratings, whereas on the MASC2 only separation anxiety, social anxiety, and harm avoidance were correlated. Overall, mother and child ratings were moderately correlated at best.

In terms of mean differences, mother ratings on the SCARED panic disorder subscale and the MASC2 physical symptoms subscale were lower than child ratings. Mother ratings on the MASC2 obsessive-compulsive subscale were also lower than child ratings, but mother ratings on the MASC2 generalized anxiety and social anxiety subscales were higher than child ratings.

Mother and Child Ratings and Behavioral Avoidance

In line with our hypothesis, child ratings of child anxiety, including total scores on both MASC2 and SCARED and some of their subscales, were positively associated with the child's behavioral avoidance during the YIKES task. The strongest association was between behavioral avoidance and the total MASC2 score. Contrary to our hypothesis, however, no mother ratings of child anxiety were associated with the child's behavioral avoidance, or even approached significance. Table 2 summarizes the bivariate correlations between mother and child ratings of child anxiety and child behavioral avoidance.

Predictably, behavioral avoidance was associated with children's self-rated fear of spiders, $r(96) = .47, p < .001$. We used partial correlations to examine the links between the child anxiety ratings and behavioral avoidance, while controlling for child-rated fear of spiders. The MASC2 total score and generalized anxiety, physical symptoms, and OCD subscales still correlated with behavioral avoidance after controlling for fear of spiders, with the following partial correlations: $r(96)s = .20, .22, .20, \text{ and } .21, ps < .05$, respectively. On the SCARED, the panic disorder subscale still partially correlated with behavioral avoidance after controlling for fear of spiders, $r(95) = .22, p < .05$, and the other SCARED scores were no longer associated with behavioral avoidance.

Family Accommodation

Child rated family accommodation was positively associated with both child and mother ratings of child anxiety. The correlation between child rated family accommodation and the total MASC2 score was, $r(96) = .28, p < .01$, for the child rated MASC2 and, $r(96) = .25, p < .01$, for the mother rated MASC2. The correlation between child rated family accommodation and the total SCARED score was, $r(96) = .37, p < .01$, for the child rated SCARED and, $r(96) = .26, p < .01$, for the mother rated SCARED. Child rated family accommodation was not associated with child behavioral avoidance.

Results of the hierarchical multiple regression predicting behavioral avoidance from mothers' total MASC2 scores changed explained variance when the interaction term

between mother MASC2 score and FASA-CR scores was included in the analysis. The decision to focus on MASC2 score (rather than SCARED) was predicated on the stronger associations between avoidance and MASC2 scores in the child ratings. The first step resulted in explained variance of $R^2 = .14$ which was not different from zero. The second step, including the interaction term, increased the explained variance to $R^2 = .22$, a significant change in explained variance, $F(1,95) = 4.15, p < .05$.

We next examined the slope of the association between mother MASC2 scores and child behavioral avoidance at different levels of child-rated family accommodation. When accommodation was low a significant positive association existed between mother total MASC2 score and child behavioral avoidance, $\beta = 1.31, 95\% \text{ CI: } .38 \text{ to } 2.25, p < .05$. At higher levels of child-rated family accommodation, the association between mother MASC2 scores and child avoidance was not significant.

DISCUSSION

This study compared mother and child ratings of child anxiety to each other and to a measure of behavioral avoidance. In line with our first hypothesis, and with earlier research, agreement between mother and child ratings was low overall and ranged from low to moderate at best (Affrunti & Woodruff-Borden, 2015; Choudhury et al., 2003; Comer & Kendall, 2004; DiBartolo et al., 1998). The highest agreement, based on two widely used scales, the SCARED and the MASC2, was for symptoms of separation anxiety. School phobia was also an area of comparatively high agreement, but was only assessed with one of the two scales. One likely explanation for the comparatively high agreement on separation anxiety indices is that the core feature of separation anxiety directly involves parents. Separation anxiety has also been found to be associated with particularly high degrees of child-rated family accommodation (Lebowitz, Leckman, 2016, Lebowitz, Panza, 2016; Lebowitz et al., 2015, 2013), indicating that parents are actively modifying their own behavior due to the child's symptoms.

Results revealed differences between mother and child ratings of the child's anxiety, and in most cases (including the total scores) the child ratings were higher than the mother ratings, in line with earlier evidence suggesting that children report more internalizing symptoms than parents report about children. Inter-informant agreement is also lower for internalizing symptoms of children than for externalizing symptoms, likely due to internalizing symptoms being less observable to parents than externalizing symptoms (Duhig, Renk, Epstein, & Phares, 2000; Stanger & Lewis, 1993). Subscales focusing on physical symptoms of anxiety (i.e., the MASC2 physical symptoms subscale and the SCARED panic disorder subscale) were rated higher by children than by mothers. This pattern of elevated child ratings of physical symptoms is also in line with earlier research, such as the study by Affrunti and Woodruff-Borden (2015) who found higher ratings in children compared with mothers.

The largest difference between mother and child ratings was found for the MASC2 obsessive-compulsive symptoms subscale. This subscale does not have a comparable scale on SCARED and, because it was added to the original MASC in the revision, no earlier published research on parent-child agreement was identified. It is therefore difficult to draw

conclusions with confidence regarding the large discrepancy between mother ratings and child ratings. However, earlier research using structured interviews with children and parents found that parent interviews identified fewer cases of OCD than child interviews, leading researchers to suggest that children may hide symptoms of OCD from parents, and to stress the importance of child interviews for detecting OCD (Rapoport et al., 2000). The preliminary finding from the current data seems to support a similar conclusion for rating scales.

A novel aspect of the current study was to compare mother and child ratings of child anxiety not only to each other, but also to an objective measure of behavioral avoidance. The use of motion tracking technology paired with experimentation software allowed participants to engage in a natural game-like activity that required them to physically walk from side to side while observing themselves on a screen alongside spider and neutral images. Presentation of the stimuli on the sides of the screen meant that at any given time children were either walking toward or away from spider or neutral images. Their motion was accurately captured and analyzed for evidence of preferential avoidance of spider images.

Contrary to our hypothesis, only child ratings of child anxiety correlated with child behavioral avoidance, whereas mother ratings of child anxiety showed no associations with child behavioral avoidance. After controlling for the child's self-rated fear of spiders, total scores on the MASC2, as well as several of its subscales, remained positively correlated with avoidant behavior. On the child-rated SCARED, the total score and several subscales were related to behavioral avoidance, but only the association with the panic disorder subscale of remained significant after controlling for fear of spiders. One interpretation is that the SCARED scores shared more variance with the spider phobia rating than did MASC2 scores.

Several possible explanations exist for the finding that only child ratings, but not mother ratings, correlated with child behavioral avoidance. One possibility is that the use of a specific stimulus set (i.e., spiders) reduced the link to general anxiety measures and that using more generic anxiety stimuli (e.g., angry faces), or a variety of stimuli, may produce different results. This hypothesis is somewhat supported by the fact that the correlations between behavioral avoidance and child anxiety measures were explained in part by child fear of spiders. However, several child-rated anxiety measures remained correlated with behavioral avoidance even when partialling out the fear of spiders, whereas the mother ratings did not correlate with behavioral avoidance even without partialling fear of spiders. Further research with different stimuli, including more generic anxiety triggers would help to test the hypothesis that the specificity of the stimulus set in the current study weakened the link between behavioral avoidance and the general anxiety measure. Research has already indicated that YIKES can be effective in measuring preference for different facial expressions (Weng et al., 2014), and measuring avoidance of hostile or angry faces, compared to neutral faces, is one possibility for testing the current study hypotheses with a more generic anxiety trigger.

Another explanation for the finding that only child ratings correlated with child behavioral avoidance is that child anxiety ratings are more strongly correlated with behavioral

avoidance than parent ratings of child anxiety. The interpretation of a stronger link between child ratings and child behavioral avoidance, even if found to be true across a broad range of stimuli, remains to be determined and would not necessarily imply that child ratings are more accurate overall. Behavioral avoidance is one important aspect and consequence of elevated anxiety, but scales such as MASC2 and SCARED query multiple aspects of anxiety, including cognitive, physiological, and emotional symptoms, in addition to avoidant behavior. It is possible for children's ratings to be better predictors of behavioral avoidance, without being better indicators of overall anxiety symptomatology. However, this possibility seems to be at odds with the research indicating that parents are generally better at reporting observable behavior rather than internal symptoms.

Our results showed that, although the link between mother ratings of child anxiety and child behavioral avoidance was not significant in the overall sample, this link was moderated by the degree of child-rated family accommodation. When accommodation was low, mother ratings correlated with child behavioral avoidance. When accommodation was high, the relation was not significant, suggesting that parental involvement in childhood anxiety symptoms influences parent ratings and potentially also contributes to parent-child informant discrepancy.

In contrast to the traditional view of informant discrepancy as measurement error (i.e., inevitable, but uninformative "noise"), theoretical work has highlighted contextual and motivational factors that can contribute to informant discrepancy in meaningful and predictable ways (De Los Reyes, 2011; De Los Reyes & Kazdin, 2005) leading to empirical explorations of theory-driven hypotheses relating to informant discrepancies (De Los Reyes et al., 2012, 2009). The current study builds on this research and indicates that parent ratings are best considered in light of family accommodation, a phenomenon that directly bears on parents and that has been shown to be an important feature of child anxiety and related disorders (Lebowitz, Panza, 2016; Lebowitz, Panza, Su, & Bloch, 2012; Lebowitz et al., 2015; Lebowitz et al., 2014, 2013; Storch et al., 2007; Thompson-Hollands, Kerns, Pincus, & Comer, 2014).

One explanation for the pattern of moderation in the current data is that, when parents are highly accommodating, their perception and awareness of the child's anxiety are also heightened. The actor-observer effect that has been posited as one factor contributing to informant discrepancies (De Los Reyes & Kazdin, 2005) may play a role, as parents are likely to attribute the child's need for accommodation to internal, dispositional rather than situational causes, with a correspondingly greater impact on their anxiety ratings. Another possibility is that parents who are highly accommodating and experiencing more distress as a result of the accommodation, are more incentivized to access treatment for their child and that their ratings are influenced by the motivation to access treatment.

The current results need to be interpreted in light of certain limitations. Children's fear of spiders was rated only by the children, and mothers completed only the SCARED and MASC2. It is impossible to ascertain whether mothers' ratings of children's fear of spiders would correlate with child behavioral avoidance, and whether a similar pattern would emerge to the one for the broader anxiety measures. Already noted is the limitation of

focusing on a highly specific set of stimuli (i.e., spiders), and the need for research using broader or more generic anxiety provoking stimuli. Another limitation is the use of mothers alone as the parent-informant. In relying on maternal ratings we followed most of the preceding research that has focused on mothers of anxious children. But inclusion of additional informants, such as fathers or teachers, would have provided a more comprehensive picture into which to integrate the behavioral avoidance measure (Affrunti & Woodruff-Borden, 2015; Muris, Steerneman, Merckelbach, & Meesters, 1996). Using child ratings to measure family accommodation was important because mothers' ratings of child anxiety and of family accommodation are themselves highly correlated with much shared variance, but including mother ratings of family accommodation would have been a useful addition to the child ratings. Our sample was also relatively homogenous in terms of ethnicity, and results may not generalize to more diverse populations.

Despite these limitations the current data provide new information and highlight the potential benefits of including behavioral measures in assessment of child anxiety disorders and of considering factors such as family accommodation that can help to understand inter-informant discrepancies.

Acknowledgments:

Dr. Lebowitz is grateful to Ms. Alyssa Martino, Ms. Krista Basile, and Ms. Danielle Ruotolo for their assistance in the preparation of this manuscript.

Conflict of Interest Disclosures: The author signed a form for disclosure of potential conflicts of interest. Dr. Lebowitz reports grants from NARSAD, grants from NIMH, and grants from NCATS during the conduct of the study; he also reports personal fees from John Wiley and Sons, and personal fees from Cross County Education, outside the submitted work.

Funding: Grant support from NIMH (K23MH103555), NCATS (KL2TR000140), and the Brain and Behavior Research Foundation (NARSAD 21470).

Role of the Funders/Sponsors: None of the funders or sponsors of this research had any role in the design and conduct of the study; collection, management, analysis, and interpretation of data; preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication.

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IMPLICATIONS FOR PRACTICE, APPLICATION, THEORY, AND POLICY

Integrating ratings from multiple informants can enhance assessment of child anxiety disorders and requires consideration of contextual and motivational factors that contribute to informant discrepancy. The current findings suggest that ratings provided by the child are better predictors of behavioral avoidance, an important aspect of childhood anxiety, than ratings provided by mothers. The current findings demonstrate that family accommodation is one factor impacting parent ratings of child anxiety and contributing to informant discrepancy. Including assessment of family accommodation in diagnostic and assessment procedures for childhood anxiety disorders can provide valuable information and is recommended.

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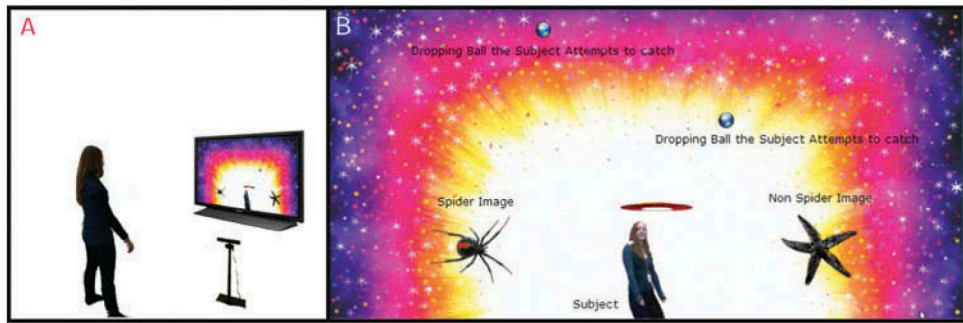


FIGURE 1. Illustrates a participant engaging in the A:Yale Interactive Kinect Environment Software (YIKES) behavioral avoidance task; and B: what the participant sees on the screen.

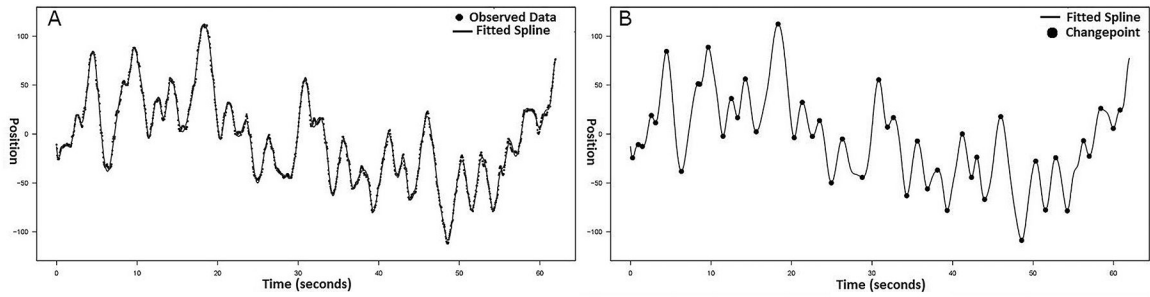


FIGURE 2.

Sample of a single participant's data from 1 min of observed behavior. Participant Time X Location data is A: first smoothed to a spline curve; and B: then extrema are identified as points at which the participant changed direction.

TABLE 1

Mother and Child Ratings of Child Anxiety and child ratings of fear of spiders and of family accommodation

	Child Rating		Mother Rating		Pearson <i>r</i>	Paired <i>t</i>	Cohen's <i>d</i>
	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)			
Child anxiety rated on SCARED							
Total score	31.9	(14.0)	29.7	(12.7)	0.23 [*]	1.3	.13
Separation anxiety disorder	6.4	(3.6)	5.5	(4.1)	.42 ^{**}	1.82 [*]	.21
Generalized anxiety disorder	8.5	(4.5)	9.6	(4.1)	.24 [*]	-1.97	-.20
Social phobia	6.8	(4.0)	7.3	(4.5)	.36 ^{**}	-.99	-.10
Panic disorder	7.5	(5.1)	4.4	(4.7)	.18	4.89 ^{**}	.49
School phobia	2.6	(2.0)	2.9	(2.4)	.54 ^{**}	-1.6	-.14
Child anxiety rated on MASC2							
Total score	71.3	(24.7)	65.1	(19.3)	.11	2.39 [*]	.21
Separation anxiety	12.3	(5.6)	12.3	(5.8)	.44 ^{**}	.41	.00
Generalized anxiety	14.9	(5.5)	16.5	(4.6)	.10	-.231 [*]	-.23
Social anxiety	13.9	(6.8)	16.5	(5.9)	.29 ^{**}	-3.18 ^{**}	-.34
Physical symptoms	14.3	(7.5)	11.4	(6.4)	.18	3.37 ^{**}	.33
Obsessive-compulsive symptoms	12.0	(6.5)	5.5	(5.5)	.09	8.86 ^{**}	.80
Harm avoidance	16.2	(4.1)	16.4	(3.9)	.21 [*]	-.43	-.04
Fear of spiders	10.1	(6.4)					
Family accommodation	17.2	8.5					

Note. Pearson *r*-values are correlation coefficients between child and mother ratings. Paired *t*-values are comparisons between child and mother ratings.

SCARED = Screen for Child Anxiety Related Emotional Disorders; MASC2 = Multidimensional Anxiety Scale for Children.

^{*} *p* < .05;

^{**} *p* < .01.

TABLE 2

Correlations between Child Behavioral avoidance and mother and child ratings of child anxiety on two measures

	Child Report		Parent Report	
	MASC	SCARED	MASC2	SCARED
Total	.30**	.21*	-.07	-.04
Separation	.29**	.12	-.05	-.14
Generalized	.30**	.16	-.02	.10
Social	.23*	.23*	.01	.08
Panic/Physical	.29*	.18*	-.10	-.03
School Phobia		.05		-.10
OCD	.23*		-.07	
Harm Avoidance	.14		.04	

Note. SCARED = Screen for Child Anxiety Related Emotional Disorders; MASC2 = Multi-Dimensional Anxiety Scale for Children.

* $p < .05$.

** $p < .01$.