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Mapping the frequency and severity of anxiety behaviors in preschool-aged children

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ABSTRACT

Although anxiety can be early-emerging, impairing, and persistent, behaviors relevant to anxiety mirror typical development in early childhood. To better understand the spectrum of typical to problematic behavior, this study characterizes the range of frequency and severity of separation and social anxiety behaviors and associated impairment in preschool-aged children using a novel daily diary method. Primary caregivers of 291 3-5-year-old children reported the frequency of children's daily separation and social anxiety behaviors and related impairment for 14 days. Frequencies of each separation and social anxiety behavior were computed and item response theory analyses revealed the specific frequencies at which the behavior was considered psychometrically severe/rare. Patterns varied across items; for example, worry that caregiver would not return and shyness with familiar adults had to occur at least 3–4 times over 14 days for the behavior to be considered severe/rare, whereas shyness around peers and new people were not severe at any frequency. In addition, behaviors were associated with impairment. To our knowledge, these data are the first to delineate empirical, dimensional information about the frequency and severity of anxiety behaviors and associated impairment in early childhood. Such data could be useful for clinical practice to enhance empirically-driven assessment of anxiety.

1. Introduction

Anxiety disorders are among the most prevalent, impairing, and persistent conditions that typically onset during childhood (Beesdo, Knappe, & Pine, 2009; Bufferd, Dougherty, Carlson, & Klein, 2011; Costello, Egger, & Angold, 2005; Franz et al., 2013; Whalen, Sylvester, & Luby, 2017; Wichstrom et al., 2012) and predict a variety of psychiatric disorders in childhood (Bufferd, Dougherty, Carlson, Rose, & Klein, 2012; Bufferd et al., 2018), adolescence (Bittner et al., 2007; Costello, Mustillo, Erkanli, Keeler, & Angold, 2003), and adulthood (Pine, Cohen, Gurley, Brook, & Ma, 1998; Shear, Jin, Ruscio, Walters, & Kessler, 2006). In addition, many adults report that their anxiety disorders began in childhood (Kessler et al., 2005; Kim-Cohen et al., 2003). However, compared to older children and adolescents, less is known about anxiety during the preschool period (Egger & Angold, 2006). This limited focus is problematic given that earlier onset of internalizing difficulties may contribute to long-term impairment and chronicity (Weissman et al., 1999). In addition, early childhood offers a developmental window for prevention or early intervention before school entry (Anticich, Barrett, Silverman, Lacherez, & Gillies, 2013; Kennedy, Rapee, & Edwards, 2009; Lau & Rapee, 2011). Therefore, it is critical to clarify the nature of anxiety during the preschool period to minimize the impact of these problems.

The limited evidence suggests that up to 20% of preschoolers meet criteria for anxiety diagnoses (Bufferd et al., 2011; Egger & Angold, 2006; Franz et al., 2013; Wichstrom et al., 2012). Separation anxiety and social anxiety are particularly common anxiety disorders identified in preschool-aged children (Bufferd et al., 2011; Franz et al., 2013). However, given that a certain degree of separation anxiety and social fear reflect typical developmental behaviors of early childhood (Gullone, 2000; Muris, Merckelbach, Gadget, & Moulaert, 2000; Muris, 2010; Ollendick, King, & Frary, 1989), it is necessary to better understand the particular level of such behaviors that may be clinically significant by characterizing the spectrum of typical to problematic behavior (Bufferd, Dyson, Hernandez, & Wakschlag, 2016). The goal of the present study is to examine the daily frequency of behaviors relevant to common anxiety difficulties, separation anxiety and social anxiety, in preschool-aged children using a parent-report daily diary assessment.

One challenge in identifying behaviors in young children relevant to

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risk for psychopathology is that the behaviors associated with psychopathology (e.g., noncompliance, inattention, irritability) are developmentally normative in early childhood. Fear and anxiety are especially common in young children and are often expressed as separation and social anxiety (Gullone, 2000; Muris et al., 2000; Muris, 2010; Ollendick et al., 1989). As behaviors relevant to anxiety can be both evolutionarily adaptive and developmentally appropriate, determination of potentially problematic levels is especially challenging.

Anxiety and fear are evolutionarily advantageous as these emotions permit rapid detection of threat to enhance survival (Öhman & Mineka, 2001; Sloman, Farvolden, Gilbert, & Price, 2006). Separation and social anxiety in particular confer adaptive advantages given protection associated with resistance to separation from a caregiver and/or hesitation around new people, respectively. Separation anxiety can also activate attachment needs, signal potential abandonment, and create arousal that enhances motivation to seek reunion/safety; social anxiety can signal potential rejection and create arousal that enhances motivation to avoid unsafe individuals (Öhman, 2009). Further, anxiety is associated with withdrawal and avoidance, which can also be adaptive as a way to preserve resources and minimize exposure to threat in the short-term (Sloman et al., 2006). Findings that identify common patterns of development of fear and anxiety across cultures and primates support the adaptive value of a threat orientation (Gullone, 2000; Marks, 1987).

Moreover, for most typically developing children, normative emotional development in early childhood involves increasing social engagement (Bufferd et al., 2016; Rubin, Coplan, Chen, Buskirk, & Wojslawowicz, 2005) and typically some degree of separation/individuation from parents/caregivers. Socially, most young children are shifting from solitary and parallel play to more interactive play with peers; these shifts require the development of a variety of skills, such as social communication, empathy, problem-solving, and reciprocity (Martin, Fabes, Hanish, & Hollenstein, 2005; Rubin et al., 2005). Expectations for social engagement with others and separation from parents typically increase during the preschool period as children enter more formal schooling. Therefore, the preschool period is an ideal time in development to investigate these emotional processes as identification of disruptions may suggest potential prevention of worsening difficulties (Bufferd et al., 2016).

Given that behaviors relevant to anxiety are both evolutionarily adaptive and developmentally appropriate yet also contribute to clinically significant distress and impairment in functioning, it is necessary to better understand anxiety behaviors in early childhood that may contribute to risk for psychopathology. Efforts have been made to theoretically map the variation in young children's anxiety from normative to problematic (Bufferd et al., 2016), but to date, empirical advances have only included externalizing behavior (Wakschlag et al., 2014; Wakschlag, Choi et al., 2012), irritability (Wakschlag et al., 2015), and depressive symptoms (Bufferd, Dougherty, & Olino, 2017). The empirical range of the frequency of separation and social anxiety behaviors in preschool-aged children that identify the levels of behavior that may suggest difficulty is unknown. As anxiety can be early-emerging, distressing/impairing, and contribute to long-term symptoms and associated difficulties, it is worthwhile to improve identification of problematic levels of anxiety in early childhood.

In addition, although valuable findings have resulted from the development and use of reliable and valid parent-report diagnostic interviews (Egger, Ascher, & Angold, 1999; Ezpeleta, de la Osa, Granero, Domenech, & Reich, 2011; Scheeringa & Haslett, 2010) and symptom scale (Andrijic, Bayer, & Bretherton, 2013; Achenbach & Rescorla, 2000; Edwards, Rapee, Kennedy, & Spence, 2010; Gadow & Sprafkin, 2000) measures to assess anxiety in preschool-aged children, some features of these measures limit the mapping of all behaviors relevant to anxiety. First, as per the Diagnostic and Statistical Manual of Mental Disorders (DSM; American Psychiatric Association, 2013), diagnostic assessment requires identifying whether anxious behaviors are "persistent" and "excessive"; without empirical guidelines, determining whether a child exhibits behavior in a sufficiently persistent and/or excessive manner is a challenging, subjective, and potentially fallible endeavor. Second, children's behavior is typically only documented when meeting these thresholds; other behaviors that may be impairing and relevant to risk for psychopathology are not documented at subthreshold levels. Third, checklist measures require parents to determine the frequency of the behavior based on their own judgement (e.g., whether the behavior happens "sometimes" or "often") and to compare their children's behavior to similarly-aged children; as parents have varying degrees of exposure to children and potentially limited knowledge of developmental norms, their judgements may be biased. Finally, both diagnostic and checklist assessment methods rely on potentially questionable retrospective report over a period of one month or more. Therefore, a method that detects behaviors along the full spectrum of relevant behavior is needed (Bufferd et al., 2016; Egger & Angold, 2006; Wakschlag, Henry et al., 2012) in a manner that reduces parents' subjective judgement and the period of retrospective recall.

One method that may address these limitations is the use of a parent-report daily diary. Several researchers have examined parental daily diary reports of anxiety in anxious and healthy comparison school-age children and adolescents, typically to characterize the phenomenology of anxiety in older youth or assess the impact of an intervention (Allen, Blatter-Meunier, Ursprung, & Schneider, 2010; Beidel, Neal, & Lederer, 1991; Beidel, Turner, & Morris, 1999; Beidel, Turner, & Morris, 2000; Eisen, Raleigh, & Neuhoff, 2008). These studies demonstrated the feasibility of daily assessment of children's anxiety. However, to our knowledge, this method has not been used to assess parents' reports of behaviors relevant to anxiety in a community sample of preschool-aged children, nor has this method been used to characterize normative to non-normative anxiety behaviors in young children.

The goal of the present study is to employ a 14-day parent-report daily diary method to assess the frequency and severity of the full range of daily behaviors relevant to separation and social anxiety in young children. Data collected using this novel approach will capture the daily variations in behaviors relevant to anxiety, minimize biases in parents' retrospective reporting, and enable documentation of the full range of normative behaviors that are relevant to anxiety in young children, rather than limiting data collection to behaviors that only meet clinical symptom thresholds in diagnostic interviews. We hypothesized that theoretically high base rate anxiety behaviors (e.g., shyness around new adults) will occur at greater frequencies to be considered psychometrically severe, whereas theoretically non-normative anxiety behavior (e.g., worry about separation due to natural disaster) will occur less frequently to be considered severe. These hypotheses reflect speculative predictions: although there have been some efforts to examine normative and clinical levels of fears in young children (e.g., Bufferd et al., 2016; Gullone, 2000; Muris et al., 2000), the specific anxiety behaviors that will be more or less severe are not known. In addition, we also hypothesized that severity/frequency of behaviors would be associated with children's and parents' distress, and children's impairment in psychosocial functioning and relationships. Empirical, developmentally sensitive information about the frequency and severity of behaviors relevant to anxiety in the preschool period is essential to delineate the level at which normative behaviors may reflect clinically significant risk.

2. Method

2.1. Participants

As part of a larger study to assess behaviors relevant to mood and anxiety in young children (Bufferd et al., 2017), 300 parents of 3-5-year-old children without medical or developmental disabilities enrolled in the study; nine parents only completed baseline measures and

Table 1
Demographic Characteristics of the Study Sample.

Demographic Variable	
Child mean age: years (SD; range)	4.3 (0.8; 3-5)
Age 3 % (*n*)	43.6 (127)
Age 4 % (*n*)	34.4 (100)
Age 5 % (*n*)	22.0 (64)
Mother mean age: years (SD; range)	33.6 (5.6; 21-49)
Father mean age: years (SD; range)	35.9 (6.7; 21-60)
Child sex: female % (*n*)	52.9 (154)
Child race/ethnicity: % (*n*)	
Caucasian/White	56.9 (165)
Hispanic	16.6 (48)
African-American/Black	8.6 (25)
Asian	6.6 (19)
Multi-ethnic/Other	11.4 (33)
Biological parents' marital status: % (*n*)	
Married	84.9 (247)
Family income: % (*n*)[a]	
< $40,000	21.5 (61)
$40,000 - $70,000	19.7 (56)
> $70,000	58.8 (167)
Parents' education: % graduated college (*n*)[b]	
Mothers	67.8 (196)
Fathers	59.8 (171)
Parents' employment: % working outside the home (*n*)	
Mothers	48.5 (141)
Mean number of hours per week (SD; range)	31.6 (13.3; 1-50)
Fathers	92.1 (258)
Mean number of hours per week (SD; range)[c]	43.6 (10.4; 8-81)
Childcare/school settings: % (*n*)[d]	
Preschool	81.1 (236)
Mean number of hours per week (SD; range)	12.8 (13.1; 1-50)
Daycare	56.4 (164)
Mean number of hours per week (SD; range)	11.5 (17.2; 1-54)
Other childcare setting (e.g., babysitter)	44.3 (129)
Mean number of hours per week (SD; range)	4.5 (11.0; 1-72)

Note: $N = 291$.
[a] 2.4% of the sample ($n = 7$) did not indicate their family income level.
[b] Level of education was not reported for .7% ($n = 2$) of mothers and 1.7% ($n = 5$) of fathers.
[c] 3.8% of the sample ($n = 11$) did not indicate whether fathers worked outside the home.
[d] Categories overlap as some children are in multiple childcare settings.

never started the diary measures, so the final sample included 291 parents (see Table 1). Participants were recruited from a twenty-mile radius around two universities: California State University San Marcos and University of Maryland. Flyers advertising the study were sent to local pediatricians, preschools/daycares, and community institutions. Participants were eligible if they had nightly Internet access, could read English, and were the primary caregiver with at least 50% custody of the child. Most respondents (93.8%) were mothers. The Institutional Review Boards at both universities approved the study, informed consent was obtained from participating parents, and parents were financially compensated.

2.2. Measures

2.2.1. Separation and social anxiety behaviors

To reduce retrospective recall, an electronic daily diary measure was created to assess separation and social anxiety behaviors. Items were derived from two validated, reliable measures, the Early Childhood Inventory (ECI) (Gadow & Sprafkin, 1997, 2000) and the Preschool Age Psychiatric Assessment (PAPA) (Egger et al., 1999) based on the symptoms of separation anxiety and social anxiety disorders in the DSM (American Psychiatric Association, 2013). Parents were asked to report the daily frequency of each of eight separation anxiety behaviors and four social anxiety behaviors across the 14-day diary period; the reported frequencies were summed across the diary period for each item. Once examining the distribution of the imputed data, frequency categories were created for data analyses (Table 2; categories vary among items; see table for more information).

2.2.2. Impairment and distress

Three sets of questions derived from the ECI and the PAPA assessed impairment. First, when the parents reported the frequencies for each of the eight separation and four social anxiety behaviors each day, they also reported the extent to which the behavior overall was problematic that day (e.g., caused child and/or parent distress; child's routine disrupted; relationships with others affected) on a 1–5 scale (1: not at all to 5: a great deal). These ratings were averaged across each set of separation ($M = 1.07$, $SD = 0.11$, *Range* 1–5) and social ($M = 1.05$, $SD = 0.11$, *Range* 1–5) anxiety behaviors across all 14 days. Second,

Table 2
Frequencies of Each Separation and Social Anxiety Behavior Item Across the 14-day Diary Period.

Separation Anxiety		Category 1	Category 2	Category 3	Category 4
Distress when anticipating separation	Frequency of Behavior	0	1	2-4	5+
	Percentile Range	< 50%	50%-80%	81%-95%	> 95%
Worry about caregiver's safety/return home	Frequency of Behavior	0	1	2+	
	Percentile Range	< 90%	90%-95%	> 95%	
Worry about disaster separating child from caregiver	Frequency of Behavior	0	1+		
	Percentile Range	< 95%	> 95%		
Avoided going places without caregiver	Frequency of Behavior	0	1	2-4	5+
	Percentile Range	< 65%	65%-80%	81%-95%	> 95%
Worry about being left home without caregiver	Frequency of Behavior	0	1	2+	
	Percentile Range	< 81%	81%-95%	> 95%	
Fearful of going to sleep without caregiver	Frequency of Behavior	0	1-4	5-10	11+
	Percentile Range	< 50%	50%-80%	81-95%	> 95%
Separation nightmares	Frequency of Behavior	0	1	2+	
	Percentile Range	< 85%	85%-95%	> 95%	
Reported illness when separation anticipated	Frequency of Behavior	0	1	2+	
	Percentile Range	< 86%	86%-95%	> 95%	
Social Anxiety					
Shy around new people	Frequency of Behavior	0	1-3	4-9	10+
	Percentile Range	< 50%	50%-80%	81%-95%	> 95%
Shy with peers	Frequency of Behavior	0	1-2	3-5	6+
	Percentile Range	< 55%	56-80%	81-95%	> 95%
Shy with family members/familiar adults	Frequency of Behavior	0	1	2-3	4+
	Percentile Range	< 65%	65%-85%	86-95%	> 95%
Distress/withdrawal in social situations	Frequency of Behavior	0	1	2-3	4+
	Percentile Range	< 70%	70%-90%	91%-95%	> 95%

parents provided an overall rating of impairment due to separation (M = 1.12, SD = 0.21, *Range* 1–5) and social (M = 1.08, SD = 0.18, *Range* 1–5) anxiety behaviors that day on the same scale; these ratings were averaged across all 14 days.

Finally, parents provided subjective reports of stress each day. However, the diary also included questions about other behaviors; therefore, these responses were not necessarily specific to anxiety behaviors and reflected general daily feelings of distress. Parents completed three questions each day, each on a 1–5 scale (1: not at all stressful to 5: extremely stressful), and scores were averaged across the 14-day diary period: parenting was difficult/stressful (M = 1.54, SD = 0.40, *Range* 1–5), the extent to which the parent-child relationship was stressful (M = 1.64, SD = 0.46, *Range* 1–5) and level of stress for the child (M = 1.50, SD = 0.40, *Range* 1–5).

2.3. Procedure

Research staff trained parents to complete the electronic daily diary. Participants were instructed to complete each diary after their child's bedtime and report about their child's behavior/impairment that day. All participants started their first diary on a Monday evening and were instructed to complete a diary entry each evening for 14 consecutive nights. Links were sent to participants at 6:00 pm each evening. Study staff checked for completed diary entries each morning; if the diary had not been completed, staff called participants to request completion of the diary by noon that day (based on their child's behaviors from the previous day). If the parent could not complete the diary by noon, that diary entry was considered missed.

In total, 291 (100%) participants completed at least 7 of the 14 diary entries; 271 (93.1%) completed at least 10 days, and 200 (68.7%) completed all 14 days. Rates of completion were consistent with or higher than other daily diary studies with children (Allen et al., 2010; Beidel et al., 1999; Beidel et al., 2000).

2.4. Data analysis

We imputed the total number of behaviors displayed using the frequency of the specific behavior on all available days as not all participants completed the full 14-day protocol. Markov Chain Monte Carlo estimation was used to impute ten complete datasets and estimates were pooled across the multiple imputations. To prepare the data for analysis, we recoded the frequency distribution for each item across the 14-day diary period into ordinal variables with four categories reflecting whether children displayed behaviors below the 50th percentile; between the 50th and 80th percentile; between the 81st and 95th percentile; and above the 95th percentile for specific behaviors over the 14-day period (Table 2). We sought for uniformity in these categories across items of the same anxiety domain; however, as some items had relatively restricted ranges, categories vary among items. These ordinal categories were used for our analyses.

Dimensionality for the separation anxiety dimension and the social anxiety dimension was tested using confirmatory factor analysis (CFA) using the robust weighted least squares estimator in Mplus 7.4. Model fit was evaluated using the chi-square test, the comparative fit index (CFI), and the root mean square error of approximation (RMSEA); CFI values > 0.90 and RMSEA values < 0.08 suggest good fit (Lord, 1980; Reise & Waller, 1990). Reported model fit information is the average across imputations. Next, Item Response Theory (IRT) (Reise, Ainsworth, & Haviland, 2005) analyses were conducted to examine item characteristics using a graded response model [GRM; (Samejima, 1970)] in Mplus using robust maximum likelihood estimation. Discrimination values reflect the extent to which items relate to the latent construct; higher discrimination values are associated with greater and more precise information. Difficulty parameters reflect the estimated severity level of the latent trait at which there is a transition in reporting the next higher category (e.g., reporting the behavior occurred five times across 14 days instead of zero to four times); the average of these parameters is also reported for each item as well as total test information assessed by the separation and social anxiety items. Finally, separation anxiety and social anxiety factor scores estimated from IRT calibration were extracted from the model and correlations between factor scores and indicators of demographic characteristics and impairment were computed.

3. Results

Table 2 shows the frequencies of each separation and social anxiety behavior across the 14-day period within each category. The percentile and frequency categories correspond such that children within each percentile group were reported to demonstrate the behavior within the range of frequency presented. For example, youth up to the 50th percentile demonstrated distress when anticipating separation from a caregiver zero times; youth between the 50th and 80th percentiles demonstrated this behavior one time; youth between the 81st percentile and 95th percentile demonstrated the behavior two to four times; and youth at greater than the 95th percentile demonstrated the behavior five or more times in the two-week period. As another example, youth up to the 50th percentile demonstrated shyness around new people zero times; youth between the 50th and 80th percentiles demonstrated this behavior one to three times; youth between the 81st percentile and 95th percentile demonstrated the behavior four to nine times; and youth at greater than the 95th percentile demonstrated the behavior ten or more times in the two-week period.

We conducted CFAs to test dimensionality of the separation and social anxiety behaviors and fit of each model. Both models yielded good fit; separation anxiety: $\chi^2(20) = 43.25$, CFI = 0.949, RMSEA = 0.063; social anxiety: $\chi^2(2) = 1.15$, CFI = 1.00, RMSEA = 0.00 (range of values identified across imputations available upon request). Two models were run to permit interpretation of item functioning parameters.

Next, we used GRMs to evaluate item functioning. Table 3 displays item discrimination values, difficulty parameters, and average difficulty parameters for each item. Seven of the eight separation anxiety and all four of the social anxiety discrimination values exceeded 1, indicating that they provided acceptable amounts of information about the latent trait. Difficulty parameters indicated items assessed a range of severity. In addition, seven separation anxiety and two social anxiety items had average difficulty parameters greater than 1.65, indicating that these items assessed some information at high levels of severity (> 95th percentile). Fig. 1 displays the test information curves, which reveals the extent to which items provided information across the underlying severity of the traits. These data show that the items provide reliable information, corresponding to an alpha of .80 from approximately 1 standard deviation (SD) to 2.5 SDs above the mean for separation anxiety and approximately 0.5 SDs below the mean to about 2 SDs above the mean for social anxiety. These data demonstrate that the items assess clinical severity well.

Difficulty parameters inform which response options reflect psychometric severity at or greater than the 95th percentile (Table 3) on levels of separation and social anxiety behaviors. For example, with regard to separation anxiety, the child trying to avoid going to daycare, school, or elsewhere without the caregiver in order to stay with the caregiver had to occur four or more times over 14 days to be considered severe/rare, and the child feeling afraid to go to sleep unless they were near the caregiver had to occur ten or more times over 14 days to be considered severe/rare. Other behaviors occurred less frequently to be considered severe. For example, the child feeling upset when they expected to be separated from the caregiver had to occur 2–4 or more times over 14 days and the child worrying that the caregiver would be hurt or leave home and not return had to occur two or more times over 14 days to be considered severe/rare. With regard to social anxiety, shyness with family members and/or familiar adults and distress and/

Table 3
Item Parameters for Each Separation and Social Anxiety Behavior.

	Discrimination	Difficulty			Average Difficulty
	a	*b1* Cat. 2	*b2* Cat. 3	*b3* Cat. 4	
Separation Anxiety					
Distress when anticipating separation	0.76	0.87	**2.15**	**4.34**	2.46
Worry about caregiver's safety/return home	2.84	1.34	**1.72**		1.53
Worry about disaster separating child from caregiver	2.86	1.64			1.64
Avoided going places without caregiver	1.47	0.42	1.10	**2.44**	1.32
Worry about being left home without caregiver	1.61	1.37	**2.87**		2.12
Fearful of going to sleep without caregiver	1.70	0.17	0.93	**1.92**	1.01
Separation nightmares	1.59	1.55	**2.44**		1.99
Reported illness when separation anticipated	1.32	**1.94**	**3.12**		2.53
Social Anxiety					
Shy around new people	3.68	−0.05	0.66	1.62	0.75
Shy with peers	4.94	0.46	0.79	1.41	0.89
Shy with family members/familiar adults	1.68	0.72	**1.82**	**2.09**	1.54
Distress/withdrawal in social situations	1.26	0.97	**2.10**	**2.63**	1.90

Note: Cat. = Category. Item thresholds (difficulty parameters) indicating severity greater than the 95th percentile (i.e., t (291) > 1.65) are displayed in **bold**. Difficulty parameters reflect the level of severity required to endorse a specific item at a given response level/category. See Table 2 for frequency categories. Difficulty parameter b1 corresponds to Category 2, b2 to Category 3, and b3 to Category 4. For example, distress when anticipating separation had to occur at least 2–4 times over 14 days for the behavior to be considered severe/rare, whereas shy around new people was not severe/rare at any frequency.

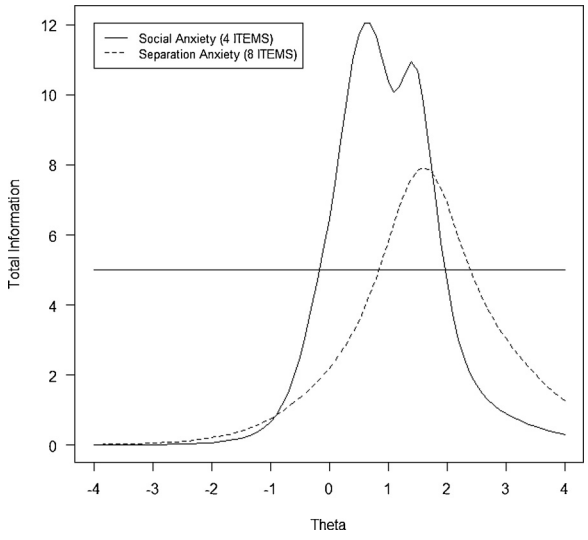

Fig. 1. Test Information Curves for Latent Separation and Social Anxiety Dimensions.
Total Information
Information = 5 ˜ alpha = .80

or withdrawal in social situations each had to occur 2–3 times over 14 days to be considered severe/rare, whereas shyness around new people and with peers was never identified as severe/rare at any frequency.

Fig. 2 displays each item's location on the severity continuum of separation (Fig. 2a) and social anxiety (Fig. 2b) behaviors based on average difficulty parameters. The severity continuum ranks each behavior according to its average difficulty parameter such that items at the top of the continuum suggest more problematic behavior than items at the bottom of the continuum. The four separation anxiety items (reported illness when separation anticipated; distress when anticipating separation; worry about being left home without caregiver; separation nightmares) and the one social anxiety item (distress/withdrawal in social situations) that fell above the 95th percentile reflect the more problematic markers of separation and social anxiety.

After extracting the scores for the social and separation factors, we examined associations with demographic and clinical covariates. There were no differences in social and separation anxiety factor scores based on child sex, parental education level and marital status, and the total number of hours the caregiver reported spending away from the child each day. There were significant differences in scores based on child age, child race/ethnicity, and parental income. Child age was significantly negatively associated with social anxiety factor scores (r = -0.19, p = 0.001) such that parents of younger children reported more social anxiety behaviors than parents of older children; no association was found between child age and separation anxiety behaviors (r = -0.09, p = 0.14). Child race/ethnicity was not associated with social anxiety behaviors (F(4,286) = 1.38, p = 0.24), but race/ethnicity was associated with separation anxiety behaviors (F(4,286) = 4.26, p = 0.002)[1] : post-hoc Scheffé tests revealed that parents of children of Hispanic descent reported higher levels of separation anxiety behaviors (M = 0.31, SD = 0.80) compared to White children (M = -0.14, SD = 0.77), p = 0.005; there were no significant differences when comparing other racial/ethnic groups. Lastly, parental income was not associated with social anxiety behaviors (t(283) = 0.96, p = 0.34), but income was associated with separation anxiety behaviors (t(283) = 2.55, p = 0.01): parents of children in families with annual incomes less than $70,000 reported higher levels of separation anxiety behaviors (M = 0.15, SD = 0.88) compared to families with annual incomes greater than $70,000 ($M$ = −0.09, SD = 0.73).

Finally, we examined associations between average impairment across the two week period and the separation anxiety and social anxiety latent factor scores extracted from the GRM models. Significant associations were found between each measure of impairment (higher scores reflect greater levels of impairment) and the separation and social anxiety scores (all $ps < 0.01$ with one exception noted below): average rating of the extent to which each behavior was problematic each day (separation: r = 0.72; social: r = 0.61), average overall rating of impairment due to behaviors each day (separation: r = 0.61; social: r = 0.55), average rating of the extent to which parenting was difficult/stressful each day (separation: r = 0.27; social: r = 0.18), average rating of the extent to which the parent-child relationship was stressful each day (separation: r = 0.20; social: r = 0.03, p = 0.61), and the average level of stress for the child each day (separation: r = 0.37; social: r = 0.32). These associations remained unchanged when controlling for demographics variables. When comparing the magnitude of associations between anxiety and impairment, the associations between separation anxiety behaviors and impairment were significantly greater

[1] The association between separation anxiety and child ethnicity remains significant when controlling for parental income.

a. Severity continuum of separation anxiety behaviors

Average Difficulty Parameter	Separation Anxiety Behaviors
2.53	Reported illness when separation anticipated
2.46	Distress when anticipating separation
2.12	Worry about being left home without caregiver
1.99	Separation nightmares
----------95th percentile----------	
1.64	Worry about disaster separating child from caregiver
1.53	Worry about caregiver's safety/return home
1.32	Avoided going places without caregiver
1.01	Fearful of going to sleep without caregiver

b. Severity continuum of social anxiety behaviors

Average Difficulty Parameter	Social Anxiety Behaviors
1.90	Distress/withdrawal in social situations
----------95th percentile----------	
1.54	Shy with family members/familiar adults
0.89	Shy with peers
0.75	Shy around new people

Fig. 2. a) Severity continuum of separation anxiety behaviors, b) Severity continuum of social anxiety behaviors.

than the associations between social anxiety and impairment in two of the five sets of correlations: the average rating of the extent to which each behavior was problematic each day was significantly greater for separation anxiety ($r = 0.72$) than for social anxiety ($r = 0.61$) behaviors, $z = 2.38$, $p = 0.02$. In addition, the extent to which the parent-child relationship was stressful each day was significantly greater for separation anxiety ($r = 0.20$) than for social anxiety ($r = 0.03$) behaviors, $z = 2.07$, $p = 0.04$.

4. Discussion

The goal of the present study was to illustrate the spectrum of behavior relevant to separation and social anxiety to determine the frequency and psychometric severity of these behaviors in young children. The study included a novel parent-report daily diary method that minimized retrospective recall as well as measured the full range of frequencies of relevant behavior rather than limiting data collection to behaviors that meet clinical symptom thresholds in diagnostic interviews or requiring parents to estimate the relative frequency of their children's behavior in checklist measures. We found that behaviors such as avoidance of going places without the caregiver, fearfulness of going to sleep without the caregiver, shyness around new people, and shyness with peers were identified as more normative during this developmental period compared to other separation and social anxiety behaviors such as worry that the caregiver would be hurt or leave home and not return, shyness with family members/familiar adults, and distress/withdrawal in social situations.

The CFA indicated good model fit for both separation and social anxiety. Therefore, anxiety behaviors assessed on a daily basis reflect a coherent underlying dimension. Most item discrimination values indicated that they provided acceptable amounts of information about the latent trait. However, distress when anticipating separation was found to provide limited information about the overall level of separation anxiety in this study. In addition, four of the eight separation anxiety items (distress when anticipating separation, worry about being left home without caregiver, separation nightmares, and reported illness when separation anticipated) and one of the four social anxiety items (distress/withdrawal in social situations) best assessed information at high levels of severity. These data suggest that these items provide less information within the less severe/more normative range of the traits; for clinicians, these findings indicate that quantifying severity of anxiety behaviors is best evaluated using these specific items. Overall, these results suggest that the items assessed clinical severity of separation and social anxiety well.

This study identified the particular frequencies of behaviors that were considered psychometrically severe. Some behaviors occurred more frequently than others to be considered severe; difficulty parameters reflect the level of severity required to endorse a specific item at a given response level. For example, the child trying to avoid going to daycare, school, or elsewhere without the caregiver in order to stay with the caregiver had to occur five or more times over 14 days to be considered severe/rare, and the child feeling afraid to go to sleep unless they were near the caregiver had to occur 11 or more times over 14 days to be considered severe/rare. Other behaviors occurred less frequently to be considered severe. For example, the child feeling upset when they expected to be separated from the caregiver had to occur 2–4 or more times over 14 days and the child worrying that the caregiver would be hurt or leave home and not return had to occur 2 or more times over 14 days to be considered severe/rare. Shyness with family members and/or familiar adults and distress and/or withdrawal in social situations each had to occur 2–3 times over 14 days to be considered severe/rare. Finally, two behaviors, shyness around new people and with peers, were not identified as severe at any frequency. The items at the top of the severity continuum (i.e., reported illness when separation is anticipated; distress when anticipating separation) suggest more problematic behavior than items at the bottom of the continuum (i.e., shyness with peers and new people).

Separation anxiety and social anxiety factor scores were computed to examine associations between reported behaviors and demographic characteristics and impairment. There were no differences in separation

and social anxiety factor scores for child sex, parental education level and marital status, and the total number of hours the caregiver reported spending away from the child each day. However, demographic differences were identified for child age, child race/ethnicity, and parental income. First, parents of younger preschoolers reported more social anxiety behaviors than parents of older preschoolers; this finding is consistent with studies in older children that identify that social anxiety and inhibition decrease for some over time (Degnan & Fox, 2007). This pattern would also be expected for separation anxiety (Costello et al., 2003), but we did not identify this pattern in our sample; it is possible that the decrease in separation anxiety occurs as children enter formal schooling, which is above the age range of children in the present study (3-5-years-old).

Second, parents of children of Hispanic descent reported more daily separation anxiety behaviors than parents of **White** children. In some studies, Hispanic/Latino children are reported to show higher levels of anxiety than **White** youth (Office of the Surgeon General; Varela & Hensley-Maloney, 2009); fewer studies have investigated specific disorders, but one study found that Hispanic youth were more likely to experience separation anxiety than **White** youth (Ginsburg & Silverman, 1996). Comparisons among individuals of different race/ethnicities require operational definitions of these socially constructed categories as well as information about the elements of ethnicity that may account for differences (Helms, Jernigan, & Mascher, 2005; Kawachi, Daniels, & Robinson, 2005; Sue, 1999). Differences in child anxiety by ethnicity may be related to factors such as culturally-relevant expectations for children's behavior (Halgunseth, Ispa, & Rudy, 2006; Zayas & Solari, 1994), parenting practices (Luis, Varela, & Moore, 2008; Varela, Sanchez-Sosa, Biggs, & Luis, 2009), parental acculturation (Gudiño & Lau, 2010; Weiss, Goebel, Page, Wilson, & Warda, 1999), and the sociopolitical context (Allen, Cisneros, & Tellez, 2015; Henderson & Baily, 2013; Landale, Hardie, Oropesa, & Hillemeier, 2015; Yoshikawa & Kalil, 2011). Further research is needed to clarify normative levels of separation behaviors across cultures.

Finally, parents in families with annual incomes less than $70,000 reported higher levels of separation anxiety behaviors in their children compared to families with annual incomes greater than $70,000. As lower income levels likely reflect greater family stress, these children may be more likely to display more problematic socioemotional development compared to children in families with higher incomes and, theoretically, relatively less family stress (Hetzner, Johnson, & Brooks-Gunn, 2011).

Significant associations were identified between most measures of impairment and separation and social anxiety factor scores. More frequent separation and social anxiety behaviors were associated with greater child distress and/or impairment (e.g., difficulty following routines, getting along with others), stressful parenting, and stressful parent-child relationships each day. These findings are consistent with other studies that identify links between anxiety and impairment in young children (Bufferd et al., 2011; Egger & Angold, 2006) and adults (Markon, 2010). The relatively high magnitudes of associations between daily rated separation/social anxiety and impairment identified in the present study suggest that assessing such links on a daily basis may generate stronger, and possibly more accurate associations compared to reports that include a longer period of recall. Further, separation anxiety behaviors were associated with significantly more impairment and more stressful parent-child relationships each day compared to social anxiety behaviors (though the magnitudes of most associations were quite high). We are not aware of any studies that investigated these associations in young children, but the latter relation is expected as separation anxiety behaviors directly include the parent (the target of the separation anxiety) more so than social anxiety. Overall, these data suggest that separation and social anxiety (and separation anxiety behaviors in particular) are associated with distress and/or impairment in children's and parent's functioning; these findings can be considered along with the data on the frequency and severity of behavior in this study to further understand which behaviors at particular levels may shift from developmentally typical to potentially clinically significant. However, longitudinal follow-up data are needed to further clarify this question.

4.1. Limitations

The findings should be considered in light of several study limitations. First, anxiety behaviors assessed were selected to match DSM symptoms of separation and social anxiety. However, behaviors relevant to other symptoms of anxiety (e.g., worry, specific fears) as well as other phenotypes reflecting the spectrum of behavior relevant to anxiety (e.g., irritability; perfectionism) may be important to assess in future work as well. Second, the frequency categories identified in this study may not generalize to other samples and there are no empirical guidelines for how frequencies of behaviors map onto severity; future research could aim to identify whether these categories can be replicated in additional, and even larger, groups of children. Third, only the primary caregiver reported about children's daily behavior; as children's behavior may vary across contexts, data from other informants, such as other caregivers, teachers, and older preschool-aged children themselves, may be useful (De Los Reyes & Kazdin, 2005; Edwards et al., 2010; Mian, Carter, Pine, Wakschlag, & Briggs-Gowan, 2015; Muris et al., 2003). Fourth, unlike most studies that utilize questionnaires, parents were trained how to rate behaviors; they did not have to decide whether behaviors occurred more/less frequently than other children or utilize imprecise response options such as "sometimes" or "frequently". However, like any self-report measure, parents' report of frequency counts in this study is nevertheless subjective. The addition of informants (e.g., other parents; teachers) could address this limitation by generating more information about children's behavior and functioning. Fifth, in this study, evaluation of "severity" is based on analysis of the frequency categories; however, severity of each instance of behavior may vary and the present analyses cannot capture this variation in behavior. Finally, although the sample was racially/ethnically diverse, a majority of participants were middle-income, college-educated parents. The findings may not generalize to families with lower incomes and/or less education or to families that would not meet the inclusion criteria (e.g., daily Internet access; parent fluency in English).

4.2. Conclusions and future directions

As behaviors relevant to risk for anxiety are both developmentally typical and evolutionarily adaptive, data are needed to illustrate the spectrum of frequencies of behaviors that may suggest risk for clinically significant anxiety in young children. The present study sought to identify the frequencies at which separation and social anxiety behaviors were statistically severe using a novel daily diary approach to minimize retrospective recall bias. Such data can inform and improve assessment efforts by practitioners (e.g., pediatricians, child psychologists) in making more empirically-based decisions about the need for anxiety prevention and intervention in children. For example, assessments can include items and frequency options that better discriminate between lower and/or more normative levels of anxiety.

Future research can enhance these efforts in a number of ways. First, these data should be collected in even larger samples to validate the results in the present sample and identify whether severity of behavior varies by sub-groups of children. Second, data on correlates (e.g., impairment, stressors, psychophysiology) and contexts of anxiety will provide more detailed information about the points at which these behaviors may be problematic. Third, a 14-day diary period was selected as a feasible and ostensibly reasonable time frame; however, longer diary periods may yield more information about normative behaviors or shorter time frames may be sufficient. Finally, longitudinal data are needed to identify the frequency of behavior during preschool

age that predicts the development of anxiety over time. Together, these data can inform diagnostic criteria as well as assessment, prevention, and intervention efforts to improve the developmental sequeale for children at risk for anxiety.

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None.

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