SI-SHY: Dysregulated Fear in Toddlerhood Predicts Kindergarten Social Withdrawal through Protective Parenting

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Abstract

Two recent advances in the study of fearful temperament (behavioral inhibition) include the validation of dysregulated fear as a temperamental construct that more specifically predicts later social withdrawal and anxiety, and the use of conceptual and statistical models that place parenting as a mechanism of development from temperament to these outcomes. The current study further advances these areas by examining whether protective parenting mediated the relation between dysregulated fear in toddlerhood and social withdrawal in kindergarten. Participants included 93 toddlers and their mothers, who engaged in laboratory tasks assessing traditional fearful temperament, dysregulated fear, and protective parenting. When children reached kindergarten, they returned to the laboratory for a multimethod assessment of social withdrawal. Results confirmed the hypothesis that dysregulated fear predicted social withdrawal through protective parenting, and this occurred above and beyond the effect of traditional fearful temperament. These findings bolster support for the use of dysregulated fear as a temperamental construct related to, but perhaps more discerning of risk than traditionally measured fearful temperament/behavioral inhibition and highlight the importance of transactional influences between the individual and the caregiving environment in the development of social withdrawal.

Keywords

Dysregulated fear; social withdrawal; parenting; toddlers

Fearful temperament (e.g., behavioral inhibition), or the biologically based tendency to exhibit withdrawal and avoidance in the presence of unfamiliarity (Kagan, Reznick, Clarke, Snidman, & Garcia-Coll, 1984), is typically observed in toddlerhood and has been consistently linked to later social withdrawal, which represents continued risk towards anxiety-spectrum maladjustment (Rubin, Coplan, & Bowker, 2009). Social withdrawal has been conceptualized as an umbrella term for related constructs (Rubin et al., 2009) such as shyness and social inhibition (anxiety about interacting with unfamiliar peers and adults coming from internal sources), reticence (observation of inhibition with unfamiliar peers),

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and anxious solitude (inhibited behavior with familiar peers; Gazelle & Ladd, 2003). Currently, we use the term, social withdrawal, to refer to anxiety-based inhibited behavior shown with unfamiliar peers and adults (i.e., relevant to shyness, social inhibition, and reticence). In this sense, it may represent the later manifestation of fearful temperament, which also is measured with unfamiliar peers and adults. Stability in this pattern of behavior, more so than behavior measured at a single time point, has been particularly indicative of risk for more severe anxiety-spectrum outcomes (Prior, Smart, Sanson, & Oberklaid, 2000), so understanding when (i.e., for which children) and how (i.e., the mechanisms by which) stability between fearful temperament and social withdrawal occurs is especially important.

Not all toddlers who exhibit fearful temperament develop social withdrawal and anxiety. Fearful temperament has traditionally been measured as high levels of fear in laboratory paradigms that reliably elicit high levels of fear (i.e., "high threat" contexts). Estimates of fearful temperament then come from one episode or an average of several of these episodes, which, across a sample, may not correlate very highly. These methods have yielded modest estimates of stability and prediction of anxiety problems, suggesting this may not be the most precise manner in which to identify toddlers at risk. Recently, the construct of dysregulated fear has been proposed as a solution to this issue. Dysregulated fear quantifies individual differences in the match between the toddler's fear and the eliciting context, with toddlers who exhibit high fear, whether or not the context warrants it, designated as higher in this construct (Buss, 2011). In other words, in addition to displaying high fear in contexts that tend to elicit fear in many toddlers, these toddlers display high fear in contexts that most toddlers find comfortable and even positive (i.e., "low threat" contexts). Dysregulated fear has been shown to more strongly predict social withdrawal and social anxiety symptomatology than traditional measures of fearful temperament (Buss, 2011). However, given the very recent emergence of this construct, mechanisms of its relation to later outcomes have not been determined.

Among myriad influences (e.g., genetics, neurobiology, peer interactions), protective parenting has been established as an important component of the predictive relation between temperament and later social withdrawal. Protective parenting has been operationalized throughout the literature (Chorpita & Barlow, 1998; Rubin, Burgess, & Hastings, 2002; Rubin, Hastings, Stewart, Henderson, & Chen, 1997) as behaviors that prevent children from coping with the stress of a feared/anxious situation either by distancing the child from the stimulus/situation or taking over the management of the child's distress (i.e., high levels of physical affection). Several studies have identified protective parenting as predicting anxiety-spectrum outcomes (e.g., Edwards, Rapee, & Kennedy, 2010) or as a moderator of the association between temperament (or related psychophysiology) and outcomes, with temperamentally fearful, shy, or physiologically dysregulated children more likely to display social withdrawal and anxiety when mothers exhibited higher levels of (over)protection or overcontrol (Coplan, Arbeau, & Armer, 2008; Degnan, Henderson, Fox, & Rubin, 2008; Hastings et al., 2008; Rubin, Burgess, & Hastings, 2002). Theoretical models of child-elicited effects on parents (e.g., Dadds & Roth, 2001) have proposed that parents' behaviors are likely not independent of children's temperament; in addition to the possibility that parenting influences the development of fear of novelty, fearful children likely elicit more protective responses. Indeed, alternative models that place protective parenting as a mediator

of development, such that fearful temperament relates to protective parenting, which then predicts social withdrawal and anxiety, have gained empirical support (Kiel & Buss, 2011; 2012). These studies have relied on traditional measures of fearful temperament, so it remains unknown whether such models are also appropriate when considering dysregulated fear.

The current study therefore aimed to provide initial evidence for the importance of the relation between dysregulated fear and protective parenting for children's development of social withdrawal. First, we examined whether dysregulated fear related to solicited protective behavior above and beyond a traditional measure of fearful temperament. This addresses questions about which toddlers are most likely to elicit protective responses from their mothers. Second, we examined whether protective behavior provides an indirect pathway from dysregulated fear in toddlerhood to social withdrawal in kindergarten. This addresses questions both about how dysregulated fear results in outcomes indicative of continued risk towards maladaptation and about whether this type of mechanistic model, established with traditional fearful temperament, is also relevant for dysregulated fear.

Method

Participants

Ninety-three toddlers (42 female; M_{age} = 24.76 months, SD_{age} = 0.42 months) participated in a longitudinal study from toddlerhood to kindergarten with their mothers. Recruited from locally published birth announcements with broad inclusion criteria (displaying typical development), participants were 91% Caucasian, 3% African American, 2% Hispanic, 3% Asian American, and 1% American Indian. The sample was primarily middle class but spanned the range of socioeconomic status (Hollingshead Index: M = 48.42, $Range$ = 17–66).

Procedure

At the initial laboratory visit, mothers and toddlers engaged in a variety of tasks, including a Risk Room paradigm, a traditional assessment of fearful temperament, as well as six novelty tasks that varied in their level of subjective threat. Mothers were present for all activities but were asked to minimize their interactions with their toddlers.

The Risk Room contained a tunnel, trampoline, balance beam, black box with a face and cut-out mouth with teeth, and a gorilla mask on a pedestal. The toddler played freely for 3 minutes. Then, the experimenter returned to ask the toddler to engage with each activity. The novelty tasks comprised two low-threat (Puppet Show and Clown), two medium threat (Stranger Approach and Stranger Working), and two high-threat (Spider and Robot) tasks derived from episodes of the Laboratory Temperament Assessment Battery and other previous studies of toddler behavior (Buss & Goldsmith, 2000; Nachmias, Gunnar, Mangelsdorf, Parritz, & Buss, 1996). Puppet Show and Clown involved a secondary experimenter, either using puppets behind a stage or dressed up as a clown, inviting the toddler to play several short games in a friendly and enthusiastic manner. In the medium-threat episodes, the toddler encountered either a male stranger who engaged the child in a

short conversation (Stranger Approach) or a female stranger who appeared to be working in the room for 2 minutes (Stranger Working). The high-threat episodes involved remote-controlled toys moving around for roughly 1 minute, followed by the primary experimenter asking the toddler to touch it with up to three prompts. The Robot stayed on a small wooden platform in the opposite corner of the room. The Spider was attached to a remote-controlled truck and approached and retreated from the child twice with 10 second pauses in between each movement.

At kindergarten entry, children and parents participated in multiple assessments throughout the kindergarten year. At an individual visit, the child participated in a variety of tasks, of which a Stranger Approach was used for the current study. Similarly to the episode in the toddler visit, a male stranger engaged the child in a brief conversation, but without the mother in the room. At a second visit, groups of 3–4 same-sex children participated in a 15-minute free-play with a variety of toys (used in the current study), followed by clean-up, card sorting, and a short speech task. Parents and teachers completed questionnaires about participating children's behaviors and adjustment. Kindergarten social withdrawal therefore consisted of parent- and teacher- report and coding from the individual visit Stranger Approach and peer visit free play episodes.

Behavioral coding was conducted to derive several of the measures listed below. More details on the coding can be found in a previous reports (Buss, 2011). In general, coders established minimum reliability (kappa or % agreement = .80) with a master coder (typically the first or second author) prior to coding independently. Reliability was assessed throughout coding on approximately 15–20% of cases to prevent coder drift. Given the high number of zero-values for many of the codes, reliability was typically assessed as % agreement.

Measures

Dysregulated fear (DF)—Dysregulated fear was conceptualized as the (lack of) change in level of fear according to the threat-level of the episode. The variable is described briefly; it has been described in greater detail elsewhere (Buss, 2011). Fear composites were created for each of the novelty episodes as the average of the following variables (coded second-by-second), with each one weighted by the length of the episode for the specific toddler: latency to freeze (reversed) and durations of facial fear, bodily fear, freezing, and close proximity to mother (coding % agreement = 80% – 100%; Cronbach's alphas = .61 – .73). In a multilevel model (to account for the nesting of composites within toddlers), fear composites, as the dependent variable, were predicted by a contrast variable indicating the threat level of the episode (low, medium, high). Overall, level of threat was related positively to fear composites ($\gamma = 14.11$, $t = 7.54$, $p < .001$), suggesting that as the subjective threat of the episode increased, toddlers displayed more fear. Moreover, a negative relation ($r = -.80$) between toddler-level intercepts and slopes suggested that children with flatter slopes were higher in fear in the low-threat episodes. This model also allowed for the extraction of a slope (Empirical Bayes estimate) for each toddler to indicate how toddlers' individual levels of fear changed as a function of the level of threat of the episode. These slopes provided individual differences in the extent to which toddlers calibrated their level of fear to the

threat of the episode. In this manner, higher (more positive) values indicated steeper slopes, consistent with a regulation of fear to the context, and flatter (less positive or negative) slopes indicated a lack of change (i.e., high fear) across all contexts, regardless of level of threat, or more dysregulated fear. As reported in (Buss, 2011), approximately 60% of the sample displayed the pattern of clearly positive slopes, 11 toddlers (12%) had zero or negative slopes, and the remaining toddlers had more modest increasing slopes. We reversed these values to aid in interpretation, so that higher values indicating more *dysregulated fear*.

Traditional fearful temperament (TFT)—From the Risk Room episode, toddlers were scored for several behaviors indicative of inhibition: latency in seconds to touch first toy (% agreement = .90); approach towards parent, attempt to be held by parent, and tentativeness of play (each measured on a 0 [*none*] −3 [*strong display*] intensity scale each 10 second epoch of the episode and averaged, % agreement = .73, .94, and .83, respectively); and the number of activities with which the toddler engaged when asked by the experimenter (kappa = .75), reversed. These variables were standardized and averaged (alpha = .84), such that higher scores indicated higher traditional fearful temperament.

Maternal protective behavior—Mothers were scored for both prototypical protective behaviors (e.g., moving the toddler away from or preventing the toddler from interacting with the stimulus) and comforting behaviors on a 0 (*none*) to 3 (*extreme or prolonged display*) in each 10-second epoch of each of the novelty episodes. To isolate behaviors indicative of those elicited by toddlers, these behaviors were only scored when in direct response to a toddler's solicitation of support or display of distress to the mother. Comforting (% agreement = .93) and protective (% agreement = .96) behaviors were each averaged across epochs within an episode, and these composites were then averaged across episodes (except Clown and Stranger Working, in which they occurred with near-zero frequency). The mean of the across-episode comforting and protection composites (r[91] = . 84, $p < .001$) comprised *protective behavior*.

Kindergarten social withdrawal—Our multimethod assessment of social withdrawal comprised parent and teacher report of social inhibition, observation of social reticence with peers, and observation of shyness with an adult stranger. Because measures had different amounts of missing data, the composite was formed after imputation.

Parents ($n = 72$) and teachers ($n = 47$) completed the Social Inhibition scale of the McArthur Health and Behavior Questionnaire (HBQ; Armstrong, Goldstein, & the McArthur Working Group on Outcome Assessment, 2003). Parents (α = .77) and teachers (α = .69) rated the three items of the scale (e.g., "Shy with other children") on a 0 (*rarely applies*) to 2 (*certainly applies*) scale. Items were averaged for each reporter.

Reticence with unfamiliar peers ($n = 60$) was determined from observation of the 15-minute free play with 3–4 same-sex children. Reticence was computed as the proportion of 10-second epochs in which unoccupied (e.g., staring into space, wandering without purpose) or onlooking (e.g., watching other children without joining in) behavior was determined by coders (% agreement = .93) to be the predominant behavior displayed, according to the guidelines of the Play Observation Scale (Rubin, 2001). Shyness with an unfamiliar adult (*n*

= 64) was reliably (ICC = .71) scored on a 1 (*no display*) to 5 (*extreme display*) scale from the Stranger Approach episode of the individual laboratory visit.

Results

Missing data for the kindergarten social withdrawal measures, the pattern of which was consistent with missing-at-random (Little's MCAR test: $\chi^2_{[40]} = 33.00$, $p = .776$), were imputed using multiple imputation in SPSS. Across all study variables, 31% of values were missing. The 20 imputed data sets were averaged to accommodate all analyses, including those that cannot use an imputation file. After this procedure, the four components of kindergarten social withdrawal were transformed into Z-scores and summed. Descriptive statistics and bivariate relations among primary variables are presented in Table 1. Protective behavior demonstrated slight skew (2.03) but improved with a square root transformation (1.74). As can be seen, DF and TFT were significantly but only modestly related, suggesting a substantial portion of unique variance between the constructs. At the bivariate level, both DF and TFT related to protective parenting and kindergarten social withdrawal. Neither SES nor child gender were related to primary variables (all rs < |.12| and all ts < |1.10|, respectively, all ps > .27), so they were not considered further.

We tested our proposed mediation model using a series of multiple regression analyses to investigate individual pathways (Baron & Kenny, 1986) and bootstrapping techniques (the PROCESS macro for SPSS) to test the indirect effect (Hayes, 2013; Preacher & Hayes, 2004). To test the unique role of DF in this model, we included TFT as a predictor (covariate) in all analyses. A summary of pathways including unstandardized betas can be found in Figure 1. Standardized betas are presented in text. In the first model (R^2 = .16, $F_{[2, 90]} = 8.81$, $p < .001$), DF related to protective parenting (Path A: $\beta = 0.36$, $t = 3.57$, $p = .001$). Notably, with both temperament constructs in the same model, TFT did not relate to protective parenting ($\beta = 0.11$, $t = 1.08$, $p = .283$), suggesting that DF may more uniquely identify toddlers who successfully solicit protective parenting from their mothers. A hierarchical multiple regression model tested remaining paths. In Step 1 (R^2 = .13, $F_{[2, 90]} = 6.53$, $p = .002$), DF predicted social withdrawal ($\beta = 0.26$, $t = 2.49$, $p = .015$) above and beyond TFT ($\beta = 0.18$, $t = 1.78$, $p = .078$), which no longer predicted social withdrawal. In Step 2 (R^2 = .12, $p < .001$; $F_{[3, 89]} = 9.66$, $p < .001$), protective behavior predicted social withdrawal ($\beta = 0.38$, $t = 3.75$, $p < .001$) above and beyond DF and TFT, which subsequently dropped to non-significance ($\beta = 0.12$, $t = 1.18$, $p = .243$, and $\beta = 0.14$, $t = 1.47$, $p = .145$, respectively). This pattern suggests full mediation. The bootstrapped confidence interval for the indirect effect did not contain zero (95% CI [0.02, 0.16]), indicating a significant pathway from DF to social withdrawal through protective parenting, above and beyond TFT[1].

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[1]Using a multiple imputation file that weights the contribution of each imputation's parameter estimate to the pooled estimate by its standard error, protective parenting related to social withdrawal above and beyond DF and TFT ($b = 7.80$, $SE = 3.88$, $t = 2.01$, $p = .045$). The 95% CI around the indirect effect provided by PROCESS did not contain zero in 19 of the 20 imputation sets. The Monte Carlo Method for Assessing Mediation (MCMAM) also suggested a significant indirect effect (95% CI [0.001, 0.113]) using the parameter estimates and standard errors provided by the pooled estimates from the multiple imputation file.

Discussion

The current study examined the association between dysregulated fear, an innovative method for assessing temperamental risk for anxiety-spectrum outcomes, and protective parenting, both above and beyond a traditional assessment of fearful temperament and in relation to social withdrawal in kindergarten. Our hypotheses were confirmed, such that dysregulated fear more strongly related to toddlers' successful elicitations of maternal protective behavior than traditional fearful temperament did, and dysregulated fear in toddlerhood predicted social withdrawal in kindergarten through protective parenting. These results extend current literatures both on the significance of dysregulated fear as well as on the interplay between temperamental and environmental risk for social withdrawal.

Although it is well established that protective parenting plays a role, typically studied as a moderator, in the development from temperamental risk to later social withdrawal and anxiety, only recently have models emerged in which child-elicited effects on this behavior are acknowledged (Dadds & Roth, 2001; Kiel & Buss, 2011; 2012). This theoretical and empirical work suggests that more fearful children actively elicit the high levels of comfort and protection that predict anxiety-spectrum outcomes. To advance this burgeoning area, we examined whether dysregulated fear related to solicited protective behavior along with, or even more strongly than, a traditional measure of fearful temperament. Individually, both traditional fearful temperament and dysregulated fear related to toddlers' solicitations of protective behavior, such that more fearful toddlers elicited more protective behavior. When considered within the same analysis, however, only dysregulated fear related to protective behavior. This association is important because consistent responses of protection when young children express fear may establish an "anxious-coercive cycle" in which children get reinforced for avoiding novel stimuli (because the mother provides reduction in distress through reduced proximity to the stimulus or high levels of comforting), and mothers get reinforced for protective behavior by the reduction in their children's distress (Dadds & Roth, 2001). This cycle maintains and exacerbates withdrawal and anxiety over time. The prediction of social withdrawal from the association between dysregulated fear and protective behavior may be an indication of the negative effects of this cycle. Efforts towards preventing this cycle would therefore benefit from targeting not only parents' effects on fearful children, but also parents' experiences as they react to children's fear.

The current study also provides evidence that dysregulated fear was a better predictor of later social withdrawal than traditional fearful temperament. Like the initial investigations of this construct (Buss, 2011), these results suggest that examining fear in a single context, particularly one that elicits wariness for many children, does not provide as precise of a prediction of future maladjustment as examining the pattern of fear over a variety of contexts, including those that, although novel, do not tend to elicit fear for most children. Toddlers who are temperamentally at-risk for social withdrawal and anxiety are outliers in the distribution of inhibited behavior. Therefore, behavior must be observed in low-threat contexts to highlight the extremity of this behavior.

Several limitations within the current study point towards future directions for this research. Mothers were instructed to minimize spontaneous interactions with their toddlers, so the

current results should be replicated when allowing mothers to behave more naturally. Both toddler dysregulated fear and maternal protective parenting were observed at the same time point; in future work, a more rigorous mediation model would use three time points. In addition, the current study cannot clarify the role of maternal anxiety, a known correlate of children's social withdrawal (Rubin et al., 2009), so in the present mediation model, so this remains an important area for future inquiry.

In conclusion, the current study demonstrated the unique contribution of dysregulated fear to protective parenting and later social withdrawal, above and beyond traditional fearful temperament. These results advance the literature in terms of both the measurement of toddler inhibition and transactional models of parenting and children's outcomes.

Acknowledgments

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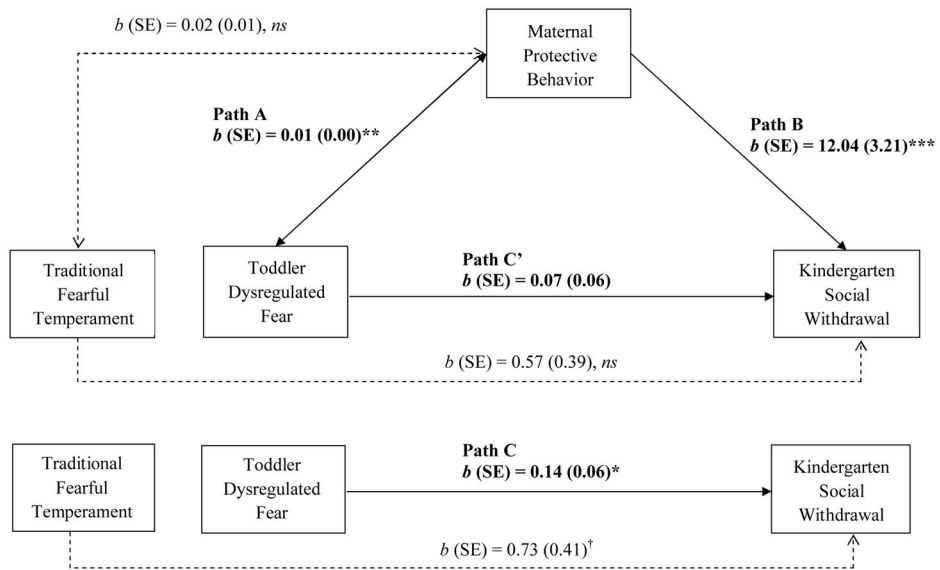
Figure 1.
Dysregulated fear in toddlerhood predicted social withdrawal in kindergarten through maternal protective behavior. Unstandardized regression coefficients and standard errors (SE) are presented, with statistics for primary pathways bolded. The indirect effect, also bolded, was estimated using bootstrapping techniques. Traditional fearful temperament was included as a covariate for all analyses.

$^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Table 1

Descriptive and Bivariate Statistics for Primary Variables

Variable	Mean (SD)	Range	2	3	4
1. DF	−14.59 (5.22)	−25.04 – 0.83	.29**	.39***	.31**
2. TFT	0.00 (2.10)	−1.06 – 2.10	--	.21*	.26*
3. Protective behavior	1.07 (0.09)	1.00 – 1.44		--	.46***
4. Social Withdrawal	0.00 (2.85)	−5.06 – 13.07			--

Note. DF = Dysregulated fear. TFT = Traditional fearful temperament. TFT and Social Withdrawal were computed as the mean and sum, respectively, of Z-scores. Protective behavior was subjected to a square root transformation prior to the calculation of descriptive and bivariate statistics.

*
p < .05,

**
p < .01,

***
p < .001.