Sirois, M.-S., Bernier, A., & Lemelin, J.-P. (2019). Child Temperamental Anger, Mother-Child Interactions, and Socio-Emotional Functioning at School Entry. *Early Childhood Research Quarterly, 47,* 30–38.

Abstract

This study investigated the role of temperamental anger in toddlerhood in the prediction of child socio-emotional functioning at school entry and the moderating function of mother-child interactions in these predictive associations. The sample included 86 children. To assess child temperamental anger, mothers and fathers completed the Anger proneness scale of the Toddler Behavior Assessment Questionnaire when children were aged 2 years. The quality of mother-child interactions was also assessed when children were 2 years old with the Mutually Responsive Orientation scale. Child internalizing, externalizing and prosocial behaviors were reported by parents in kindergarten and first grade with the Child Behavior Checklist and the Socio-Affective Profile. The results indicated that anger proneness predicted higher internalizing and externalizing behavior, and lower prosocial behavior. In the case of internalizing behavior, the effect of anger was qualified by an interaction with the quality of mother-child interaction: anger proneness predicted higher internalizing behavior only among children who had higher-quality interactions with their mothers. These findings suggest that simultaneous consideration of temperament and parent-child relationships early on in development may help identify children at risk for experiencing adjustment difficulties at school entry, allowing for prompt intervention before difficulties crystallize.

Keywords: child temperament, child anger proneness, mother-child interactions, internalizing behavior, externalizing behavior, prosocial behavior.

Child Temperamental Anger, Mother-Child Interactions, and Socio-Emotional Functioning at School Entry

One of the most significant developmental milestones of early childhood is school entry, which involves numerous behavioral, social, and intellectual challenges that children must handle simultaneously (Pianta, Cox, & Snow, 2007). Research shows that children vary widely in their adaptation to school entry, and these differences have lasting and significant consequences for academic, social, and behavioral outcomes in childhood (Duncan et al., 2007; Ladd & Dinella, 2009) and adolescence (Schofield, Bierman, Heinrichs, & Nix, 2008). Children's psychosocial adjustment during this period is one of the main factors influencing their school adaptation (e.g., Duncan & Magnuson, 2011). For instance, children who struggle with externalizing or internalizing behavior problems tend to have more social difficulties when they start school (Duncan et al., 2007; Masten et al., 2005). Their difficulty establishing positive social bonds with peers has a considerable negative impact on their current and subsequent academic success (Ladd, Kochenderfer, & Coleman, 1996), which in turn is predictive of school achievement in the years to come (Entwisle, Alexander, & Olson, 2005). Likewise, behavior problems identified in the early school years tend to persist throughout middle childhood and adolescence (Bosquet & Egeland, 2006; Dodge, Coie, & Lynam, 2006). Consequently, it is imperative to explain why some children arrive in school better prepared than others on a socio-emotional level.

One documented influence on child socio-emotional adjustment is temperament (Janson & Mathiesen, 2008; Rothbart, 2011). Several dimensions of children's temperament are linked to various aspects of their socio-emotional functioning, such as their social competence and the presence of internalizing and externalizing behavior problems (Engle & McElwain, 2011; Janson

& Mathiesen, 2008; Sanson, Hemphill, & Smart, 2004). Most studies focus on temperamental dimensions that are associated with negative emotionality (e.g., anger proneness; Eisenberg, Vaughan, & Hofer, 2009; Smeekens, Riksen-Walraven, & Van Bakel, 2007), likely because such dimensions are associated with poorer social-emotional adjustment (Lemerise & Dodge, 2008), and often predict child socio-emotional development better than temperamental dimensions associated with positive emotionality (e.g., pleasure, interest/persistence; Sanson et al., 2004; Slagt, Dubas, Deković, & Van Aken, 2016; Therriault, Lemelin, Tarabulsy, & Provost, 2011).

Child anger proneness, defined as a constitutionally based predisposition to the experience and expression of anger in situations likely to elicit frustration (Goldsmith & Campos, 1990), is one temperamental dimension that is associated with significant adjustment problems (Zentner & Shiner, 2015). Children who are more prone to anger tend to show poorer cognitive and emotional regulation (Eisenberg et al., 2009; Wilkowski, Robinson, & Troop-Gordon, 2010), and poor regulatory skills, in turn, are associated with child socio-emotional maladjustment including the display of externalizing behavior problems (Chaplin & Cole, 2005; Eisenberg et al., 2001). Anger-prone children are also likely to interact inappropriately with other children and thus be at risk of social withdrawal and peer rejection, which may lead to internalizing problems (Pedersen, Vitaro, Barker, & Borge, 2007). Indeed, temperamental anger in children is often found to be associated with externalizing and internalizing problems assessed concurrently (Rettew, Copeland, Stanger, & Hudziak, 2004) and subsequently (Eisenberg et al., 2009; Lehman, Steier, Guidash, & Wanna, 2002; Lengua, 2006; Smeekens et al., 2007). Moreover, children who struggle with negative emotionality such as anger proneness have been observed to be less empathic with their peers and less likely to show prosocial behavior (Eisenberg et al., 2009).

Despite convincing evidence for the link between child anger proneness and socio-emotional functioning, very few longitudinal studies have focused on temperamental anger as manifested in toddlerhood to predict different aspects of child socio-emotional functioning at school entry. Yet, it is essential to measure child temperament early on, when behavior may be easier to change in an intervention context (Bruder, 2010). Moreover, anger proneness may be a particularly salient dimension of temperament in toddlerhood when the child's struggle for autonomy, combined with increased parental expectations for behavior, elicits high levels of child anger and frustration (Brownell & Kopp, 2007). In addition, using multiple data sources (e.g., mother and father reports) to increase studies' methodological quality has been largely advocated (e.g., Kazdin, 2016), but research often uses only one source of information to measure child temperament, socio-emotional adjustment, or both (Janson & Mathiesen, 2008). Accordingly, the current study focused on the role of mother- and father-reported toddler temperamental anger in the prediction of children's socio-emotional functioning at school entry, as also reported by both parents.

In addition to temperament, research has shown that the family context is highly relevant to children's socio-emotional adjustment including their adaptation to school (Cowan, Cowan, Ablow, Johnson, & Measelle, 2005). Notably, the quality of mother-child relationships is one of the primary contexts of child socialization. For instance, mothers can help their children identify their emotions and develop their emotional and behavioral self-regulatory skills, which in turn can positively influence their adaptation (Leerkes, Blankson, & O'Brien, 2009): child emotion regulation is associated with less anxiety, depression, and aggression (e.g., Suveg & Zeman, 2004) and better peer relationships (Contreras, Kerns, Weimer, Gentzler, & Tomich, 2000). Moreover, in higher-quality relationships, mothers often promote children's self-esteem and

perceptions of competence (Grolnick, Price, Beiswenger, & Sauck, 2007), which are protective against maladjustment. Overall, research shows that higher mother-child relationship quality is consistently associated with more prosocial behavior and less internalizing and externalizing behavior problems in children (Fearon, Bakermans-Kranenburg, Van IJzendoorn, Lapsley, & Roisman, 2010; Pallini, Baiocco, Schneider, Madigan, & Atkinson, 2014; Van Der Bruggen, Stams, & Bögels, 2008).

The quality of mother-child relationships can be measured in several ways. Research has often focused on either the mother's (e.g., sensitivity, autonomy support, discipline) or the child's behavior (e.g., attachment, compliance). Using dyadic measures instead to index the quality of mother-child relationships may be preferable. Such measures take into account both parent and child behavior as well as their mutual influence on each other, and thus are likely to provide a richer and more accurate picture of the relational dynamics characterizing the mother-child relationship, which is dyadic and reciprocal by nature. Furthermore, dyadic measures allow for the assessment of the cooperative, mutually binding aspect of the relationship, which has been found predictive of child socio-emotional functioning (Aksan, Kochanska, & Ortmann, 2006; Feldman, 2003; Kochanska, Forman, Aksan, & Dunbar, 2005). Accordingly, the current study examines the mutual responsiveness of mother-child dyads to index the quality of their relationship. Specifically, we were interested in the capacity of mother-child relational quality to modulate the prospective associations between child anger and subsequent adjustment, as described next.

Temperament and mother-child relationships: Toward interactive models

Child-by-environment models (Ladd, 2004) contend that a dual focus on children and their environment provides a more thorough account of child adjustment than models that test

either child or environmental influences alone (Palermo, Hanish, Martin, Fabes, & Reiser, 2007). It is assumed that child adaptation is the result of factors within children (e.g., their temperament) as well as factors characterizing their relational environment (e.g., relationships with parents). Among the different forms of interplay that could characterize the joint contributions of child and relational factors to child socio-emotional functioning, interactive models are of interest because most developmental theorists agree that the factors influencing child development interact with one another, rather than simply having independent additive contributions (Belsky & Pluess, 2009; Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000; Hemphill & Sanson, 2001).

As the primary context in which child temperament unfolds in the early years, parent-child relationships could modulate the links between temperamental anger and child socio-emotional adjustment in several ways (Putnam, Sanson, & Rothbart, 2002; Slagt et al., 2016; Zentner & Shiner, 2015). For example, parenting can influence aspects of psychobiological development that affect the way children feel and express their emotions (Perlman & Pelphrey, 2010) such as physiological stress response and brain development (Atkinson et al., 2013; Bernier, Calkins, & Bell, 2016). Also, through parental modeling, children gradually internalize their parents' style of emotional response and impulse control (Fox, 2006), and learn to regulate negative arousal (Calkins & Hill, 2007). Individual differences in physiological stress response, brain development, impulse control, and emotion regulation could all contribute to attenuate or exacerbate the links between anger proneness and child subsequent functioning. In addition, it is proposed that some combinations of child temperament and parenting practices are more optimal than others: according to the goodness-of-fit hypothesis, optimal fit between parent and child is achieved when the caregiver's behavioral tendencies are well-suited to the child's emotional

predispositions. This fit is an important process by which child socio-emotional development is influenced (Chess & Thomas, 1991; Seifer, 2000).

Empirical research supports the general hypothesis that temperament and parenting interact in the prediction of child socio-emotional adjustment. For example, Crockenberg and Leerkes (2006) found that maternal sensitivity to infant cues modulates difficult temperament, reducing the risk of later aggression and anxiety. Penela, Henderson, Hane, Ghera, and Fox (2012) found that when infants with elevated temperamental difficulty received lower-quality maternal caregiving, they showed low social engagement and high aggression, whereas these relations were non-significant among infants who received higher-quality maternal caregiving. It has also been reported that among children high in irritable distress, higher maternal hostility was associated with more externalizing problems (Morris et al., 2002). Although those studies used different measures of child temperament, maternal behavior, or child functioning, they all suggest a protective function of high-quality mother-child interactions in the relation between negative emotionality and child emotional maladjustment.

Although less frequent, other studies found that parenting behaviors that are generally considered to be of high quality could be poorly adjusted to child temperament and, paradoxically, be detrimental to child adjustment. For example, Davis, Votruba-Drzal, and Silk (2015), using data from the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (N = 881), found that children with high negative emotionality were more likely to show elevated levels of internalizing symptoms if their mothers exhibited *high* sensitivity (see also Kiel & Buss, 2010, 2011; Mount, Crockenberg, Jó, & Wagar, 2010). Thus, despite substantial support for a protective function of maternal behavior and mother-child relationships considered to be high in quality, some studies suggest that presumably

high-quality mother-child relationships may sometimes, paradoxically, exacerbate children's difficulties in the context of a difficult temperament. Although no studies thus far have found such paradoxical results with child temperamental anger specifically, some maternal behaviors that are generally considered to be of high quality might not be optimal in the context of child anger proneness. For example, mothers who react with acceptance and warmth to their child's displays of anger could inadvertently reinforce the child's aggressive behavior. Else, mothers who are very patient with their child's anger episodes could make it more difficult for the child to adapt to new environments wherein many peers and adults may be less tolerant, such as in school.

The current study

The objective of this study was to investigate the association between child anger proneness (assessed in toddlerhood by both parents) and child socio-emotional functioning at school entry, as well as the moderating role of the observed quality of mother-child interactions in these predictive links. In both kindergarten and Grade 1, socio-emotional functioning was indexed by child internalizing, externalizing and prosocial behavior reported by both parents. Because mothers' ability to effectively report on their child's behavior may be confounded with the quality of the relationship they have developed with him or her (Meins, Fernyhough, Fradley, & Tuckey, 2001), limiting shared-method variance with the use of father reports was important. In light of the literature presented above, it was expected that child temperamental anger would predict less prosocial behavior and more behavior problems at school entry. Significant interactions between child anger proneness and mother-child interactions were also expected. Although both directions of interaction are plausible as explained above, in line with the majority

of prior studies we expected that high-quality mother-child interactions would have a protective function in the relation between temperamental anger and child maladjustment.

Material and methods

Participants

Eighty-six families (46 girls, 40 boys) were recruited from random birth lists generated by the Ministry of Health and Social Services. Criteria for participation were full-term pregnancy and the absence of known developmental delays. Socio-demographic information was gathered upon recruitment (8 months). At that time, mothers were between 20 and 45 years old (*M* = 32) and fathers were between 21 and 50 years old (*M* = 34). Mothers had 16.1 years of education on average (varying from 11 to 18 years) and fathers, 15.6 years (varying from 11 to 21 years). The families' average income fell in the CDN$60,000 to CDN$79,000 bracket. Mean family income in Canada was CDN$74,600 for the years of data collection (Government of Canada, Statistics Canada, 2005). The majority of mothers and fathers were Caucasian (92.9%; 85.9%) and French-speaking (90.8%; 83.9%).

Procedure

Data were collected at three time points. To assess child anger proneness, both mothers and fathers completed the Anger proneness scale of the Toddler Behavior Assessment Questionnaire (described below) when children were 2 years old (T1; *M* = 25.4 months; *SD* = 1.1). The quality of mother-child interactions was assessed during a home visit at the same time. Mother and child were asked to play "grocery shopping": they were given a written list of food items (banana, milk, broccoli, etc.) that they had to find together and "purchase" (i.e., place the items in a basket). Small plastic representations of the 20 food items had previously been spread throughout the room (generally the family's living room), and the dyad had to collect them in the

order prescribed on their list, which did not correspond to the items' arrangement in the room. The interactions lasted approximately 10 minutes, were videotaped, and these videotapes were later coded by trained observers with the Mutually Responsive Orientation scale (described below).

When children were in kindergarten (T2; *M* = 72 months; *SD* = 2.6) and first grade (T3; *M* = 84.8 months; *SD* = 3.0), their mothers and fathers completed the Child Behavior Checklist and the Socio-Affective Profile (described below) to assess internalizing, externalizing, and prosocial behavior. Parents were invited to fill in the questionnaires separately and to return them by mail to our laboratory with provided pre-paid envelopes.

Measures

Toddler Behavior Assessment Questionnaire (TBAQ; Goldsmith, 1996). The TBAQ, translated and validated in French by Lemelin and colleagues (2007), evaluates five dimensions of temperament in children aged between 15 and 36 months. In this study, only the anger proneness scale was considered (28 items; α = .86 mothers and .88 fathers; e.g., *when your child wanted to play outside but you said "no", how often did she/he pout, frown, sulk, or look mad?*; *when you removed something your child should not have been playing with, how often did she/he scream?*). Given that mother and father reports showed good concordance (*r* = .32), they were averaged to allow for the use of psychometrically strong indicators of children's anger proneness (varying from 1 to 7). The anger proneness scale of the TBAQ shows satisfactory convergent validity with corresponding scales of other temperament questionnaires such as the Infant Characteristics Questionnaire (Bates, Freeland, & Lounsbury, 1979) and the Infant Behavior Questionnaire (Rothbart, 1986).

Mutually Responsive Orientation scale (MRO; Aksan et al., 2006). The MRO is a rating system that assesses the quality of parent-child interactions, with an emphasis on the mutual orientation responses observed during dyadic exchanges. It consists of three subscales: Harmonious Communication, Mutual Cooperation and Emotional Ambiance. The Harmonious Communication subscale (3 items; α = .88) refers to the level at which both verbal and nonverbal aspects of communication flow smoothly, are harmonious and promote intimacy. The Mutual Cooperation subscale (4 items; α = .73) evaluates dyads' efficacy in resolving potential sources of conflict and the extent to which partners are open to each other's influence. The Emotional Ambiance subscale (4 items; α = .74) measures how dyads enjoy an emotionally positive atmosphere, indicating clear pleasure in each other's company, and whether expressions of affection are a source of pleasure for both partners. These three subscales are averaged into a global score of mutual orientation response, varying from 1 to 5. A score of 1 represents disconnected, unresponsive, hostile, and/or affectively negative interactions. In contrast, a score of 5 suggests mutually responsive, cooperative, harmonious, and/or emotionally positive interactions between parent and child. The MRO has good reliability, with excellent internal consistency of the global score as reported by Aksan and colleagues (α = 0.90; 2006) and in this sample (α = .88). In the current study, 30% of dyads were independently double-coded. Excellent inter-rater reliability was observed (Intra-Class Correlation [ICC] = .93).

Child Behavior Checklist, 4-18 years version (CBCL; Achenbach, 1991; Achenbach & Edelbrock, 1983). The CBCL consists of 100 items with which parents are asked to describe their child on a 3-point scale (0 = does not apply to my child, 1 = sometimes true of my child, 2 = always or often true of my child). Scoring generates scores on six subscales, four of which are grouped into an internalizing problems dimension (36 items), that is, emotionally reactive,

anxious/depressed, somatic complaints, and withdrawn syndromes, whereas two others (aggressive behavior and attention problem syndromes) form an externalizing problems dimension (24 items). Owing to the moderate inter-parental concordance on the kindergarten (r = .40 internalizing; r = .66 externalizing) and first grade assessments (r = .48 internalizing; r = .33 externalizing), and to the moderate stability in both maternal (r = .48 internalizing; r = .49 externalizing) and paternal scores between kindergarten and first grade (r = .54 internalizing; r = .60 externalizing), the four scores were averaged, yielding two global scores for analysis: internalizing problems (α = .72) and externalizing problems (α = .77). The psychometric properties of the CBCL have been demonstrated repeatedly (Achenbach, 1991). The CBCL shows excellent test-retest reliability (average: r = .90; Achenbach & Rescorla, 2001) and its content validity is supported by its ability to discriminate clinical and non-clinical populations (Achenbach & Rescorla, 2001).

Socio-Affective Profile (SAP; LaFrenière, Dumas, Capuano, & Dubeau, 1992). The SAP assesses children's skills and difficulties in interaction with their peers or adults. In this study, the 10-item social competence subscale (a = .84; Tremblay, Vitaro, Gagnon, Piché, & Royer, 1992), which mainly refers to child prosocial behavior (e.g., *comforts or assists another child in difficulty*) was used, rated on a 6-point Likert scale (from almost never (1) to almost always (6)). Owing to the inter-parental concordance in kindergarten (r =.56) and first grade (r = .63), and to maternal (r = .55) and paternal (r = .60) stability, the four scores were averaged into a global index of prosocial behavior (α = .82). This subscale shows satisfactory convergent validity, predictive validity, and temporal stability (Tremblay et al., 1992).

Results

Preliminary Analyses

Table 1 presents the descriptive statistics for child anger proneness, the quality of mother-child interaction, and child internalizing, externalizing, and prosocial behavior. Temperamental anger scores were comparable to those reported by Goldsmith (1996; *M* = 4.10, *SD* = 0.79) as well as by Lemelin et al. (2007; *M* = 3.57, *SD* = 0.89) in their French-Canadian validation study. In the current sample, 14% of children scored in the clinical range (T-scores > 64) for internalizing problems and 12% for externalizing problems; comparable to the rates reported by Achenbach (1991) in the non-referred sample (18% for internalizing and 17% for externalizing problems). The prosocial behavior (*M* = 3.90, *SD* = 0.70; LaFrenière et al., 1992) and mother-child interaction scores (*M* = 2.97, *SD* = 0.41; Kochanska, Kim, Boldt, & Yoon, 2013) were also comparable to those reported in previous studies. All variables showed satisfactory variability. Screening of variable distributions revealed normal or near-normal distributions.

The zero-order correlations among key study variables are presented in Table 2. In line with previous studies, the correlations among internalizing, externalizing and prosocial behavior were modest to moderate (*r*s = -.53 to .56, *p*s < .01). The predictor (anger proneness) was not associated with the moderator (the quality of mother-child interaction; *p* = .46), which made for more easily interpretable interaction terms. Consistent with other studies, child anger proneness was positively related to externalizing behavior and negatively related to prosocial behavior (Eisenberg et al., 2001; Roberts, Strayer, & Denham, 2014). However, anger was not significantly correlated with child internalizing behavior at the bivariate level.

We also examined whether sociodemographic variables (child sex, child age, family SES) were related to children's functioning. As observed in previous studies (e.g., Zimmer-Gembeck, Geiger, & Crick, 2005), child sex was related to children's prosocial behavior (*r* = .22, *p* = .01); girls presented more prosocial behavior than boys. Child sex was unrelated to other aspects of

child socio-emotional functioning or to temperamental anger. Child age and family SES were unrelated to children's functioning or anger proneness (p's > .05). However, SES was positively (albeit weakly) associated with the quality of mother-child interactions (r = .14, p = .05) and consequently was co-varied in the subsequent main analyses, along with child sex.

Main Analyses

A series of multiple regressions was used next to examine the main and interactive effects of temperamental anger and quality of mother-child interactions in the prediction of children's externalizing, internalizing, and prosocial behavior. Each predictor variable was initially mean-centered, and interaction terms were formed as the product of the two centered predictors. A hierarchical order of entry of predictors was used, in which child sex and family SES were entered first (Block 1), followed by the main effects of the predictor variables (Block 2), and their interaction term (Block 3).

Results are presented in Table 3. Main effects of anger proneness were initially observed (Block 2) on all three aspects of child functioning, net of the effects of child sex, family SES, and quality of mother-child interactions. These effects remained significant in the final models for externalizing and prosocial behavior: higher temperamental anger was associated with more externalizing behavior and less prosocial behavior (although these effects were partly qualified by marginal interactions with the quality of mother-child interaction). In the case of internalizing behavior, the initial effect of anger was subsumed under a significant interaction, and was no longer significant in the final model. This interaction was broken down following Preacher, Curran, and Bauer's (2006) guidelines, plotting fitted regression lines at high (+ 1 SD) and low (-1 SD) values of the moderator, namely the quality of mother-child interactions. The trend-level interactions observed with externalizing and prosocial behavior were also broken down despite

their marginal nature with an exploratory aim, namely to examine whether their shape revealed phenomena similar to that at play with internalizing behavior.

Figure 1 illustrates that, among dyads characterized by higher quality of mother-child interaction, more temperamental anger was related to higher levels of internalizing problems ($\beta = .40$, $p < .001$). In contrast, anger was unrelated to subsequent internalizing problems ($\beta = -.06$, $p = .59$) among children exposed to lower-quality mother-child interactions. Although the interactions themselves did not reach statistical significance (and thus are not displayed graphically), the links between temperamental anger and child externalizing and prosocial behavior under conditions of low-quality ($\beta = .09$, $p = .64$; $\beta = -.10$, $p = .53$) and high-quality mother-child interactions ($\beta = .44$, $p < .001$; $\beta = -.44$, $p < .001$) were qualitatively comparable to those involving internalizing behavior. In other words, significant associations between temperament and adjustment were observed only when quality of mother-child interactions was high.

In all cases, and in contrast with temperamental anger, the quality of mother-child interactions was not directly related to child functioning after accounting for child sex, family SES, and child anger, and thus was involved in the prediction of child adjustment only through its moderating role described above.

Discussion

This study's objective was to investigate the role of temperamental anger in toddlerhood in the prediction of child socio-emotional functioning at school entry, and the moderating role of the quality of mother-child interactions in these associations. It was expected that child temperamental anger would predict higher behavior problems and lower prosocial behavior at school entry, and that high-quality mother-child interactions would have a protective function in

the relations between anger proneness and child maladjustment. The results showed that, as expected, anger proneness predicted higher internalizing and externalizing behavior, as well as lower prosocial behavior, when children reached school four to five years later, over and above family SES and child sex. However, these effects must be interpreted in the context of a significant interaction with mother-child interactions in the case of internalizing behavior (and are qualified by marginal interactions when considering externalizing and prosocial behaviors). We discuss temperament effects first, followed by the interactions.

Although long-term predictions of school entry adaptation from early temperament are uncommon, the current findings are broadly consistent with numerous studies that found anger proneness to be associated with poorer socio-emotional functioning in children (Eisenberg et al., 2009; Lehman et al., 2002; Lengua, 2006; Smeekens et al., 2007). One of the most obvious connections between anger and maladaptive functioning is the development of physical aggression (Averill, 2012), which represents a major component of externalizing problems. Anger also tends to intensify symptoms of depression and anxiety (Perlis et al., 2009) and contributes to the etiology of internalizing disorders (Mash & Barkley, 2014). Hence, anger proneness assessed as early as the age of 2 may be an important risk marker for the development of both internalizing and externalizing behavior problems, and such problems are likely to interfere with children's peer relationships and thus with their prosocial tendencies at school entry.

As mentioned earlier, in the case of internalizing behavior, the initial effect of anger was qualified by an interaction with the quality of mother-child interaction: anger proneness predicted higher internalizing behavior only among children who had higher-quality interactions with their mothers. In contrast, child anger was unrelated to internalizing problems among

children exposed to lower-quality mother-child interactions. To a lesser extent, two marginal interactions suggested qualitatively comparable sets of findings when predicting externalizing and prosocial behavior. Overall, temperamental anger in toddlerhood predicted socio-emotional difficulties at school entry mostly in the context of a more optimal mother-child relationship.

These findings suggesting more adjustment problems in the context of higher mother-child relationship quality are at odds with the widespread idea that high-quality relationships protect children against the deleterious consequences of sub-optimal temperament, such as high anger proneness. However, the current findings are similar to those of some previous studies that reported that temperamental dimensions associated with negative emotionality were related to more behavior problems especially in the context of presumably higher-quality parental behavior (Davis et al., 2015; Degnan & Fox 2007; Kiel & Buss, 2010, 2011; Mount et al., 2010). As proposed by Davis and colleagues (2015), one explanation could be that children prone to temperamental difficulty tend to struggle with self-regulation (Rothbart & Sheese, 2007; Shiner & Caspi, 2003). Well-meaning parents may provide more frequent reassurance when their children frequently exhibit negative emotions such as anger, and shield them from situations that elicit those negative emotions. In turn, this may lead children to rely excessively on their parents to regulate their emotions (Rubin, Hastings, Stewart, Henderson, & Chen, 1997), failing to develop self-regulatory skills. Such self-regulatory deficits can then place children at risk of gradually developing more internalizing problems, and to a lesser extent (according to the current results) more externalizing problems as well as less prosocial behavior.

A different explanation is that structured parenting, entailing behavioral control and limit-setting, is sometimes required when dealing with difficult children (e.g., those prone to anger). Thus, more competent parents may often use strict limit-setting when dealing with children

prone to anger, who are more likely to have anger outbursts and other behavioral manifestations requiring a firm parental response. While appropriate, such firm parenting may nonetheless generate anxiety and depression in children prone to anger, as parental control sharply confronts these children's behavioral predispositions (Morris et al., 2002). With time, the anxiety elicited by such antagonism between children's natural tendencies and parental responses may snowball into internalizing symptoms. Note that although maternal limit-setting is not captured by the MRO, previous studies have reported that higher mother-child relationship quality (as indexed in the current study by high MRO scores) is associated with more parental behavioral control and limit setting (e.g., Karavasilis, Doyle, & Markiewicz, 2003). This might explain, to some extent, the association between anger proneness and internalizing problems in the context of higher mother-child interactional quality observed here. This interpretation, based on the general notion of goodness-of-fit, is tentative and more research is needed to examine it formally.

Finally, it could be that a higher-quality mother-child relationship leaves more room for children's hereditary predispositions (in this case, temperamental anger) to be expressed. For example, Turkheimer, Haley, Waldron, D'Onofrio, and Gottesman (2003) found that the genetic and environmental contributions to child IQ varied according to family SES. In impoverished families, most of the variance in IQ was accounted for by the shared environment, with negligible genetic contribution. In higher-SES families, the result was almost exactly opposite. The authors interpreted these results as suggesting that genetic differences among individuals could be accentuated in favorable environments. Accordingly, a favorable mother-child relationship could represent an environment that allows child temperamental difficulties to unfold and create developmental cascades that negatively influence children's socio-emotional adjustment, as observed here at school entry.

The quality of mother-child interactions was not directly predictive of child functioning after accounting for child sex, family SES, and child temperamental anger. While unexpected, this finding is consistent with some studies that found no direct contribution of parenting to the prediction of child internalizing and externalizing behavior problems (Crockenberg & Leerkes, 2006; Lengua, 2008). In fact, meta-analytic studies reveal relatively small associations between parenting and child externalizing (r = .24; Rothbaum & Weisz, 1994) and internalizing behavior (rs = .21 to .28; McLeod, Weisz, & Wood, 2007; McLeod, Wood, & Weisz, 2007). Moreover, Fraley, Roisman, and Haltigan (2013) found that effect sizes of relations between early parenting and child functioning diminish rapidly over time, which may be explained by the fact that mother-child relationship quality is only moderately stable (e.g., Meins, Bureau, & Fernyhough, 2018; Pinquart, Feußner, & Ahnert, 2013). Accordingly, given the four- to five-year delay between the assessment of mother-child interactions and that of child socio-emotional adjustment used here, this study may have failed to detect what are potentially small effects.

This study presents some methodological limitations that call for careful interpretation of the results. Given the correlational design, we cannot conclude that the associations observed are indicative of causal relations. The modest sample size (although not unusual in labor-intensive longitudinal parenting research) weakened statistical power, perhaps contributing to the fact that some interactive effects were marginally significant. The low-risk nature of the sample also limited variation in the lower-end of mother-child relationship quality and the higher-end of children's behavior problems. More variation might have yielded other significant interaction effects. Moreover, an observational measure of child temperamental anger would have provided a useful complement to the parent reports that we used (Lemery, Essex, & Smider, 2002). Finally, this study did not account for what is arguably a salient parental influence, namely the

quality of father-child interactions. Steele and Steele (2005) argued that mother-child relationships may be particularly important for children's self-understanding and dealing with inner conflicts (akin to internalizing behavior), whereas father-child relationships may be especially salient for dealing with the outside world (e.g., interactions with peers, closely related to externalizing and prosocial behavior). Thus, a hypothesis that we could not test in this study is that the quality of father-child relationships may moderate the links between child temperament and externalizing and prosocial behaviors.

These limitations are to be considered in the context of the study's methodological strengths. The fact that child anger proneness was assessed by both parents, and with good convergence, somewhat attenuates the concern that anger was parent-reported only. The quality of mother-child interaction was assessed in the families' homes with a well-validated observational measure, which showed excellent reliability. Four and five years later, children's socio-emotional adjustment was also reported by both parents and over two consecutive years, making for psychometrically strong outcomes. Lastly, the longitudinal design is useful in suggesting that temperamental anger assessed as early as two years of age may have unique and long-lasting consequences for children's socio-emotional functioning when they enter school.

Conclusion

School entry represents an important transitional point for child development and the current results suggest that certain combinations of child temperament and mother-child relationship may adversely affect children's socio-emotional functioning in this developmental period. These findings add to the understanding of how the complex interplay between children's affective predispositions and their family context contributes to their socio-emotional adjustment at school entry. In all likelihood, however, the associations between child temperament, quality

of parent-child relationships, and child functioning are much more complex than this study could investigate. These associations probably vary according to aspects of child temperament, child functioning and parent-child relationships assessed, as well as across populations and developmental periods. Given the well-demonstrated predictive power of socio-emotional skills in the prediction of children's school trajectories (Blair & Raver, 2015), more attention should be paid to how these skills are shaped by transactions between children and their early caregiving environment.

References

Achenbach, T. (1991). *Child behavior checklist/4-18.* Burlington: University of Vermont.

Achenbach, T. M., & Edelbrock, C. (1983). *Manual for the child behavior checklist and revised child behavior profile.* Burlington: University of Vermont.

Achenbach, T. M., & Rescorla, L. (2001). *Manual for the ASEBA school-age forms & profiles.* Burlington: University of Vermont.

Aksan, N., Kochanska, G., & Ortmann, M. R. (2006). Mutually responsive orientation between parents and their young children: Toward methodological advances in the science of relationships. *Developmental Psychology*, *42*, 833-848. doi:10.1037/0012-1649.42.5.833

Atkinson, L., Gonzalez, A., Kashy, D. A., Santo Basile, V., Masellis, M., Pereira, J., ... & Levitan, R. (2013). Maternal sensitivity and infant and mother adrenocortical function across challenges. *Psychoneuroendocrinology*, *38*, 2943-2951. doi:10.1016/ j.psyneuen.2013.08.001

Averill, J. R. (2012). *Anger and aggression: An essay on emotion*. New York, NY: Springer-Verlag.

Bates, J. E., Freeland, C. A. B., & Lounsbury, M. L. (1979). Measurement of infant difficultness. *Child Development*, 794-803. doi:10.2307/1128946

Belsky, J., & Pluess, M. (2009). Beyond diathesis stress: Differential susceptibility to environmental influences. *Psychological Bulletin*, *135*, 885–908. doi:10.1037/a0017376

Bernier, A., Calkins, S. D., & Bell, M. A. (2016). Longitudinal associations between the quality of mother–infant interactions and brain development across infancy. *Child Development*, *87*, 1159–1174. doi:10.1111/cdev.12518

Blair, C., & Raver, C. C. (2015). School readiness and self-regulation: A developmental psychobiological approach. *Annual Review of Psychology*, *66*, 711–731. doi:10.1146/annurev-psych-010814-015221

Bosquet, M., & Egeland, B. (2006). The development and maintenance of anxiety symptoms from infancy through adolescence in a longitudinal sample. *Development and Psychopathology*, *18*, 517–550. doi:10.1017/s0954579406060275

Brownell, C. A., & Kopp, C. B. (Eds.). (2007). Transitions in toddler socioemotional development. *Socioemotional development in the toddler years: Transitions and transformations* (pp. 1–40). New York, NY: The Guilford Press.

Bruder, M. B. (2010). Early childhood intervention: A promise to children and families for their future. *Exceptional Children*, *76*, 339–355. doi:10.1177/001440291007600306

Calkins, S. D., & Hill, A. (2007). Caregiver influences on emerging emotion regulation. In J. Gross (Ed.), *Handbook of emotion regulation* (pp. 229–248). New York, NY: Guilford Press.

Chaplin, T. M., & Cole, P. M. (2005). The role of emotion regulation in the development of psychopathology. In B. L. Hankin & J. R. Z. Abela (Eds.), *Development of Psychopathology: A Vulnerability-Stress Perspective* (pp. 49–74). California, TO: Sage.

Chess, S., & Thomas, A. (1991). Temperament and the concept of goodness of fit. In J. Strelau & A. Angleitner (Eds.), *Explorations in temperament* (pp. 15–28). New York, NY: Springer US.

Collins, W. A., Maccoby, E. E., Steinberg, L., Hetherington, E. M., & Bornstein, M. H. (2000). Contemporary research on parenting: The case for nature and nurture. *American Psychologist*, *55*, 218–232. doi:10.1037//0003-066x.55.2.218

Contreras, J. M., Kerns, K. A., Weimer, B. L., Gentzler, A. L., & Tomich, P. L. (2000). Emotion regulation as a mediator of associations between mother–child attachment and peer relationships in middle childhood. *Journal of Family Psychology*, *14*, 111–124. doi:10.1037//0893-3200.14.1.111

Cowan, P. A., Cowan, C. P., Ablow, J. C., Johnson, V. K., & Measelle, J. R. (2005). *The family context of parenting in children's adaptation to elementary school*. Mahwah, NJ: Lawrence Erlbaum Associates.

Crockenberg, S. C., & Leerkes, E. M. (2006). Infant and maternal behavior moderate reactivity to novelty to predict anxious behavior at 2.5 years. *Development and Psychopathology*, *18*, 17–34. doi:10.1017/s0954579406060020

Davis, S., Votruba-Drzal, E., & Silk, J. S. (2015). Trajectories of internalizing symptoms from early childhood to adolescence: Associations with temperament and parenting. *Social Development*, *24*, 501–520. doi:10.1111/sode.12105

Degnan, K. A., & Fox, N. A. (2007). Behavioral inhibition and anxiety disorders: Multiple levels of a resilience process. *Development and Psychopathology*, *19*, 729–746. doi:10.1017/s0954579407000363

Dodge, K. A., Coie, J. D., & Lynam, D. (2006). Aggression and antisocial behavior in youth. In W. Damon & R. M. Lerner (Series Ed.) and N. Eisenberg (Vol. Ed.*), Handbook of child psychology. Vol. 3. Social, emotional, and personality development* (6th ed.). New York, NY: Wiley.

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., ... & Sexton, H. (2007). School readiness and later achievement. *Developmental Psychology*, *43*, 1428–1446. doi:10.1037/0012-1649.43.6.1428

Duncan, G. J., & Magnuson, K. (2011). The nature and impact of early achievement skills, attention skills, and behavior problems. In G. J. Duncan & R.J. Murnane (Eds.), *Whither opportunity?: Rising inequality, schools, and children's life chances* (pp. 47–70). New York, NY: Russell Sage Foundation.

Eisenberg, N., Cumberland, A., Spinrad, T. L., Fabes, R. A., Shepard, S. A., Reiser, M., ... & Guthrie, I. K. (2001). The relations of regulation and emotionality to children's externalizing and internalizing problem behavior. *Child Development*, *72*, 1112–1134. doi:10.1111/1467-8624.00337

Eisenberg, N., Valiente, C., Spinrad, T. L., Cumberland, A., Liew, J., Reiser, M., ... & Losoya, S. H. (2009). Longitudinal relations of children’s effortful control, impulsivity, and negative emotionality to their externalizing, internalizing, and co-occurring behavior problems. *Developmental Psychology*, *45*, 988–1008. doi:10.1037/a0016213

Eisenberg, N., Vaughan, J., & Hofer, C. (2009). Temperament, self-regulation, and peer social competence. In K. H. Rubin, W. M. Bukowski, & B. Laursen (Eds.), *Handbook of Peer Interactions, Relationships, and Groups* (pp. 473–489). New York, NY: Guilford Press.

Engle, J. M., & McElwain, N. L. (2011). Parental reactions to toddlers' negative emotions and child negative emotionality as correlates of problem behavior at the age of three. *Social Development*, *20*, 251-271. doi:10.1111/j.1467-9507.2010.00583.x

Entwisle, D. R., Alexander, K. L., & Olson, L. S. (2005). First grade and educational attainment by age 22: A new story. *American Journal of Sociology*, *110*, 1458–1502. doi:10.1086/428444

Fearon, R. P., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Lapsley, A. M., & Roisman, G. I. (2010). The significance of insecure attachment and disorganization in the development of children's externalizing behavior: A meta-analytic study. *Child Development*, *81*, 435–456. doi:10.1111/j.1467-8624.2009.01405.x

Feldman, R. (2003). Infant–mother and infant–father synchrony: The coregulation of positive arousal. *Infant Mental Health Journal*, *24*, 1–23. doi:10.1002/imhj.10041

Fox, G. (2006). Development in family contexts. In L. Combrinck-Graham (Ed.), *Children in family contexts: Perspectives on treatment* (pp. 26–50). New York, NY: Guilford Press.

Fraley, R. C., Roisman, G. I., & Haltigan, J. D. (2013). The legacy of early experiences in development: Formalizing alternative models of how early experiences are carried forward over time. *Developmental Psychology*, *49*, 109–126. doi:10.1037/a0027852.supp

Goldsmith, H. H. (1996). Studying temperament via construction of the Toddler Behavior Assessment Questionnaire. *Child Development*, *67*, 218–235. doi:10.2307/1131697

Goldsmith, H. H., & Campos, J. J. (1990). The structure of temperamental fear and pleasure in infants: A psychometric perspective. *Child Development*, *61*, 1944–1964. doi:10.2307/1130849

Government of Canada, Statistics Canada. (2005). *Statistics Canada*. Retrieved from https://www.statcan.gc.ca

Grolnick, W. S., Price, C. E., Beiswenger, K. L., & Sauck, C. C. (2007). Evaluative pressure in mothers: Effects of situation, maternal, and child characteristics on autonomy supportive versus controlling behavior. *Developmental Psychology*, *43*, 991–1002. doi:10.1037/0012-1649.43.4.991

Hemphill, R. A., & Sanson, A. (2001). Matching parenting to child temperament. *Family Matters*, *59*, 42–47.

Janson, H., & Mathiesen, K. S. (2008). Temperament profiles from infancy to middle childhood: Development and associations with behavior problems. *Developmental Psychology*, *44*, 1314–1328. doi:10.1037/a0012713

Karavasilis, L., Doyle, A. B., & Markiewicz, D. (2003). Associations between parenting style and attachment to mother in middle childhood and adolescence. *International Journal of Behavioral Development*, *27*, 153–164. doi:10.1080/0165025024400015

Kazdin, A.E. (2016). *Methodological issues and strategies in clinical research (4th edition)*. Washington, DC: American Psychological Association.

Kiel, E. J., & Buss, K. A. (2010). Maternal accuracy and behavior in anticipating children's responses to novelty: Relations to fearful temperament and implications for anxiety development. *Social Development*, *19*, 304–325. doi :10.1111/j.1467-9507.2009.00538.x

Kiel, E. J., & Buss, K. A. (2011). Prospective relations among fearful temperament, protective parenting, and social withdrawal: The role of maternal accuracy in a moderated mediation framework. *Journal of Abnormal Child Psychology*, *39*, 953–966. doi:10.1007/s10802-011-9516-4

Kochanska, G., Forman, D. R., Aksan, N., & Dunbar, S. B. (2005). Pathways to conscience: Early mother–child mutually responsive orientation and children's moral emotion, conduct, and cognition. *Journal of Child Psychology and Psychiatry*, *46*, 19–34. doi:10.1111/j.1469-7610.2004.00348.x

Kochanska, G., Kim, S., Boldt, L. J., & Yoon, J. E. (2013). Children's callous-unemotional traits moderate links between their positive relationships with parents at preschool age and externalizing behavior problems at early school age. *Journal of Child Psychology and Psychiatry*, *54*, 1251–1260. doi:10.1111/jcpp.12084

Ladd, G. W. (2004). Probing the adaptive significance of children's behavior and relationships in the school context: A child by environment perspective. *Advances in Child Development and Behavior*, *31*, 43–104. doi:10.1016/s0065-2407(03)31002-x

Ladd, G. W., & Dinella, L. M. (2009). Continuity and change in early school engagement: Predictive of children's achievement trajectories from first to eighth grade? *Journal of Educational Psychology*, *101*, 190–206. doi:10.1037/a0013153

Ladd, G. W., Kochenderfer, B. J., & Coleman, C. C. (1996). Friendship quality as a predictor of young children's early school adjustment. *Child Development*, *67*, 1103–1118. doi:10.1111/j.1467-8624.1996.tb01785.x

LaFrenière, P. J., Dumas, J. E., Capuano, F., & Dubeau, D. (1992). Development and validation of the Preschool Socioaffective Profile. *Psychological Assessment*, *4*, 442–450. doi:10.1037//1040-3590.4.4.442

Leerkes, E. M., Blankson, A. N., & O'Brien, M. (2009). Differential effects of maternal sensitivity to infant distress and nondistress on social-emotional functioning. *Child Development*, *80*, 762–775. doi:10.1111/j.1467-8624.2009.01296.x

Lehman, E. B., Steier, A. J., Guidash, K. M., & Wanna, S. Y. (2002). Predictors of compliance in toddlers: Child temperament, maternal personality, and emotional availability. *Early Child Development and Care*, *172*, 301–310. doi:10.1080/03004430212124

Lemelin, J. P., Tarabulsy, G. M., Provost, M. A., Fournier, M., Robitaille, J., Hémond, I., & Tessier, R. (2007). Questionnaire d'évaluation du comportement de l'enfant: Version canadienne française du Toddler Behavior Assessment Questionnaire. *Canadian Journal of Behavioural Science*, *39*, 291–300. doi:10.1037/cjbs2007021

Lemerise, E. A., & Dodge, K. A. (2008). The development of anger and hostile interactions. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (Eds.), *Handbook of emotions* (pp. 730–741). New York, NY: The Guilford Press.

Lemery, K. S., Essex, M. J., & Smider, N. A. (2002). Revealing the relation between temperament and behavior problem symptoms by eliminating measurement confounding: Expert ratings and factor analyses. *Child Development*, *73*, 867–882. doi:10.1111/1467-8624.00444

Lengua, L. J. (2006). Growth in temperament and parenting as predictors of adjustment during children's transition to adolescence. *Developmental Psychology*, *42*, 819–832. doi:10.1037/0012-1649.42.5.819

Lengua, L. J. (2008). Anxiousness, frustration, and effortful control as moderators of the relation between parenting and adjustment in middle-childhood. *Social Development*, *17*, 554–577. doi:10.1111/j.1467-9507.2007.00438.x

Mash, E. J., & Barkley, R. A. (2014). *Child psychopathology*. New York, NY: Guilford Press.

Masten, A. S., Roisman, G. I., Long, J. D., Burt, K. B., Obradović, J., Riley, J. R., ... & Tellegen, A. (2005). Developmental cascades: Linking academic achievement and externalizing and internalizing symptoms over 20 years. *Developmental Psychology*, *41*, 733–746. doi:10.1037/0012-1649.41.5.733

McLeod, B. D., Weisz, J. R., & Wood, J. J. (2007). Examining the association between parenting and childhood depression: A meta-analysis. *Clinical Psychology Review*, *27*, 986–1003. doi:10.1016/j.cpr.2007.03.001

McLeod, B. D., Wood, J. J., & Weisz, J. R. (2007). Examining the association between parenting and childhood anxiety: A meta-analysis. *Clinical Psychology Review*, *27*, 155–172. doi:10.1016/j.cpr.2006.09.002

Meins, E., Bureau, J. F., & Fernyhough, C. (2018). Mother–child attachment from infancy to the preschool years: Predicting security and stability. *Child Development*, *89*, 1022–1038. doi:10.1111/cdev.12778

Morris, A. S., Silk, J. S., Steinberg, L., Sessa, F. M., Avenevoli, S., & Essex, M. J. (2002). Temperamental vulnerability and negative parenting as interacting predictors of child adjustment. *Journal of Marriage and Family*, *64*, 461-471. doi:10.1111/j.1741-3737.2002.00461.x

Mount, K. S., Crockenberg, S. C., Jó, P. S. B., & Wagar, J. L. (2010). Maternal and child correlates of anxiety in 2½-year-old children. *Infant Behavior and Development*, *33*, 567–578. doi:10.1016/j.infbeh.2010.07.008

Palermo, F., Hanish, L. D., Martin, C. L., Fabes, R. A., & Reiser, M. (2007). Preschoolers' academic readiness: What role does the teacher–child relationship play? *Early Childhood Research Quarterly*, *22*, 407–422. doi:10.1016/j.ecresq.2007.04.002

Pallini, S., Baiocco, R., Schneider, B. H., Madigan, S., & Atkinson, L. (2014). Early child–parent attachment and peer relations: A meta-analysis of recent research. *Journal of Family Psychology*, *28*, 118–123. doi:10.1037/a0035736

Pedersen, S., Vitaro, F., Barker, E. D., & Borge, A. I. (2007). The timing of middle-childhood peer rejection and friendship: Linking early behavior to early-adolescent adjustment. *Child Development*, *78*, 1037–1051. doi:10.1111/j.1467-8624.2007.01051.x

Penela, E. C., Henderson, H. A., Hane, A. A., Ghera, M. M., & Fox, N. A. (2012). Maternal caregiving moderates the relation between temperamental fear and social behavior with peers. *Infancy*, *17*, 715–730. doi:10.1111/j.1532-7078.2012.00114.x

Perlis, R. H., Fava, M., Trivedi, M. H., Alpert, J., Luther, J. F., Wisniewski, S. R., & John Rush, A. (2009). Irritability is associated with anxiety and greater severity, but not bipolar spectrum features, in major depressive disorder. *Acta Psychiatrica Scandinavica*, *119*, 282–289. doi:10.1111/j.1600-0447.2008.01298.x

Perlman, S. B., & Pelphrey, K. A. (2010). Regulatory brain development: Balancing emotion and cognition. *Social Neuroscience*, *5*, 533–542. doi:10.1080/17470911003683219

Pianta, R. C., Cox, M. J., & Snow, K. L. (2007). *School readiness and the transition to kindergarten in the era of accountability*. Baltimore, MD: Paul H. Brookes Publishing.

Pinquart, M., Feußner, C., & Ahnert, L. (2013). Meta-analytic evidence for stability in attachments from infancy to early adulthood. *Attachment & Human Development*, *15*, 189–218. doi:10.1080/14616734.2013.746257

Preacher, K. J., Curran, P. J., & Bauer, D. J. (2006). Computational tools for probing interactions in multiple linear regression, multilevel modeling, and latent curve analysis. *Journal of Educational and Behavioral Statistics*, *31*, 437–448. doi:10.3102/10769986031004437

Putnam, S. P., Sanson, A. V., & Rothbart, M. K. (2002). Child temperament and parenting. In M. H. Bornstein (Ed.), *Handbook of parenting: Volume I: Children and parenting* (pp. 255–277). Mahwah, NJ: Lawrence Erlbaum Associates.

Rettew, D. C., Copeland, W., Stanger, C., & Hudziak, J. J. (2004). Associations between temperament and DSM-IV externalizing disorders in children and adolescents. *Journal of Developmental and Behavioral Pediatrics*, *25*, 383–391. doi:10.1097/00004703-200412000-00001

Roberts, W., Strayer, J., & Denham, S. (2014). Empathy, anger, guilt: Emotions and prosocial behaviour. *Canadian Journal of Behavioural Science*, *46*, 465–474. doi:10.1037/a0035057

Rothbart, M. K. (1986). Longitudinal observation of infant temperament. *Developmental Psychology*, *22*, 356–365. doi:10.1037//0012-1649.22.3.356

Rothbart, M. K. (2011). *Becoming who we are: Temperament and personality in development*. New York, NY: Guilford Press.

Rothbart, M. K., & Sheese, B. E. (2007). Temperament and Emotion Regulation. In J. Gross (Ed.), *Handbook of emotion regulation* (pp. 331–350). New York, NY: Guilford Press.

Rothbaum, F., & Weisz, J. R. (1994). Parental caregiving and child externalizing behavior in nonclinical samples: A meta-analysis. *Psychological Bulletin*, *116*, 55–74. doi:10.1037//0033-2909.116.1.55

Rubin, K. H., Hastings, P. D., Stewart, S. L., Henderson, H. A., & Chen, X. (1997). The consistency and concomitants of inhibition: Some of the children, all of the time. *Child Development*, *68*, 467–483. doi:10.2307/1131672

Sanson, A., Hemphill, S. A., & Smart, D. (2004). Connections between temperament and social development: A review. *Social Development*, *13*, 142–170. doi :10.1046/j.1467-9507.2004.00261.x

Schofield, H. L. T., Bierman, K. L., Heinrichs, B., & Nix, R. L. (2008). Predicting early sexual activity with behavior problems exhibited at school entry and in early adolescence. *Journal of Abnormal Child Psychology*, *36*, 1175–1188. doi:10.1007/s10802-008-9252-6

Seifer, R. (2000). Temperament and goodness of fit. In A. J. Sameroff, M. Lewis, & S. M. Miller (Eds.), *Handbook of developmental psychopathology* (pp. 257–276). New York, NY: Springer US.

Shiner, R., & Caspi, A. (2003). Personality differences in childhood and adolescence: Measurement, development, and consequences. *Journal of Child Psychology and Psychiatry*, *44*, 2–32. doi:10.1111/1469-7610.00101

Slagt, M., Dubas, J. S., Deković, M., & Van Aken, M. A. (2016). Differences in sensitivity to parenting depending on child temperament: A meta-analysis. *Psychological Bulletin*, *142*, 1068–1110. doi:10.1037/bul0000061

Smeekens, S., Riksen-Walraven, J. M., & Van Bakel, H. J. (2007). Multiple determinants of externalizing behavior in 5-year-olds: A longitudinal model. *Journal of Abnormal Child Psychology*, *35*, 347–361. doi:10.1007/s10802-006-9095-y

Steele, H., & Steele, M. (2005). The construct of coherence as an indicator of attachment security in middle childhood: The Friends and Family Interview. In K. Kerns & R. Richardson (Eds.), *Attachment in Middle Childhood*. New York, NY: The Guilford Press.

Suveg, C., & Zeman, J. (2004). Emotion regulation in children with anxiety disorders. *Journal of Clinical Child and Adolescent Psychology*, *33*, 750–759. doi:10.1207/s15374424jccp3304_10

Therriault, D., Lemelin, J. P., Tarabulsy, G. M., & Provost, M. A. (2011). Direction des effets entre le tempérament de l'enfant et la sensibilité maternelle. *Canadian Journal of Behavioural Science*, *43*, 267–278. doi:10.1037/a0024309

Tremblay, R. E., Vitaro, F., Gagnon, C., Piché, C., & Royer, N. (1992). A prosocial scale for the Preschool Behaviour Questionnaire: Concurrent and predictive correlates. *International Journal of Behavioral Development*, *15*, 227–245. doi:10.1177/016502549201500204

Turkheimer, E., Haley, A., Waldron, M., D'Onofrio, B., & Gottesman, I. I. (2003). Socioeconomic status modifies heritability of IQ in young children. *Psychological Science*, *14*, 623–628. doi:10.1046/j.0956-7976.2003.psci_1475.x

Van Der Bruggen, C. O., Stams, G. J. J., & Bögels, S. M. (2008). Research review: The relation between child and parent anxiety and parental control: A meta-analytic review. *Journal of Child Psychology and Psychiatry*, *49*, 1257–1269. doi:10.1111/j.1469-7610.2008.01898.x

Wilkowski, B. M., Robinson, M. D., & Troop-Gordon, W. (2010). How does cognitive control reduce anger and aggression? The role of conflict monitoring and forgiveness processes. *Journal of Personality and Social Psychology*, *98*, 830–840. doi:10.1037/a0018962

Zentner, M., & Shiner, R. L. (2015). *Handbook of temperament*. New York, NY: Guilford Press.

Zhou, Q., Eisenberg, N., Wang, Y., & Reiser, M. (2004). Chinese children's effortful control and dispositional anger/frustration: Relations to parenting styles and children's social functioning. *Developmental Psychology*, *40*, 352–366. doi:10.1037/0012-1649.40.3.352

Zimmer-Gembeck, M. J., Geiger, T. C., & Crick, N. R. (2005). Relational and physical aggression, prosocial behavior, and peer relations: Gender moderation and bidirectional associations. *The Journal of Early Adolescence*, *25*, 421–452. doi:10.1177/027243160527984

Table 1

Range, Mean (M), and Standard Deviation (SD) for all Main Variables

Main variables	Range	*M*	*SD*
Anger proneness (composite)	2.21 - 5.70	3.83	0.69
Mother report	2.21 - 5.93	3.87	0.76
Father report	1.95 - 5.93	3.75	0.76
Mother-child interactions	1.88 - 4.83	3.64	0.61
Internalizing behavior (composite)	0 - 29	7.92	5.32
Mother report (K)	0 - 33	8.77	6.36
Mother report (G1)	0 - 34	8.23	7.04
Father report (K)	0 - 34	8.29	6.61
Father report (G1)	0 - 26	6.93	6.09
Externalizing behavior (composite)	0 - 33	8.98	5.82
Mother report (K)	0 - 34	9.40	7.02
Mother report (G1)	0 - 37	9.58	7.16
Father report (K)	0 - 38	8.41	6.80
Father report (G1)	0 - 24	7.77	5.68
Prosocial behavior (composite)	3.28 - 5.70	4.25	0.47
Mother report (K)	3.20 - 5.70	4.28	0.54
Mother report (G1)	2.80 - 5.50	4.32	0.56
Father report (K)	2.80 - 5.30	4.15	0.52
Father report (G1)	2.80 - 5.50	4.15	0.55

Note. K = kindergarten, G1 = first grade.

Table 2

Zero-Order Correlations among all Study Variables

	1	2	3	4	5	6	7	8
1. Child sex	…	-.07	.02	-.10	.12	.08	-.11	.22*
2. SES		…	.04	.11	.14*	-.07	-.02	-.07
3. Child age			…	.05	-.08	-.06	-.06	-.10
4. Anger proneness				…	-.06	.21	.29**	-.30**
5. Mother-child interactions					…	-.09	-.03	.04
6. Internalizing behavior						…	.56***	-.28**
7. Externalizing behavior							…	-.53***
8. Prosocial behavior								…

Note. Child sex: 1 = boys, 2 = girls.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$

Table 3

Regression Analyses: Anger Proneness and Mother-Child Interactions Predicting Child Functioning

	Child functioning					
	Internalizing behavior		Externalizing behavior		Prosocial behavior	
	β when first entered	β in final model	β when first entered	β in final model	β when first entered	β in final model
B1ock 1:						
Child sex	.09	.11	-.11	-.08	.27**	.26*
SES	-.13	-.10	.03	.01	-.09	-.09
B1ock 2:						
Anger	.22*	.16	.29**	.24*	-.28**	-.24*
Mother-child interactions	-.03	-.06	.03	-.00	-.04	-.02
B1ock 3 :						
Anger X Mother-child interactions		.24*		.19 t		-.19 t
Model's total R^2	.13		.13		.19	

Note. Child sex: 1 = boys, 2 = girls.
t $p < .10$. * $p < .05$. ** $p < .01$.

Figure 1

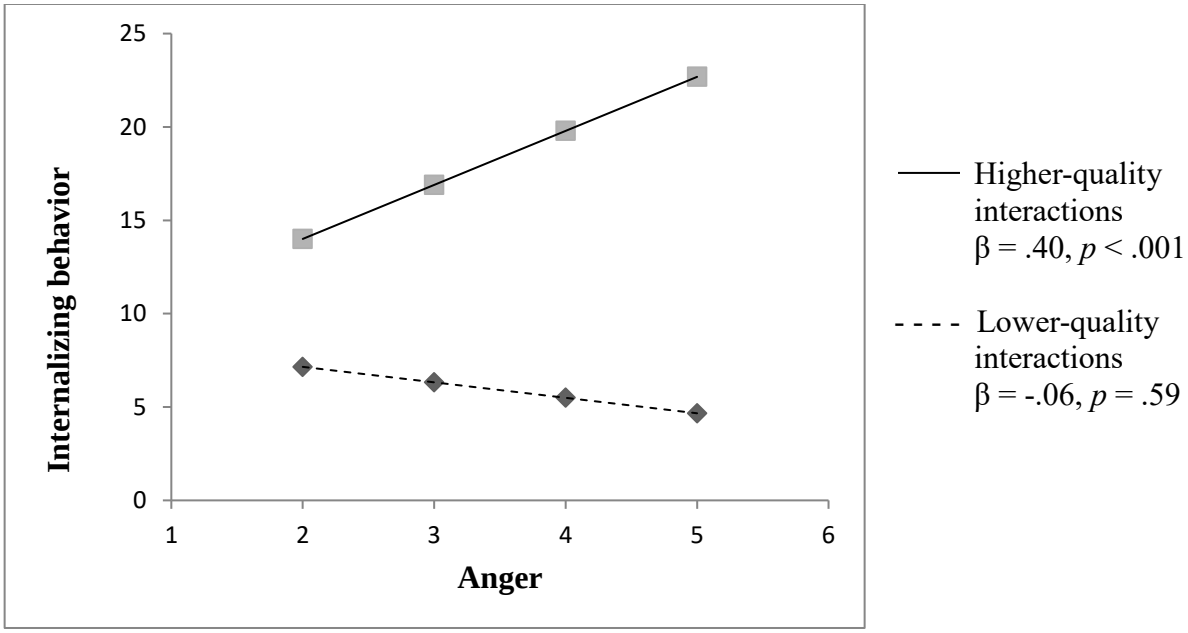

Figure 1. Child anger proneness and mother-child interactions predicting child internalizing behavior. The regression lines were plotted at high (+ 1 SD) and low (- 1 SD) values of the quality of mother-child interactions.