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Regular Article

Considering heterogeneity within negative emotionality can inform the distinction between diathesis-stress and differential susceptibility: Children's early anger and fear as moderators of effects of parental socialization on antisocial conduct

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Abstract

The importance of interactions between child temperament and parenting has been accepted ever since Thomas and Chess (1977) proposed their "goodness-of-fit" construct, but over the last three decades, pertinent research has grown exponentially. Researchers examining child characteristics that can moderate the effects of socialization have tested increasingly complex, nuanced, and sophisticated models, largely inspired by the highly influential frameworks of child plasticity or differential susceptibility (Belsky & Pluess, 2009). Yet, multiple questions remain unsettled. We addressed four such questions as applied to predicting children's observed disregard for rules at age 4.5 in a study of 200 community families from the US Midwest. (a) We examined children's observed negative emotionality at 16 months, most commonly seen as a plasticity "trait," but separating anger and fear proneness, which may differently moderate effects of socialization. (b) We examined two separate aspects of observed parental socialization at age 3, mutually responsive orientation and power assertion. (c) We distinguished analytically diathesis-stress from differential susceptibility. (d) We examined all effects in mother– and father–child relationships. We supported both diathesis-stress and differential susceptibility, depending on the facet of negative emotionality, the aspect of socialization considered, and parental gender, highlighting the nuanced nature of the processes involved.

Keywords: Anger; diathesis-stress; differential susceptibility; disregard for rules; fear

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Introduction

In developmental psychology and psychopathology, few questions have been more fundamental than the role of parental socialization and child biologically based characteristics as contributors to individual differences in children's developmental outcomes. Historically, early psychoanalytic and learning theories viewed parents' child-rearing as a key influence, but later, the focus increasingly shifted to children's biologically based temperament, reflecting the changing conceptual landscape of the field, informed by progress in neurosciences, psychobiology, psychophysiology, and genetics. Already in the 1970s, Thomas and Chess (1977), in what is often considered the first longitudinal modern research on children's temperament, introduced their influential concept of "goodness of fit" between the child's biological characteristics and the socialization environment created by the parents. They framed goodness of fit as a key determinant of children's future developmental outcomes. Soon, research on child temperament in the 1980s and 1990s grew exponentially (e.g., Buss & Plomin, 1984; Goldsmith et al., 1987; Rothbart & Bates, 1998). A view that the child's biological characteristics can moderate the effects of parenting the child receives (e.g., organismic specificity, Wachs & Gandour, 1983) became widely accepted, ultimately rendering the "nurture versus nature" contradiction moot and obsolete (Thompson, 2015).

But perhaps the most transformational development occurred in the 1990s, when Belsky (1997) proposed the construct of "susceptibility to rearing influences" to describe individual differences in how children respond to or are affected by their socialization experiences. Over the last two decades, that approach has proved extraordinarily influential and heuristically productive, resulting in massive, exponentially growing bodies of literature, well beyond the scope of this article. Extensive research on related concepts of differential susceptibility, differential sensitivity to environmental influences, or child plasticity has substantially transformed and informed our understanding of children's adaptive and maladaptive development and pathways of risk and resilience. Multiple reviews summarize this important work (e.g., Bakermans-Kranenburg & van IJzendoorn, 2007; Belsky & Pluess, 2009; Belsky et al., 2007; Ellis et al., 2011; Ellis & Boyce, 2011; Ellis & Del Giudice, 2014, 2019; Kiff et al., 2011; Pluess, 2015; Slagt et al., 2016).

Within that massive and rich area, extensive scholarly efforts have focused on determining children's traits or characteristics

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that may serve as putative markers of plasticity, sensitivity, or differential susceptibility. A relative consensus appears to be that children's negative emotionality, often referred to as difficulty or difficult temperament, is the prime candidate for the plasticity or differential susceptibility marker, especially when examined as a moderator of the effects of parenting. A recent comprehensive meta-analysis (Slagt et al., 2016) supported the role of negative emotionality or difficult temperament – but not of other traits – as a consistent moderator of parenting across a range of children's outcomes.

The focus on negative emotionality has historical roots in work on the origins of children's psychopathology and the earlier concept of diathesis-stress. In that work, children's negative emotionality or difficult temperament have been typically viewed as a transdiagnostic diathesis for a range of future disorders, both internalizing and externalizing. Highly difficult or emotionally negative infants and toddlers have been seen as vulnerable to future maladaptive outcomes (Bates, 1980; Lengua & Wachs, 2012; Rothbart & Bates, 2006; Sanson et al., 2004; Thomas & Chess, 1977), and particularly so if parenting they received was negative, harsh, unresponsive, hostile, rejecting, or unsupportive. However, positive, warm, and supportive parenting could buffer the risk, with difficult children developing no worse than their easy peers. Of note, what constitutes "negative" or "positive" parenting can vary quite considerably across cultures; however, several parenting characteristics, such as warmth, appear to be adaptive across diverse cultural niches (Lansford, 2022).

The differential susceptibility perspective, a modern version of the earlier goodness-of-fit model, reformulated and expanded those views by reframing the studied traits as susceptibility or plasticity rather than vulnerability. Several scholars have proposed that high negative emotionality may reflect a highly sensitive nervous system in which experience – both good and bad – registers especially powerfully, with enduring developmental impacts (Belsky et al., 2007; Belsky, 2005; Ellis & Boyce, 2011). Highly emotionally negative or difficult children were now expected to have maladaptive long-term outcomes if given harsh, rejecting, unsupportive socialization experiences, but given positive, supportive parenting, they could thrive and achieve better outcomes than their easy peers. The vibrant research on children's characteristics that serve as plasticity or differential susceptibility traits continues to expand, examining constructs at multiple levels – certain genotypes (Weeland et al., 2015), qualities of the central nervous system, single temperament dimensions, suites of related dimensions (e.g., hawk vs. dove, Davies et al., 2021), profiles of traits (Brown et al., 2022), recovered "difficultness" factors (van Zeijl et al., 2007), skin conductance level (Kochanska et al., 2015), or combinations of multilevel constructs (Brock et al., 2017).

Although research has broadly supported the role of negative emotionality as a marker of differential susceptibility, it is important to consider its heterogeneity. Negative emotionality encompasses proneness to anger, fear, sadness, general distress or discomfort, distress to limitations, frustration, emotional reactivity and poor regulation, or low soothability (e.g., Muris & Ollendick, 2005; Rothbart & Bates, 2006; Zhang et al., 2022). Indeed, different components of negative emotionality, such as fear and anger, stem from distinct neurological systems, are associated with different emotion regulation behaviors, and are related to different developmental outcomes (Buss & Goldsmith, 1988; Kiff et al., 2011; Nozadi et al., 2015; Planalp et al., 2023). A more nuanced and fine-grained approach that distinguishes among various facets of negative emotionality may further inform our understanding of its role in the origins of future developmental outcomes (Dollar et al., 2023; Kopala-Sibley et al., 2016).

Such an approach may yield particularly useful insights when applied to the study of the origins of disruptive disorders, opposition, disregard for rules of conduct, and other externalizing behaviors, as developmental pathways unfolding from early anger proneness and fear proneness may be quite distinct (Frick & Morris, 2004; Nigg, 2006; Pardini & Frick, 2013; Wakschlag et al., 2018; Waller et al., 2016, 2017). Abundant research has supported a view of *high anger proneness*, frustration, or irritability as early risk factors for disruptive problems (Fernandez & Johnson, 2016; Finley-Jones et al., 2024; Kiff et al., 2011; Klein et al., 2021; Leibenluft et al., 2024; McElwain et al., 2012; Nigg, 2006; Patrick et al., 2009). An equally large body of literature has documented *low fear proneness*, or fearlessness, as a risk factor for a variety of externalizing problems including callous-unemotional symptoms, opposition, disregard for rules, or lack of concern for others (Dadds & Salmon, 2003; Fowles & Kochanska, 2000; Frick & Viding, 2009; Gao et al., 2010; Patrick et al., 2009; Waller et al., 2016, 2017, 2021).

Research on children's high anger and low fear as plasticity traits is unsettled. Few studies included measures of both facets of negative emotionality. The review by Kiff et al. (2011) indicated highly complex and often inconsistent findings across studies on interactions between children's anger proneness versus fear proneness and various features of parenting. Further, measures of anger and fear have often involved parents' reports. *The first aim of our study was to examine children's early anger and fear proneness, observed in standard episodes designed to elicit those specific emotions, as moderators of parental socialization in the pathways to children's disregard for conduct rules.*

The socialization measures in differential susceptibility research are also highly heterogeneous. A wide variety of parenting styles and dimensions have been considered, again extending beyond the scope of this paper. Generally, they can be grouped under traditional constructs of warmth (with the high end reflecting love, acceptance, responsiveness, and sensitivity and the low end reflecting rejection, hostility, unresponsiveness, and coldness) and control (with the high end reflecting power assertion, negative, harsh, coercive, punishing, and threatening discipline and the low end reflecting gentle and subtle control). Often, in reviews, scholars use variously defined broad constructs of negative parenting, indicated by high levels of negative control and/or behaviors reflecting hostility and rejection, versus positive parenting, indicated by high levels of positive, gentle control and/or behaviors reflecting warmth (e.g., Slagt et al., 2016). In individual studies, scholars have deployed a broad range of observational and parent-reported socialization measures. *The second aim of the current work was to examine two observational measures of parental socialization, extensively studied in past research: parent–child mutually responsive orientation (MRO), a close, warm, cooperative relationship, observed across multiple lengthy interactive contexts (Kochanska, 1997), and parental use of power assertion, observed in prototypical control contexts.*

As conceptual research on differential susceptibility has grown, so have methodological and analytical advances. In particular, scholars have proposed appropriate statistical techniques to discern the specific forms of the significant interactions modeling the role of child characteristics as moderators of parenting: diathesis-stress versus differential susceptibility (Roisman et al., 2012). *The third aim of this work was to deploy this approach while*

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examining the significant interactions between child anger and fear proneness and parent–child MRO and parental power assertion.

Finally, the fourth aim was to study the developmental processes in mother–child and father–child relationships, using fully parallel data. Like most research in social-emotional development, the study of differential susceptibility has been overwhelmingly based on mothers and children. As an example, only 11.7% of the studies in the meta-analysis by Slagt et al. (2016) included separate data on mothers' and fathers' socialization. Due to the dearth of extant research, this direction was exploratory.

We report data from a longitudinal study of 200 community families of typically developing children. We focus on data collected at toddler age, 16 months (anger and fear proneness), and at age 3 (parent–child socialization), predicting outcomes at age 4.5. We focused on predicting children's disregard for conduct rules, or rule-breaking behavior, observed in the absence of adult surveillance. A large literature has considered out-of-sight compliance as a key part of early internalization, traced back to early classic learning and psychoanalytic studies (Parke, 1969; Sears et al., 1965), and more recently, refueled and bolstered by research on multiple dimensions of children's early conscience (e.g., Aksan & Kochanska, 2005; Kochanska et al., 2007). Internalization of rules is considered a key developmental task at preschool age (Sroufe, 2016). All our measures were observational, to reduce issues of shared-method variance. Slagt's (2016) meta-analysis indicated that interactions between parenting and child temperament were more pronounced in studies using observational measures.

Relatively few studies have examined children's "pure" anger proneness as the plasticity trait, as most have combined children's anger measures with other measures of negative affect, under the umbrella of child difficulty. In their review, Kiff et al. (2011) summarized studies that had focused on anger or frustration and concluded that most of them had supported the diathesis-stress model, with positive parenting buffering risks of anger or irritability on child outcomes (mostly externalizing), and that fewer supported differential susceptibility. They also pointed out that the evidence was quite mixed. Chen et al. (2019), using maternal ratings of children's anger, reported findings consistent with differential susceptibility, with highly anger-prone children more affected by variations in mothers' sensitivity. Similarly, McElwain et al. (2012) reported that children high or average in anger proneness (according to maternal ratings) were affected by their security level, but children low in anger proneness were not. The studied outcome was self-assertiveness, considered as an expression of appropriate autonomy. Bendel-Stenzel and colleagues (2022a, 2022b), using measures of anger observed in standard episodes, also reported a differential susceptibility pattern, with variations in positive parenting associated with outcomes among children who were high, but not those who were low in anger proneness. Kochanska et al. (2005) also found the effects of parenting for high- but not low-anger children, but they did not formally test the form of the interaction. Consequently, we expected variations in MRO to be related to outcomes for children more prone to anger rather than in their less anger-prone peers, but, due to mixed findings, we hesitated to specify whether the results would be consistent with diathesis-stress or differential susceptibility. Those analyses are best viewed as exploratory. Likewise, the analyses of the moderating effects of anger on the relations between parental power assertion and rule violations were also exploratory due to a dearth of relevant research.

Based on relatively consistent past research (Fowles & Kochanska, 2000; Kochanska et al., 2007, 2015; Kochanska, 1995, 1997; Waller et al., 2016, 2017), we expected fear-by-parenting interactions to be more complex, with MRO and power assertion operating differently at low versus high level of fear. We expected fear proneness to moderate effects of MRO, such that fearless children would have worse outcomes (more rule-breaking) than fearful children if they had experienced a less positive parent–child relationship (low MRO), but better outcomes if the relationship had been close and positive (high MRO), supporting differential susceptibility. We also expected fear proneness to moderate the effects of power assertion, such that fearful children would have worse outcomes than fearless children if their parents relied on highly power-assertive control, but better outcomes when the parents used gentle, less power-assertive control, consistent with differential susceptibility. Past work has shown that fearful children appeared especially susceptible to, and perhaps overwhelmed by negative, harsh control (Colder et al., 1997; Kochanska et al., 2007; Waller et al., 2021), but they were responsive to low-level, subtle control (Fowles & Kochanska, 2000; Kochanska, 1995, 1997), with some effects found for both mother– and father–child dyads. That work echoed Hoffman's view (Hoffman, 1983) about the optimal level of arousal necessary for the effective internalization of rules (easily exceeded for fearful, reactive children). For those fearful children, even relatively modest power assertion – largely descriptive of the parents in this low-risk community sample – may result in arousal that exceeds the optimal level.

Method

Participants

The Children and Parents Study (CAPS) included 200 8-month-old typically developing infants (96 girls), born in 2017 and 2018, and their biological parents (mothers and fathers) from US Midwestern areas that encompassed a college town, a small city, and rural areas and towns. The study was advertised broadly in the community venues frequented by families (libraries, daycare centers, pediatric practices, children's stores, local markets, etc.), using flyers, brochures, advertisements, and posts on social media targeting parent groups. The families were mostly White, but in 20% of them, one or both parents were not White. Demographic information is in Supplemental Table S1. Data on children's negative emotionality (proneness to anger and fear) were collected at 16 months ($N = 194$, 93 girls, 101 boys); on parent–child MRO at 38 months, age 3 ($N = 175$, 86 girls, 89 boys); and on children's rule violations at 52 months, age 4.5 ($N = 177$, 86 girls, 91 boys). All data were collected during mother–child and father–child 2–3-hr laboratory sessions, parallel for both parents, conducted by female experimenters (Es). Attrition at ages 3 and 4.5 was due to the COVID-19 pandemic, with some families reluctant to participate in person (but some willing to complete online measures). The above-reported *N*s include all families that contributed data (*N*s for each construct are in Table 1). The laboratory encompasses a naturalistic living room and a playroom. Data were coded from videotapes by multiple teams; coders used 15%–20% of cases for reliability, followed by regular realignments throughout the coding process. Comparisons of families that did and did not return at age 4.5 did not reveal significant differences in any measure. Parents completed informed consent. The University of Iowa IRB approved the study (CAPS, 201701705).

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Table 1. Descriptive data for all measures

Parent-specific constructs							
	Mother–child dyads			Father–child dyads			
Construct	*M*	*SD*	*N*	*M*	*SD*	*N*	*p*
MRO, age 3							
Parental responsiveness	4.99	0.54	157	4.70	0.68	149	< .001
Child responsiveness	14.02	2.06	157	13.40	1.93	149	< .001
Shared positive Affect	7.69	1.30	157	7.11	1.79	149	< .001
Parent-child MRO[a]	0.00	0.81	157	0.00	0.83	149	–
Parental power assertion, Age 3	42.48	6.24	157	43.80	7.09	147	.031
Violations of parental rule, Age 4.5	0.08	0.18	155	0.05	0.13	145	ns
Child-specific constructs							
Child negative emotionality, age 16 months		*M*			*SD*		*N*
Anger							
Body		7.51			7.15		187
Facial		13.55			12.83		187
Vocal		11.79			12.22		187
Latency to first expression		10.01			15.02		187
Proneness to anger[a]		0.00			0.78		187
Fear[b]							
Body		2.42			0.60		191
Facial		2.25			0.80		191
Vocal		0.57			1.01		191
Proneness to fear[a]		0.00			0.86		191
Violations of adult's rule, age 4.5		*M*			*SD*		*N*
Peeking at animals		0.13			0.29		150
Peeking in basket		0.01			0.08		150
Touching with more fingers		0.04			0.09		150
Latency to peek at animals		37.32			26.55		150
Latency to peek in basket		58.79			5.82		150
Latency to touch with more fingers		40.64			24.79		150
Violations of adult rules[a]		0.00			0.87		150
Overall violations of conduct rules[a]		0.03			0.78		157

Note. MRO = mutually responsive orientation.
[a]Average of standardized scores. [b] Due to lack of variability, latencies were not coded in Masks.
Reported are latencies before reversals. *P* refers to differences between mother and father dyads.

Measures

Children's temperament measures, 16 months

Proneness to Anger. The child was observed in the Car Seat episode from Laboratory Temperament Assessment Battery (LAB-TAB, Goldsmith & Rothbart, 1999). The child was buckled tightly in a commercially available car seat for 60 s. For each 5s segment, coders rated body anger (waving arms, kicking, pushing, wiggling, struggling, yanking straps, etc.), from 0 = *none*, to 1 = *mild*, to 2 = *medium*, to 3 = *moderate*, to 4 = *strong*; facial anger, from 0 = *none*, to 1 = *mild*, to 2 = *moderate*, to 3 = *strong*; and vocal anger (fussing, crying, screeching, etc.), from 0 = *none*, to 1 = *mild*, to 2 = *moderate*, to 3 = *strong*. Reliability, kappas, ranged from .68 to .87. Latency to express anger was also coded; reliability, intra-class correlation was .99.

To form the composite of the final measure of anger, we standardized body, facial, and vocal anger scores (summed across coded segments) and reversed latency, and we averaged across those variables. Cronbach's alpha was .79. Boys had higher scores than girls, t (175.88) = −2.15, p = .03, M = 0.11, SD = 0.88, and M = −0.13, SD = 0.63, respectively.

Proneness to Fear. The child was observed in Masks episodes from LAB-TAB (in both laboratory sessions). In each session, E put on consecutively four somewhat unusual masks and faced the child for 10 s wearing each mask. For each 5s segment, coders rated body

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fear (twisting, turning away, freeing, running away, etc.), facial fear, and vocal fear (all coded from 0 = *none*, to 1 = *mild*, to 2 = *medium*, to 3 = *strong*). Reliability, kappas, were .57 to .90.

To form the composite of the final measure of fear, we averaged body, facial, and vocal fear (summed across coded segments) across eight mask presentations, standardized those three variables, and averaged across them. Cronbach's alpha was .83. There was no gender difference.

Parent–child socialization measures, age 3

Parent–Child MRO. Parent–child MRO was a composite of three measures: the parent's responsiveness to the child, the child's responsiveness to the parent, and parent–child shared positive affect.

The Parent's Responsiveness to the Child. Parental responsiveness was coded during interactions (a total of 25 min for each parent–child dyad), encompassing naturalistic but carefully scripted contexts, such as introduction to the lab, snack, play, etc. The parent received one overall rating for each context (e.g., snack, play), from 1= *highly unresponsive* to 7 = *highly responsive*. The rating integrated the classic dimensions of sensitivity-insensitivity, cooperation-interference, and acceptance-rejection (Ainsworth et al., 1971). Reliability, weighted kappas, ranged from .87 to .92. The scores were averaged into an overall responsiveness score for the parent. Girls and boys did not differ in terms of responsiveness received from either parent.

The Child's Responsiveness to the Parent. Child responsiveness was coded in three of the above contexts (introduction to the room, waiting for snack, and play; coded for each 1-min segment) and in two elicited imitation contexts. In the latter, the parent demonstrated play scripts and encouraged the child to imitate (the child received one score for demonstration and one for imitation). The codes ranged from 1 = *not responsive* to 5 = *highly responsive*. They were added for each context. The rating incorporated the child's sensitivity (detection, interpretation, and prompt, appropriate, and contingent response to the parent's cues or overtures, etc.), acceptance (warmth, affection, resentment toward the parent), and cooperation (respect, acknowledging parental attempts). Generally, high scores denoted instances when the child's behavior was likely to please the parent. Reliability, weighted kappas, were .62 to .76. The scores were then averaged across the contexts into an overall responsiveness score for the child (with each parent). Girls were more responsive to mothers than boys, $M = 14.46$, $SD = 1.93$ for girls; $M = 13.59$, $SD = 2.11$ for boys, $t\,(155) = 2.71$, $p = .008$, but there was no gender difference with fathers.

Parent–Child Shared Positive Affect. Parent and child affect was coded in the same contexts as parental responsiveness. For each 30s segment, coders coded positive and negative affect as 0 = *not present*, 1= *neutral positive or neutral negative mood; not a "full-blown" positive emotion, but pleasant, engaged mood, or tired, uncomfortable, disengaged, negatively tinged mood*, 2 = *discrete positive or negative emotion; "full-blown" expression of emotion (joy, distress, cry, anger, etc.)*, or 3 = *a strong positive or negative emotion; intense or lasting more than 15 s*. Reliability, weighted kappas, ranged from .70 to .87.

All segments in which both the parent and the child displayed positive affect or neutral positive mood and neither displayed negative affect or neutral negative mood were tallied for each context. Those tallies were then averaged to form a score of shared positive affect for each dyad. Girls and boys had comparable scores, with either parent.

Parent–Child MRO. The three scores correlated, for mothers, $rs = .36–.56$, $ps < .001$, and fathers, $rs = .44–.66$, $ps < .001$, and were standardized and averaged into a composite of MRO for each dyad. There were no differences due to children's gender.

Parental Power Assertion. Following parent–child play, the parent asked the child to put all the toys in a large basket (10 min). We coded the parent's control for each of the 20 30s segments using ratings that reflected the increasing amount of power: No control (no interaction, purely social exchange, play), gentle guidance (gentle, subtle, polite, pleasant control), control (firm, no-nonsense, matter-of-fact, relatively assertive control), and power-assertive, negative, harsh control (control delivered in forceful, impatient, threatening, angry, negative manner). The coding conventions clearly specified verbal, affective, and physical markers of those ratings, based on extensive past work. Reliability, weighted kappas, ranged from .61 to .92.

The instances of each code were tallied, weighted (no control multiplied by 1, gentle guidance multiplied by 2, control by 3, and power assertion by 4), and summed, forming a score of power-assertive control for each parent. Fathers directed more power assertion toward boys than girls, $M = 45.03$, $SD = 6.86$ for boys; $M = 42.55$, $SD = 7.14$ for girls, $t\,(145) = -2.15$, $p = .03$, but there was no gender difference in maternal power assertion.

Child outcome measures (violations of conduct rules), age 4.5

Violations of the Parent's Rule Regarding Prohibited Objects. In the lab's living room, there was a low shelf with multiple very attractive objects. At the outset, E informed the parent that those were off limits to the child and asked the parent to communicate the prohibition to the child right away and then enforce it throughout the session. At the end of the session, E set a tray with blocks in front of the shelf and asked the parent to remind the child of the prohibition and to request that the child sort the blocks on the tray. The parent then moved to the playroom, leaving the child alone in the living room for 8 min.

Child behavior was coded for each 5s segment. Here, we focus on all instances when the child touched a prohibited object(s): Brief Touch defined as touching for less than 3 s, and Long Touch as touching for 3 s or more. Reliability, kappa, was .87. The instances of each of the two codes were tallied and divided by the number of 5s segments the child spent in the living room (children occasionally left the room). These two scores were then summed. There were no gender differences.

Violations of an Adult's Rules Regarding a Game. E brought in a basket filled with stuffed animals and invited the child to play a game that involved guessing what three animals were hidden under scarves that obscured their shapes. The child was promised a prize for a successful guess. E explained that the rules of the game required that the child not peek at the animals under the scarves or in the basket (also covered with a scarf) and touch the covered animals only with the tip of one finger (making correct guesses impossible). E reviewed the rules with the child, and in a gentle but serious tone conveyed that breaking the rules would be cheating. E then left the child alone for 3 min. Upon return, she "discovered" that she had set up the game wrong by hiding the wrong animals. She apologized to the child and then hid the animal whose shape was easy to guess (a caterpillar) and the child played again until they all guessed successfully and received a prize.

Coders coded child behavior for each 3s segment as playing according to the rules or engaging in one of the rule violations (peeking at the animals, peeking in the basket, touching with more than one finger). Latencies to each violation were also recorded.

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Table 2. Correlations among the key constructs

	C anger, 16 months	C fear, 16 months	M–C MRO, age 3	M power assertion, age 3	F–C MRO, age 3	F power assertion, age 3	C violations of conduct rules, age 4.5
C anger, 16 months		.10	−.01	.16*	.01	.04	.18*
C fear, 16 months			−.03	−.03	.03	.03	.06
M–C MRO, age 3				−.23**	.30***	−.19*	−.25**
M power assertion, age 3					−.27***	.36***	.26**
F–C MRO, age 3						−.17*	−.11
F power assertion, age 3							.24**

Note. *C* = child; *M* = mother; *F* = father; MRO = mutually responsive orientation.
*$p < .05$. ** $p < .01$. *** $p < .001$.

Segments when the child was uninvolved in the game were also coded. Reliability, kappas, ranged from .78 to 1.00.

Each type of rule violation was tallied and divided by the number of segments when the child was involved in the game. Those scores were averaged. The latencies were reversed and averaged. Then the two scores (violations and reversed latencies, correlating .51, $p < .001$) were standardized and aggregated into a composite reflecting the violations of the adult's rules. There were no gender differences.

Overall Violations of Conduct Rules. All three measures of rule violations were intercorrelated, $rs = .34–.50$, $ps < .001$, and Cronbach's alpha was .71. Therefore, they were averaged into a composite measure of children's violations of conduct rules (the scores of violations of parental rules were first standardized). There were no gender differences. All descriptive data are in Table 1.

Results

Preliminary analyses

We first examined the intercorrelations among the studied constructs (see Table 2). Children's temperament scores – anger and fear – were uncorrelated with each other or with any other constructs, with one exception. Children with higher anger scores engaged in more violations of conduct rules at age 4.5. In both mother– and father–child dyads, MRO and power assertion at age 3 were negatively related. The mothers' and the fathers' higher use of power assertion was associated with children's increased violations of conduct rules. Children in dyads with higher mother–child MRO engaged in fewer violations. All constructs measured in mother– and father–child dyads correlated across the dyads. The correlations were generally modest in size

Main analyses: predicting children's violations of conduct rules from children's negative emotionality (anger and fear), parent–child socialization (MRO and power assertion), and their interactions

We tested models predicting children's violations of conduct rules separately for mother–child and father–child dyads. Child gender was modeled as a covariate, child negative emotionality (anger and fear) at 16 months and parent–child socialization measures (parent–child MRO and parental power assertion) at age 3 as predictors, and the interactions between each negative emotionality measure and each socialization measure were modeled as testing the moderating role of child negative emotionality. All variables were considered normally distributed, as the values of skewness and kurtosis were in the acceptable range (less than 3 and less than 10, respectively; Kline, 2016). The multiple regression models were tested in Mplus 7 (Muthén & Muthén, 1998-2012) with full information maximum likelihood estimator to address missing data (Enders, 2010). For significant interaction effects, simple slopes were probed and plotted at 1 *SD* above and below the mean (Aiken & West, 1991) and the regions of significance (RoS) were generated using the method developed by Fraley (2012) and cited in Roisman et al. (2012).

Although simple slope analysis is the most widely used method to probe interaction effects, it is based on arbitrary values. In contrast, the RoS analyses provide more precise information about interaction effects by specifying the upper and lower bounds of values for the predictor related to significant effects. In addition, the RoS help distinguish the differential susceptibility model from the diathesis-stress model. If the effect of the moderator on the outcome is significant at both low and high ends of the range of the predictor bounded by ±2 *SD* from the mean of the predictor, it can provide evidence of differential susceptibility. However, if it is significant at only the low (for a positive predictor, MRO) or only the high (for a negative predictor, power assertion) end, it supports the diathesis-stress model.

Mother–child dyads

The findings are in Table 3. There was a significant effect of children's anger on their violations of conduct rules: Children with higher anger scores engaged in more violations. Mother–child MRO and maternal use of power assertion also had significant effects on rule violations. Children in dyads with higher MRO engaged in less rule-violating conduct, whereas children who received more maternal power assertion engaged in more such conduct. Both aspects of children's negative emotionality – anger and fear – significantly moderated the effects of both predictors on rule violations (Figure 1).

Child Anger as Moderator. Child anger significantly moderated the effects of both mother–child socialization measures on child violations of conduct rules. Higher mother–child MRO was related to fewer rule violations among children with higher anger scores, $B = -0.37$, $SE = 0.08$, $t\ (131) = 4.32$, $p < .001$, but not among those with lower anger scores (Figure 1A). The RoS

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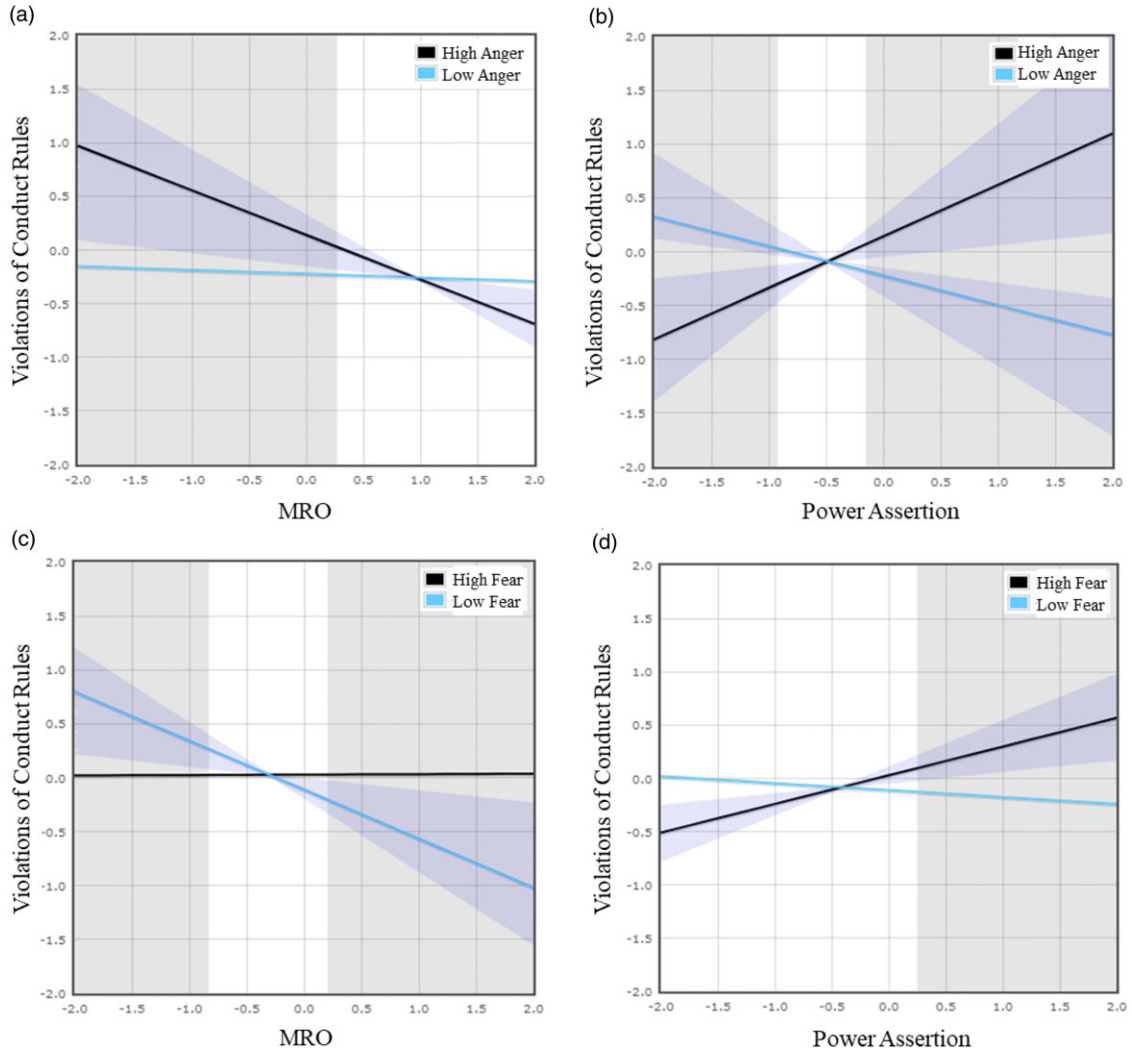

Figure 1. *Predicting children's violations of conduct rules at age 4.5 from children's negative emotionality (anger and fear) at 16 months, mother–child socialization at age 3, and their interactions in mother–child dyads.* MRO = mutually responsive orientation. Purple areas around the regression lines represent the regions of significance with respect to a moderator (negative emotionality; anger or fear), whereas gray boxes represent the regions of significance with respect to a predictor (mother–child socialization; MRO or power assertion). (a) and (d) = diathesis-stress ("for worse only"). (b) and (c) = differential susceptibility ("for better or for worse").

indicated that highly anger-prone children had worse outcomes than low-anger children when they experienced a low level of MRO (<0.3 *SD* above the mean). However, in dyads with higher MRO, children with higher or lower anger scores had comparable outcomes. In other words, higher mother–child MRO buffered the risk for disregard for rules for angry children. Consequently, this pattern of finding is consistent with diathesis-stress – "for worse" only.

Higher maternal power assertion was associated with more violations of rules among children with higher anger scores, $B = 0.40$, $SE = 0.08$, t (131) = 5.07, $p < .001$, but fewer rule violations among those with lower anger scores, $B = -0.19$, $SE = 0.08$, t (131) = 2.48, $p < .05$ (Figure 1B). The RoS indicated that highly anger-prone children had worse outcomes than low-anger children when they experienced a high level of maternal power assertion (>0.2 *SD* below the mean). However, highly anger-prone children had better outcomes than their low-anger peers when they experienced a low level of maternal power assertion (<1 *SD* below the mean). Consequently, this pattern of findings supports differential susceptibility – "for better or for worse."

Child Fear as Moderator. Child fear moderated the effects of both predictors on child violations of conduct rules. Higher MRO was associated with fewer rule violations among fearless children, $B = -0.42$, $SE = 0.07$, t (131) = 5.57, $p < .001$, but not among fearful children (Figure 1C). The RoS further elucidated the findings. Fearless children had worse outcomes than fearful children when they experienced a low level of MRO (<0.8 *SD* below the mean). However, in dyads with higher MRO (>0.2 *SD* above the mean), fearless children had better outcomes than fearful children. Consequently, this pattern is consistent with differential susceptibility – "for better or for worse."

Higher maternal power assertion was associated with more rule violations among fearful children, $B = 0.25$, $SE = 0.08$, t (131) = 3.01, $p < .01$, but not among fearless children (Figure 1D). The RoS indicated that fearful children had worse outcomes when they experienced a high level of maternal power assertion (>0.3 *SD* above the mean). However, fearful children and fearless children had comparable outcomes when the level of maternal power assertion was lower. In other words, maternal avoidance of power-assertive control buffered the risk for disregard for rules for fearful children.

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Table 3. Predicting children's violations of conduct rules at age 4.5 from children's negative emotionality (anger and fear) at 16 months, parent-child socialization at age 3, and their interactions

	Mother–child dyads			Father–child dyads		
	B	*SE*	95% *CI*	*B*	*SE*	95% *CI*
Child gender	0.07	0.10	[−0.13, 0.27]	0.05	0.12	[−0.19, 0.28]
Anger at 16 months	**0.18****	0.06	[0.06, 0.31]	0.11	0.08	[−0.04, 0.26]
Fear at 16 months	0.07	0.06	[−0.04, 0.18]	0.04	0.07	[−0.10, 0.18]
MRO at age 3	**−0.23*****	0.05	[−0.33, −0.12]	−0.07	0.06	[−0.18, 0.05]
Power assertion at age 3	**0.10***	0.05	[0.00, 0.20]	**0.16****	0.06	[0.04, 0.28]
Anger × MRO	**−0.19**^{**a}	0.07	[−0.32, −0.06]	**−0.16**^{*a}	0.07	[−0.29, −0.02]
Anger × power assertion	**0.38**^{***b}	0.07	[0.24, 0.51]	0.14	0.09	[−0.05, 0.32]
Fear × MRO	**0.23**^{***b}	0.05	[0.12, 0.33]	−0.09	0.07	[−0.23, 0.05]
Fear × power assertion	**0.17****a	0.06	[0.05, 0.28]	0.08	0.09	[−0.10, 0.25]
R^2	**.44*****			**.18****		

Note. Child gender was coded as 0 = *girls* and 1 = *boys*. MRO = mutually responsive orientation.
Unstandardized coefficients are presented. Significant coefficients are bolded.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.
[a]Diathesis-stress ("for worse only"), [b]differential susceptibility ("for better or for worse").

Consequently, this pattern of findings is consistent with diathesis-stress – "for worse" only.

Father–child dyads

The findings are in Table 3. There was a significant effect of paternal use of power assertion on children's violations of conduct rules: Children who received more power assertion engaged in more violations. There was one moderation effect: Children's anger significantly moderated the effect of father–child MRO on children's rule-violating conduct. Higher MRO was associated with fewer rule violations among highly anger-prone children, $B = -0.19$, $SE = 0.09$, $t\ (124) = 2.20$, $p < .05$, but not among low-anger children (Figure 2). The RoS indicated that highly anger-prone children had worse outcomes than low-anger children when they experienced a low level of MRO (<0.3 *SD* below the mean). However, in dyads with higher MRO, children with higher or lower anger scores had comparable outcomes. In other words, as for mother–child dyads, higher father–child MRO buffered the risk for disregard for rules for angry children. Consequently, this pattern of findings is consistent with diathesis-stress – "for worse" only.

Supplemental analyses: predicting children's violations of parent- and adult-specific rule regarding prohibited objects from children's negative emotionality (anger and fear), parentchild socialization, and their interactions

Because our final outcome measure combined children's violations of conduct rules specified by each parent regarding the prohibited objects (parent specific) and rules specified by an adult regarding the game (adult related), in additional regressions, we examined these outcomes – the two parent-specific outcomes (mother specific and father specific) and the adult-related outcome in mother–child and father–child dyads – separately. Those regressions are presented in Supplemental Tables S2 and S3. We focused specifically on our key questions pertaining to children's anger and fear as moderating parental socialization and compared the findings to those reported in Table 3 for the overall rule-violating conduct outcome measure.

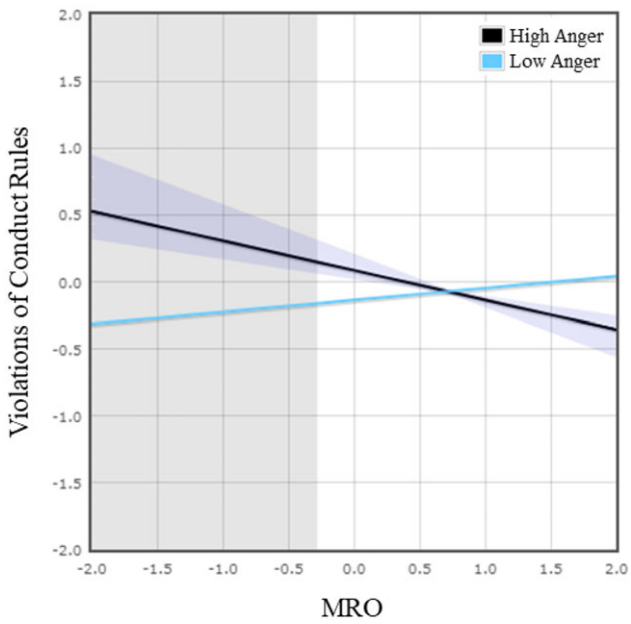

Figure 2. *Predicting children's violations of conduct rules at age 4.5 from children's negative emotionality (anger and fear) at 16 months, father–child socialization at age 3, and their interactions in father–child dyads.* MRO = mutually responsive orientation. Purple areas around the regression lines represent the regions of significance with respect to the moderator (negative emotionality; anger), whereas gray boxes represent the regions of significance with respect to the predictor (father–child socialization; MRO). Diathesis-stress ("for worse only").

The findings were largely comparable, with a few exceptions. In mother–child dyads, all four interaction effects predicting violations of maternal prohibition were significant, mirroring the equation predicting overall rule-violating conduct. Further, three interaction effects predicting violations of adult's rules were significant, again mirroring the equation predicting overall rule-violating conduct, with only one not significant (interaction between fear and maternal power assertion).

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In father–child dyads, violations of paternal prohibition were predicted by the interaction of anger and power assertion, but not the interaction of anger and MRO as in the equation predicting overall rule-violating conduct. When predicting violations of an adult's rule, the same interaction was significant as the one reported in the equation predicting overall rule-violating conduct. Those supplemental analyses suggest that in future research, perhaps a more nuanced approach to antisocial outcomes, such as disregard for rules (e.g., distinguishing among rules that are parent specific, peer specific, or teacher specific) might provide further insights.

Discussion

As it often happens in science, more research brings even more new questions, and the extraordinarily influential differential susceptibility framework has been no exception. Scholars continue to examine child characteristics that serve as plasticity traits and aspects of socialization environments that may affect various children in different ways. The answers are not yet settled, and the findings are mixed, but new science keeps accumulating.

We proposed that it may be useful and informative to assess, using precise observational measures, two facets of children's negative emotionality, anger and fear, and to examine them separately as potential plasticity traits in diathesis-stress/differential susceptibility research. In the current study, those measures were uncorrelated with each other, and they moderated the effects of parental socialization on children's disregard for rules in largely different ways.

We further proposed, and supported, the need to study more than one aspect of parental socialization and to use well-established observational measures that are specific rather than global, such as overall "positive or negative parenting." The effects of MRO, a measure of a close, cooperative, positive relationship, assessed across a variety of naturalistic contexts, and of power assertion assessed during a toy cleanup task on children's disregard for rules were different for children with varying levels of anger and fear proneness.

The patterns of findings were not the same across the two parent–child relationships. In mother–child dyads, there were more significant moderation findings; they involved both facets of negative emotionality and both socialization measures, and evidence of both diathesis-stress and differential susceptibility was found. In father–child dyads, there was only one moderation finding, for child anger and father–child MRO, consistent with diathesis-stress (and replicating the parallel finding for mothers and children).

As is often the case, a coherent explanation of the reasons for differences in the studied processes in the two relationships is challenging. A growing body of research has suggested differences between mother–child and father–child relationships. For example, mothers were more responsive, sensitive, and encouraging than fathers, while fathers were more restrictive and imperative than mothers during parent–child interactions (Hallers-Haalboom et al., 2017; Shinn & O'Brien, 2008; Wilson & Durbin, 2013; Yaffe, 2023). In addition, preschoolers were more likely to actively engage in interactions with their mothers than with their fathers (Davidson & Snow, 1996; Leaper, 2000; Wilson & Durbin, 2013). Our data seem to suggest a similar pattern. Additionally, mothers are often more involved in early child care in terms of time spent with the children during the first year (as was the case in our study). For these reasons, mothers may be better "tuned" into children's temperament characteristics than fathers, and children may be more susceptible to variations in maternal socialization. Recall, however, that in our analyses, we standardized the parenting scores, and thus the differences between mothers and fathers were unlikely to affect the interaction effects.

Anger proneness as a moderator

High anger proneness and MRO

Highly anger-prone children had worse outcomes (more rule violations) than low-anger children when they experienced low MRO, but high MRO in the parent–child relationship buffered that risk, consistent with diathesis-stress. This pattern was replicated across mother– and father–child relationships. When faced with frustration, which in our study the paradigms assessing rule-breaking engendered (wishing to touch the prohibited toys and playing an impossible-to-win game), highly anger-prone children may have been likely to forge ahead and break the rules to achieve the desired outcomes; this was exacerbated by a history of a cold, disconnected, remote relationship with the parent (low MRO). However, this risk was buffered by a history of a warm, trusting, coordinated, and cooperative relationship (high MRO), a robust source of self-regulatory and inhibitory capacities (Kim & Kochanska, 2012). This pattern was parallel, to some extent, with previous findings regarding the significant associations between parenting (e.g., MRO, secure attachment, sensitivity, responsiveness) and child developmental outcomes (e.g., self-regulation, compliance, cooperation, positive affect) in highly anger-prone children (Bendel-Stenzel et al., 2022a; Brock & Kochanska, 2019; Chen et al., 2019; Kim & Kochanska, 2012; Kochanska et al., 2005; McElwain et al., 2012). Note that the results should be interpreted cautiously because most of them supported differential susceptibility rather than diathesis-stress (Bendel-Stenzel et al., 2022a; Chen et al., 2019; McElwain et al., 2012). Additionally, previous studies (and the current study) have often focused on either adaptive or maladaptive child outcomes as outcome variables. In the future, it would be useful to include both positive and negative outcomes when testing differential susceptibility versus diathesis-stress and possibly versus vantage sensitivity (Pluess, 2015).

High anger proneness and power assertion

In mother–child dyads, we found a pattern supporting differential susceptibility. Highly anger-prone toddlers had worse outcomes than low-anger peers if their mothers relied on power-assertive control, but they had better outcomes than their peers if their mothers avoided power assertion. Few studies have examined the interaction between anger proneness and power assertion. However, some studies with similar constructs have yielded comparable results. For instance, child frustration or irritability exacerbated the negative effects of inconsistent discipline, rejection, hostility, or psychological control on externalizing and internalizing problems (Lengua, 2008; Morris et al., 2002).

Children's appraisals and acceptance of parental behaviors could differ depending on their personality traits or emotional states (Grusec & Goodnow, 1994; Hoffman, 1994; Soenens et al., 2015). In particular, anger can shift children's attention from the importance of a given task to their subjective perception of injustice imposed by the authority figure (Robichaud et al., 2020). Consequently, highly anger-prone children may have been more likely to perceive their mothers' power assertion as hostile and coercive and to respond with defiance to maternal socialization influence (Brock & Kochanska, 2019). Thus, limiting the use of

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power assertion can be particularly important for parents of highly anger-prone children to minimize the intensity of their emotional reactions and help their internalization process. When the level of maternal power assertion is low, highly anger-prone children may feel more autonomous and self-assertive, which may promote internal attributions for compliance and thus rule-compatible conduct (Grusec & Goodnow, 1994; McElwain et al., 2012).

On the other hand, children with low-anger proneness may respond with optimal levels of arousal to higher levels of maternal power assertion, which can help them internalize rules (Frick & Morris, 2004; Hoffman, 1994). It is important to note that power assertion scores in the current study were generally low, and almost never involved harsh punishments, hostility, or threats. Parents with higher scores were better described as firm rather than authoritarian.

Fear as a moderator

In contrast to the associations between anger proneness and parent–child socialization, where high anger proneness served as a vulnerability or plasticity trait, children's fear interacted with parent–child socialization in more complex ways. Both extremes (fearlessness and fearfulness) served as moderators, albeit differently.

Fearlessness and MRO

Our patterns of findings are strikingly consistent with research by Waller et al. (2016, 2017), who have demonstrated the key role of positive, warm parenting for fearless children in two different samples. In the sample of adopted children in the Early Growth and Development Study, children's inherited fearlessness observed at 18 months predicted children's higher callous-unemotional (CU) behavior reported by parents at 27 months when adopted mothers' positive parenting at 18 months was low or average but not high (Waller et al., 2016). Thus, high levels of adoptive mothers' positive parenting buffered the negative effect of inherited fearlessness on children's higher CU behavior. Of note, as in our data, there were no effects of fathers' positive parenting. In another sample that involved low-income mothers and sons, children's observed fearlessness at 24 months predicted higher CU behaviors at 42 months, but only for children who experienced low levels of positive parenting observed at 24 months (Waller et al., 2017).

The current findings are also consistent with past research by Kochanska and colleagues across a variety of observed and psychophysiological measures of fear, various measures of parenting, and diverse measures of both antisocial and prosocial (conscience) outcomes, for both mother– and father–child dyads (Fowles & Kochanska, 2000; Kochanska et al., 2007, 2015; Kochanska, 1995, 1997). In these studies, more positive parent–child relationships were related to better outcomes (fewer antisocial behaviors or more prosocial behaviors) for fearless children but not for fearful children. For fearless children, developing positive parent–child relationships can be particularly effective in preventing disruptive outcomes.

Fearfulness and power assertion

We found that higher levels of maternal power assertion were related to more violations of conduct rules among fearful children, whereas there were no significant relations among fearless children, replicating previous findings in an unrelated sample (Kochanska et al., 2007). Fearful children are likely overwhelmed and overly aroused by parents' negativity and threat associated with even modest levels of power assertion, and thus fail to process effectively parental prohibitions. This is consistent with past work on the development of conscience (Fowles & Kochanska, 2000; Hoffman, 1983; Kochanska, 1995, 1997), aggression (Colder et al., 1997), and oppositional-defiant behavior (Waller et al., 2021).

In the context of discussing individual differences in children's anger and fear proneness, it is important to note that assessments at 16 months may reflect not only biologically "wired" characteristics but also the child's rearing experience – and susceptibility to it – prior to that point. Indeed, early parental care, during the first months of life, makes significant contributions to children's emotionality (e.g., Keenan, 2000; Propper & Moore, 2006; Swingler et al., 2014). Ideally, measures of individual differences in infants' temperament and parental care – and their bidirectional associations – should both be collected throughout infancy and older ages.

Relevance to developmental psychopathology

Our patterns of findings illustrate the core concepts of multifinality and equifinality in developmental psychopathology (Cicchetti & Rogosh, 1996). According to the multifinality principle, children with similar early temperaments can embark on different developmental trajectories depending on other factors, such as parenting. For example, early anger proneness can trigger varying developmental cascades. In our data, highly anger-prone toddlers reached very different outcomes depending on the quality of their relationships with the parents (MRO) and parental control styles. According to the equifinality principle, children with very different temperaments can arrive at similar developmental outcomes, again depending on other factors. In our data, this principle applies to fearless and fearful toddlers, both of whom may come to disregard conduct rules depending on MRO and parental control style.

Another core tenet of developmental psychopathology is a focus on the study of adaptive development as informing the study of maladaptive development and vice versa. Although the children in our study were all typically developing, the families were generally well functioning, and children mostly abided by the rules of conduct, our findings can inform the study of children with atypical temperaments (either extremely irritable or extremely fearless) and thus at high risk for CU traits, oppositional disorders, and other externalizing problems and of families at high risk (e.g., abuse, maltreatment, chaos, parental psychopathology). Our findings can also inform parenting intervention and prevention programs, which should incorporate components to enhance parents' understanding of their child's temperament and its relevance to the choices of the most appropriate socialization strategies (Brock & Kochanska, 2016; Cassidy et al., 2011; Frick & Viding, 2009; Viding & McCrory, 2012).

Strengths and limitations

This work has strengths. We relied on well-established behavioral measures, reducing the issue of shared-method variance and avoiding weaknesses associated with reliance on parental reports. The sample was relatively large, and a longitudinal design covered the span from late infancy, when differences in temperament can be robustly measured, to toddler age, when issues of parental socialization of rules and parental control become prominent, and to preschool age, when internalization of rules and values becomes a salient, key developmental task (Sroufe, 2016). Parallel data were obtained for mother– and father–child

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relationships, addressing a stubborn gap in social-emotional research. We deployed analyses specifically addressing diathesis-stress versus differential susceptibility.

The weaknesses included limited ethnic diversity (although recall that 20% of families were not "White alone"). As mentioned, all children were typically developing, mostly well behaved and compliant with rules, parents used generally very low levels of power assertion, and most parent–child relationships were harmonious and positive. Nevertheless, the hypothesized effects were detected, potentially contributing to the growing literature on the interplay of child temperament and parental socialization.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S0954579424001731.

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Competing interests. The authors declare no conflicts of interest.

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