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CHAPTER 20

Temperament and Parenting in Developmental Perspective

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In this chapter we consider how child temperament and parenting differences might influence one another and interact in shaping child adjustment. By temperament we mean concepts of individual differences in both reactivity and regulation (Rothbart & Bates, 2006). The frequently used three-factor model of temperament includes positive emotional reactivity, negative emotional reactivity, and self-regulation. Parenting differences are important because they occur in the primary context for socializing children (Maccoby & Martin, 1983). Parenting dimensions are not as well established as temperament dimensions, but research has shown dimensions of warmth—including supportiveness, positive involvement, responsiveness, affection, and nurturance—and control, which is often described in terms of harsh versus gentle and autonomy encouraging versus suppressing styles of control (Maccoby & Martin, 1983). Parental control probably includes more than one subdimension (Barber, Stolz, & Olsen, 2005; Bugental & Grusec, 2006), so in this chapter, we specify types of control when citing particular studies. One could treat temperament and parenting as independent, separate factors in accounting for adjustment outcomes, but studies suggest that they are related. Temperament traits involve social behaviors and, as such, child temperament traits could elicit parenting behaviors. At the same time, parenting behaviors could shape the social behaviors that constitute the phenotype of temperament. For example, a child who laughs and smiles often would seem likely to elicit similar positive behavior from parents, compared with a child who is predominantly sober. And the positive emotionality of the child could, at least partly, reflect the normal environmental press of a happy, interested, affectionate, responsive parent (Rothbart & Bates, 2006). This view of child temperament and parenting influencing each other and interacting to shape adjustment is based in developmental theory.

It is generally agreed that parents' cognitive and social skills enable them to choose how they will respond to the behavioral cues of their children, and that parents are capable of shaping at least some child behavior (Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000), but modern theory (e.g., Sameroff, 2009) recognizes that children can influence the behavior of parents. Empirical work provides evidence of children's influence (Schermerhorn & Cummings, 2008). For example, findings of evocative effects of genetically influenced behavior (Ge et al.,

1996), and findings of parental differential treatment of children (Suitor, Sechrist, Plikuhn, Pardo, & Pillemer, 2008) suggest that children's social behavior influences the caregiving environment. Child temperament traits such as negative emotional reactivity could elicit either directly reciprocal (distress, fear, or anger) or compensatory patterns of parent behavior (soothing or protecting). In fact, as we describe, research has considered the possible influence of temperament upon parenting.

Similarly, although temperament is generally considered a largely constitutional trait, the phenotypes that reflect temperament continue to develop after birth and are shaped by contextual factors, including parenting and family processes (Rothbart & Bates, 2006). Despite being fairly stable over the lifespan, temperament shows mean-level (i.e., group-level) and rank-order (i.e., between-person) change (Neyer & Lehnart, 2007). Twin studies affirm the importance of the environment in the development of temperament (Ganiban, Saudino, Ulbricht, Neiderhiser, & Reiss, 2008; Goldsmith, Buss, & Lemery, 1997; Goldsmith, Lemery, Buss, & Campos, 1999; Saudino, 2005; also see Saudino & Wang, Chapter 16, this volume). Parenting could influence the development of temperament through several possible mechanisms. It is known that caregiving and other environmental factors can influence children's biological development, including physiological responses (Gunnar & Donzella, 2002; Propper & Moore, 2006) and brain development (Glaser, 2000; Schore, 1996). Children gradually internalize their parents' modeling of impulse control (Kopp, 1982), styles of emotional responding (Fox, 2006), and behavioral compliance (Kopp, 1982), perhaps because of parental modeling of appropriately warm and well-regulated social behavior and the encouragement of a secure attachment. In short, despite the field's tendency to define temperament as reflections of the child's constitution, there are also good reasons to think that parenting qualities could affect temperament, especially children's complexly determined behavioral phenotypes.

This chapter considers studies in which temperament differences are conceptualized as predictors of parenting differences, as well as those in which parenting is conceptualized as a factor contributing to temperament and changes in temperament. And, finally, it considers how temperament and parenting might combine, especially in the form of interaction effects, in predicting social-developmental outcomes in children. It is becoming increasingly clear (Bates & Pettit, 2007; Bates, Schermerhorn, & Goodnight, 2010; Degnan & Fox, 2007; Henderson & Wachs, 2007; Rothbart & Bates, 2006) that child temperament differences help explain how a given style of parenting is related to child adjustment and, alternatively, that a given temperament predicts child adjustment as a function of parenting qualities. In what follows, we describe studies on how temperament and parenting relate, organized according to the design of the study. Design affects inferences regarding developmental processes involving temperament and parenting. Within major methodological categories, we organize, as far as possible, by the child temperament domain and by the domain of parenting, emphasizing warmth and control. Temperament and parenting constructs are operationally measured in multiple ways. Commonly, different studies we cite in a given section have different, specific measures of the broad categories in which we place them. There is some convergence between different measures, especially questionnaire measures (for temperament: Bates & Bayles, 1984; Goldsmith et al., 1997; Rothbart & Bates, 2006; for parenting: Hawes & Dadds, 2006). This is not the occasion for a methodologically rigorous comparison of studies, but we occasionally mention a few key method details.

Nondirectional Association Studies

In this section we describe studies of associations between child temperament and parenting that used cross-sectional, correlational data. Many of the findings were interpreted by their authors as reflecting the influence of temperament on parenting or, in other cases, as the influence of parenting on temperament. However, because of the cross-sectional design, we interpret the studies merely as showing an association. The authors' original causal interpretations may turn out to be correct, and with a transactional model (Sameroff, 2009) both child and parent effects can operate. For now, it is useful just to know the basic correlations, which may suggest areas for fruitful longitudinal and experimental studies.

Child Positive Reactivity and Parenting

A few cross-sectional studies have shown associations between child positive reactivity and parental warmth, as measured in children by observation (Kochanska, Friesenborg, Lange, & Martel, 2004), and in adolescence by questionnaire (Latzman, Elkovitch, & Clark, 2009). Such association could reflect simple social reciprocity, shaping, or genetic similarity between parent and child in temperament.

A few cross-sectional studies have also examined associations between child positive reactivity and parental control. Among the findings, mothers of joyful infants tracked their infants' location more closely than did mothers of less joyful infants (Kochanska et al., 2004). Tracking might be interpreted as reflecting proactive control. In contrast, Latzman and colleagues (2009) found no associations between positivity and maternal monitoring, inconsistent discipline, or corporal punishment. Thus, we know little about concurrent associations between positive reactivity and parental control.

Child Negative Reactivity and Parenting

Many studies have measured a general negative reactivity, sometimes called *difficult temperament*, marked by frequent expressions of distress. Difficult temperament, referring to a general tendency to express negative emotions, is more general than the related constructs of fearful and angry negative reactivity (Rothbart & Bates, 2006). The different qualities of negative emotion could elicit or stem from different kinds of parenting. Depending on parents' adaptive capacities, negative emotionality could produce nurturance, neglect, or even reciprocal negativity. Likewise, parent habits of warmth could elicit child habits of equanimity or reinforce negative reactivity.

Negative Reactivity/Difficultness

Findings on associations between general negative reactivity and parental warmth have been fairly numerous but mixed (Paulussen-Hoogeboom, Stams, Hermanns, & Peetsma, 2007). One study found negative associations between toddlers' difficultness and maternal responsiveness concurrently but not longitudinally (Owens, Shaw, & Vondra, 1998). Another study found concurrent positive associations of infant difficultness, with only two of seven aspects of observed maternal warmth and responsiveness: higher levels of affection and stimulating the infant with an object (Bates, Olson, Pettit, & Bayles, 1982). This study included a substantial number of middle-class families. The Paulussen-Hoogeboom and colleagues (2007) meta-analysis suggests that child negative reactivity overall may be correlated with less parental warmth, but this is more so for lower-socioeconomic-status (SES) than upper-SES samples. As in the Bates and colleagues (1982) study (and see Crockenberg, 1986), some mothers, especially those with educational and economic resources, may respond in supportive ways to a fussy child, especially an infant, whereas others, especially those with fewer such resources, respond with less support for a child who is high in negativity than for one who is low in negativity.

Previous findings of child negative emotionality relating to parental control are less extensive than those relating to parental warmth. Nonetheless, Paulussen-Hoogeboom and colleagues (2007) did find a general tendency for parents of more negative children to exercise more restrictive control. Much of this effect may concern child anger, but some of it appears to involve difficultness or irritability, too. To consider one study, Coplan, Reichel, and Rowan (2009) found associations between child negative reactivity and lower levels of parent authoritative control, but not overprotective or coercive parenting. Thus, in overview, plausible associations have been found between child general negative reactivity and parental warmth and, to a lesser extent, parental control.

Fear and Inhibition

The Paulussen-Hoogeboom and colleagues (2007) meta-analysis tables do not suggest that child fearful reactivity is associated with either less or more parental support. The

same is true for parents' restrictive control. Considering a few specific studies, two studies found concurrent associations in infancy and early childhood between fear/inhibition and more observed parental warmth (Kertes et al., 2009; Kochanska et al., 2004), but longitudinal tests were nonsignificant, even without autoregressive controls (Kochanska et al., 2004). In contrast, another study with 2-year-olds showed an association between child fearfulness and low levels of sensitivity/responsiveness (Rubin, Hastings, Stewart, Henderson, & Chen, 1997). In addition to these findings on parental warmth, one study found concurrent positive associations between child shyness and overprotective maternal parenting (Coplan et al., 2009). Thus, there is little consistent evidence of concurrent associations between children's fearful traits and parenting.

Frustration and Anger

A child's disposition to become frustrated and angry may be hard to distinguish from other forms of negative affect in early infancy, but it soon becomes more distinct from other forms of negative affect (Rothbart & Bates, 2006). Frustration and anger have greater likelihood of a negative association with supportive parenting than does fearful reactivity, and possibly with greater likelihood of a positive association with restrictive control, too (Paulussen-Hoogeboom et al., 2007). For example, infant anger has been concurrently associated with less parental warmth (Kochanska et al., 2004) and more harsh parenting (Rhoades et al., 2011).

Child Self-Regulation and Parenting

Self-regulation traits have been described in terms of a wide array of mechanisms, including behavioral, emotional, and physiological regulation. These traits are most often described as effortful control and executive functions. *Effortful control* is the ability to inhibit a dominant response in favor of a subdominant one. *Executive function* has been defined as "the set of higher order cognitive processes that underlie flexible goal-directed behaviors, such as inhibitory control, working memory, planning, and set shifting" (Bernier, Carlson, & Whipple, 2010, p. 326). Both can be considered related ways of talking about self-regulation (Zhou, Chen, & Main, 2012). The natural complement of child self-regulatory traits would be parental autonomy support and lower levels of control in general. Self-regulatory traits could also stem from and elicit parental warmth and low levels of hostility.

Tests of concurrent links between child self-regulation and parental warmth have been mixed, at least in early childhood. In a meta-analysis on concurrent associations between parenting and child self-regulation at ages 2 to 5, Karreman, van Tuijl, van Aken, and Dekovic (2006) found no associations between parental responsiveness and child self-regulation. In contrast, two studies that were not part of Karreman and colleagues' meta-analysis did find concurrent associations between parental warmth or responsiveness and child compliance (Dennis, 2006) and toddler self-regulation (Popp, Spinrad, & Smith, 2008).

Karreman and colleagues' (2006) meta-analysis found concurrent associations between children's self-regulation, measured by observation and questionnaire, and more positive, less negative parental control, measured by observation and questionnaire. Similar patterns have been reported in several more recent studies using observational and questionnaire measures of self-regulation (Karreman, van Tuijl, van Aken, & Dekovic, 2008; Latzman et al., 2009; Popp et al., 2008). In Karreman and colleagues' meta-analysis, when self-regulation was disaggregated into subcategories of compliance, inhibition, and emotion regulation, only compliance was correlated with parental control. Karreman and colleagues distinguished between positive control, referring to encouraging, guiding, and directive parenting, and negative control, or power-assertive, harsh, and possibly physical control. Compliance was positively related to positive control and negatively related to negative control.

In summary, children with better self-regulation tend to have parents who score high on warmth and low on negative kinds of control, similar to the associations between temperamental negative reactivity and parenting. The findings do not show, however, how the child and parent traits come to be associated. Next, we consider studies with design features that shed more light on the development of temperament–parenting links.

Directional Studies

In this section, we discuss longitudinal studies testing how children's temperament and parenting might influence one another.

Child Positive Reactivity and Parenting

Child Positive Reactivity Predicting Parenting

Very few longitudinal studies have tested whether child positivity elicits parental warmth, and their results are mixed. In one study, infants' joyfulness predicted neither subsequent parent–child shared positive affect nor maternal responsiveness (Kochanska et al., 2004). In contrast, Lengua and Kovacs (2005) found that during middle childhood, positive emotionality predicted more subsequent maternal acceptance, controlling for earlier acceptance. Thus, although both the assumption of reciprocity and child effects research (Bates, 1976) suggest that child positivity could elicit parental warmth, there is very little evidence on this issue. We have not seen any longitudinal studies examining the influence of child positivity on parental control.

Parenting Predicting Child Positive Reactivity

Two longitudinal studies show links between parental warmth and positive temperamental reactivity. Belsky, Fish, and Isabella (1991) found that greater parental involvement predicted increases in infants' positive reactivity, controlling for prior levels of positive reactivity. Halverson and Deal (2001) found that positive parenting predicted children's temperamental persistence, even after autoregressive controls. We place this study here, even though Halverson and Deal's persistence measure may involve self-regulation, because most of their persistence items refer to approach-type, assertive behaviors, such as mastering a physical skill, which relates to positive reactivity. These findings may suggest part of the mechanism that accounts for twin studies' findings of relatively strong shared environmental components in children's positive affectivity (Goldsmith et al., 1997). Shared environmental factors are those that make siblings more similar to one another. Thus, it may be that children of parents who have high levels of positive parenting are more similar to one another in (high levels of) positive affect. On the other hand, we did not find studies examining parental control as a predictor of positive temperamental reactivity.

Child Negative Reactivity and Parenting

Child Negative Reactivity Predicting Parenting

NEGATIVE REACTIVITY/DIFFICULTNESS

Several longitudinal studies have examined the association between children's general negative reactivity and parental warmth. For example, as noted earlier, Owens and colleagues (1998) did not find longitudinal associations between toddlers' difficultness and maternal responsiveness, although they did find a concurrent association. Gauvain and Fagot (1995) found that toddlers' difficultness was associated with not only more subsequent maternal problem-solving assistance but also less subsequent maternal encouragement and approval, and more disapproval; however, autoregressive controls were not used. Similarly, Boivin and colleagues (2005) found that maternal hostile-reactive parenting was partly due to infants' genetically influenced difficultness. In a further complexity, Frankel and Bates (1990) found that male infants' difficultness was associated with less discordant subsequent mother–child interactions, but female infants' difficultness was associated with more discordant subsequent interactions. Negative emotionality was also linked with more subsequent maternal sensitive responsiveness in a study by Paulussen-Hoogeboom, Stams, Hermanns, and Peetsma (2008). However, neither Frankel and Bates (1990) nor Paulussen-Hoogeboom and colleagues used autoregressive controls for earlier parenting. At this point, we would characterize the evidence for child negative reactivity upon parental warmth as quite mixed. Although negative reactivity appears to predict subsequent parental warmth, the valence of that relationship is consistent across neither studies nor child gender.

There also is some evidence that negative reactivity might elicit more parental control.

A longitudinal study found that difficultness during the first 2 years of life was associated with more maternal reactive control and mother–child conflict at age 2 (Lee & Bates, 1985). In Gauvain and Fagot's (1995) study, mentioned earlier, difficult temperament in toddlerhood was subsequently associated with more maternal directives. Neither of these studies used autoregressive controls for earlier parenting. However, two studies of middle childhood, which did control for earlier discipline, found that temperamental irritability predicted increases in inconsistent discipline (Lengua, 2006; Lengua & Kovacs, 2005). As with evidence of negative reactivity predicting parental warmth, negative reactivity may predict parental control, but the evidence is thin so far.

FEAR AND INHIBITION

Several longitudinal studies have examined associations between children's fear/inhibition and parental warmth. As noted earlier, although Kochanska and colleagues (2004) found concurrent associations in infancy and early childhood between fear/inhibition and more parental warmth, they did not find longitudinal associations, even without controls for earlier warmth. Interestingly, as with difficultness, male infants' inhibition has been linked with less discordant subsequent mother–child interactions, but female infants' inhibition has been linked with more discordant subsequent interactions (Frankel & Bates, 1990); however, autoregressive controls were not used. Fearfulness in middle childhood in one study predicted more subsequent maternal acceptance (Lengua & Kovacs, 2005), and in another also predicted decreases in maternal rejection, the inverse of warmth (Lengua, 2006), with both studies controlling for earlier parenting. Thus, several studies suggest that children's fearful traits function to increase maternal warmth.

In addition, one study examined the longitudinal association between child fearfulness and parental control. Fearfulness in middle childhood predicted decreases in inconsistent discipline, even after statistical controls for earlier discipline (Lengua, 2006). It is interesting that fearfulness, a child trait that could be a negative indicator, actually has predicted increased parental warmth and decreased inconsistency in control. This may be related to a tendency of fearful children to show less growth in externalizing problems (Keiley, Lofthouse, Bates, Dodge, & Pettit, 2003), but more replications are needed before detailed interpretation is indicated.

FRUSTRATION AND ANGER

Although Kochanska and colleagues (2004) found that infant anger predicted less parental warmth concurrently, as described earlier, their longitudinal tests were nonsignificant. Thus, there is little to suggest that children's anger elicits less warm parenting. We know of no longitudinal studies of associations between frustration or anger and parental control.

Parenting Predicting Child Negative Reactivity

NEGATIVE REACTIVITY/DIFFICULTNESS

A number of studies show longitudinal links between parenting and child negative reactivity. One of the stronger findings is that caregivers who score high in sensitivity/responsivity have children who end up scoring lower in negative reactivity, even with controls for initial levels of temperament (Belsky et al., 1991; Braungart-Rieker, Hill-Soderlund, & Karrass, 2010; Engfer, 1986; Pauli-Pott, Mertesacker, & Beckmann, 2004).

In addition to these findings for parental warmth, one study examined a measure of parental control as a predictor of child negative emotionality. In that study, parental punitive reactions, a form of harsh control, predicted higher levels of negative emotionality, even with controls for earlier negative emotionality (Eisenberg et al., 1999).

FEAR AND INHIBITION

Low levels of parental sensitivity/responsivity predict child fearfulness, with controls for prior levels of fearfulness (Braungart-Rieker et al., 2010; Pauli-Pott et al., 2004). This may be due to insecure attachment because parental sensitivity has also been associated with infant attachment security (De Wolff & van IJzendoorn, 1997).

FRUSTRATION AND ANGER

We failed to identify studies examining the longitudinal effects of parenting on child frustration or anger. We would expect future research to show that parental warmth or control influences children's frustration and anger.

Comparison of Parenting's Influence on Positive and Negative Reactivity

Studies that control for genetic similarities between parents and children tend to show stronger shared environmental influences on child positive reactivity than on negative reactivity (Goldsmith et al., 1997, 1999; Plomin et al., 1993). Studies that do not control for genetic effects, however, tend to show more evidence of associations between parenting and child negative reactivity than between parenting and positive reactivity. For example, Belsky and colleagues (1991) found that several aspects of parenting predicted increases in child positive reactivity over time when controlling for prior levels of positive reactivity, but they also noted that parenting factors were much more predictive of the development of negative, rather than positive, reactivity. Other studies including autoregressive controls have found that parenting predicts the development of child negative, but not positive, reactivity (Lengua & Kovacs, 2005; Pauli-Pott et al., 2004). Although the behavioral genetic studies' finding that positive reactivity has more shared environmental contributions than negative reactivity may seem to contradict behavioral studies' finding that negative reactivity may be more influenced by parenting than positive reactivity, they are not necessarily inconsistent. Behavior genetic studies do show that *nonshared environment*, which refers to factors that make siblings different from one another, accounts for some variance in negative emotionality. Nonshared environment could include how one sibling is parented differently than the other. In addition, nonshared environment also explains some of the change in both negative and positive reactivity traits across development (Ganiban et al., 2008; Saudino, 2005; Takahashi et al., 2007). Although it is notable that parenting can influence change in negative reactivity, and that shared family factors can make siblings similar in positive reactivity, further research is needed to chart the more fine-grained developmental processes underlying these findings.

Child Self-Regulation and Parenting

Child Self-Regulation Predicting Parenting

The standard view is that warm and supportive, but firm, parenting produces a self-regulated child (Baumrind, 1991). Even so, as suggested by Bell (1968), children's self-regulation could also influence parenting. Among the few studies that have examined infants' or young children's self-regulation as a predictor of parenting warmth, Popp and colleagues (2008) found that toddlers' self-regulation was linked with more subsequent maternal responsiveness, but not when controls for initial maternal responsiveness were added. In addition, in another study in early childhood, researchers found that higher child vagal tone, indexing higher regulation by the parasympathetic system, predicted more subsequent maternal supportive parenting, controlling for earlier supportive parenting (Kennedy, Rubin, Hastings, & Maisel, 2004). This suggests that better self-regulation elicits more supportive parenting.

In studies of older children, two studies examined associations between early adolescents' attention problems, which are likely related to deficiencies in self-regulation traits, and subsequent parenting. Even with statistical controls for initial parenting, attention problems predicted more subsequent mother–child (but not father–child) rejection (Lifford, Harold, & Thapar, 2008), and boys' (but not girls') attention problems predicted more subsequent mother–son (but not father–son) hostility (Lifford, Harold, & Thapar, 2009). Similarly, effortful control in late childhood and early adolescence predicted decreases in maternal rejection (Lengua, 2006), and adolescents' conscientiousness—a core personality trait linked to temperamental effortful control—predicted increases in paternal support (Asendorpf & van Aken, 2003). All four of these studies included controls for earlier parenting. Thus, the overall pattern of findings from these studies provides converging evidence that children's self-regulatory deficits produce less warm, supportive, and accepting parenting.

Several studies have found associations between self-regulatory difficulties and higher levels of parental control. For example, one study found longitudinal associations between children's self-regulation and less negative parental control (less overreactivity, laxness, and verbosity), but the study did not include controls for earlier parenting (Bridgett et al., 2009). However, Kennedy and colleagues (2004) found that lower vagal tone, a marker of less effective self-regulation, in early childhood predicted more maternal restrictive parenting, controlling for earlier parenting. Further, restrictive parenting was stable over the observation period only for mothers of children with lower vagal tone. Studies using a variety of methods and examining a variety of child ages consistently suggest that child self-regulatory deficits elicit more negative parental control, especially in parents most at risk for such parenting.

Evidence for Parenting Predicting Child Self-Regulation

Research suggests that parenting can influence children's self-regulation. Parental warmth has been implicated in various outcomes involving behavioral regulation. For example, in a study that included autoregressive controls, maternal responsiveness predicted more child effortful control (Kochanska, Murray, & Harlan, 2000). Bernier and colleagues (2010) found that maternal sensitivity and autonomy support predicted children's later executive functioning, but they did not include autoregressive controls.

Ineffectual parental control has also been associated with child deficits in behavioral regulation. In the most relevant example, Eisenberg and colleagues (1999) found that parents' punitive reactions predicted poorer behavioral regulation, controlling for prior regulation.

Summary

Temperament Influences on Parenting

A few studies provide evidence that child positive reactivity might predict more parental warmth. Fewer studies have tested associations between positive reactivity and parental control, and these cross-sectional studies offer little evidence that child positive reactivity is directly linked with parental control. Findings on associations between child general negative reactivity and parenting warmth are complex and somewhat inconsistent. This could reflect developmental stages of sampled children (Crockenberg, 1986). It could also reflect differences between studies in how general negative emotionality or difficultness was measured (Bates, 1989). In contrast, there is more consistent evidence that fearfulness elicits more warmth. A few studies also suggest that negative reactivity may be linked with higher levels of parental control, whereas fearfulness is linked with less inconsistent parenting. We note that few studies have tested associations between negative reactivity and parenting during adolescence. Studies more consistently suggest that child self-regulation predicts parental warmth and positive forms of control. Longitudinal studies represent considerable progress in description of developmental processes involving temperament.

Parenting Influences on Temperament

Findings on parental influences on children's reactivity and regulation support the model that temperament, despite being biologically based and relatively stable, is shaped by environmental factors, including parenting. Specifically, parental warmth and positive control tend to be associated with children's more positive emotionality, less negative emotionality, and better self-regulation. In addition, parental warmth predicts less child fearfulness. These interpretations are tentative, however, because most relevant studies fail to control for prior levels and to test whether associations owe to parent or child effects. More studies with cross-lag, longitudinal designs would advance understanding of the unfolding development of temperament. In addition, more studies on intermediary processes will aid understanding of the mechanisms by which temperament affects parenting and parenting affects temperament.

Temperament × Parenting Interactions in Development

In the first two sections of this chapter we have described findings of linear relationships between temperament and parenting. Here we consider evidence that they interactively combine with one another in shaping social development. It is increasingly well established that temperament variables predict social functioning in developmentally important settings, even longitudinally (Bates, 1989; Kagan & Fox, 2006; Rothbart & Bates, 1998, 2006). Findings tend to converge in showing a differential linkage pattern (Bates, 1989), with general negative emotionality predicting both externalizing and internalizing behavior problems, fearful temperament predicting internalizing problems more than externalizing, and temperamental self-regulation deficits predicting externalizing more than internalizing problems (Janson & Mathiesen, 2008; Rothbart & Bates, 2006; Saudino, 2005; Zhou et al., 2009). These findings tend to converge across studies covering various age spans, using various parent- and teacher-report measures, and even observational measures of temperament. Such linkages partially reflect common genetic bases for both temperament and adjustment (Saudino, 2005). And, of course, it is well known that parenting helps explain development of child social outcomes (Rothbaum & Weisz, 1994).

Nevertheless, temperament and parenting account for only moderate portions of the variance in children's adjustment outcomes, even when they are additively combined (Deater-Deckard, Dodge, Bates, & Pettit, 1998). A particularly interesting type of additive model would be would be of temperament effects on adjustment outcomes as mediated by parenting or the reverse. Such models would show, for example, that some of temperament's effects on adjustment are explained by temperament's effects on parenting, which in turn explain adjustment. However, there have been too few reports of such mediation models to require a review at this point. Another kind of model involves nonlinear interactions between temperament and parenting in predicting child adjustment. Numbers of studies reporting temperament × parenting interactions as predictors of child adjustment have grown increasingly in recent years. Here we summarize recent reviews of the temperament × parenting literature and mention newer studies. We consider the same dimensions of temperament and parenting as in the previous sections. Some studies choose to describe interaction effects in terms of the moderating effects of parenting, and others in terms of the moderating effects of child temperament. Although these different descriptive approaches can provide different answers, in general, they should be highly complementary, so we intermix findings from the different perspectives.

Positive Reactivity × Parenting → Adjustment

We have seen few reports of child positive reactivity interacting with parenting. In one study, children who scored lower on positive emotionality were more likely to show both depression and conduct problems in conjunction with maternal rejection, but more positive children were buffered against the effects of maternal rejection (Lengua, Wolchik, Sandler, & West, 2000). A more recent study supports this pattern. Lahey and colleagues (2008) found that the prediction from spanking and restriction in infancy to childhood conduct problems was weak among infants scoring high in positive affect compared to low positive affect infants.

Negative Reactivity × Parenting → Adjustment

Many studies report child negative reactivity interactions with parenting. We have subdivided this section into studies concerning fearful, frustrated, and general negative emotionality variables.

General Negative Emotional Reactivity

As noted earlier, studies often use an overall adverse or "difficult" temperament measure that typically combines several theoretically separable dimensions, including fearful and frustrated reactivity, as well as general irritability and emotional dysregulation. This is especially so when the temperament is assessed in infancy and via parental report. All studies in this section used parent reports of temperament, but one (Belsky, Hsieh, & Crnic, 1998) defined negative reactivity with both parent report and behavior observed in the laboratory. Bates and Pettit (2007) concluded in their review that child negative emotionality has tended

to amplify the harmful effects of negative parenting upon child adjustment outcomes, or conversely, negative parenting has amplified the effects of negative child temperament. A key early example is the finding by Belsky and colleagues (1998) that parents' intrusive control with toddlers predicted child externalizing behavior at age 3, but more for toddlers who scored high in negative reactivity than for those who scored low. Three recent papers report temperament × parenting interactions found in the National Institute of Child Health and Human Development (NICHD) child care study: Stright, Gallagher, and Kelley (2008) found that children's positive school adjustment in the first grade was predicted by mothers' sensitive, warm, and autonomy-supportive parenting, especially for children scoring high on adverse temperament at age 6 months. Bradley and Corwyn (2008) found a similar pattern with externalizing in first grade, using a difficultness composite from 1 and 6 months. They also found that harsh parenting predicted externalizing problems at school only for children scoring high on difficultness, and that mother productive activity (educational stimulation) predicted lower levels of externalizing for more difficult children. Pluess and Belsky (2010) found that lower levels of parenting quality were associated with lower academic and social adjustment across preschool to sixth grade but to a greater degree for children scoring high on temperamental negativity. For the academic skills measures, at high levels of parenting quality, temperament made no difference. However, for social skills, difficult children with high-quality parenting actually scored slightly higher than easy-going children, and those with low-quality parenting scored lower. Two additional studies provide similar findings. Mesman and colleagues (2009) found that maternal sensitivity predicted less growth of mother-reported externalizing problems from Time 1 (2–3 years of age) to Time 2 (3–4 years) only for children who scored high in adverse temperament. van Aken, Junger, Verhoeven, van Aken, and Deković (2007) similarly found that low levels of maternal warm, sensitive control, and high levels of hostile, intrusive control predicted increases in mother-reported externalizing behavior from 17 to 23 months only for difficult/dysregulated boys. One study found an effect opposite to the dominant pattern: Lahey and colleagues (2008) found that maternal spanking and restrictiveness, assessed in infancy, predicted conduct problems at ages 4–13 years more weakly for infants rated by their mothers as high in negative emotionality than for those low in negative emotionality. Perhaps this anomalous finding pertains to the relatively young age at which parenting was measured.

Fearful Reactivity

The Bates and Pettit (2007) review mentioned about 10 studies suggesting that the implications of fearful versus fearless traits depend on qualities of parenting, with a few patterns converging across studies. The most important of the patterns concerns high-fear toddlers developing signs of conscience better when their mothers are gentle than when their mothers are harsh in their control, and low-fear toddlers developing signs of conscience better when they have an emotionally positive relationship with their mothers than when they do not have such a relationship. The key early study showing this pattern was that by Kochanska (1995). This pattern was essentially replicated in two studies of toddlers by Kochanska, Aksan, and Joy (2007). In addition, Lahey and colleagues (2008) found that infants seen by their mothers as low in fear showed fewer conduct problems (mother-report) at ages 4–13 years if as infants they had mothers who were high in responsiveness. Furthermore, Lengua (2008) found that boys who were highly anxious in a laboratory game reported increased externalizing problems when they described their mothers as high in physical punishment. A second, highly intriguing pattern concerns high-fear children developing lower levels of internalizing behavior when their parents allow them to experience more rather than less frustration. Arcus (2001) found that infants who were negatively reactive in a laboratory situation, attributable to an early form of fearfulness, were less likely to show behavioral inhibition at age 14 months if their mothers were observed to be high in limit setting. Two studies provide additional support for this pattern. Lengua found that anxious 8- to 12-year-old boys who reported inconsistent parental discipline showed a decrease in self-reported internalizing problems over the next year. This can be construed as supporting the pattern because inconsistent parenting would produce frustration. Williams and colleagues (2009) found that for toddlers who were behaviorally inhibited, permissive parenting (inconsistent and ineffectual) predicted a high level of internalizing at age 4, whereas the parenting did not matter much for the low-inhibited children. Finally, we mention an interesting, qualitatively different moderator effect: Cornell and Frick (2007) found that relatively fearless preschoolers showed more advanced levels of guilt and empathy when they received more authoritarian and more consistent discipline, whereas parenting made little difference for the ratings of guilt of highly inhibited children. Low inhibition in this study may partly index a lack of self-regulation, in which case the finding would resemble a pattern we describe in the subsequent section on interactive effects of self-regulation.

Frustrated Reactivity

Theoretically, frustrated reactivity is quite different from fearful reactivity. It is often embedded in measures of general negative reactivity, but few studies have evaluated its effects separately. Two studies represent a promising interaction pattern. Degnan, Calkins, Keane, and Hill-Soderlund (2008) found that high-frustration toddlers whose mothers displayed overcontrol tended to show a high trajectory of mother-reported aggression across ages 2 to 5. Lengua (2008) found that parenting differences mattered more for children's adjustment when the children scored high in frustration. When mothers were seen by their children as inconsistent in discipline, low-frustration children showed decreased internalizing problems over a 1-year period, but high-frustration children showed increased internalizing problems. When mothers were seen as rejecting, high-frustration children increased in externalizing problems, but low-frustration children did not. In contrast, when mothers were seen as high in physical punishment, low-frustration boys showed increased externalizing problems, but high-frustration boys showed decreased externalizing problems.

Self-Regulation × Parenting → Adjustment

Our previous review (Bates & Pettit, 2007) highlighted a pattern in which high levels of negative parenting (e.g., harsh discipline) or low levels of positive parenting (e.g., warmth or effective control) were associated with adjustment problems, especially for children who scored low in temperamental manageability or self-regulation. This pattern was supported to a comparatively substantial degree. A key example is the study by Rubin, Burgess, Dwyer, and Hastings (2003), following children from ages 2–4. Subsequent studies have continued to support this pattern. King and Chassin (2004) found that teens' self-reported impulsivity at age 15 predicted more self-reported drug problems at age 20, especially for teens who described their parents as unsupportive. Interestingly, the King and Chassin study found that the moderator effect did not apply at extremely high levels of impulsivity. Lengua (2008) found that child-rated inconsistent parental discipline predicted increased externalizing behavior 1 year later for children scoring low in executive functioning.

The pattern in which parenting matters more for poorly regulated children than it does for well-regulated children does not preclude other patterns. Lengua (2008), for example, also found that child perceptions of parental physical punishment predicted no decrease in child externalizing behavior for children low in effortful control, but it did predict a decrease in the externalizing behavior of children high in effortful control. Thus, children with better effortful control showed bigger reductions in their externalizing behavior over 1 year in response to perceived punishment. This finding comes from a sample that represents an urban community in the United States, with a broad range of incomes and ethnic/racial minorities. A rather different interaction effect is reported by de Haan, Prinzie, and Dekovic (2010) in a broadly representative sample of families followed in Flanders, involving child conscientiousness as a marker of effortful control. Here, mothers who described themselves as unlikely to criticize and yell saw greater decreases in child aggression than mothers who described themselves as likely to criticize and yell, but only if the child scored high on the trait of conscientiousness. In a

perhaps related vein, Degnan and colleagues (2008) used a physiological index of self-regulation—vagal suppression in response to a frustrating situation at age 2, that is, a measure of decreased vagal influence in response to challenge. Mothers who showed less harsh and more child-focused parenting less often saw their children on a subsequently high trajectory of disruptive behavior, if their children were high in vagal suppression. This parenting variable did not matter much for children with low vagal suppression. Similarly, Obradovic, Bush, Stamperdahl, Adler, and Boyce (2010) found that the behavioral and academic development of children with low vagal responsiveness was less sensitive to levels of parent-reported family adversity (which includes harsh and restrictive parenting) than that of children high in vagal suppression. Those with high vagal suppression in response to a laboratory challenge and low family adversity showed better baseline adjustment on parent-, teacher-, and child-report measures in the Fall of kindergarten, and increased growth in academic competence across the kindergarten year compared to children with high family adversity.

Across studies, findings suggest that there may be a pattern in which the social development of children with traits of lower behavioral self-regulation proceeds notably better in families with parental warmth and effective control than in families with low levels of warmth and effective control, and that for such children, parenting matters more than it does for children with higher self-regulation. This is still not sufficiently established, but it has become a solid hypothesis. There is also a trend for a similar effect for parenting to matter more for children high in vagal suppression in response to challenge.

Summary of Temperament × Parenting → Adjustment

The emerging literature on temperament × parenting interactions continues the trend of accelerating numbers of relevant findings. The pattern of more fearful children showing fewer externalizing behaviors when they receive gentle discipline, and for relatively fearless children to do this when they have a responsive, enjoyable relationship with their parent, continues to receive support. This fits the theoretical notion of two pathways to socialization, one based on optimal and not excessive amounts of fear of negative consequences for misbehavior, and the other based on desire to maintain a positive relationship (Kochanska, 1997). The pattern of fearful children developing fewer internalizing behaviors when they receive more demanding parenting has received only a bit of further support, and some challenges. Some recent studies suggest that easily frustrated children may be more sensitive to negative parenting in terms of developing behavior problems than less easily frustrated children. A few recent studies also suggest that children who score high on general negative emotionality develop higher levels of behavior problems in response to negative parenting, more so than children who score low on negative emotionality. At the same time, studies suggest that children who score high on negative emotionality might be likely to develop positive adjustment in response to positive parenting, more so than less negatively emotional children. We reiterate a previously noted pattern (Bates, Pettit, Dodge, & Ridge, 1998) in which children with lower levels of self-regulation develop better adjustment if they receive positive or effective parenting, whereas the absence of such parenting does not matter as much for children with higher self-regulation. And finally, another pattern may also be emerging, in which children with higher self-regulation may actually develop better adjustment in response to higher levels of negative parenting, whereas this matters less for poorly self-regulated children.

Conclusion

This chapter has considered how children's temperament relates to their experiences with parenting. Temperament characteristics are biologically rooted and relatively stable, so one might think of temperament as fundamentally independent of environmental pressures. Nevertheless, temperament, at least as it is measured, could actually be part of a transactional, developmental process with the environment, especially the parenting environment. Our review provides numerous examples that support this possibility, at least in a loose way. Studies show that child temperament predicts parental warmth and control. These studies have used a variety of operational definitions of temperament and parenting, including both self- or parent-report and observational measures, which increase our confidence that child temperament does have effects upon parenting. However, only a few of these studies show temperament predicting parenting at a later time even after statistically controlling for parenting at the initial time. Thus, we need more longitudinal data, modeled in ways that allow inferences about direction of effects. Controls for initial levels of parenting may be difficult in eras of development in which children's needs from parents change rapidly (e.g., infancy to toddlerhood or toddlerhood to the preschool era). However, it is probably possible to develop some additional parenting measures with cross-age validity. We also found studies showing that parenting variables predict child temperament variables. As with the studies of temperament influences upon parenting, parenting → temperament studies used various measures of parenting and temperament, but again, only some of them used longitudinal models controlling for initial levels of temperament. More such evidence is needed for confident conclusions. Also on our wish list for future research is more systematic coverage of the developmental spectrum. Adolescence has been least well considered, and we are not aware of any studies comparing the effects of temperament or parenting at multiple stages of development. In addition, if longitudinal, replicated transactional effects are found, it will be important to measure the more basic processes that mediate the correlations, such as genes, child or parent learning, active parental campaigns (Goodnight, Bates, Pettit, & Dodge, 2008), and dynamic cascades (Dodge et al., 2009). It will also be valuable to have a taxonomy of parenting dimensions that allows confident comparisons of the many different ways we measure temperament.

Finally, we also have considered recent studies that show how child temperament and parenting interact in predicting child social adjustment. Ultimately, replicated patterns of temperament × parenting interaction could specify how children with a given temperament may profit from different types of parenting, and conversely, how a given kind of parenting may have different implications for temperamentally different children. Such patterns are beginning to emerge. However, many gaps remain in the literature. In addition to the general need for further and more explicit replications of longitudinal studies, another need, as with the main effects of temperament or parenting, is for more evaluation of the influence of developmental stage. In a useful example of the work that is needed, Kochanska and colleagues (2007) suggested that interactions involving parental gentle control and child fearfulness may affect social development only when they occur in the first few years of life. Ultimately it is important to understand the developmental processes through which the temperament × parenting interactions influence child adjustment. We think it most likely that temperament could affect social learning processes (Patterson, Reid, & Dishion, 1992), perhaps through how the child perceives parent behaviors (e.g., whether parent social punishments or rewards are more salient; Goodnight et al., 2008) and the extent to which they motivate the child's social learning. Other processes, however, are also possible. We are eager to see future findings and theoretical developments on temperament–parenting transactions and interactions in shaping social development.

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