

## Dispositional Emotionality and Regulation: Their Role in Predicting Quality of Social Functioning

Nancy Eisenberg, Richard A. Fabes, Ivanna K. Guthrie, and Mark Reiser  
Arizona State University

Individual differences in emotionality and regulation are central to conceptions of temperament and personality. In this article, conceptions of emotionality and regulation and ways in which they predict social functioning are examined. Linear (including additive) and nonlinear effects are reviewed. In addition, data on mediational and moderational relations from a longitudinal study are presented. The effects of attention regulation on social functioning were mediated by resiliency, and this relation was moderated by negative emotionality at the first, but not second, assessment. Negative emotionality moderated the relation of behavior regulation to socially appropriate/prosocial behavior. These results highlight the importance of examining different types of regulation and the ways in which dispositional characteristics interact in predicting social outcomes.

The similarity between definitions of personality and temperament is often striking. Traits are seen as fundamental to the construct of personality and refer to “individual differences in the tendency to behave, think, and feel in certain consistent ways” (Caspi, 1998, p. 312; see also Johnson, 1997). Temperament has been defined as “constitutionally based individual differences in emotional, motor, and attentional reactivity and self-regulation. Temperamental characteristics are believed to demonstrate consistency across situations, as well as relative stability over time” (Rothbart & Bates, 1998, p. 109). Thus, both temperament and personality refer to individual differences that show some stability over time. An important distinction is that temperament is assumed to have some biologically based substrate, whereas the role of biological input is less central to most conceptualizations of personality. However, experience is believed to affect temperament (Rothbart & Bates, 1998), and many personality traits are believed to have a biological basis (e.g., Bergeman et al., 1993; Rowe, 1997).

There is increasing recognition that the constructs of temperament and personality overlap, and that early temperamental differences are the substrate of personality (Caspi, 1998; Rutter,

1987). Moreover, there is overlap in the types of items used to assess temperament and personality on self-report or other-report assessment instruments. For example, emotion and its regulation play a central role in the conceptualization and measurement of temperament in childhood (Goldsmith & Campos, 1982; Rothbart & Bates, 1998) and are also central to some dimensions of personality (e.g., in the Big Five constructs of neuroticism and conscientiousness).

The goal of this article is to review some of the developmental research on emotionality and regulation and to consider their role in predicting quality of concurrent and future social functioning. This research draws heavily on temperament research and is relevant to an understanding of links between personality and social competence and adjustment. Constructs of emotion and regulation are much more differentiated in some conceptualizations and measures of temperament than in most work on personality. For example, sadness, fear, and anger are differentiated in some temperament scales, whereas personality theorists generally lump negative emotionality into one or two more general categories (e.g., neuroticism). Similarly, in the temperament work, different modes of regulation sometimes are assessed (e.g., inhibition control, attention focusing and shifting), whereas in work on personality the norm is to study larger regulation-related constructs such as constraint (Abadi & Rothbart, 1994; Goldsmith & Rothbart, 1991). However, as is discussed shortly, different types of emotions or regulation may relate somewhat differently to a given outcome. For example, it may be that fearful emotions are especially linked to internalizing problems, whereas irritable or angry emotions are more consistently related to externalizing problems (Robins, John, Caspi, Moffitt, & Stouthamer-Loeber, 1996; Rothbart & Bates, 1998; see also Kagan, 1998). Of equal importance is the fact that personality researchers often combine either emotionality and regulation into the same construct so that their independent effects cannot be examined (e.g., Caspi, Henry, McGee, Moffitt, & Silva, 1995) or items tapping emotionality and regulation with items assessing quality of social behavior when assessing personality types (e.g., Hart, Hofmann, Edelstein, & Keller, 1997; Robins et al., 1996). Thus, it often is more useful to study the narrower

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Nancy Eisenberg and Ivanna K. Guthrie, Department of Psychology, Arizona State University; Richard A. Fabes, Department of Family Resources and Human Development, Arizona State University; and Mark Reiser, Department of Economics, Arizona State University.

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Correspondence concerning this article should be addressed to Nancy Eisenberg, Department of Psychology, Arizona State University, Tempe, Arizona 85287-1104. Electronic mail may be sent to nancy.eisenberg@asu.edu.

constructs delineated by temperament theorists than it is to study the broader constructs that are typically (albeit not always) examined in personality research, especially if one wishes to isolate the influences of emotion or regulation on outcomes. Of course, the personality types and dimensions in the research on personality reflect broader aspects of functioning than do measures of specific types of regulation and, as a consequence, may be better suited for some purposes, such as testing consistency of personality over long periods of time.

## Conceptions of Emotion and Emotion-Related Regulation

### *Emotion and Emotionality*

A variety of conceptions of emotionality and regulation have been proposed and used in research in developmental and child clinical research. Although there is some disagreement about the definition of emotion, it is commonly viewed in a more dynamic and functionalist way than it was a decade or two previously. A number of theorists have argued that the primary function of emotion is to bias or modulate action (Frijda, Kuipers, & ter Schure, 1989; Saarni, Mumme, & Campos, 1998). Saarni and colleagues have defined emotion as "the person's attempt or readiness to establish, maintain, or change the relation between the person and the environment on matters of significance to that person" (Saarni et al., 1998, p. 238). Factors that render an event "significant" include one's goals, the social signals of others, hedonic stimulation, or the elicitation of schematic processes from memory. Thus, this definition highlights person-event transactions, particularly in the social world. However, relatively stable individual factors such as goals, schema in memory, and how one experiences and responds to hedonic stimulation would seem to play an important role in emotional responding.

In temperament and personality work on individual differences, the constructs of reactivity (Rothbart, 1989), emotional or affective intensity (Eisenberg & Fabes, 1992; Larsen & Diener, 1987), valence of emotion (positive or negative; Watson, Clark, & Tellegen, 1988), and type of negative emotion (e.g., sadness, fear; Goldsmith & Rothbart, 1991; Rothbart, Ahadi, & Hershey, 1994) have been used. However, in most studies, distinctions among various types of negative (or positive) emotions have not been made. Indeed, in many commonly used measures of personality, temperament, and emotion (e.g., Buss & Plomin, 1984; Eysenck, 1967; Watson et al., 1988), diverse negative emotions are combined into a construct such as negative emotionality or neuroticism. One notable exception is the distinction of different types of negative emotions such as anger or frustration and sadness in some temperament scales developed relatively recently (Goldsmith & Rothbart, 1991). Moreover, sometimes intensity of emotion, across positive and negative emotions (Larsen & Diener, 1987) or emotions with an unspecified valence (Eisenberg, Fabes, et al., 1997), has been differentiated from frequency of occurrence of emotions, but more often measures have tapped frequency and, to some degree, intensity of emotionality.

### *Regulation*

The topic of emotion regulation has received much attention in recent years. However, views of the nature of emotion-related

regulation vary considerably. At one end of the continuum of perspectives, some people have argued that an intrinsic emotion program is generated as the result of a transaction with the world, which immediately results in an emotional response and usually a facial reaction (e.g., Ekman, Friesen, & Ancoli, 1980). At the other end of the continuum is the newer functionalist perspective, which treats emotion regulation as part of the emotion-eliciting situation. A given stimulus is viewed as intrinsically affected by the possibility of the response that the individual can make to the situation. Emotion and emotion regulation are not viewed as a sequential process because even an initial response is affected by affordances of that situation—what might happen in the situation and what responses the individual can make in the given context. For example, an infant's perception that he or she can control the activation of a fear-inducing toy influences initial fear reactions to the activation of the toy (Gunnar, 1980). In our view, aspects of emotion regulation occur along the entire continuum—some are an intrinsic part of the emotional response (and can modify the response even before it occurs), whereas others occur during and subsequent to the initial emotional reaction. Moreover, it is likely that there are individual differences in the degree to which people modulate emotion at these various points in time.

Given the range of perspectives on the nature of emotion regulation, it is not surprising that definitions of the construct vary, although they tend to contain some common elements. Campos and colleagues (Campos, Mumme, Kermoian, & Campos, 1994) suggested that emotion regulation can take place at three general loci: at the level of sensory receptors (input regulation), at central levels where information is processed and manipulated (central regulation), and at the level of response selection (output regulation). According to Thompson (1994), "Emotion regulation consists of the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goals" (pp. 27–28). Thompson described various domains for emotion regulation, including neurophysiological responses, attention processes, construals of emotionally arousing events, the encoding of internal emotion cues, access to coping resources, the regulation of the demands of familiar settings, and the selection of adaptive response alternatives.

These definitions are quite inclusive, as they encompass monitoring, modulating, and changing internal mental and physiological states as well as actions that have effects in the external world. Rather than include so many processes under the rubric of "emotion regulation," we find it heuristically useful to differentiate between the regulation of internal processes or physiological states and the regulation of behavioral reactions associated with, or resulting from, internal states. Building on the work of Thompson (1994), Cole and colleagues (Cole, Michel, & Teti, 1994), Campos et al. (1994), and others (Walden & Smith, 1997), we define *emotion regulation* as the process of initiating, maintaining, modulating, or changing the occurrence, intensity, or duration of internal feeling states and emotion-related physiological processes, often in the service of accomplishing one's goals. We suggest that emotion regulation is often achieved through effortful management of attention (e.g., attention shifting and focusing, distraction) and cognitions that affect the interpretation of situations (e.g., positive cognitive restructuring) as well as through neurophysiological processes (see Thompson, Flood, & Lundquist, 1995).

In contrast, *emotion-related behavior regulation* is defined as the process of initiating, maintaining, inhibiting, modulating, or changing the occurrence, form, and duration of behavioral concomitants of emotion, including observable facial and gestural responses and other behaviors that stem from, or are associated with, internal emotion-related psychological or physiological states and goals. This type of regulation (henceforth labeled *behavioral regulation* for brevity) may involve the communication of emotion; it often involves inhibition or activation of behavior linked to emotion; and sometimes it is an attempt to change the emotion-inducing context. Thus, behaviors such as instrumental coping—that is, attempts to manage a stress-inducing context—can be considered one aspect of behavior regulation, although it also may be useful to distinguish between the regulation of the expression or communication of emotion and attempts to alter an emotion-eliciting context (Eisenberg & Fabes, 1992). The critical distinction between what we have labeled emotion regulation and behavior regulation is the locus of regulation: internal psychological and physiological reactions or overt behavior driven by or associated with aroused internal states. Behavior regulation is most often achieved through voluntary inhibition or activation of behavior, but attentional processes also play a role. Although we believe that attention control (especially attention shifting) most often is used to modulate internal emotion-related processing, attention control (especially attention focusing) sometimes may be used to manage overt behavior associated with emotion when the emotion itself was not sufficiently regulated.

Emotion regulation and behavior regulation are intricately and perhaps sometimes inextricably associated, particularly in infancy. Not only is behavior regulation affected by internal emotion-related processes but the consequences of behavior regulation often may influence the course of internal emotion-related processes and states and may serve to modify contemporaneous and future emotion-related cognitive or physiological processes. Moreover, as was already noted, it would appear that some processes, such as inhibiting behavior and attention focusing, can serve as a mechanism for both emotion and behavior regulation. For example, behavior inhibition could be used to inhibit approach toward, and exposure to, a potentially distressing situation, which likely will affect the internal experience of emotion. Nonetheless, emotion regulation and emotion-related regulation refer to somewhat different processes, at least at a conceptual level. In addition, regulatory processes involved in emotion and behavior regulation may be used to regulate mental processes that are not especially emotionally charged or behavior that is not clearly connected with emotion.

Yet a different type of regulation relevant to emotion is niche picking or proactive coping—that is, behaviors that act either to control exposure to various aspects of the environment related to emotional experience or to mute their impact (Aspinwall & Taylor, 1997; Thompson, 1994). An example is when socially anxious individuals choose not to attend social events that elicit discomfort. Niche picking occurs prior to subsequent emotion-eliciting events, although it also may occur as a reaction to previous emotional experiences. Although niche picking is an important method of regulating emotional experience, its use has not been frequently studied (see Aspinwall & Taylor, 1997), especially in children.

Appropriate regulation depends, in part, on the particular context. Effective emotion-related regulation is viewed as flexible and

relevant to one's goals (Cole et al., 1994; Eisenberg & Fabes, 1992). The process of emotion regulation, if effective, also permits emotional flexibility, quick reappraisals of emotionally provoking situations, access to a broad range of emotions, and effective goal directedness (Thompson et al., 1995). Thus, as we discuss shortly, very high control is not always optimal regulation. Nor is apparent regulation due to involuntary inhibition, which is relatively inflexible, likely to relate to optimal outcomes. Moreover, what is optimal regulation in a normal social environment may differ from the level or type of emotion-related regulation required for adaptation in stressful, difficult environments (e.g., for children exposed to domestic or community violence, living with a depressed parent, or with temperamental vulnerability to stress; Thompson & Calkins, 1996).

### The Relation of Dispositional Emotionality and Regulation to Quality of Social Functioning

Individual differences in the intensity and valence of emotion and in the use of emotion-relevant types of regulation play a central role in high-quality social functioning. Indeed, it has been argued that emotion regulation is a social process rather than an intraindividual process, one that occurs within the context of social relationships and social interactions (Campos, Campos, & Barrett, 1989; Walden & Smith, 1997). Clearly, emotional expression and regulation affect our reactions to other people and vice versa. Moreover, many behavioral problems are characterized by negative emotionality and lack of emotion regulation.

In normal populations (without substantial numbers of people with clinical problems), it is reasonable to expect relatively high levels of behavior regulation to be associated with both high levels of social competence and low levels of problem behavior. Individuals who can modulate the experience of emotional overarousal or underarousal and the expression or release of emotion are relatively likely to express socially appropriate emotions and to behave in appropriate ways (Eisenberg & Fabes, 1992; Pulkkinen, 1982). However, it is important to differentiate between optimal and high levels of regulatory processes.

J. H. Block and Block's (1980; see also J. Block, 1994) thinking about the constructs of ego control and resiliency is highly relevant to this issue. Their construct of ego control reflects, to a large degree, dispositional behavior regulation. Specifically, *ego control* refers to the threshold or operating characteristics of an individual with regard to the expression or containment of impulses, feelings, and desires. J. H. Block and Block argued that overcontrol is related to constricted, nonadaptive behavior, whereas undercontrol is related to out-of-control behavior. People who excessively inhibit their emotional experience may have difficulty responding spontaneously (Cole et al., 1994) and may avoid important experiences and interactions. Similarly, excessive and especially involuntary behavior inhibition can reduce an individual's contact with novel situations and has been associated with fearfulness, avoidant behavior, social withdrawal, and lack of assertiveness (Gersten, 1989; Kagan, 1998). In contrast, individuals who are ego undercontrolled are likely to express emotion inappropriately, engage in socially problematic behaviors, and elicit negative responses from others. Of course, the degree to which behavioral inhibition or the lack thereof is adaptive and appropriate likely varies with the context.

J. H. Block and Block's (1980) construct of ego resiliency seems to reflect flexible, optimal attempts at coping or regulation. *Ego resiliency* refers to the dynamic capacity of individuals to modify their modal level of ego control (regulation) as a function of the demands of the environment. At one extreme of the dimension, *high ego resiliency* is defined as the resourceful adaptation to changing circumstances and contingencies, the analysis of the fit between situational demands and behavioral possibilities, and the flexible use of the available repertoire of problem-solving strategies (broadly defined to include social, personal, and cognitive strategies). The other end of the continuum, called *ego brittleness*, implies little adaptive flexibility, an inability to respond to changing demands, a tendency to perseverate or become disorganized when confronted with changes in circumstances or when stressed, and a difficulty in recovering from traumatic experiences. Although J. H. Block and Block's construct of resiliency encompasses the notion of flexible coping, it is usually operationalized in terms of the expected psychological outcomes of optimal regulation (e.g., recoups from stress, is curious and exploring, tends to get sick when things go wrong and there is a lot of stress [reversed], is creative in the way he or she looks at things)—outcomes that likely enhance the quality of the individual's social behavior. An individual's degree of regulatory control undoubtedly contributes to resiliency, but resiliency may be influenced by a range of factors (e.g., feelings about oneself) and, as operationalized in most studies, it reflects evidence of hardiness and flexibility and does not directly tap social competence.

J. H. Block and Block (1980) argued that ego control and ego resiliency are unrelated. However, they also noted that "extreme placement at either end of the ego-control continuum implies a constancy in mode of behavior that, given a varying world, can be expected to be adaptively dysfunctional" (p. 44). One could infer from this statement that moderate levels of ego control are generally the most adaptive and entail flexibility. Thus, Eisenberg and Fabes (1992) predicted that there is a relation between ego control and ego resiliency, but that it is quadratic.

### Styles of Regulation and Their Relations to Emotionality

There is a growing body of work on how individual differences in emotionality and regulation both singularly and jointly predict a variety of aspects of social competence and problem behavior. In a heuristic model, Eisenberg and Fabes (1992) outlined hypothesized relations of social functioning with emotional intensity and three styles of regulation. Our latest version of our model includes the interactions of negative emotionality with three styles of regulation that reflect J. H. Block and Block's (1980) theorizing: highly inhibited, undercontrolled, and optimally regulated. *Highly inhibited* individuals are high in involuntary behavioral inhibition (often labeled *behavioral inhibition* in the temperament literature; e.g., inhibition to novelty, rigidity of behavior), low to average in voluntary inhibitory control, low in activation control (the ability to get oneself to do things that one might not be motivated to do, e.g., do a difficult task), low to moderate in attentional regulation, and low in problem-focused coping strategies. The behaviorally inhibited children studied by Kagan (1998) probably would fall into this group. Because individuals high in involuntary behavioral inhibition tend to be constrained in their behavior, they may be viewed as behaviorally regulated by others, even if their inhibition

is not voluntary. Highly inhibited individuals are overcontrolled behaviorally, but their inhibition is not due to voluntary inhibition of behavior.

*Undercontrolled* individuals are believed to be low in emotion and behavior regulation, including inhibitory, attentional, and activation control, and low in adaptive problem-focused and proactive coping behavior. *Optimally regulated* individuals are relatively high in various modes of adaptive emotion and behavior regulation, including moderately high behavioral inhibition, but are also flexible in the use of regulatory behavior. They are not overcontrolled because of voluntary or involuntary inhibitory mechanisms.

The three styles of regulation bear a substantial resemblance to personality types recently found by several groups of researchers. Using Q-sort procedures, Hart et al. (1997) studied the personality of Icelandic school children, whereas Robins et al. (1996) studied European American and African American adolescent boys. They identified three groups of children on the basis of ratings made by adults: well adjusted, undercontrolled, and overcontrolled. D. L. Newman, Caspi, Moffitt, and Silva (1997) identified similar groups of 3-year-olds in New Zealand on the basis of their behavior during a testing session. The well-adjusted children generally were resilient, self-assured, and not emotionally labile. In two samples (Hart et al., 1997; D. L. Newman et al., 1997) they were also attentionally and/or behaviorally regulated and not overcontrolled or undercontrolled. (In Robins et al.'s sample, emotionality and regulation were less salient in the characteristics of these children.) The well-adjusted children continued to be well adjusted over time (Hart et al., 1997; D. L. Newman et al., 1997). The undercontrolled individuals were low in attention and behavior regulation and were active and sometimes irritable and impulsive. They were prone to externalizing problem behaviors in later adolescence, in adulthood, or concurrently (Hart et al., 1997; D. L. Newman et al., 1997; Robins et al., 1996). The overcontrolled children were inhibited, shy, and nonaggressive. In the D. L. Newman et al. study, the undercontrolled 3-year-olds had attention problems. Moreover, Hart et al. found that undercontrolled children developed concentration problems later in adolescence (it was not clear if they had such problems in elementary school). Overcontrolled individuals were prone to internalizing problems (Robins et al., 1996), were socially withdrawn in adolescence (Hart et al., 1997), and exhibited relatively few social strengths as adults (D. L. Newman et al., 1997).

In these three studies, the items used to classify children into the three personality groups included ratings of a wide variety of social behaviors and/or items pertaining to both regulation and emotionality. Thus, these investigators did not examine individual differences in regulation and emotionality separate from each other, their social consequences, or other temperamental or personality characteristics. Nonetheless, the general descriptions of these groups of children are consistent with the notion that children have different characteristic styles of regulation and that different styles of regulation are associated with long-term adjustment and social competence.

Eisenberg and Fabes (1992) suggested that both style of regulation and individual differences in emotional intensity predict quality of social behavior, and that the effects are additive and sometimes multiplicative. Our current view is that intensity and valence of negative emotion, as well as type of negative emotion,

are aspects of emotionality that predict individual differences in behavior, in combination with individual differences in various types of emotion-relevant regulation (see Figure 1).

Specifically, we predict that people who are optimally regulated—moderately to relatively high in emotion and behavior regulation, but not overcontrolled—will be high in quality of social functioning and well adjusted regardless of their level of emotional intensity. Well-regulated individuals who are prone to negative emotions may be especially likely to experience sympathy with others (Eisenberg, Fabes, Murphy, et al., 1996; Eisenberg, Fabes, Shepard, et al., 1998) and, consequently, to engage in prosocial behaviors motivated to alleviate others' distress (Batson, 1998; Eisenberg & Fabes, 1992).

Furthermore, undercontrolled people, who are low in a variety of modes of emotion and behavior regulation, are expected to exhibit externalizing problems and low social competence. Undercontrolled people who are also high in intensity and frequency of negative emotion are expected to be particularly out of control and prone to reactive (i.e., emotionally driven) aggression as well as to other externalizing behaviors that are based on unregulated emotion. They also may exhibit some internalizing symptoms such as

social withdrawal or anxiety because of the social consequences of their negative social behavior (see Lopez & Little, 1996). For example, the aggression exhibited by undercontrolled children high in intensity and frequency of negative emotion is likely to lead to rejection by peers and, consequently, some social withdrawal. Undercontrolled individuals who are low in intensity and frequency of negative emotion would also be expected to be low to moderate in social competence and prone to externalizing problems, but their externalizing behavior is hypothesized to be more calculated and less emotionally driven than that of emotional, undercontrolled people. For example, they are likely to engage in covert externalizing behaviors (e.g., stealing) and proactive aggression (i.e., aggression that is organized, unemotional, and aimed at fulfilling a need or desire; Dodge, Lochman, Harnish, Bates, & Pettit, 1997). The psychopathic personality, characterized by impulsive behavior, manipulateness, and callous, unemotional responding to others, as well as lack of emotional expression (Christian, Frick, Hill, Tyler, & Frazer, 1997; Frick, 1998; Lynam, 1997), would be an extreme example of the hypothesized outcomes of underregulation and low-intensity emotionality. However, in some measures of psychopathy, lack of emotional control,

**THE INTERACTION OF EMOTION-RELEVANT REGULATION AND NEGATIVE EMOTIONALITY: HYPOTHESIZED CORRELATES**

		<u>Style of Emotion-Relevant Regulation</u>		
		<u>Highly Inhibited</u>	<u>Optimal Regulation</u>	<u>Undercontrolled</u>
<u>Negative Emotionality</u>		(high involuntary behavioral inhibition; moderate to low voluntary inhibitory control; low attentional control; low to moderate attentional regulation; low problem-focused coping )	(moderately high use of inhibitory control); relatively high use of attentional control; attentional regulation, proactive and problem-focused coping strategies; <u>flexible</u> use of self-regulatory strategies)	(low in inhibitory control and high in impulsivity; underutilization of adaptive attentional and attentional control, and proactive or problem-focused coping strategies)
<u>Negative Emotionality</u>	Moderately High	<b>Inhibited</b> Expressive at a young age but learns to inhibit overt expressions of emotion Shy Low to average social skills Prone to reactive (emotion-induced) withdrawal Prone to anxiety, fear, personal distress, and internalizing behavior problems	<b>Appropriately expressive</b> Socially competent and popular Resilient Prone to sympathy and spontaneous prosocial behavior Low in problem behavior	<b>Uncontrolled, active behavior</b> Frequently controversial or rejected children Prone to reactive aggression Low in prosocial behavior Prone to personal distress, frustration, and anger; Prone to externalizing and internalizing behavior problems
	Moderately Low	<b>Inhibited and passive</b> Nonexpressive Unsocial or introverted Prone to proactive social withdrawal Low to average social skills and popularity Somewhat flat affect	<b>Placid</b> Low to average expressiveness Socially competent and popular Resilient Moderately high in prosocial behavior and sympathy Low in problem behavior	<b>Low to average popularity</b> Prone to proactive aggression and covert externalizing behavior Low in prosocial behavior and vicarious emotional responding

Figure 1. A heuristic model of the prediction of adjustment and quality of social behavior from level of negative emotionality and style of regulation.

as tapped by explosive, irritable, and frustrated reactions, is part of the measure of psychopathic tendencies (Lynam, 1997). Thus, there may be groups of people with psychopathic tendencies who are high in frequency or intensity of externalizing emotion such as anger but not internalizing emotions such as empathy or guilt.

Intrinsic deficits in self-regulatory systems tied both to neural responding to rewards and punishments (e.g., behavioral activation or inhibition systems; Gray, 1975) and to executive prefrontal cortex cognitive functioning have been linked to antisocial behavior, including psychopathy (Moffitt, 1993; J. P. Newman & Wallace, 1993). For example, individuals high in approach to rewarding cues and active avoidance given cues of potential relief (behavioral activation system, [BAS] responding) are prone to impulsivity, aggression, and psychopathy, whereas anxiety and behavioral inhibition are linked to passive avoidance and responsiveness to punishment (behavioral inhibition system [BIS] responding; see McBurnett, 1992; O'Brien & Frick, 1996). Executive dysfunctions may interfere with an individual's ability to voluntarily control his or her behavior, producing an inattentive, impulsive person who has difficulty voluntarily allocating cognitive resources (attention) in situations involving sustained attention despite lack of novelty (Derryberry & Rothbart, 1997; Peterson & Pihl, 1990). In addition, deficits in processing of peripheral information when engaged in goal-directed behavior may undermine the evaluation of behavior and, consequently, underlie some impulsive, antisocial behavior (J. P. Newman, Schmitt, & Voss, 1997), especially for nonanxious children and adults with psychopathic traits (J. P. Newman & Wallace, 1993; O'Brien & Frick, 1996; O'Brien, Frick, & Lyman, 1994).

Finally, highly inhibited individuals are expected to be low to average in social competence and, if they are prone to negative emotionality, susceptible to internalizing problems such as fearfulness, anxiety, depression, and social withdrawal due to timidity in regard to the novel and excessive shyness that is due to social anxiety (see Weinberger & Schwartz, 1990). Because behavioral overcontrol is not viewed as voluntary, such individuals would not be expected to be high on effortful behavioral modes of coping with stress such as instrumental problem solving. Although measures of low impulsivity generally tend to correlate positively with high behavioral control, these children are expected to be viewed by others as both low in impulsivity and low to average in voluntary inhibition control. Individuals who are low in negative emotionality but highly inhibited are hypothesized to be low to average in social competence, to show some social withdrawal due to a nonfearful tendency to be alone (rather than social anxiety; Eisenberg, Fabes, & Murphy, 1995), and to be average rather than high in internalizing emotional reactions.

Overcontrolled people tend to feel anxious or fearful (e.g., Bates, Bayles, Bennett, Ridge, & Brown, 1991; Rubin, Chen, & Hymel, 1993), although some undercontrolled children also evidence relatively high anxiety in addition to externalizing problems (e.g., Robins et al., 1996). We recognize that there may be some cultural differences in regard to the social correlates of a behaviorally inhibited style of regulation. Chinese children who are shy, have sensitive feelings, and are cautious and inhibited in their behavior are viewed as socially competent and as leaders by teachers and are liked by their peers (Chen, Rubin, & Li, 1995a, 1995b; Chen, Rubin, & Sun, 1992). Moreover, a highly inhibited

style might be viewed as socially desirable for women in some collectivist cultures.<sup>1</sup>

In brief, we predict that relatively high emotion regulation and moderately high behavior regulation are associated positive outcomes, even for people prone to intense emotions. In contrast, undercontrol (low emotion and behavior regulation) and high negative emotionality would be expected to predict externalizing problems and low social competence, especially if they co-occur. We also hypothesize that low emotion regulation and behavioral overcontrol, combined with high emotional intensity, predict low social competence as well as intense or frequent internalizing problems.

### Linear and Additive Effects of Emotionality and Regulation

Rothbart and Bates (1998) discussed the various processes that may link temperament and adjustment. The simplest links involve direct linear effects, as when a temperamental extreme constitutes psychopathology (e.g., attention deficit disorder) or positive adaptation, or when temperament predisposes the individual to a related condition (e.g., attentional control leading to good social adjustment). The second type of relation is an indirect, linear effect—that is, when the effects of temperamental regulation or emotionality on social functioning are mediated by other processes. One example is when temperament structures the immediate environment, which then influences social functioning; for example, high attentional control → planning → good school and social adjustment.

Most of the relevant research pertains to simple correlational relations between measures of emotionality and/or regulation and outcomes reflecting social competence or problem behavior. There is a rapidly accumulating body of literature indicating that individual differences in both emotionality and the regulation of emotion and in emotionally derived behavior are related in a linear manner to variations in social competence and adjustment (Caspi et al., 1995; Eisenberg, Fabes, Karbon, et al., 1996; Eisenberg, Fabes, Murphy, et al., 1996; Pulkkinen, 1982; Rothbart et al., 1994; see Rothbart & Bates, 1998). We cannot adequately review this work in the allotted space, so we provide only illustrative examples.

In regard to regulation, behavior regulation has been associated with both socially competent behavior and low-externalizing problem behavior in numerous studies, even when information on regulation and outcome variables was not obtained from the same source and when behavioral measures of regulation were obtained (e.g., persistence on a task or delay of gratification; J. H. Block & Block, 1980; Eisenberg et al., 1993; Eisenberg, Fabes, Guthrie, et al., 1996; Krueger, Caspi, Moffitt, White, & Stouthamer-Loeber, 1996; Kyrios & Prior, 1990; Lynam, 1997; Oosterlaan & Sergeant, 1996, 1998). In addition, behavior regulation (including low impulsivity) has been linked to low levels of adolescent substance abuse (e.g., J. Block, Block, & Keyes, 1988; Colder & Chassin, 1997), as well as high levels of conscience (Kochanska, Murray, & Coy, 1997) and sympathy (Eisenberg, Fabes, Murphy, et al., 1994, 1996). Similarly, attentional regulation has been associated with

<sup>1</sup> We thank Ed Diener for suggesting the last example.

high social competence (Eisenberg et al., 1993; Eisenberg, Guthrie, et al., 1997) and low problem behavior (Eisenberg, Fabes, Guthrie, et al., 1996), as have composites of behavior and attention regulation (Eisenberg, Fabes, Murphy, et al., 1995; Rothbart et al., 1994). Problems in attentional regulation, as tapped by measures of executive cognitive functioning, have been linked to both conduct disorders (Moffitt, 1993) and psychopathy (O'Brien & Frick, 1996; Patterson & Newman, 1993), perhaps especially for children at risk (e.g., because of genetic risk for substance abuse; Giancola, Moss, Martin, Kirisci, & Tarter, 1996).

Similar to Eisenberg and Fabes (1992), Rothbart and Bates (1998) argued that specific temperament dimensions relate in a differentiated way to internalizing and externalizing problems, with early inhibition related more to later internalizing problems and early unmanageability linked to later externalizing problems. Early inhibition is characterized, in part, by a high degree of behavior inhibition and low impulsivity, whereas unmanageability involves undercontrol and impulsivity. Consistent with this view, Huey and Weisz (1997) found that ego undercontrol (behavior underregulation) was related to externalizing problems in clinic-referred children, whereas ego overcontrol and low resiliency predicted internalizing problems. Similarly, Biederman, Rosenbaum, and colleagues (Biederman et al., 1990; Rosenbaum et al., 1993) found that children who are highly inhibited early in life are prone to anxiety disorders (especially phobias), whereas uninhibited children are more likely to develop externalizing disorders (especially oppositional disorders). Thus, individual differences in style of emotion-relevant regulation appear to be associated with different behavioral problems.

Individual differences in the intensity and frequency of negative emotionality also predict low social competence (Eisenberg et al., 1993, 1994; Eisenberg, Fabes, et al., 1997), externalizing problem behavior (e.g., Eisenberg, Fabes, Guthrie, et al., 1996; Rothbart et al., 1994; Stice & Gonzales, 1998), and adolescent substance use and/or abuse (Chassin, Pillow, Curran, Molina, & Barrera, 1993; Cooper, Frone, Russell, & Mudar, 1995; see also Caspi, Moffitt, Newman, & Silva, 1996), although data pertaining to the role of childhood negative emotion in predicting adult substance use sometimes are complex (see Pulkkinen & Pitkanen, 1994). In addition, temperament–personality negative emotionality has been linked to shyness (Asendorpf, 1987; Eisenberg, Shepard, Fabes, Murphy, & Guthrie, 1998; Eisenberg, Fabes, & Murphy, 1995; Leary, 1986) and internalizing problems (Caspi et al., 1995; Teglasi & MacMahon, 1990). Indeed, Clark, Watson, and Mineka (1994) argued that temperamental negative affectivity and neuroticism are vulnerability factors in the development of mood and anxiety disorders.

As suggested by Rothbart and Bates (1998), sometimes the relations of emotionality or regulation to socially relevant outcomes are indirect (mediated or partially mediated by other factors). For example, Chassin et al. (1993) found that the relation between dispositional negative emotionality and substance use was mediated by both self-report of internalizing symptomatology (including internalizing, self-derogation, and perceived loss of control in the previous 3 months) and contact with deviant peers (negative emotionality → internalizing symptomatology → association with drug-using peers → child substance abuse; for examples of mediation, also see Cooper et al., 1995; Wills, DuHamel, & Vaccaro, 1995).

It is clear that individual differences in emotionality and regulation are correlated (Derryberry & Rothbart, 1988; Eisenberg et al., 1993). Nonetheless, they sometimes provide unique additive prediction of social competence and behavior problems. For example, Eisenberg, Fabes, Guthrie, et al. (1996) found that both low regulation and high negative emotionality provided significant and unique (as well as overlapping) prediction of externalizing problem behavior. Similar unique effects were obtained by Eisenberg, Fabes, Murphy, et al. (1995) for both contemporaneous teachers' reports of 6- to 8-year-olds' social competence and mothers' reports of externalizing problem behavior, although significant, unique effects of both regulation and emotionality generally were not evident in across-time predictive analyses (which involved different teachers at each time period). However, in this analysis, a variety of predictors besides temperamental emotionality and regulation (e.g., coping) were included in the regressions, and this may have reduced the unique effects of regulation and emotionality. Indeed, for the same sample 2 years later, additive effects (in the predicted directions) were found when negative emotionality and regulation were assessed at the same time as social competence or externalizing problems, or 2 years prior (and there were mixed results for prediction over 4 years). Only negative emotionality, general emotional intensity, and regulation were included as predictors in these regressions (Eisenberg, Fabes, et al., 1997).

Rothbart et al. (1994) obtained less evidence of additive effects. They found that parents' reports of 7-year-olds' aggression and defiant behavior (negativity) were positively related to temperamental negative affect and negatively related to effortful control (regulation). When Rothbart et al. computed multiple stepwise regressions, aggression and defiant behavior were predicted by negative affect but not effortful control. Surgency, which is similar to extraversion, also was controlled in these analyses. One possible reason that effortful control no longer significantly predicted aggression once the other factors were controlled for is that there was an indirect relation between effortful control and negative outcomes. Effortful control was negatively correlated with surgency and negative affectivity. Thus, effortful control may reduce negative affect or surgency; in turn, lowered reactive tendencies may reduce aggressive tendencies (e.g., high effortful control → lowered negative affectivity → lowered aggression). Unfortunately, mediating and moderating relations were not examined in this study.

In a longitudinal study that included adolescents aged 12 to 21, Pandina, Johnson, and Labouvie (1992) examined the prediction of adolescent drug abuse vulnerability from the additive effects of negative affectivity and arousability (characterized as a bipolar construct in which impulsive/disinhibited responding reflected high arousability and overcontrolled/inhibited responding reflected low arousability). In general, although the presence of high negative affectivity or arousability alone heightened the risk for drug abuse, additive effects also were obtained. Individuals who displayed consistently high combinations of arousability and negative affectivity displayed the greatest amount of drug use over longer time intervals. Conversely, persistently low arousability and low negative affectivity combined were related to lower rates of initiation of drug use and fewer problematic consequences. Consequently, low levels of both of these temperamental qualities appear to function additively as protective factors against the initiation and continued use of drugs.

Thus, the data are generally consistent with the view that dispositional emotionality (usually negative emotionality) and regulation, alone or in combination, are related in predictable ways to both behavior problems and social competence. However, there are methodological issues that should be noted. For example, in many studies, measures of regulation are combined with measures of either emotion (J. Block et al., 1988; Pulkkinen & Hamalainen, 1995) or aggression and/or socially appropriate behavior (Dawes, Tarter, & Kirisci, 1997). In the former case, one cannot examine the unique effects of emotionality and regulation. In the latter case, the predictor and outcome variables are confounded if one is predicting social behavior or adjustment from temperament or personality. This overlap in items can produce artificially inflated estimates of the associations between individual-differences constructs and behavior problems, especially if both are obtained from a single reporter. This problem may be particularly true for internalizing problems, because they often are described by emotional reactions. Sanson, Prior, and Kyrios (1990) found that there was substantial contamination between temperament scales and items assessing internalizing (albeit not externalizing) behavior problems.

Lengua, West, and Sandler (1998) examined the relation of temperamental emotionality and regulation to depression and conduct problems using temperament measures that were either typical (including contaminated items) or uncontaminated (eliminating overlapping items). In general, negative emotionality was more strongly positively related to depression (and positive emotionality was negatively related), whereas the regulation dimensions of impulsivity and attentional focusing were more strongly related to conduct problems. Removal of overlapping items did not appreciably decrease these associations between temperament and symptomatology, a finding that suggests that individual differences in temperament are related to symptoms in systematic ways, even when overlap in measures is removed. However, additive effects were more evident for contaminated than uncontaminated measures, although some additive effects of emotionality and regulation were evident even for uncontaminated measures.

#### *Nonlinear Relations of Regulation and Emotionality to Quality of Social Functioning*

Rothbart and Bates (1998) discussed different kinds of nonlinear relations between temperament and quality of social functioning that involve moderating processes. A moderator is a variable such as sex, personality, or type of situation that affects the direction or strength of the relation between an independent or predictor variable and a dependent or criterion variable (Baron & Kenny, 1986). The first relation involving moderation occurs when temperament or personality characteristics, including individual differences in regulation, moderate the effects of the environment on adjustment. For example, temperament may buffer against the negative effects of stressors or may heighten the individual's response to events and, consequently, affect social behavior. The second type of moderational effect, Temperament  $\times$  Environment interactions, is particularly relevant to our heuristic model. As an example, Rothbart and Bates suggested that self-regulation of a temperament extreme may qualitatively change its expression (e.g., high negative emotionality combined with low attentional control  $\rightarrow$  sensitization and increasing anxiety, whereas high negative emo-

tionality plus high attentional control  $\rightarrow$  no maladjustment). Furthermore, one temperament trait may protect against risk from another temperament-based trait (e.g., high fearfulness or high attentional control can protect against the negative effect of impulsivity).

In addition to the aforementioned interactions, Eisenberg and Fabes (1992) hypothesized that there are quadratic relations between regulation or emotionality and social functioning. For example, in a sample including individuals very high and very low in behavior regulation, one would expect emotion-related behavior regulation to bear linear and quadratic relations to positive social functioning. Up to a point, behavior regulation is likely to enhance social competence in a linear fashion. However, people characterized by extreme overcontrol (because of either very high involuntary behavioral inhibition or voluntary control) probably are not as socially competent as individuals who are moderately high in control (although they may not be as low in social functioning as underregulated individuals).

There have been few examinations of quadratic effects of measures of children's temperament or personality. Shedler and Block (1990) found a linear, but not quadratic, relation between ego control and marijuana use, with use increasing with undercontrol. Eisenberg, Fabes, Guthrie, et al. (1996) found quadratic relations between mothers' and fathers' reports of ego control and parent reports of boys' externalizing problem behavior; there also was a quadratic relation between teacher-reported ego control and problem behavior. In general, low ego control (undercontrol) was positively associated with high problem behavior, whereas moderate and high levels of ego control were associated with lower levels of problem behavior and did not differ much from one another (although overcontrol was associated with somewhat less problem behavior than was moderate control). With the same sample, Eisenberg, Guthrie, et al. (1997) found a quadratic (as well as linear) relation between adult reports of children's behavioral regulation (ego control) and ego resiliency. Teacher-reported resiliency was highest at moderate levels of regulation. Parent reports of resiliency were lowest for children low in regulation and higher and similar for children moderate or high in regulation. Thus, the relation between regulation and social behavior is probably not always linear. To our knowledge, there is little research on quadratic relations between dispositional emotionality and social functioning (see Eisenberg & Fabes, 1995).

#### *Trait $\times$ Environment Effects*

Relatively few researchers have examined the prediction of social competence or adjustment from the interaction of regulation and/or emotionality with environmental factors. However, there is evidence of such effects. For example, Henry, Caspi, Moffitt, and Silva (1996) found that a composite measure of early childhood regulation and emotionality (labeled *lack of control*) predicted men's convictions for criminal offenses at age 18, especially for violent crime. Boys who were high in lack of control and were raised by a single parent were especially prone to convictions for violent offenses at age 18. The combination of lack of control and number of changes in parents (e.g., as a consequence of divorce) also predicted convictions for violent crimes. Although single parenting and changes in parents may partly reflect genetic factors, they also likely function as an environmental influence on children.



Bates, Pettit, Dodge, and Ridge (1998) obtained evidence of an interaction between temperamental resistance to control in infancy or toddlerhood and restrictive parenting when predicting externalizing behavior. Children's early resistance to control was more strongly related to externalizing behavior in middle childhood if their mothers were low in restrictive control (in the early years or at age 5). This effect was replicated in two samples, suggesting that it is reliable.

The more immediate interactional context also can moderate the relation between dispositional emotionality or regulation and social competence or adjustment. In a study in which social competence was based on observers' judgments of preschoolers' real-life behaviors, Fabes et al. (1999) found that the intensity of children's peer interactions moderated the relation of effortful control (dispositional regulation) to social competence. Effortful control predicted higher social competence in the given interaction for only fairly intense social interactions (i.e., those involving forceful actions and/or high activity levels by any participant). When the intensity in an interaction was low or moderate, socially competent responding was relatively high regardless of level of effortful control. Moreover, there was mediated moderation: The prediction of social competence from the interaction between intensity of the situation and dispositional effortful control was mediated by the negative emotion experienced by the child in the situation. Children high in regulatory control may be able to voluntarily regulate their attention and behavior in ways that attenuate overreactivity in arousing contexts, thereby maintaining emotional responsiveness at optimal levels. In turn, this optimal level of emotional responding may influence children's socially competent responding.

The context of children's typical social interactions (rather than any specific interaction) also can moderate the relation of temperament to children's problem behavior. Using measures of both temperamental emotionality and regulation, Fabes and colleagues (Fabes, Shepard, Guthrie, & Martin, 1997) created a composite index of arousability consisting of ratings of negative emotionality, activity level, impulsivity, persistence (reversed), and decision making (reversed). This index of emotionality and regulation was positively related to measures of young children's negative behavior, particularly that of boys. However, the relations were moderated by the playgroup of the children. For boys, problem behaviors increased significantly with proportionately more experience in same-sex peer groups, but the degree of the association between participation in male peer interactions and negative behavior was greater for boys higher in arousability. Boys high in same-sex participation who were also high in arousability displayed the most problem behavior. The opposite pattern was found for girls. For girls who were moderate or high in dispositional arousal, a high level of interaction with other girls was associated with less problem behavior. These findings are consistent with the notion that the peer culture interacts with children's dispositional emotionality and regulation in predicting problem behavior (although the measure of peer interaction could also reflect dispositional characteristics to some degree).

#### *Trait × Trait Interactions*

In their recent review of research on Temperament × Temperament interactions, Rothbart and Bates (1998) concluded that there was, as yet, little evidence for this type of interaction, although

"there are indications that some interactive effects will be discovered" (p. 158). As they noted, investigators often have not tested additive versus moderating effects in their studies.

Some researchers have found that composite scores including measures of both regulation and emotionality predict quality of social behavior over time. Although it is impossible to determine if the effects are additive or multiplicative, such findings suggest that there may be a multiplicative effect. For example, Caspi et al. (1995) found that a factor called Lack of Control, which was composed of irritability, restlessness, short attention span, and negativism, predicted conduct disorders and antisocial behavior at ages 13 and 15, and low competence (social and otherwise) at age 15. Lack of control did not predict socialized delinquency (norm-violating tendencies such as loyalty to delinquent friends and staying out at night). In addition, individuals classified as undercontrolled at age 3 were relatively low in control and high in aggression at age 18 (Caspi & Silva, 1995). Similarly, Pulkkinen and Hamalainen's (1995) index of weak self-control at age 14, which combined behavior and attention regulation with moodiness ("is impulsive, lacks concentration, changes mood"), predicted criminal offenses at age 20 and amount of criminal behavior at age 32.

#### *Substance Abuse*

The interaction between regulation (behavioral undercontrol) and emotionality has been examined occasionally in work on adolescent substance abuse, which can be considered an externalizing behavior. Colder and Chassin (1993) did not find evidence that behavioral undercontrol moderated the effects of negative emotion on alcohol use. However, the measure of behavioral undercontrol was rebelliousness, which is a questionable index of regulation, and the index of negative affect was internalizing emotions (anxiety, depression, social withdrawal).

When the children in this study were 2 years older, Colder and Chassin (1997) found that impulsivity moderated the effects of positive affectivity on alcohol use and alcohol-related impairment. Impulsive adolescents who were also prone to low levels of positive affectivity were higher in alcohol use and impairment. Although negative emotionality (using a subset of Buss & Plomin's [1984] items) was positively related to alcohol use, its effects were not moderated by impulsivity. However, impulsivity did moderate the relation of depression to alcohol use; depressed, impulsive adolescents drank more heavily than did depressed, nonimpulsive adolescents or nondepressed adolescents (Hussong & Chassin, 1994).

Pandina et al. (1992) found a modest number of interactional effects when predicting adolescent substance abuse. They assessed negative emotionality (including a variety of negative emotions) and arousal, with arousal reflecting disinhibition, impulsivity, and experience seeking. Thus, their index of arousal primarily reflected lack of regulation. For individuals who were stable in arousal and negative affectivity over a 3-year period in adolescence, there were some significant interactions. Adolescents high in both arousal (i.e., high in disinhibition) and negative affect exhibited the most alcohol problems, whereas those low in both negative affect and arousal exhibited the least problems with marijuana. Interactions between arousal and negative affect were infrequent for adolescents who were not stable in both arousal and negative affectivity,

perhaps because they were not as extreme in dispositional regulation or emotionality as adolescents who were stable in these characteristics.

In other work on drug use, different types of regulation interacted in predicting abuse. Wills, Windle, and Cleary (1998) found that high control (including soothability, dependability, and attentional control) interacted with poor control (including impatience [impulsivity] and distractibility [seemingly low attention focusing]) when predicting drug use outcomes. A high level of good self-control (including emotion-related regulation and the ability to modulate emotional reactions) reduced the impact of poor self-control on substance use. Wills et al. reported that they found a similar interaction in two other samples. Although this interaction did not include emotionality, it indicates that different types of regulation may predict risk behavior in a multiplicative manner.

### *Internalizing and Externalizing Problems*

In our work on dispositional emotionality and regulation, we have found numerous moderating effects. These effects have often surfaced only when the same reporter (parent or teacher) provided information about emotionality and regulation and outcomes, but this has not always been the case. Given that there is often very modest agreement between parents and teachers on children's negative emotionality, it is not surprising that parent reports of emotionality and regulation often do not predict teacher reports of outcomes in a multiplicative manner, or vice versa.

Shyness, especially when it involves behavioral inhibition when confronted with novelty (including people who are not well known), is generally viewed as an internalizing behavior. We predicted that children high in internalizing negative emotionality (intensity and frequency of emotions such as fear and anxiety) and low in emotion regulation (e.g., the ability to shift attention) would be viewed as shy by adults. Eisenberg, Shepard, Fabes, Murphy, and Guthrie (1998) obtained support for this hypothesis when negative emotionality was assessed with parent (usually mothers') reports of combined intensity and frequency of fear, sadness, anxiety, and autonomic reactivity (e.g., sweating during an important event); regulation was a composite of attention shifting and focusing. Specifically, children high in parent-reported internalizing emotion and low in parent-reported attention shifting were reported to be high in shyness by parents 2 and 4 years later and by teachers 2 years later. The relation between internalizing negative emotion and shyness held primarily for children low in attention shifting (the slope also was significant for children moderate in attention shifting for parental reports of shyness at one time period). However, similar interactions were not obtained when teachers' reports of attention shifting and internalizing negative emotion were used as predictors or when a different measure of internalizing negative emotion (mostly including items from the PANAS [Watson et al., 1988] and not autonomic reactivity items) was used at later assessments. Teachers and parents tend not to agree much on children's internalizing emotion (Achenbach, McConaughy, & Howell, 1987; Stanger & Lewis, 1993) and did not do so in this study. Moreover, mothers may be more attuned than teachers to subtle internalizing symptoms (Stanger & Lewis, 1993; Thomas, Forehand, Armistead, Wierson, & Fauber, 1990). Thus, it is not especially surprising that teachers' reports of internalizing emotion did not interact with attention shifting in predicting chil-

dren's shyness. Moreover, autonomic reactivity may be especially related to disorders involving anxiety (Clark et al., 1994), which could explain why the index of internalizing negative emotion including autonomic reactivity predicted better than did the measures that did not include autonomic reactivity.

In a study mentioned previously, Eisenberg, Fabes, Guthrie, et al. (1996) examined the prediction of externalizing problem behaviors from the interaction between the intensity and frequency of negative emotionality and low regulation. Consistent with our earlier discussion, we hypothesized that children high in negative emotionality (including anger) would be more prone to externalizing problems than would other children, especially if they were low in regulation. For children not prone to negative emotionality, regulation was expected to be less predictive of low problem behavior.

In this study, regulation was operationalized as a composite of teachers' (or parents') ratings on measures of temperamental attention shifting and focusing as well as items pertaining to behavioral undercontrol taken from J. H. Block and Block's (1980) Q-sort. Negative emotionality was a composite of items pertaining to negative emotional intensity (adapted from Larsen & Diener, 1987) and negative emotion items on the Q-sort. Care was taken to remove items that were contaminated (overlapping) on the Q-sort scales of emotionality, ego control, and resiliency (see Eisenberg, Fabes, Guthrie, et al., 1996). The interaction terms in regression analyses were significant for teachers' reports of regulation and emotionality predicting both teachers' and parents' reports of externalizing behavior. In general, children low in negative emotionality were lowest in problem behavior. In addition, as negative emotionality increased, regulation became a stronger predictor of low externalizing behavior. For example, when teachers' reports of regulation and emotionality were used to predict parent reports of children's externalizing behavior, the relation between regulation and problem behavior was significant for children moderate and high, but not low, in negative emotionality (see Figure 2). Teacher reports' of regulation were correlated with teachers' reports' of low problem behavior at all levels of negative emotion; however, the relation between regulation and problem behavior was strongest for children high in negative emotionality. Moderation effects were obtained less frequently for mothers' reports of emotionality and regulation; however, an interaction effect was obtained for the prediction of fathers' reports of boys' problem behavior. Mothers' reports of regulation were unrelated to fathers' reports of problem behavior for boys low and moderate in negative emotionality (who were relatively low in problem behavior). However, for boys high in negative emotionality, problem behavior decreased with increasing regulation. Thus, regulation was most important for predicting problem behavior of children prone to negative emotion (Eisenberg, Fabes, Guthrie, et al., 1996). A somewhat similar interaction was obtained in a smaller sample when the children were aged 6-8 (Eisenberg, Fabes, Murphy, et al., 1995) but not when they were 2 years older and the sample was smaller (Eisenberg, Fabes, et al., 1997).

### *Socially Appropriate Behavior and Prosocial Behavior*

In other studies, we have examined the prediction of social competence (rather than externalizing problem behavior) from the

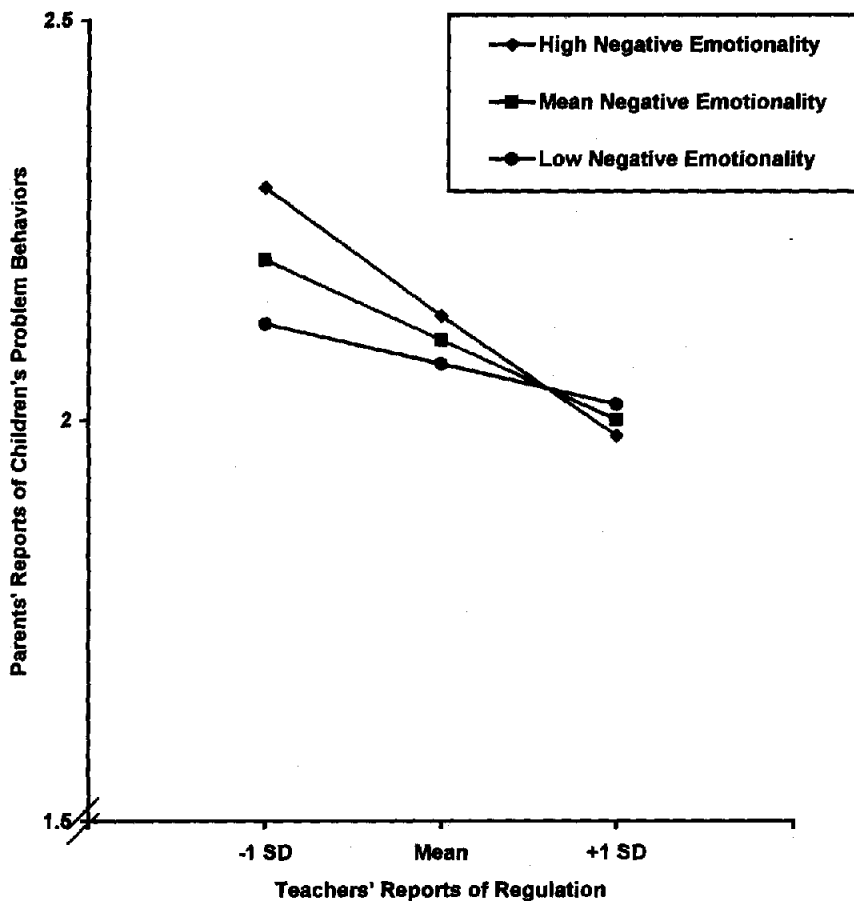


Figure 2. The interaction of teacher-reported regulation and negative emotionality when predicting parents' ratings of children's problem behavior (with significant slopes for children moderate and high in negative emotionality).

interaction of regulation and emotionality. A pattern analogous to that found for externalizing behavior was expected.

Measures of social competence have varied across samples and sometimes assessments. In a longitudinal study (Eisenberg, Fabes, et al., 1997), 8–10-year-olds' social competence was operationalized as a composite of teacher reports of children's socially appropriate behavior, popularity, prosocial behavior, and aggressive and disruptive behavior (reverse scored). Also included were ratings of how friendly versus hostile children were when they acted out with puppets what they would do in five hypothetical situations involving the potential for peer conflict. Regulation was a composite of attention and behavior regulation. There was a significant interaction of teacher-reported general emotional intensity (intensity of emotions with valence of the emotion unspecified) and regulation when predicting social competence. Social competence increased with regulation at all levels of emotional intensity, but the association was strongest for children high in general emotional intensity. Similar interactions were identified when the children were aged 6–8 years and when negative emotionality rather than general emotional intensity was used as a predictor. Thus, regulation generally was a predictor of social competence, especially for children prone to intense emotions.<sup>2</sup>

In another study of children in kindergarten to third grade, we examined the relations of both emotion and behavior regulation to children's social competence and whether ego resiliency mediated the moderated relations (Eisenberg, Guthrie, et al., 1997). Regulation was expected to predict resiliency, which in turn was expected to predict peer popularity and socially appropriate/prosocial behavior as reported by teachers and peers. Consistent with earlier

<sup>2</sup> In one study, peer-rated prosocial behavior was the index of social competence. Negative emotionality was a composite of negative emotional intensity, autonomic reactivity, and frequency of fearfulness and sadness; regulation was attention shifting and focusing. Interaction effects were obtained. Girls high in regulation were high in prosocial behavior, regardless of their level of negative emotionality. However, for girls low or moderate in regulation, prosocial nominations were higher if negative emotionality was lower. Boys low in regulation were low in prosocial nominations regardless of their level of negative emotionality. However, for boys moderate or high in regulation, higher negative emotionality predicted fewer prosocial nominations (Eisenberg, Fabes, Karbon, et al., 1996). The findings may differ somewhat from other findings because negative emotionality pertained primarily to internalizing negative emotion.

findings, we expected these relations to be stronger for children high in negative emotionality for whom regulation is particularly important.

In this study, the primary caregiving parent (usually the mother) and the teachers provided information on children's attention regulation, behavior regulation (i.e., ego control; see J. H. Block & Block, 1980), and ego resiliency (J. H. Block & Block, 1980). Attention regulation was expected to reflect primarily emotion regulation, although it could also reflect a particular type of behavior regulation to some degree. It clearly represented internal regulatory processes as opposed to regulation involving overt behavior. In addition, children played a puzzle game in which their persistence and resistance to cheating were assessed; this measure was viewed as an index of behavior regulation. Attention regulation and behavior regulation (including parent and teacher reports of ego control as well as the puzzle box persistence task) were treated as separate latent constructs in the structural equation model. The model fit quite well (Comparative Fit Index [CFI] = .962). The effects of attentional control on social status and socially appropriate behavior were mediated by resiliency. Moreover, the path from attentional control to resiliency, albeit significant for children both high and low in negative emotionality, was more significant for children prone to negative emotion. Thus, children who could regulate their attention were resilient to stress and, perhaps as a consequence, were better liked by peers and viewed as more socially appropriate or prosocial at school. However, attentional control was more important for predicting social functioning for children prone to negative emotion.

The relation between behavior regulation and social functioning was not mediated by resiliency. Rather, individual differences in behavior regulation were directly related to socially appropriate behavior (but not social status). This unmediated effect held only for children high in dispositional negative emotionality. Thus, behavior regulation was particularly important for children likely to experience negative emotions, probably because they must manage more frequent and intense emotions.

### Summary

Initial findings suggest that dispositional emotionality and regulation interact with each other or with factors in the social environment in their prediction of problem behavior and social competence. Prospective longitudinal data occasionally have been used in these analyses, which increases our confidence that dispositional characteristics may actually have causal effects on social outcomes and adjustment. However, in none of these studies have early levels of the outcome variables been controlled when predicting level of adjustment or social competence, a procedure that would provide further information regarding the probability of dispositional emotionality and regulation having causal effects on important outcomes. Further, as noted by Bates et al. (1998), moderational findings pertaining to temperament seldom have been replicated. In addition, in only one of the aforementioned studies were different types of regulation considered when examining moderation. Thus, research with these characteristics would be useful, and we now present data from such a study.

## New Longitudinal Findings

### Method

#### Participants

The initial sample (discussed previously) consisted of 199 children (97 girls, 102 boys) in kindergarten through third grades (henceforth called T1). Two years later (henceforth called T2), the sample included 169 children (86 girls, 83 boys), some with partial data. Of the 30 children lost to attrition, 4 families refused to participate, 6 said they would but never sent back the materials (most were out of town), and 20 were never located despite our having contact phone numbers (Eisenberg, Guthrie, et al., 1997).

Only the 142 children (70 girls, 72 boys;  $M$  age = 88.62 months,  $SD$  = 13.71, at T1, and  $M$  age = 112.89 months,  $SD$  = 13.65, at T2) who had all relevant measures at both time periods were included in the structural equation analyses. Participants at T2 were 75% Caucasian, 15% Hispanic, 1% African American, 4% Native American, 2% Asian, and 2% of mixed origin. Mean years of maternal and paternal education at T2 were 14.95 and 14.95,  $SD$ s = 2.18 and 2.70 (range = 8 to 20), respectively. Yearly family income ranged from \$4,000 to \$175,000 ( $M$  = \$48,940,  $SD$  = \$28,441) at T2.<sup>3</sup> Age did not seem to moderate the general pattern of relations and, consequently, is not emphasized in the presentation of findings.<sup>4</sup>

#### Procedure and Measures

Measures of attentional control, behavior regulation, resiliency, and social competence were obtained at both T1 and T2. Mothers usually completed parent-report measures at the laboratory; however, four fathers completed these measures at T1 and six fathers also completed them at T2. As part of the laboratory session, children participated in a regulation task (the puzzle box). Teacher measures were sent to schools after the children had come to the laboratory.

At both T1 and T2, regulation measures included (a) parent and teacher reports of children's ego control (behavior regulation), (b) adults' reports on temperamental attention shifting and focusing, and (c) a behavioral measure (the puzzle box). In addition, resiliency, negative emotionality,

<sup>3</sup> On the basis of  $t$  tests and chi-squares (and analyses of variance), there were some differences between individuals who were lost to attrition from T1 to T2. Families who did not participate at T2 tended to be disproportionately from minority groups, particularly Black,  $\chi^2(5, N = 199) = 16.88$ ,  $p < .005$ ; attrited families were lower in maternal and paternal education,  $t(195, 180) = -2.82$  and  $-2.96$ ,  $ps < .005$  and  $.003$ , respectively, and were marginally lower in income,  $t(186) = -1.71$ ,  $p < .09$ . Attrited children were viewed by teachers as less attentionally regulated, resilient, and socially appropriate,  $t(197) = -2.29$ ,  $-2.13$ , and  $-2.19$ ,  $ps < .023$ ,  $.035$ , and  $.029$ , respectively, and were less often nominated by peers as liked or prosocial,  $t(193, 194) = -2.18$  and  $-2.79$ ,  $ps < .031$  and  $.006$ , respectively. Mothers viewed attrited children as marginally less resilient,  $t(197) = -1.77$ ,  $p < .08$ . However, differences between children in the model and those dropped because of either attrition or lack of complete data were less frequent and smaller. Children not in the model were viewed by mothers as lower in ego control,  $t(197) = -1.97$ ,  $p < .052$ , and by teachers or peers as less resilient, more negative, and marginally less prosocial,  $t(197, 197, 194) = -2.42$ ,  $2.30$ , and  $-1.87$ ,  $ps < .017$ ,  $.022$ , and  $.063$ , respectively. Again, there was a disproportionate loss of Black children,  $\chi^2(5, N = 199) = 15.75$ ,  $p < .008$ .

<sup>4</sup> Age at T2 was not related to any measures of social competence at T2. The only significant relations of T2 age with variables in the model were positive correlations with primary caregiving parent reports of T2 regulation (ego control) and T2 persistence on the box,  $r(140) = .18$  and  $.26$ ,  $ps < .036$  and  $.002$ , respectively.

and quality of social functioning were assessed with parents' and teachers' reports. Social competence was assessed with reports from teachers and peers (the latter only at the initial assessment).

*Behavioral (ego) control and resiliency (from Q-sort items).* At T1, parents and teachers completed the Block and Block Q-sort (J. H. Block & Block, 1980; Caspi et al., 1992). Teachers and mothers sorted the cards into nine unequal piles (with a normal distribution) on a 9-point scale (1 = *most undescriptive*, 9 = *most descriptive*). At T2, we constructed questionnaires by using the Q-sort items for ego control and resiliency (and negative emotionality), and adults rated children on the same 9-point scale used at T1.

At T1, we started with the list of items identified by J. Block and Block (1969; personal communication, 1992) as being highly representative of ego control and resiliency (i.e., were rated by experts with an absolute value of 7.7 or higher on a 9-point scale). Then items deemed by a consensus of the first three authors as reflecting specific social skills, problem behaviors, or overt emotional responses were dropped. Moreover, items that were rated as reflecting both ego control and resiliency were included in only the scale with the higher rating. As a consequence, our assessment of the relations of regulation and resiliency to social functioning was relatively uncontaminated by the problem of overlapping items (see Sanson et al., 1990), and our indexes of regulation (ego control) and resiliency were purer measures of the constructs than sometimes is the case in the literature.

This procedure resulted in a 19-item Ego-Control Scale (e.g., "Is inhibited and constricted," "Tries to see what and how much he or she can get away with; usually pushes limits and tries to stretch the rules"; see Eisenberg, Guthrie, et al., 1997, for item numbers). Cronbach's alphas for teachers and parents were .84 and .80 at T2, respectively (for T1 alphas see Eisenberg, Guthrie, et al., 1997). All items except one pertained primarily to behavior regulation; one item could refer to both attention regulation ("Is attentive and able to concentrate") and the ability to sit still and work. A high score indicated ego overcontrol.

The Ego-Resiliency Scale, was reduced to 23 items taken from items in Block and Block's (1980) Q-sort (e.g., "Can bounce back or recover after a stressful or bad experience"; "Is resourceful in initiating activities" [finds ways to make things happen and gets things done]). Cronbach alphas for teachers and parents were .90 and .87 at T2, respectively.

*Regulation puzzle box task.* Children's behavior regulation also was assessed with a puzzle box task. Children were instructed to try to assemble a wooden puzzle in a large box without looking at it. A cloth covered the front; children slipped their arms through sleeves to get into the box. The cloth could be lifted up so that a child could cheat by looking. Children were told that if they finished the puzzle within 5 min, they would receive an attractive prize; they were also told that they could call the experimenter back by ringing a bell if they finished in less than 5 min. Children's persistence on the puzzle box when alone was timed by two observers. A third observer timed 76 children at T2; interrater reliability (Pearson correlation) was .99 (for reliability at T1 see Eisenberg, Guthrie, et al., 1997). Because some children called for the experimenter before the total time of 5 min had elapsed, proportion of time persisting was computed by dividing the number of seconds spent working by the total amount of time spent on the task. Because cheating is a behavior with more moral and social significance than persistence, we did not use it in the measure of regulation in this analysis (although it was used in Eisenberg, Guthrie, et al., 1997).

*Attention shifting and focusing.* Parents and teachers completed 11-item Attention Shifting and Attention Focusing subscales from Rothbart's Child Behavior Questionnaire (Goldsmith & Rothbart, 1991), which were adapted slightly for teachers. Parents and teachers rated on a 7-point scale how true items were for children (1 = *extremely untrue*, 7 = *extremely true*) for both attention shifting (e.g., "Has an easy time leaving play to come inside for school work," "Has a lot of trouble stopping an activity when called to do something else") and attention focusing (e.g., "When picking up toys or other tasks, usually keeps at the task until it's done," "Has a hard time concentrating on an activity when there are distracting noises"). Cronbach alphas at T2 for attention shifting and attention focus-

ing were .74 and .81 for parents and .85 and .88 for teachers, respectively. T2 attention shifting and focusing were significantly related for both parents and teachers,  $r_{s(165, 157)} = .34$  and  $.46$ , respectively,  $ps < .001$ . Thus, as at T1, these constructs were standardized and averaged (henceforth called attentional control).

*Emotionality.* Teachers and parents rated on a 7-point scale (1 = *never*, 7 = *always*) children's emotional intensity on an adaptation of Larsen and Diener's (1987) Affect Intensity Scale (Eisenberg, Fabes, Murphy, et al., 1995), which included 5 negative emotionality items (e.g., "When my child experiences anxiety, it normally is very strong"; Cronbach alphas at T2 = .74 and .85 for parents and teachers, respectively). Adults also rated 11 items from Block and Block's (J. H. Block & Block, 1980) Q-sort pertaining to children's emotionality (e.g., "Is fearful and anxious [nervous]," "Is calm and relaxed, easy-going"; Cronbach alphas at T2 for parents and teachers = .84 and .86, respectively).

For parents and teachers, T2 ratings on negative emotional intensity and the Q-sort emotionality composite were correlated,  $r_{s(160)} = .65$  and  $.79$ , respectively,  $ps < .001$  (for the total sample). Thus, as at T1, the two measures were standardized and averaged to form a negative emotionality composite.

*Social competence.* At T1 and T2, teachers rated children's socially appropriate behavior by using four items (e.g., "This child is usually well-behaved" vs. "This child is often not well-behaved"; Eisenberg, Fabes, Murphy, et al., 1995). Teachers used a 4-point response scale on the 4 items (i.e., selected an option and indicated if the item was "sort of" or "really" true; T2  $\alpha = .90$ ). As part of this measure, at T1 and T2 teachers also rated children's popularity with three items (e.g., "This child finds it hard to make friends" vs. "For this child, it's pretty easy to make friends"; T2  $\alpha = .93$ ). At T2 only, teachers also rated children's popularity with three items from Dodge (Lemerise & Dodge, 1988; e.g., "Overall, how much is this child liked by classmates?") using a 5-point scale ranging from *top 15% of the class* (1) to *bottom 15% of the class* (5;  $\alpha = .90$ ).

At T1 only, children's sociometric status was assessed using a peer-rating measure similar to Asher, Singleton, Tinsley, and Hymel (1979) and a nomination procedure (see Eisenberg, Guthrie, et al., 1997). Children rated classmates on a 5-point scale (5 = *you play with the child a lot—that he or she is like a best friend*, 1 = *you do not play together because you don't want to*). Ratings by same-sex raters were averaged, as were ratings by other-sex raters, and these two scores were then averaged.

In addition, at T1 children were asked, "Who in your class is the person most likely to go up and offer help or share with other kids without being asked—someone who is really nice to other kids in the class?" After nominating one classmate, children were asked to nominate a second child. The total number of times a child was nominated first by same-sex classmates was multiplied by 2 and then added to the total number of times that child was nominated second by same-sex classmates. This sum was divided by the number of same-sex potential nominators. The same procedure was conducted for other-sex nominations. The same-sex and other-sex scores were then averaged to form a prosocial nomination score.

## Results

The original moderational model, which was discussed previously, was derived at T1 and extended longitudinally (see Eisenberg, Guthrie, et al., 1997). At T1, confirmatory factor analyses were used to verify that we could construct the various latent constructs (e.g., attention vs. behavior regulation, social competence) prior to testing the structural model. The structural model at T1 supported the mediating role of resiliency between attentional control and socially appropriate and socially competent behaviors. Further, negative emotionality moderated the relations between (a) attentional control and resiliency and (b) behavior regulation and socially appropriate behavior.

To determine the longitudinal relations among variables, models were run separately for children high and low in negative emotionality

Table 1  
Correlation Matrices for Stacked Moderation Model

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Teacher: socially appropriate behavior T1	—	.41***	.33**	.48***	.18	.62***	.37**	.54***	.08	.32**	.29*	.56***	.36**	.41***	.26*	.46***	.32**	.46***	.05	.32**	.22
2. Teacher: social status T1	.30**	—	.46***	.30*	.10	.27*	.14	.01	.06	.52***	.11	.30*	.19	.27*	.14	.25*	.12	.18	.03	.21	.08
3. Peer: liking T1	.15	.16	—	.57***	.08	.18	.12	.16	.05	.28*	.09	.26*	.20	.23	.12	.21	.11	.15	.03	.18	.07
4. Peer: helping T1	.23*	.10	.26*	—	.14	.31*	.28*	.37**	.06	.32**	.22	.43***	.28*	.32**	.20	.36**	.25*	.35**	.04	.24	.17
5. Parent: attentional control T1	.10	.08	.14	.12	—	.19	.30*	.16	.24	.10	.10	.20	.13	.15	.44***	.22	.11	.16	.02	.11	.07
6. Teacher: attentional control T1	.51***	.19	.26*	.22	.17	—	.28*	.35**	.04	.53***	.22	.45***	.29*	.33**	.27*	.49***	.25*	.35**	.04	.26*	.17
7. Parent: ego control T1	.10	.08	.14	.12	.29*	.17	—	.43***	.24	.15	.26*	.39***	.19	.22	.18	.32**	.71***	.41***	.03	.17	.19
8. Teacher: ego control T1	.44***	-.10	.20	.17	.13	.51***	.32**	—	.04	.05	.34**	.51***	.25*	.28*	.23	.42***	.37**	.51***	.03	.22	.25*
9. Parent: resiliency T1	.02	.02	.03	.03	.15	.04	.13	.03	—	.06	.02	.06	.05	.05	.03	.05	.02	.04	.32**	.04	.02
10. Teacher: resiliency T1	.09	.24*	.15	.12	.10	.40***	.10	.13	.02	—	.12	.32**	.25*	.29*	.15	.26*	.13	.19	.03	.34**	.09
11. Behavior regulation box T1	.07	.06	.10	.08	.07	.12	.16	.23*	.01	.07	—	.31*	.15	.17	.14	.25*	.23	.32**	.02	.13	.43***
12. Teacher: socially appropriate behavior T2	.23*	.18	.33**	.28*	.21	.40***	.22	.31**	.05	.23*	.16	—	.59***	.68***	.43***	.77***	.54***	.77***	.08	.52***	.36**
13. Teacher: social status T2	.20	.26*	.29*	.24*	.19	.36**	.19	.27*	.04	.20	.14	.64***	—	.71***	.26*	.51***	.24	.19	.06	.57***	.16
14. Teacher: liking T2	.22	.17	.31**	.26*	.20	.38***	.21	.29*	.04	.22	.15	.69***	.78***	—	.29*	.60***	.27*	.44***	.07	.46***	.19
15. Parent: attentional control T2	.14	.11	.20	.17	.39***	.24*	.13	.19	.03	.14	.09	.35**	.31**	.33**	—	.50***	.41***	.37***	.47***	.23	.18
16. Teacher: attentional control T2	.26*	.21	.38***	.31**	.24*	.49***	.25*	.35**	.05	.26*	.18	.66***	.62***	.62***	.46***	—	.47***	.66***	.06	.62***	.32**
17. Parent: ego control T2	.09	.07	.13	.11	.08	.16	.62***	.29*	.02	.09	.15	.26*	.23*	.24*	.37***	.37***	—	.60***	.14	.21	.28*
18. Teacher: ego control T2	.15	.12	.22	.19	.14	.27*	.36**	.47***	.03	.15	.25*	.45***	.19	.29*	.34**	.43***	.50***	—	.05	.20	.40***
19. Parent: resiliency T2	.03	.02	.04	.03	.02	.05	.03	.04	.23*	.03	.02	.08	.07	.08	.37***	.08	.08	.05	—	.06	.02
20. Teacher: resiliency T2	.18	.14	.26*	.22	.17	.32**	.17	.24*	.04	.25*	.12	.57***	.61***	.64***	.28*	.67***	.20	.11	.07	—	.14
21. Behavior regulation box T2	.01	.01	.01	.01	.01	.01	.01	.02	.00	.01	.48***	.02	.02	.02	.01	.02	.02	.03	.00	.01	—

Note. Correlations above the diagonal are for children high in negative emotionality; those below the diagonal are for children low in negative emotionality. Ns for children high and low in negative emotionality were 67 and 75, respectively. T1 = time period of the initial sample (Kindergarten through third grade); T2 = sample from T1 measured 2 years later.  
\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 2  
*Means and Standard Deviations of Model Variables*

Variable	High negative emotionality		Low negative emotionality	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Teacher: socially appropriate behavior T1	2.94	0.89	3.61	0.55 <sup>b</sup>
Peer: helping T1	0.16	0.23	0.26	0.26
Teacher: social status T1	2.64	0.82	3.40	0.76
Peer: liking T1	2.33	0.52	2.60	0.55
Parent: attentional control T1	-0.19	0.76	0.21	0.64
Teacher: attentional control T1	-0.28	0.80	0.34	0.81
Parent: ego control T1	4.79	0.87	4.97	0.66 <sup>a,c</sup>
Teacher: ego control T1	5.11	1.21	5.51	0.83 <sup>b</sup>
Parent: resiliency T1	6.09	0.65	6.44	0.43 <sup>b</sup>
Teacher: resiliency T1	5.50	0.86	6.29	0.65 <sup>a</sup>
Behavior regulation box T1	0.63	0.28	0.79	0.21 <sup>a</sup>
Parent: negative emotionality T1	0.57	0.73	-0.50	0.58
Teacher: negative emotionality T1	0.50	0.86	-0.63	0.51 <sup>b</sup>
Teacher: socially appropriate behavior T2	3.01	0.86	3.51	0.63 <sup>a</sup>
Teacher: social status T2	2.84	0.90	3.27	0.72
Teacher: liking T2	3.47	1.26	4.04	0.99
Parent: attentional control T2	4.37	0.73	4.75	0.60
Teacher: attentional control T2	4.38	0.94	4.88	0.81
Parent: ego control T2	4.71	1.10	4.86	0.83 <sup>a,c</sup>
Teacher: ego control T2	4.97	1.28	5.37	0.89 <sup>b</sup>
Parent: resiliency T2	6.42	0.99	6.89	0.89
Teacher: resiliency T2	6.24	1.09	6.66	0.98
Behavior regulation box T2	0.70	0.29	0.78	0.24
Parent: negative emotionality T2	0.27	0.79	-0.25	0.90
Teacher: negative emotionality T2	0.31	1.07	-0.29	0.74 <sup>b</sup>

*Note.* The variances (standard deviations are presented above) were not significantly different between the two groups unless specified. Means differed significantly across groups at  $p < .05$  unless specified. A composite of parent and teacher reports of negative emotionality at T1 was used to block the groups into high and low negative emotionality. T1 = time period of the initial sample (kindergarten through third grade); T2 = sample from T1 measured 2 years later.

<sup>a</sup> Variances were significantly different between the two groups,  $p < .05$ . <sup>b</sup> Variances were significantly different between the two groups,  $p < .01$ . <sup>c</sup> Means were not significantly different between the two groups.

including both T1 and T2 variables, as this is the only way for EQS to determine misspecifications within groups across time. These models appeared to be similar to the original moderation model (Eisenberg, Guthrie, et al., 1997). In addition, the autoregressive lagged (across time) effects for attentional control, behavior regulation, and resiliency from T1 to T2 accounted for significant variance, whereas the autoregressive lagged effects for socially appropriate behavior and social status did not. After any misspecifications that made conceptual sense to change were corrected, the two groups were included in one model to examine the moderating role of negative emotionality.<sup>5</sup> High and low negative emotionality groups were constructed on the basis of a median split on that variable at T1. Multigroup structural equation analyses were conducted using EQS (Bentler, 1989). Raw data were analyzed to obtain estimates. The correlations of all the measured variables used in the analyses are presented in Table 1. Further, the means and standard deviations for observed variables at T2 are in Table 2 (for T1 means and standard deviations, see Eisenberg, Guthrie, et al., 1997).

The two moderated paths were allowed to vary across groups in the first model. That is, the paths from the latent variables of attentional control to resiliency (only for T1)<sup>6</sup> and behavior regulation to socially appropriate behavior (for both T1 and T2) were not constrained to be equal across the two groups of children,

whereas all other paths were constrained to be equal (e.g., the magnitude of the betas between resiliency and socially appropriate behavior were constrained to be equal across both low negative and high negative emotionality and across T1 and T2). The lagged effects from socially appropriate behavior from T1 to T2 and for social status from T1 to T2 were not included as the  $t$ -test statistics

<sup>5</sup> To determine areas of misspecification as a reason for moderation effects, the Lagrange multiplier test statistics were examined to determine whether some constraints were inappropriate across groups. That is, constraints were examined to determine if it was inappropriate to assume the equality of parameter estimates across groups. The Lagrange multiplier test statistics (called modification indexes in LISREL) indicate whether the restriction given in the model is appropriate for the data. Further, the Lagrange multiplier test statistics suggest specific parameters, previously fixed in the model, for which removal of the constraints across groups would result in a model that better represents the data.

<sup>6</sup> The parameter from emotional (attentional) control to resiliency at T2 was constrained across emotionality groups in this model. In preliminary models run solely for T2 data, this parameter did not differ across groups. Further, the Lagrange multiplier test statistics indicated that this constraint was valid, so there was no evidence to support the moderating effects of negative emotionality on this parameter at T2.

from the previous model indicated that these parameters did not account for significant variance in the model. This combined model did not fit the data especially well. However, all modifications to the model as suggested by the Lagrange multiplier test statistics were introduced if the modification was reasonable for the model. For example, the constraint for the correlated error terms for peer ratings of prosocial behavior with peer ratings of liking at T1 was released (so these correlations were free to vary across groups at T1). The modified model had a reasonable fit,  $\chi^2(323) = 455.207$ ,  $p < .001$ , CFI = .910 (imperative fit index [IFI] = .916, root-mean-square error of approximation [RMSEA] = .055; see Figure 3 for the model). Standard errors for the estimates are shown in Table 3.

To test for moderation, another model was computed that constrained all contemporaneous and lagged parameter estimates for both groups to be equal (i.e., the moderational paths were not allowed to vary). If parameters were found to be equivalent across high and low emotionality groups, then moderation is not present (Bollen, 1989). For the resulting model,  $\chi^2(326) = 480.653$ ,  $p < .001$ , CFI = .895, IFI = .901, RMSEA = .059. The difference of 25.446 on 3 degrees of freedom is highly significant ( $p < .001$ ). This comparison indicates that moderation was present on the specified paths.<sup>7</sup>

### Discussion

The effect of attentional control on social status and socially appropriate behavior was mediated by resiliency for children both high and low in negative emotionality at both T1 and T2, and the path from attentional control to resiliency was moderated at T1. Negative emotionality moderated the relation of behavior regulation to socially appropriate or prosocial behavior; for children high in negative emotion only, behavior regulation predicted socially appropriate behavior at both T1 and T2. The lagged effects (autoregressive effects across time for the same variable at the two time points) of attentional control, behavior regulation, and resiliency were significant for both high and low negative emotionality children.

In general, we obtained a similar pattern of moderation and mediation at T2 as we did at T1. The only major difference was that there was no moderation by negative emotionality at T2 for the path from attentional control to resiliency. However, at both time periods, this path was significant for both emotionality groups. This difference in regard to moderation could be due to changes in the method for assessing ego control and ego resiliency (from the Q-sort procedure to questionnaires) or to factors related to development. To test a third possibility—that the lagged effects in the model with both T1 and T2 data accounted for too much variance—the model was rerun with only T2 data. There still was no moderation of the path from attentional control to resiliency, so the lack of moderation was not due to lagged effects.

Although measures of social competence generally were correlated across time, individual differences in regulation, resiliency, and emotionality at T2, rather than social functioning at T1, predicted T2 measures of social functioning. Thus, it appears that continuity over time in social competence was due primarily to consistency in individual differences in emotion-relevant dispositional characteristics rather than solely due to direct relations between social competence at the two assessments. This finding

emphasizes the importance of dispositional regulation and emotionality in the continuity of social functioning.

The moderation of the path from behavior regulation to social competence at T2 may have been partially due to greater variability in ego control and one measure of socially appropriate behavior for children high versus low in negative emotionality (see Table 2). However, at T1 for the initial sample, there were no significant differences in variability of measures across groups. Thus, it seems unlikely that the same finding at T2 as at T1 was due merely to differential variability in some of the variables.

At both times, no path was required from behavior regulation to resiliency. This may be due to attentional control, which was correlated with behavior regulation, carrying the variance of the relation between regulation and resiliency. In regression analyses, Eisenberg, Guthrie, et al. (1997) found a quadratic relation (as well as a linear relation) between T1 adult reports of children's behavior regulation (ego control) and ego resiliency (see above). The analogous quadratic relations were not significant at T2, perhaps because some of the most unregulated children were lost from the sample at T2.

In this model, we used a laboratory test of regulation and teacher, parent, and peer reports of various variables. Because of this multimethod, multireporter approach, we could compute latent constructs with information from more than one source. This procedure increases our confidence that our results do not primarily reflect consistency in a single reporters' perceptions of the various constructs in the model. In addition, the longitudinal method allowed for a replication of results over time, albeit not across samples.

### Summary

These data, combined with other research reviewed previously, indicate that temperamental and personality variables tapping individual differences in emotionality and regulation predict concurrent and subsequent quality of social behavior. Moreover, the findings are consistent with a growing body of literature indicating that emotion and its regulation play a fundamental role in the development of high quality social behavior and that developmental data provide insight into the emergence of personality and behaviors linked to personality and social adaptation over time.

Relations between regulation and/or emotionality and social competence or adjustment are often linear and direct. It appears that negative emotionality is a general risk factor, relating both to internalizing and externalizing behavior problems. In addition, regulatory undercontrol (e.g., low voluntary behavioral control, impulsivity) is a predictor of externalizing behavior problems, whereas behavioral inhibition predicts internalizing problems. Nonetheless, prediction is often improved if additive effects and nonlinear relations are considered. Indeed, when direct linear (or indirect mediated) relations are not obtained, the lack of findings may be due to the fact that significant relations are obtained only

<sup>7</sup> To increase the sample size to 152 (75 girls, 77 boys;  $M$  age = 112.62,  $SD = 13.94$ ), we also computed the same models dropping the box regulation task (which children who did not come to the lab did not complete). For the moderated model,  $\chi^2(251) = 381.836$ ,  $p < .001$ , CFI = .911, whereas for the constrained model,  $\chi^2(254) = 399.633$ . The difference was highly significant,  $\chi^2(3) = 17.797$ ,  $p < .001$ .



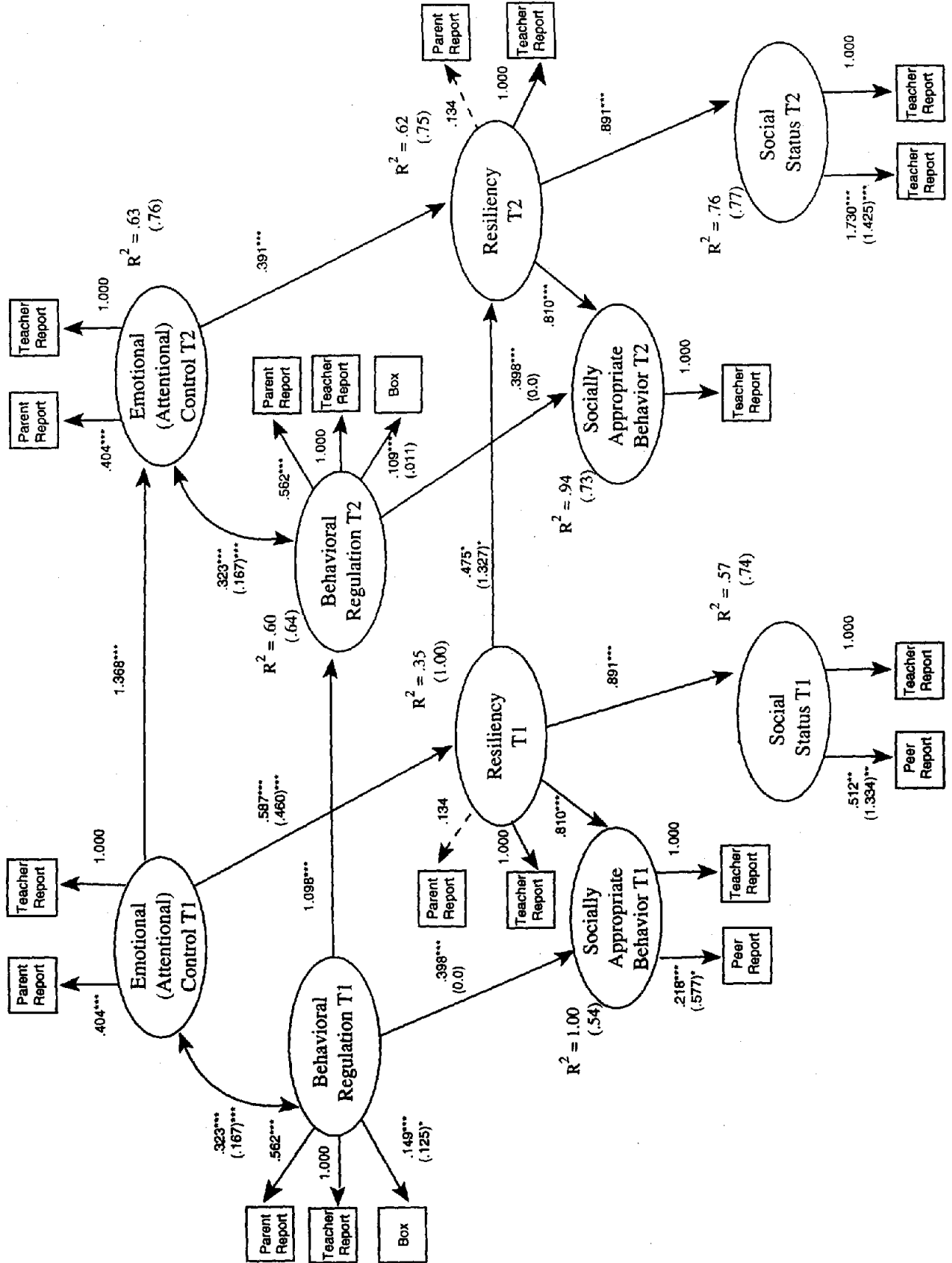


Table 3  
*Standard Errors of the Estimates for Observed Variables, Structural Paths,  
 and Latent Constructs*

Variable	High negative emotionality	Low negative emotionality
Standard errors for loadings of observed variables on latent constructs		
Teacher: socially appropriate behavior T1	—	—
Peer: helping T1	.043	.219
Teacher: social status T1	—	—
Peer: liking T1	.153	.485
Parent: attentional control T1	.060	.060
Teacher: attentional control T1	—	—
Parent: ego control T1	.075	.075
Teacher: ego control T1	—	—
Parent: resiliency T1	.100	.100
Teacher: resiliency T1	—	—
Behavior regulation box T1	.042	.049
Teacher: socially appropriate behavior T2	—	—
Teacher: social status T2	—	—
Teacher: liking T2	.230	.147
Parent: attentional control T2	.060	.060
Teacher: attentional control T2	—	—
Parent: ego control T2	.075	.075
Teacher: ego control T2	—	—
Parent: resiliency T2	.100	.100
Teacher: resiliency T2	—	—
Behavior regulation box T2	.029	.035
Standard errors for structural paths		
Attentional control T1 to resiliency T1	.169	.117
Resiliency T1 to social status T1	.105	.105
Resiliency T1 to socially appropriate behavior T1	.109	.109
Behavioral regulation T1 to socially appropriate behavior T1	.056	—
Attentional control T1 to attentional control T2	.203	.203
Behavioral regulation T1 to behavioral regulation T2	.132	.132
Resiliency T1 to resiliency T2	.186	.534
Attentional control T2 to resiliency T2	.102	.102
Resiliency T2 to social status T2	.105	.105
Resiliency T2 to socially appropriate behavior T2	.109	.109
Behavioral regulation T2 to socially appropriate behavior T2	.056	—
Standard errors for latent constructs		
Attentional control T1	.077	.063
Behavioral regulation T1	.156	.089
Resiliency T1	.073	.586
Social status T1	.079	.027
Socially appropriate behavior T1	.128	.022
Attentional control T2	.111	.086
Behavioral regulation T2	.139	.085
Resiliency T2	.058	.045
Social status T2	.057	.041
Socially appropriate behavior T2	.035	.028

*Note.* Dashes indicate that standard errors are not available because of either a fixed variance of the factor loading of 1.0 or because the structural path was not estimated in the model. T1 = time period of the initial sample (kindergarten through third grade); T2 = sample from T1 measured 2 years later.

*Figure 3 (opposite).* Prediction of social status and socially appropriate behavior from dispositional regulation and emotionality: Moderation and mediating effects. The longitudinal model for the prediction of socially appropriate or prosocial behavior and popularity from emotionality, regulation, and resiliency. Dotted lines represent nonsignificant paths at  $p > .05$  for children both high and low in negative emotionality. Values not in parentheses are unstandardized coefficients for children high in negative emotionality; values in parentheses are unstandardized coefficients for children low in negative emotionality. When one coefficient is presented, the parameter was constrained to be equal across children high and low in negative emotionality. Values on curved lines with double-headed arrows are unstandardized covariances between the two connected constructs. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ . T1 = time period of the initial sample (kindergarten through third grade); T2 = sample from T1 2 years later.

in certain contexts or when individuals are characterized by a certain configuration of temperamental or personality traits.

Thus, the relations of individual differences in dispositional regulation and/or emotionality to social adjustment are likely to be complex and influenced by a variety of factors. Moreover, bidirectionality of causation between the child and the environment must be considered. Individuals evoke distinctive reactions from others on the basis of their unique combinations of temperamental tendencies. For example, Anderson, Lytton, and Romney (1986) found that conduct-disordered boys elicited more negative responses from unrelated mothers than did boys who did not have such behavior problems. As such, early temperamental differences in emotionality and regulation contribute to the development of later personality differences and social adjustment by evoking responses from the interpersonal environment that reinforce the child's initial tendencies. Moreover, even after early childhood there is evidence that relations between parental reactions to children's emotions and children's emotionality and regulation are reciprocal (especially for externalizing emotions and low regulation; Eisenberg et al., 1999).

Individual-environment transactions continue throughout a person's life and promote the continuity of one's dispositional style and the outcomes related to it. For example, Caspi, Bem, and Elder (1989) found cumulative consequences for men who had a history of childhood temper tantrums (e.g., had high negative emotionality and low regulation). Ill-temperedness predicted lower educational attainment, which, in turn, predicted occupational status. There was, however, no direct effect of ill-temperedness on occupational status. Boys with a history of dysregulated expression of negative emotionality had a lower occupational status at midlife because they had truncated their formal education.

Of course, the origins, pathways, and consequences of individual differences in dispositional emotionality and regulation can only be ascertained from well-designed and well-conducted longitudinal studies. The importance of multiple methods, reporters, and contexts must be considered when conducting such studies. Additionally, consideration of developmental changes in emotionality and regulation must be taken into account to accurately model the roles that these qualities play in influencing both short- and long-term adjustment. With these recent developments, it is likely that in the next decade much more will be known about the contributions of emotionality and regulation to moral and social development.

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