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# Multiple Pathways to Bullying: Tailoring Educational Practices to Variations in Students' Temperament and Brain Function

**Zopito A. Marini, Andrew V. Dane, and Richard E. Kennedy**

In preparing this chapter, which like this entire book is dedicated to the memory of Robbie Case, we were guided by some of his best qualities as a powerful thinker and developer of grand theories. In a small way, we tried to emulate Robbie's adventurous spirit as he continuously searched to uncover developmental patterns, make predictions and test them, so that the end results could be put to the service of improving the lives of children. In addressing the issue of bullying, an area of concern to many school-age children, we tried to be cognitively adventurous by expanding our horizons and venturing across less-traveled research landscapes, to search for patterns and integrate different areas of research, perhaps the way Robbie would have done it.

## Bullying and Its Educational and Psychosocial Consequences

Bullying is a major concern for educators in light of its substantial prevalence in schools, its considerable impact on the psychosocial adjustment of perpetrators and victims, and its adverse effect on the school environment. Bullying is a type of aggression characterized by repeated and systematic coercive use of power among peers (Marini, Dane, Bosacki, & YLC-CURA, 2006; Olweus, 2001; Smith, Pepler, & Rigby, 2004). Research has shown that involvement in bullying as a perpetrator, victim, or both is pervasive, with estimates ranging from as low as 10% to as high as 30% of the student population (Marini, McWhinnie, & Lacharite, 2004; Nansel et al., 2001). While the prevalence statistics are dependent on the way bullying is measured and the particular time frame used (i.e., 1 month vs. 1 year vs. lifetime), there is considerable agreement that about 10–15% of the student population are likely to report being bullied, with 5–10% reporting having bullied others (Nansel et al., 2001). In addition, there is an emerging group, ranging from

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10 to 15%, who are dually involved as both bully and victim (Craig, 1998; Marini, Dane, et al., 2006; Schwartz, Proctor, & Chein, 2001).

In childhood and adolescence, engagement in bullying is associated with a range of psychosocial problems including peer rejection, psychiatric difficulties such as Conduct and Anxiety disorder, and poor academic performance (Coie, Dodge, & Kupersmidt, 1990; Haynie et al., 2001; Loeber, Green, Lahey, & Kalb, 2000; Nansel et al., 2001; Olweus, 2001). Furthermore, several aspects of maladjustment in adulthood have been linked to childhood and adolescent aggression or bullying, including criminal convictions, unemployment, smoking and substance use, partner abuse, depression and anxiety, lower level of education, high-school drop out, and lower status occupation (Farrington, 1993; Moffitt, Caspi, Harrington, & Milne, 2002; Pepler, Jiang, Craig, & Connolly, 2008; Rigby, 2001). Students who are victimized often report an array of internalizing difficulties related to anxiety, depression, and self-esteem, as well as a heightened risk of suicide (Craig, 1998; Grills & Ollendick, 2002; Rigby, 2001).

In addition to the large array of psychosocial problems associated with bullying and victimization, incidents of aggression and bullying in the school may disrupt classroom activities and affect the overall school climate. Bullying may also disrupt classroom instruction; divert teachers', educational assistants', youth workers', and school psychologists' time from other students; and contribute to a classroom atmosphere that is not conducive to learning (Nucci, 2006). Educators must also tackle the issue of bullying because it is paramount that the school be a safe, secure environment for all students.

Although there are many programs that educators could obtain to address the issue of bullying in schools, research has shown that these interventions have had mixed results (Smith et al., 2004; Smith, Stewart, & Cousins, 2004). One possible reason for this limited success is these programs assume that children who bully are a homogenous group, whereas recent theoretical and empirical work suggests that children may follow different etiological pathways en route to bullying their peers. For example, some authors have proposed that children with two distinct clusters of temperament characteristics – callous-unempathic and emotionally dysregulated subtypes – follow two different pathways toward involvement in aggression and bullying (Frick & Morris, 2004; Nigg, 2006). Current etiological models emphasize that temperament features, such as impulsivity and fearlessness, may predispose children to greater engagement in aggression by influencing on-line actions, as well as making an indirect contribution by affecting transactions with socialization agents such as peers, parents, and teachers (e.g., Dodge & Pettit, 2003). Therefore, models of aggression and bullying, and interventions based on them, would be would be improved by greater attention to the role of temperament.

To enhance an appreciation of bullying as a heterogenous concept, the first aim of this chapter is to describe the characteristics of children with callous-unempathic and emotionally dysregulated temperaments and to discuss neural models that may account for individual differences along these temperamental dimensions. Second, we examine evidence of direct and indirect links between relevant temperament features and aggression in children and adolescents to determine whether empirical

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research supports the validity of theoretical work suggesting two distinct pathways to aggression and bullying for children with callous-unempathic and emotionally dysregulated temperaments. Finally, the practical implications of this research for educators are discussed.

## Callous-Unempathic and Emotionally Dysregulated Temperaments

Temperament has been defined recently as constitutionally based individual differences in emotional, motor, and attentional reactivity and self-regulation that are relatively consistent across time and situations (Rothbart & Bates, 2006; for similar definitions see Kagan, 1998; Nigg, 2006; Putnam, Ellis, & Rothbart, 2002). Although a precise definition of temperament has been difficult to agree upon, there is a growing consensus that temperament characteristics are (1) biologically/constitutionally based; (2) early appearing, first surfacing in early infancy; (3) behavioral tendencies that constitute the core of personality and influence directions for development; (4) somewhat stable across time and situations; (5) an open system affected by developmental processes and social context; and (6) most readily observed in social interactions (Goldsmith et al., 1987; Nigg, 2006; Rothbart & Bates, 2006).

Although researchers have used a wide variety of terms to label temperament characteristics, a general consensus has been emerging recently about three or four basic dimensions of temperament that continually arise in factor analytic studies (Nigg, 2006; Putnam et al., 2002; Rothbart, Ahadi, & Evans, 2000). The first is related to surgency, extraversion, and positive affect, and individuals high in this dimension are particularly likely to approach and explore objects or situations that are perceived as novel or potentially rewarding. The second major characteristic involves negative affectivity, including fear, irritability, anger, and withdrawal. Although both fearful distress and irritable distress are considered to be components of negative emotionality, researchers are beginning to make a distinction between the two in infancy, toddlerhood, childhood, and adolescence (Nigg, 2006; Putnam et al., 2002). Effortful control is a third characteristic that features in most measures of temperament, which includes the regulation of attention; the inhibition of dominant responses to allow the activation of subdominant responses; as well as the activation of behaviors that are not immediately rewarding but provide longer-term positive consequences (Putnam et al., 2002). A fourth dimension, affiliativeness, includes warmth, agreeableness, friendliness, and sociability, but this dimension does not appear in the literature as consistently as the other three (Putnam et al., 2002).

Recently, researchers have been suggesting that exclusive emphasis on individual temperament variables may mask patterns among these variables (Nigg, 2006), and that specific clusters may be more predictive of adjustment outcomes than individual temperament features on their own. The first constellation, referred

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to as the callous-unempathic subtype, is characterized mainly by (a) low negative emotionality, especially low levels of fear, anxiety, sadness, and withdrawal and (b) low affiliation. The development of empathy and guilt is compromised in these individuals, possibly because fearlessness reduces their capacity to feel and recognize others' distress, and because irritability and hostility, opposites of affiliativeness, may interfere with feelings of compassion and remorse (Nigg, 2006; Rothbart & Posner, 2006), and hence people with callous-unempathic temperaments may be prone to psychopathic behavior. It was suggested that this pattern of temperament variables is predictive of proactive (planned, instrumental, and goal-directed) aggression, because their insensitivity to punishment and lack of regard for others' rights and feelings amplifies the likelihood that aggression may be used proactively to obtain instrumental rewards (e.g., tangible rewards, enhanced social status) without considering others' welfare (Frick & Morris, 2004; Nigg, 2006). The second combination is referred to as the emotionally dysregulated subtype and is characterized primarily by (a) high negative emotionality, including high fearfulness, anxiety, anger, frustration, and irritability; (b) high approach or surgency; and (c) low effortful control. This temperament pattern may be more predictive of reactive aggression (e.g., emotional, provoked, defensive) than proactive, and may ultimately result in major conduct problems. Emotionally dysregulated children may be prone to experiencing anger and frustration of high intensity and duration when their goals are blocked, or becoming fearful when they are facing stressful or threatening circumstances, which in combination with poor effortful control may predispose them to reactive aggression (Frick & Morris, 2004).

## Neural Models of Temperament

Neural models of temperament, derived from physiological studies on animals, research on individuals with a brain injury, or brain imaging techniques, have outlined the function of three interrelated systems: (1) a positive affect or reward system variously called the Behavior Activation System (Gray & McNaughton, 2000) or the Behavior Facilitation System (Depue & Iacono, 1989) or Expectancy-Foraging System (Panksepp, 1998); (2) a negative affect system whose components include the Fight/Flight/Freeze and the Behaviour Inhibition systems (Gray & McNaughton, 2000), and the Rage system (Panksepp, 1998); and (3) a cognitive self-regulation system that has been described in terms of the Executive Attention Network or Anterior Attentional System (Derryberry & Rothbart, 2001; Posner and Rothbart, 2007).

The Behavior Activation System includes brain circuits that are dependent on the neurotransmitter dopamine, including the ventral tegmental area, nucleus accumbens, amygdala, hypothalamus, and prefrontal cortex (Gray, 1991; Gray & McNaughton, 2000). It responds to all appetitive stimuli signaling reward, and triggers voluntary approach behavior through motor systems in the cortex. Individual differences in the reactivity of this system have been linked to temperament

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dimensions relating to positive affect, including surgency and sensation seeking (Derryberry & Rothbart, 1997; Rothbart & Posner, 2006).

In contrast, the Fight/Flight/Freeze system is activated by aversive cues of punishment, which results in the emotion of fear and motivates defensive avoidance, freezing, or defensive aggression, depending on one's defensive distance from the perceived danger (McNaughton & Corr, 2004; Smillie, 2008). The primary neural components of the Fight/Flight/Freeze system include the periaqueductal gray, amygdala, hypothalamus, anterior cingulated cortex, and prefrontal cortex (McNaughton, 2006; Smillie, 2008), whose pathways are modulated by serotonin and noradrenaline. Variations in temperamental fearfulness are thought to be related in part to the reactivity of this system (Derryberry & Rothbart, 2001).

Although Gray and McNaughton (2000) discuss fearful and aggressive behaviors as being mediated by the Fight/Flight/Freeze system, Panksepp (1998) introduces a "rage system," that is separate from the fear system. It is proposed to underlie emotional experiences of frustration and anger, and to direct defensive aggression in the face of threat. He further proposed a connection between the rage system and the reward or positive affect system. Specifically, he suggested that the prefrontal cortex activates the circuitry of the rage system when expected rewards have not been detected, and the pursuit of reward is thwarted.

According to Gray and McNaughton (2000), the Behavior Inhibition System is another key circuit related to negative emotionality, which gives rise to feelings of anxiety. Specifically, this system is activated in the face of conflicting cues signaling both punishment and reward. It serves to inhibit approach and avoidance behavior, forestalling immediate action to allow a period of risk assessment during which one can determine whether it is safe to pursue a desired reward in a potentially dangerous environment. The Behavior Inhibition System is comprised of structures such as the periaqueductal gray, amygdala, hypothalamus, septo-hippocampal system, the posterior cingulate, and the dorsolateral prefrontal cortex, and its circuits depend upon the neurotransmitters serotonin and noradrenaline (McNaughton, 2006; McNaughton & Corr, 2004; Smillie, 2008).

The temperament characteristic of effortful control is thought to be related to neural activity in the anterior attention system (Derryberry & Rothbart, 2001; Posner, Rothbart, Sheese & Tang, 2007). The anterior cingulate cortex is the central feature of the attentional system, which receives input from systems processing affective-motivational (frontal cortex, amygdala, hippocampus), spatial (parietal cortex), object (temporal cortex), semantic (temporal and frontal cortex), and behavioral information (basal ganglia, supplementary motor area). Executive functions are performed by the attentional system, including the inhibition of dominant responses to perform a subdominant response, directing attention to semantic information, sustaining working memory, and error detection, which allow for more flexible decision making and planning.

Affiliativeness has been studied relatively less than other dimensions of temperament, and accordingly there is less literature discussing the neural circuits that may underlie it. However, Panksepp (1986) posited that opiate projections from the amygdala and cingulate cortex to the hypothalamus may promote social comfort,

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pair bonding, friendliness, trust, and helpful behavior, possibly by suppressing hostile and aggressive tendencies controlled by the central gray area of the brain stem. Individual differences in affiliation may be related to variations in endogenous opiates and the neuropeptide oxytocin (Panksepp, 1993).

Linking neural models to psychosocial theories of temperament, it seems that in children with callous-unempathic characteristics the Fight/Flight/Freeze system and the system underlying affiliativeness are relatively less responsive, whereas the reward or positive affect system (e.g., Behavior Activation System) and the anterior attention system function within normal limits. In contrast, an emotionally dysregulated temperament would appear to reflect hyperactivity in the three systems governing negative emotionality, including the Fight/Flight/Freeze system, the rage system, and the Behavior Inhibition System, as well as the Behavior Activation System. In addition, the emotional dysregulation likely reflects under-activity in the anterior attention system, leading to poor self-regulation.

## Direct Links Between Temperament and Aggression

The purpose of this section is to examine whether research supports the conceptualization of temperament by Nigg (2006) and Frick and Morris (2004), by examining whether callous-unempathic and emotionally dysregulated temperaments are differentially linked to proactive and reactive aggression or bullying, respectively. Recent research has revealed that bullying is best characterized by heterogeneity in the forms used to carry out the attacks (e.g., direct vs. indirect; Marini, Dane, et al., 2006), the function (e.g., proactive vs. reactive) served for the attacker and the role (e.g., bullies, victims, bully-victims) of the participants (Little, Brauner, Jones, Nock, & Hawley, 2003; Marini, Koruna, & Dane, 2006). Thus, for instance, researchers have distinguished bullying with a proactive function from that which is a reaction to provocation. Reactive bullying involves a more immediate reaction to a perceived provocation, usually driven by frustration, instantaneous emotional release, defense against a perceived threat, and general lack of inhibition (Dodge & Coie, 1987; Poulin & Boivin, 2000). This type of abrupt reaction has also been labeled as self-defensive aggression and tends to be generally impulsive, accompanied by visible hostile expressions and a great deal of strong negative emotions (see Poulin & Boivin, 2000; Pulkkinen, 1996). In contrast, proactive bullying entails more deliberate and methodical planning of attacks, using aversive acts to obtain instrumental or social goals, such as stealing lunch money or bidding for popularity or social status (Camodeca, Goossens, Meerum-Terwogt, & Schuengel, 2002; Poulin & Boivin, 2000). In general, proactive bullying tends to entail unprovoked, goal-directed, predatory, and deliberate acts (Crick & Dodge, 1996; Pellegrini, Bartini, & Brooks, 1999). At this point, there is minimal research on temperament and bullying per se, although there is a considerable amount dealing with the closely related topic of temperament and aggression. Given that bullying is a specific form of aggression, this literature can illuminate the role that temperament plays in developmental pathways leading to bullying.

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In general, less optimal temperament characteristics have been shown to correlate with later maladjustment in children and adolescents (Giancola & Parker, 2001; Ortiz & Gandara, 2006). With regard to aggression, the majority of research examining its connection to temperament refers to aggression or externalizing behavior (aggression, delinquency) in general without regard to subtypes. These data do not reveal whether there are differential outcomes associated with the two temperament subtypes, but they do nevertheless indicate that temperament dimensions related to the callous-unempathic and emotion dysregulation subtypes, such as surgency, fearlessness, emotional dysregulation, and effortful control, are associated with aggression and externalizing behavior in general (Barnow, Lucht, & Freyberger, 2005; Raine, Reynolds, Venables, Medrick, & Farrington, 1998; Rubin, Burgess, Dwyer, & Hastings, 2003; Schmidt, Fox, Rubin, Hu, & Hamer, 2002).

As shown in Table 1, there were seven studies that explicitly investigated direct links between temperament and proactive or reactive aggression. Seven of these papers consider aspects of temperament consistent with the emotion dysregulation subtype, (Barry et al., 2007; Bjornebekk, 2007; Pellegrini & Bartini, 2000; Raine et al., 2006; Shields & Cicchetti, 1998; Vitaro, Barker, Boivin, Brendgen, & Tremblay, 2006; Vitaro, Brendgen, & Tremblay, 2002). Consistent with the conceptualization of Nigg (2006) and Frick and Morris (2004), research demonstrated that reactive aggression was associated with a high level of fearfulness (reactivity, negative emotionality, emotional lability/negativity), high approach/surgency (BAS drive; approach–withdrawal; stimulation seeking), and low effortful control (low attention, high hyperactivity, high impulsivity). Notably, the measures of reactivity, negative emotionality, and emotional lability/negativity associated with reactive aggression are undifferentiated measures of emotionality, which would include both fearfulness and proneness to anger, irritability, or frustration, the latter of which may have a basis in high surgency and the concomitant sensitivity to reward.

There were four investigations that permitted an examination of whether the fearlessness aspect of the callous-unempathic temperament was associated with proactive aggression, as predicted by Nigg (2006) and Frick and Morris (2004). Consistent with this expectation, in two studies, behavior inhibition system sensitivity (e.g., sensitivity to punishment or negative consequences; Bjornebekk, 2007) and responsiveness to distressing stimuli (Kimonis, Frick, Fazekas, & Loney, 2006) were found to be inversely linked to proactive aggression in children and adolescents. In contrast, Vitaro and colleagues (2002; 2006) did not find proactively aggressive toddlers or children to be lower than average in negative emotionality or emotional reactivity, though they did find the expected distinction between proactive and reactive aggression in that only reactively aggressive participants were more fearful than other children. Low empathy is thought to be another component of the callous-unempathic temperament, and two studies included evidence of this characteristic, operationalized as psychopathy and callous-unempathic traits, being positively associated with proactive aggression (Barry et al., 2007; Raine et al., 2006). We did not find any research that explicitly examined whether individuals with a low degree of affiliativeness are more prone to proactive aggression, so this aspect of the proposed link between a callous-unempathic temperament and aggression could not be subjected to empirical scrutiny.

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**Table 1** Direct links between temperament subtypes and bullying subtypes

| | Methodology | | | | |
|---|---|---|---|---|---|
| Author(s) | *N* (Gender) | Age measures | Temperament measures | Aggression/bullying | Results |
| *Direct Links Between Temperament and Aggression/Bullying Subtypes* | | | | | |
| Barry et al. (2007). | 160 (58 girls) | 10 yrs 9 mon | Parent and impulsivity; teacher-rated impulsivity; narcissism; and callous-unempathic traits | Parent and teacher-rated proactive and reactive aggression | Impulsivity and narcissism positively associated with reactive aggression; narcissism positively linked with proactive aggression |
| Bjornebekk (2007) | 48 (12 girls) | 15.43 yrs | Self-report Behavior Inhibition System (BIS) and Behavior Activation System (BAS) | Self-reported proactive and reactive aggression | BAS positively associated with reactive aggression; BIS inversely associated with proactive aggression |
| Kimonis et al. (2006) | 50 (23 girls) | 9.3 yrs | Responsiveness to distressing or threatening stimuli (Dot-Probe Task) | Parent and child-rated proactive and reactive aggression | Proactive aggression negatively related to responsiveness to distressing stimuli |
| Vitaro et al. (2002) | 3017 (1594 girls) | Long. 6–12 yrs | Mother-rated activity level, attention/distractibility withdrawal, rhythmicity, reactivity | Proactive and reactive aggression, teacher-rated | Reactively aggressive participants lower attention, higher approach-withdrawal, reactivity, activity than non-aggressive peers; proactively aggressive participants showed higher approach-withdrawal |
| Vitaro et al. (2006) | 1516 (51% girls) | Long. 17 mon to 6 yrs | Parent-rated negative emotionality (at 17 mon) | Mother and teacher-rated reactive-proactive aggression (at 6 yrs) | Negative emotionality positively associated with reactive aggression |

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**Table 1** (continued)

| Author(s) | Methodology | | | | Results |
|---|---|---|---|---|---|
| | *N* (Gender) | Age measures | Temperament measures | Aggression/bullying | |
| Raine et al. (2006) | 503 boys | 7 & 16 yrs | Self-report sensation seeking, impulsivity, hostility-aggression Childhood Psychopathy Scale | Reactive-proactive aggression questionnaire self-report | Stimulation-seeking significantly correlated with both proactive and reactive aggression; impulsivity correlated with reactive aggression |
| Shields and Cicchetti (1998) | 228 (82 girls) | 6–12 yrs | Parent and child-rated lability/negativity | Parent and teacher-rated reactive aggression | Emotional lability/negativity positively related to reactive aggression |
| *Direct Links Between Temperament and Bully-Victim Status Subtypes* | | | | | |
| Pellegrini and Bartini (2000) | 138 (61 girls) | 12.8 yrs (grade 5) | Teacher-rated emotional intensity | Senior Bully/Victim Questionnaire self-report | Emotionality positively associated with reactive and proactive aggression, and with aggressive victimization |
| Hess and Atkins (1998) | 470 (231 girls) | 7–9 yrs | Teacher-rated (TTQ-S) attention, approach, frustration tolerance, irritability, mood | Peer nominations of aggression and victimization | Compared to controls, aggressive victims are lower on attention, mood and frustration tolerance, and higher on irritability |
| Marini, Dane, et al. (2006) | 7290 (3756 girls) | 13–18 yrs | Adolescent-rated (DOTS-R) activity level, mood | Direct and indirect bullying and victimization checklist | Indirect and direct bully victims higher than uninvolved in activity level, and indirect bully-victims had less positive mood than uninvolved |

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Another way to confirm the validity of the concept of an emotionally dysregulated temperament is to examine the connection between these temperament characteristics and bully-victims, because their aggression tends to be reactive in nature (Salmivalli & Nieminen, 2002; Unnever, 2005). Although most studies have focused predominantly on bullies and victims, in a recent study it was found that about 33% of the students who reported high levels of experience with either bullying or victimization were dually involved in both (Marini, Dane, et al., 2006). Schwartz and his colleagues (see Schwartz et al., 2001) have suggested that the common risk factor predisposing bully-victims to both bullying and victimization is difficulty with the regulation of emotions. Since they are prone to emotional reactivity, they are likely to over-react to provocation such as peer teasing with an explosive outburst. Their predisposition to frustration and anger may render them more susceptible to being aggressive, whereas their emotional volatility may alienate peers and set them up as targets of bullying (Marini, Koruna, et al., 2006; Salmivalli, Kaukiainen, Voeten, & Sinesammal, 2004).

Three studies presented in Table 1 have examined the temperament of bully-victims. In all three studies, bully-victims were higher than uninvolved participants in various aspects of emotional reactivity, including emotionality, irritability, low frustration tolerance, and low positive mood (Hess & Atkins, 1998; Marini, Dane, et al., 2006; Pellegrini & Bartini, 2000). In addition, activity level was higher in bully-victims than in uninvolved participants, and attention regulation, suggesting a lower level of effortful control, a hallmark of individuals with an emotionally dysregulated temperament (Hess & Atkins, 1998; Marini, Dane, et al., 2006).

As a whole, this research supports the conceptualization that temperament characteristics reflecting emotional dysregulation may predispose children to reactive aggression. Specifically, temperament dimensions such as negative emotionality, emotional reactivity, emotional lability/negativity, low effortful control, and high surgency have been linked to reactive aggression and also to the probability of children being bully-victims, who primarily use aggression of a reactive nature. Although the amount of evidence was more limited, some research was consistent with the expectation that proactive aggression would be linked to low fear and low empathy; however, the possible link between instrumental aggression and low affiliation has not been empirically evaluated.

## Interactive and Indirect Pathways from Temperament to Bullying

The challenge for teachers is to determine optimal strategies for managing and regulating the behavior of children with emotionally dysregulated or callous-unempathic temperaments. Recently, several studies have shown that children of different temperaments respond differentially to various behavioral control strategies used by parents, and are influenced dissimilarly by the parent–child relationship

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(Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000; Cumming, Davies, & Campbell, 2000). This research may have implications for teachers, who as socialization agents within the classroom, may need to be mindful of how emotionally dysregulated and callous-unempathic children may respond differently to behavior management strategies aimed at reducing bullying, and may respond in a unique fashion to the teacher–student relationships that develop over the course of a school year. An additional consideration that merits attention from teachers is how they themselves may react differently to emotionally dysregulated and callous-unempathic children in their daily interactions with them. Some insight into this issue may be gleaned from research on indirect links between temperament and aggression, mediated by the intermediate impact of temperament on the parents' parenting. A final benefit to examining literature on the relations among parenting, temperament, and aggression is some studies demonstrate that temperament can be shaped by parenting and is therefore amenable to change rather than being a fixed characteristic. Such investigations may provoke thoughts on how teachers may interact with emotionally dysregulated and callous-unempathic youngsters to curb their non-optimal tendencies and to promote more adaptive qualities. With these objectives in mind, we now turn to a brief review of literature on the interactive and indirect relations among parenting, temperament, and aggression.

Research on parent-temperament interactions is summarized in Table 2. One of the major patterns evident in this research is that children with emotionally dysregulated temperaments appear to react more adversely than other children to harsh forms of parental control and to negative parent–child relationships. With respect to parental control, harsh and inconsistent discipline was associated with aggression or conduct problems for children high in impulsivity (i.e., low effortful control) or fearfulness (Colder, Lochman, & Wells, 1997; Lengua, Wolchik, Sandler, & West 2000; Leve, Kim, & Pears, 2005), although the interaction between harsh discipline and impulsivity in the study by Leve and colleagues was significant only for girls. Problems with the parent–child relationship also seem to have a larger impact on emotionally dysregulated youngsters. In particular, children and adolescents who are uninhibited, low in effortful control, prone to anger, high in negative emotionality, or have a difficult temperament (defined as low inhibitory control, high frustration, high activity level, and low soothability) are more apt to experience behavioral problems if the parent–child relationship is characterized by avoidant attachment, maternal hostility, low maternal support, less positive parenting (low sensitivity, less positive and more negative affect, intrusiveness, detachment), and a lack of maternal sensitivity (Belsky, Hsieh, & Crnic, 1998; Burgess, Marshall, Rubin, & Fox, 2003; Carlo, Roesch, & Melby, 1998; Morris et al., 2002; van Aken, Junger, Verhoeven, van Aken, & Dekovic, 2007).

Two studies examined parenting by temperament interactions with respect to dimensions of the callous-unempathic temperament. Leve and colleagues (2005) found that harsh discipline increased girls' externalizing behavior when fear or shyness was low. In regard to the parent–child relationship, parental support was

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**Table 2** Interactive and indirect relations between temperament and aggression/bullying

| | Sample | | Temperament | Parenting | Aggression/bullying | |
|---|---|---|---|---|---|---|
| Author(s) | *N* Gender | Age(s) | measure | measure | measure | Results |
| *Parent-Temperament Interactions* | | | | | | |
| Burgess et al. (2003) | 140 | Longitudinal follow-up 14 mon to 4 yrs | Uninhibited temperament, -observed 24 mon, 4 yrs -heart rate; respiratory sinus Arrhythmia -maternal ratings 4 yrs | Mother-child attachment in strange situation – 14 mths | Mother-rated externalizing behaviors age 4 | Avoidant attachment associated with externalizing behavior problems when uninhibited temperament high |
| Leve et al. (2005) | 337; 163 girls | Longitudinal follow-up 5–17 yrs | Parent-rated fear/shyness, impulsivity at age 5 | Mother and interviewer-rated maternal harsh discipline, age 5 | Parent-rated externalizing behavior at ages 5, 7, 10, 14, 17 | Harsh discipline predicted increases in girls' externalizing behavior only when impulsivity high or fear/shyness low. |

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**Table 2** (continued)

| | Sample | | Temperament | Parenting | Aggression/bullying | |
|---|---|---|---|---|---|---|
| Author(s) | *N* Gender | Age(s) | measure | measure | measure | Results |
| Rubin et al. (2003). | 104; 54 girls | Longitudinal follow-up to 4 yrs | Composite of observed effortful control and mother-rated emotion dysegulation at age 2. | Observed negative mothering (hostile affect, intrusive, negative control) at age 2. | Teacher-rated externalizing behavior at age 4 | Behavioral/emotional under-control was associated with externalizing behavior for children with high and moderate levels of maternal negativity |
| Morris et al. (2002). | 40 | Mean 7.7 yrs | Mother-rated irritable distress, effortful control | Child puppet interview for maternal psychological control and hostility | Teacher-rated externalizing behavior | Maternal hostility associated with externalizing behavior for participants low in effortful control. |
| Carlo et al. (1998). | 80 | Mean 14.2 yrs | Parent-reported sociability and anger temperaments | Parent-rated support | Self-reported aggression and antisocial behaviors | Parent support inversely associated with aggression and antisocial behavior when sociability was low. |

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**Table 2** (continued)

| Author(s) | Sample *N* Gender | Sample Age(s) | Temperament measure | Parenting measure | Aggression/bullying measure | Results |
|---|---|---|---|---|---|---|
| | | | | | | Maternal support inversely associated with aggression when anger was high and sociability low. |
| Rubin et al. (1998). | 104; 52 girls | 2 yrs | Observed and mother-rated dysregulated temperament | Observed maternal warmth and dominance | Mother-rated externalizing behavior observed aggression | Observed aggression and mother-rated externalizing behavior associated with dysregulated temperament only when boys' mothers were high in negative dominance. |

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**Table 2** (continued)

| Author(s) | Sample *N* Gender | Sample Age(s) | Temperament measure | Parenting measure | Aggression/bullying measure | Results |
|---|---|---|---|---|---|---|
| Bates et al. (1998) | (Study 1) 139 44% girls | Study 1: Longitudinal follow-up from 13 mon to 10 yrs | Study 1: Mother-rated resistance to control; ages 13 mon and 24 mon | Study 1: Observed maternal restrictive control (prohibitions, warnings, scolding) at ages 6–24 mon | Study 1: Mother and teacher ratings of externalizing behavior, mean of measures.at ages 7, 8, 10. | Study 1: Resistance to control positively associated with teacher and mother-rated externalizing behavior only when mothers low in restrictive control |
| | (Study 2) 156 51% girls | Study 2: Longitudinal Follow-up 5–11 yrs | Study 2: Retrospective mother-rated resistance to control age 5 yrs | Study 2: Observed maternal restrictive control age 5 | Study 2: Mother and teacher ratings of externalizing behavior, mean of measures. at ages 7, 8, 9, 10, 11. | Study 2: Resistance to control positively associated with teacher and mother-rated externalizing behavior only when mothers low in restrictive control. |

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**Table 2** (continued)

| Author(s) | Sample *N* Gender | Sample Age(s) | Temperament measure | Parenting measure | Aggression/bullying measure | Results |
|---|---|---|---|---|---|---|
| Belsky et al. (1998) | 125 Boys | Longitudinal follow-up 12–37 mon | Parent-rated and observed infant negative emotionality at 12 mon | Observed positive parenting (sensitivity, positive affect, cognitive stimulation and detachment) and negative parenting (intrusiveness, negative affect) at 15–33 mon | Parent-rated externalizing behavior at 37 mon | Composite of maternal positive and negative parenting predictive of externalizing behavior only for infants high in negative emotionality. |
| Colder et al. (1997) | 64 Boys | Fourth and fifth grade | Parent-rated activity level and fear; self-reported fear | Parent-rated involvement and monitoring, and harsh discipline. | Teacher-rated aggression | Poor monitoring positively associated with aggression only for high activity level boys; harsh discipline associated with aggression only for high and moderately fearful boys |

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**Table 2** (continued)

| Author(s) | Sample *N* Gender | Sample Age(s) | Temperament measure | Parenting measure | Aggression/bullying measure | Results |
|---|---|---|---|---|---|---|
| Paterson & Sanson (1999) | 74; 40 girls | 5–6 yrs | Parent-rated inflexibility (negative emotionality and adaptability); persistence (attention); and approach | Parent-rated physical punishment | Parent and teacher-rated externalizing behavior. | High inflexibility positively associated with externalizing behavior only for children exposed to high punishment. |
| Lengua et al. (2000). | 231; 50.2% girls; divorced parents | 9–12 yrs; mean 10.3 | Child and mother-rated positive emotionality and impulsivity | Mother and child-rated rejection; inconsistent discipline | Child-rated conduct problems | Rejection more strongly associated with conduct problems for children low in positive emotionality Inconsistent discipline more strongly related to conduct problems for children high in impulsivity |

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**Table 2** (continued)

| Author(s) | Sample *N* Gender | Sample Age(s) | Temperament measure | Parenting measure | Aggression/bullying measure | Results |
|---|---|---|---|---|---|---|
| Aken et al. (2007) | 117 boys | Longitudinal follow-up 17–23 mon | Mother-rated inhibitory control, frustration, activity level and soothability | Observed maternal sensitivity and negative control | Mother-rated externalizing behavior | Lack of maternal sensitivity and high negative control positively associated with externalizing behaviors for children with a difficult temperament |

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**Table 2** (continued)

| Author(s) | Sample *N* Gender | Sample Age(s) | Temperament measure | Parenting measure | Aggression/bullying measure | Results |
|---|---|---|---|---|---|---|
| *Parent-Temperament Indirect Effects* | | | | | | |
| Lengua and Kovacs (2005) | 92; 54% Male | 8–11 mean 9.9 | Mother and child-rated fearfulness, irritability, positive emotionality and self-regulation. | Mother and child-rated acceptance, involvement and inconsistent discipline | Mother and child-rated externalizing problems. | Child irritability associated with greater inconsistent discipline, controlling for prior parenting. Child fearfulness and positive emotionality associated with greater maternal acceptance, controlling for prior parenting. Maternal inconsistent discipline predicted Higher fearfulness and irritability, controlling for |

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**Table 2** (continued)

| Author(s) | Sample *N* Gender | Sample Age(s) | Temperament measure | Parenting measure | Aggression/bullying measure | Results |
|---|---|---|---|---|---|---|
| | | | | | | prior temperament. Fearfulness, irritability, acceptance and inconsistent discipline uniquely associated with externalizing problems. |
| Eisenberg et al. (1999) | 64; 33 girls | Longitudinal follow-up 58–132 mon | Parent-reported negative emotionality and self-regulation | Parent-reported distress, punitive responses and minimization responses to child negative emotions | Mother and father-rated problem behavior; teacher-rated social functioning (aggres-sion/disruptive behavior minus socially appropriate behavior. | 1)Age 6–8 self-regulation inversely related to age 8–10 parental punitive reactions age 8–10 punitive reactions positively associated with age 10–12 punitive reactions; age 10–12 punitive reactions positively related to age 10–12 problem behavior. |

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**Table 2** (continued)

| Author(s) | Sample *N* Gender | Sample Age(s) | Temperament measure | Parenting measure | Aggression/bullying measure | Results |
|---|---|---|---|---|---|---|
| | | | | | | 2) Age 6–8 parental distress inversely related to age 8–10 regulation age 8–10 regulation positively associated with age 10–12 regulation, which in turn was inversely associated with problem behavior. |
| Watson et al. (2004) | 391 174 girls | Longitudinal follow-up; 7–13 yrs to 8–14 yrs | Mother-rated behavioral inhibition | Mother-rated negative family functioning | Mother and child-rated aggression | Negative family functioning associated with greater behavioral inhibition, which in turn was related to a higher level of aggression at 1-year follow-up. |

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**Table 2** (continued)

| Author(s) | Sample *N* Gender | Sample Age(s) | Temperament measure | Parenting measure | Aggression/bullying measure | Results |
|---|---|---|---|---|---|---|
| Finkenauer et al. (2005) | 1359; 650 girls | 12.3 yrs | Self-reported self-control | Self-reported acceptance/involvement, strict control, and psychological control | Self-reported undifferentiated aggression | Self-control partially mediated significant inverse relation between acceptance-involvement and aggression, and positive association between psychological control and aggression. |

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**Table 2** (continued)

| Author(s) | Sample *N* Gender | Sample Age(s) | Temperament measure | Parenting measure | Aggression/bullying measure | Results |
|---|---|---|---|---|---|---|
| Zhou et al. (2004) | 425; 236 girls | 7 yrs, 8 mon | Parent and teacher-rated effortful control and anger/frustration | Parent-rated authoritative and authoritarian parenting | Parent and teacher-rated social functioning (which includes low aggression) | Positive relation between authoritative parenting and social functioning fully mediated by effortful control; inverse link between authoritarian parenting and social functioning partially mediated by effortful control. |

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**Table 2** (continued)

| Author(s) | Sample *N* Gender | Sample Age(s) | Temperament measure | Parenting measure | Aggression/bullying measure | Results |
|---|---|---|---|---|---|---|
| | | | | | | Positive association between authoritative parenting and social functioning weakly mediated by anger/frustration; negative relation between authoritarian parenting and social functioning weakly mediated by anger/frustration |
| Shields and Cicchetti (1998) | 228; 82 girls | 6–12 yrs | Parent and child-rated labil-ity/negativity | Parent-interview of maltreatment | Parent and teacher-rated reactive aggression | Positive association between maltreatment and reactive aggression |

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negatively linked with aggression and antisocial behavior only for children low in sociability, which relates to the lack of affiliativeness purported to characterize children with callous-unempathic temperaments (Carlo et al., 1998).

Other studies included data on temperament by parenting interactions, wherein the likelihood of a risky temperament characteristic predisposing a child to behavioral problems was altered by the kind of parenting experienced by the child. For example, three studies showed that youngsters with aspects of an emotionally dysregulated temperament, including low effortful control, high emotion dysregulation (i.e., approach, anger proneness), and negative emotionality, were more likely to evidence aggression or externalizing behavior when they experienced negative features of parental control or of the parent–child relationship, such as maternal dominance and negativity, and high parental physical punishment (Paterson & Sanson, 1999; Rubin, Hastings, Chen, Stewart, & McNichol, 1998; Rubin et al., 2003).

One explanation for these findings, provided by Rubin and colleagues (Rubin et al., 1998), is that children high in emotion dysregulation may have less effective internal mechanisms for exerting self-control, which places them at high risk for aggressive interactions with peers when parents limit opportunities for practicing self-regulation through intrusive forms of parenting (e.g., dominance). Paterson and Sanson (1999) suggest that emotionally dysregulated children are more likely to engage in coercive cycles when they encounter punitive parenting, by reacting adversely, escalating coercive exchanges until parents withdraw demands and negatively reinforce aggressive or externalizing behavior. Additional research by Bates and colleagues (Bates, Pettit, Dodge, & Ridge, 1998) also demonstrated a temperament by parenting interaction, except the link between resistance to control, which involves facets of emotional dysregulation and callous-unempathic characteristics, and externalizing behavior was moderated or offset by parental restrictive control. Consistent with the explanation advanced by Paterson and Sanson (1999), Bates and colleagues (1998) suggested that parents may avoid becoming involved in coercive cycles, wherein inappropriate behavior is inadvertently reinforced, with children high in aspects of emotion dysregulation (as well as some aspects of callous-unempathic temperaments, including low fear), by consistently restricting inappropriate behavior (and not giving in) in the face of defiance and oppositionality.

In addition to temperament by parenting interactions, three studies in Table 2 provide evidence of indirect effects, whereby temperament is indirectly linked to aggression through its intermediate impact on parenting. In accordance with the concept of evocative gene–environment correlations, whereby children with maladaptive temperaments are more likely than other youngsters to evoke negative parenting (e.g., Collins et al., 2000; Rutter, 1997), several studies indicated that children with emotionally dysregulated temperament features, such as high irritability and low self-regulation, appeared more likely to evoke negative forms of parental control including inconsistent discipline and punitive reactions, which in turn were uniquely associated with child behavior problems (Eisenberg et al., 1999; Lengua & Kovacs, 2005; Watson, Fischer, Andreas, & Smith, 2004).

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However, several studies demonstrated that the reverse was also possible, in other words, that parenting could exacerbate or mitigate temperament qualities such as emotion dysregulation, which in turn may increase or decrease the risk of aggressive behavior. As shown in Table 2, negative aspects of parental control and the parent–child relationship, such as inconsistent discipline, parental distress to child behavior, negative family functioning, authoritarian parenting, psychological control, and parental maltreatment, were found to increase maladaptive temperament features such as fearfulness, irritability, emotional lability/negativity, poor self-regulation, uninhibited behavior, and low self-control (Eisenberg et al., 1999; Finkenauer, Engels, & Baumeister, 2005; Lengua & Kovacs, 2005; Shields & Cicchetti, 1998; Watson et al., 2004; Zhou, Eisenberg, Wang, & Reiser, 2004). These temperament characteristics were in turn uniquely associated with behavioral problems. On the other side of the coin, positive dimensions of parenting such as high acceptance-involvement and authoritative parenting were positively associated with self-control and effortful control, which in turn were linked with a reduced likelihood of negative social functioning (aggression and poor peer relations) and aggression (Finkenauer et al., 2005; Zhou et al., 2004). Notably, these studies provide evidence that parenting may shape facets of an emotionally dysregulated temperament, such as effortful control, proneness to irritability/frustration or fearfulness, but they do not speak as to whether the same is true for callous-unempathic characteristics. Since it is not clear whether it is possible to modify the problematic temperamental tendencies of callous-unempathic children through socialization, socialization agents instead may need to adopt strategies that compensate for or work around these temperamental limitations, as we discuss in greater detail below.

These findings are consistent with the contention of researchers that temperament is an open system subject to change (e.g., Rothbart & Bates, 2006), rather than being fixed or predetermined. Despite there being much theoretical agreement that temperament is malleable, the prospect of parenting exacerbating or reinforcing temperament characteristics is seldom studied (Lengua & Kovacs, 2005), and hence these results are quite notable.

## Tailoring Educational Practices to Students' Temperament and Brain Function

Although existing research does not explicitly address the issue of temperament and aggression/bullying in a school context, the studies reviewed herein nonetheless have important implications for teachers dealing with bullying and disruptive behavior in their schools. The school is the setting in which the vast majority of bullying takes place, and moreover, processes relating to temperament and parenting may inform teachers since they too are important socializing agents. For example, teachers, like parents, may need to employ discipline strategies to manage student's behavior, and at the same time develop relationships with students as a means to engage, motivate, and maintain on-task and appropriate behavior.

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### *Students with Emotionally Dysregulated Temperaments*

The profile of individuals with emotionally dysregulated temperaments indicated by the research reviewed in this chapter suggests that certain strategies may be more effective for teachers working with these children. In summary, youngsters high in emotional dysregulation are prone to negative emotionality including irritability, frustration, anger, and fear due to the heightened sensitivity of the reward system that processes reward, positive affect, and frustration over blocked goals, and the system that governs fear responses to threatening or dangerous stimuli, in combination with poor effortful or cognitive control of those emotions due to limitations in prefrontal cortex functioning. Results from the empirical studies reviewed above indicated that emotionally dysregulated youngsters are susceptible to reactive aggression, and that they are at greater risk for behavioral problems than other children when they encounter harsh or ineffective forms of behavioral control (harsh or inconsistent discipline, physical punishment) or have relationships with parents characterized by insensitivity, hostility, dominance, negativity, attachment insecurity, or a lack of support. Additional evidence shows that emotionally dysregulated youngsters are likely to evoke negative parenting from parents. Moreover, negative parenting (e.g., inconsistent discipline, parental distress to child behavior, negative family functioning, authoritarian parenting, psychological control, and parental maltreatment) has been shown to exacerbate emotional dysregulation, whereas positive parenting with authoritative characteristics appears to improve self-control.

Taking these empirical findings and the temperamental profile of emotionally dysregulated children together, it appears that teachers may be able to make use of several strategies to better enable emotionally dysregulated children to exert cognitive control over their negative emotions and to reduce the negative emotionality itself through positive socialization. With regard to boosting effortful control over the behavioral expression of emotions, it is instructive to note that parenting characterized as authoritative or high in acceptance-involvement was associated with increased self-control. Some of the key elements of authoritative or highly involved parenting include good communication and the use of inductive discipline, which entails the use of reasoning and explanation to explain how others are affected by the child's inappropriate behavior (e.g., Gray & Steinberg, 1999). Teachers may take such an approach to dealing with behavioral infractions in the classroom or school yard, and in so doing, may give emotionally dysregulated children opportunities to reflect on how their emotional and behavioral outbursts affect other people. In other words, teachers may promote greater consideration of the negative consequences of emotionally volatile and reactively aggressive behavior, increasing the child's capacity to stop and think before acting out. Another quality of authoritative parenting is that children are granted an appropriate level of autonomy to make their own decisions and to solve their own problems, which in turn provides them with opportunities to learn how to regulate their own behavior rather than relying on the external regulation of adults (Gray & Steinberg, 1999). Teachers may facilitate such a process with emotionally dysregulated children as well, for example, by mediating conflict resolution between two students rather than dictating a solution, thereby

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helping to build self-regulation skills. Given their difficulties controlling emotions, it may be useful to enhance the self-regulation skills of emotionally dysregulated students by teaching self-instruction (e.g., counting to 10 before acting) or relaxation (e.g., deep breathing) techniques as a means to dampen emotional arousal, inhibit immediate, impulsive action, and to create space and time for more careful reflection.

Finally, it may be important for teachers to model appropriate self-control over their own emotions, given research showing a link between parental expression of distress to child behavior and decreased self-regulation abilities in children over time (Eisenberg et al., 1999). Further to this point, educators drawn into emotional or excessively punitive reactions by emotionally dysregulated students may precipitate an escalating exchange of aversive behavior. When teachers engage in a cycle of coercive behavior with these students, they may inadvertently reinforce inappropriate conduct, especially since they will likely have to back down to defuse the volatile confrontation. Indeed, the wisdom of exercising self-control in such situations is emphasized by research indicating children with emotionally dysregulated temperament features are more likely to exhibit behavioral problems when parents use heavy-handed tactics fraught with negative emotions to control their behavior, exemplified by maternal dominance and negativity or parental physical punishment (Paterson & Sanson, 1999; Rubin et al., 1998; 2003). Additional research by Bates et al. (1998) suggests that restricting inappropriate behavior through firm but unemotional admonitions may reduce problematic behavior effectively and prevent the escalation of coercive exchanges, which can unintentionally demonstrate that aggressive or bullying behavior can pay dividends.

To minimize emotionally dysregulated children's tendency toward negative emotionality, it may be helpful for teachers to avoid use of harsh, high-intensity behavior management strategies involving yelling, threatening, shaming, or guilt induction, in light of parenting research indicating that such control strategies tend to worsen the behavioral and emotional problems of emotionally dysregulated children. Instead, teachers may wish to employ more moderate behavior management strategies, such as privilege removal or inductive discipline, which provide consequences for inappropriate behavior that emphasize wrong doing, without overwhelming children who are prone to emotional reactivity. Because emotionally dysregulated children are temperamentally fearful, milder forms of behavior management should be sufficient to elicit an optimal level of anxiety in the face of these disciplinary encounters, which in turn should prompt attention to the moral message delivered by the teacher, and provide ample motivation for behavioral change (Kochanska, 1995). Consequently, higher intensity, more threatening forms of discipline would be unnecessary and likely counter productive. Putting such a practice into effect may be challenging, however, since research shows that irritable and unregulated children tend to evoke more punitive and inconsistent forms of discipline from parents (Eisenberg et al., 1999; Lengua & Kovacs, 2005), perhaps because their behavior can be unpredictable, disconcerting, and frustrating.

Emotional volatility may also be reduced through the cultivation of positive teacher–student relationships. As discussed earlier, emotionally dysregulated

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children seem to react more adversely to negative parent–child relationships than other children, being at heightened risk for behavioral problems in the face of hostility, insensitivity, detachment, controlling behavior, a lack of support, and insecure attachments. Speaking to negative emotionality more directly, increases in children's fearfulness have been shown to mediate or explain the positive association between negative family functioning and increased behavioral problems (Watson et al., 2004). Extrapolating from these results, it may be possible for teachers to lessen a child's emotional reactivity in the classroom, or at least not to aggravate the problem, by behaving in a kind, caring, warm, supportive, sensitive, and trustworthy manner with an emotionally dysregulated child. One strength of children with emotionally dysregulated characteristics is that they are not posited to have deficits in affiliativeness, and their being in the normal range with regard to warmth, friendliness, and sociability should aid teachers in their efforts to establish a positive relationship.

## Students with Callous-Unempathic Characteristics

Teachers may need to address the bullying of callous-unempathic children using different levers. Recall that callous-unempathic characteristics included fearlessness, low interest in affiliation, and a lack of empathy or guilt. From the standpoint of neural models, the fearlessness, and to a certain extent the lack of empathy and guilt, stems from the Fight/Flight/Freeze system being relatively insensitive to cues of punishment, threat, or danger, such that in potentially threatening circumstances callous-unempathic children would have muted fear responses. Children with callous-unempathic characteristics appear more likely to be proactively aggressive, using aggression as a means to obtain instrumental and social rewards without regard for the victim's welfare. Although research addressing the parenting of youngsters with this temperamental profile is scant, one study indicated that a lack of parental support was more strongly linked with aggression when children were low in sociability, a key callous-unempathic characteristic (Carlo et al., 1998).

Considering all of these findings together, there would appear to be two major strategies that teachers could use to address the bullying of callous-unempathic students. First, it may be helpful for teachers to recognize that these youngsters may have difficulty feeling emotions that would normally motivate a person to inhibit an inappropriate action. For example, in light of having a relatively insensitive fear system, such students may be able to use physical intimidation to take money from another student, or to humiliate a weaker student on the playground, without feeling empathetic about the victim's distress, guilty about the behavior being wrong, or fearing possible punishments that might result, such as a school suspension or having privileges removed at home by parents. It is not clear from a theoretical or empirical standpoint what could be done to change the emotional experiences of callous-unempathic children, and thus it might be best for teachers to help them at a cognitive level, providing scaffolding to assist with the development of perspective taking or problem-solving skills, so that the child learns to exert cognitive control

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over harmful actions driven by the desire for tangible or instrumental rewards. In other words, the teacher may help a child to develop beliefs whereby he "knows" that a bullying behavior is wrong and harmful, even if he does not "feel" that this is so as other children do intuitively. To provide an example, teachers may try an approach akin to inductive discipline, using reasoning and explanation following a bullying incident to point out the negative consequences for the bully and the victim. This strategy may be coupled with a problem-solving exercise through which alternative solutions to a social problem might be identified, illuminating tactics that may accomplish a desired goal in a less harmful way. Current educational initiatives, such as "Character Education," may help in this regard as long as greater emphasis is given to enhancing cognitive control mechanisms (e.g., perspective taking) rather than taking an approach that relies solely on building moral emotional responses such as empathy and guilt. In working on the development of cognitive control in callous-unempathic children, teachers would be taking advantage of the fact that their effortful control capabilities are more or less normal, as they are not as impulsive as students with emotionally dysregulated temperaments. Speaking from the standpoint of neural models, the anterior attention system of callous-unempathic youngsters appears to be fully functional and can perhaps be recruited to exert cognitive control over aggressive behavior resulting from the weak inhibitory role played by the Fight/Flight/Fear system, centered in the subcortical, limbic, and brainstem regions of the brain.

From the point of view of behavior management in the classroom and on the playground, harsh, high-intensity strategies such as yelling, threatening (i.e., harsh discipline), shaming, and guilt induction (i.e., psychological control) are unlikely to be effective, since callous-unempathic children are relatively fearless and less sensitive to punishment. However, on a more positive note, the dopaminergic pathways underlying the neural systems that process reward and positive affect (e.g., Behavior Activation System) appear to function normally in these youngsters and this may provide teachers with a mechanism for motivating appropriate behavior. Specifically, students with callous-unempathic characteristics may not inhibit inappropriate behavior out of fear of punishment, but they may activate appropriate actions to please the teacher, if they find the relationship with that teacher to be rewarding and positive. Thus, developing a mutually positive relationship with such students may provide a foundation for mutually respectful behavior. This possibility is consistent with the aforementioned finding that children with callous-unempathic characteristics are less likely to be aggressive or to engage in antisocial behavior when they have a supportive relationship with their parents (Carlo et al., 1998).

## Conclusion

School bullying remains a serious problem for educators, but recent research, reviewed in the foregoing chapter, has suggested that its etiology and prevention may be better understood through careful consideration of the different pathways

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toward aggression and bullying that may be taken by children with emotionally dysregulated and callous-unempathic temperaments. Looking at the bigger picture, we hope that this chapter illustrates how individual differences in brain function and structure may affect students' psychosocial and behavioral adjustment in the school setting, and how educators may capitalize on this knowledge to tailor educational programs and their personal interactions with these children to best meet the particular needs of each student. It is our hope that the foregoing chapter embodies Robbie Case's multidisciplinary approach to the study of children, in that we tried to integrate elements of diverse areas of theory and research, including neuropsychology, developmental psychology, psychopathology, and education. Perhaps the synthesis of these broad areas of research, and the subsequent application of these ideas to educational practice, will in some small way facilitate the socialization and education of children, particularly those whose temperaments present challenges to parents and educators.

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