

# Understanding Nonsuicidal Self-Injury

Origins, Assessment,  
and Treatment

Edited by Matthew K. Nock

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## DEVELOPMENTAL PATHWAYS FROM CHILD MALTREATMENT TO NONSUICIDAL SELF-INJURY

TUPPETT M. YATES

In the face of dramatic and apparently rising rates of nonsuicidal self-injury (NSSI), empirical and clinical scholars—including myself and many of the contributors to this book—have come together in search of clear methods for identifying, understanding, and treating NSSI. However, in our haste to focus empirical and clinical lenses of inquiry on self-injury, our knowledge about the descriptive psychopathology of NSSI has outpaced our understanding of the processes that underlie its emergence, maintenance, or desistance over time (i.e., the developmental psychopathology of self-injurious behavior; see Yates, 2004, for a discussion). Across descriptive studies of NSSI and main effect models of its etiology, NSSI has emerged as a shared end point of numerous and structurally varied developmental paths, many of which originate in adverse childhood experiences. Emphasizing developmental pathways and processes, this chapter draws on the integrative paradigm of developmental psychopathology to understand apparent relations between child maltreatment and NSSI.

The extant literature supports the assertion that NSSI is associated with traumatic experiences in childhood, including chronic illness or major surgery, parental loss or deprivation, and maltreatment (Briere & Gil, 1998; van der Kolk, Perry, & Herman, 1991). Childhood experiences of malevolent

caregiving consistently emerge as an especially powerful initiating condition for pathways toward self-injurious outcomes with up to 79% of those who self-injure reporting a childhood history of abuse or neglect (van der Kolk et al., 1991; see also Favazza & Conteiro, 1989; Low, Jones, MacLeod, Power, & Duggan, 2000; Wiederman, Sansone, & Sansone, 1999). These findings join the vast literature documenting a host of deleterious effects of maltreatment and providing support for research programs that identify specific processes carrying individuals toward and away from particular pathological outcomes in the aftermath of maltreatment (Cicchetti & Valentino, 2006).

This chapter speaks to recent calls for theoretically informed, developmental process models of maltreatment and its effects broadly, and to the pressing need to clarify pathways between maltreatment and NSSI in particular. The first section of the chapter reviews evidence of relations between child maltreatment (i.e., child sexual abuse, child physical abuse, child neglect, and child emotional abuse) and NSSI. The second section introduces a developmental psychopathology framework and an organizational perspective on development to illustrate the salience of the caregiving milieu for understanding current and prospective adaptation. Building on this foundation, this section summarizes the theoretical justification and empirical support for three putative process pathways between child maltreatment and NSSI. First, a *representational path* may carry individuals toward NSSI through internalized representations of the self as defective, of others as malevolent, and of relationships as dangerous following recurrent patterns of negative transactions in the early caregiving milieu. Second, either in isolation or in concert with representational vulnerabilities, maltreatment may thwart children's emerging integrative, symbolic, and reflective affect processing capacities. This, in turn, increases the probability of a *regulatory path* toward self-injurious behaviors. Third, maltreatment may initiate neurobiological alterations and physiological cascades that contribute to a *reactive path* toward NSSI. The chapter concludes with a discussion of the empirical and clinical implications of a developmental process perspective for future research and practice.

#### MAIN EFFECT MODELS OF CHILD MALTREATMENT AND NONSUICIDAL SELF-INJURY

Over the past 20 years, scientific understanding of the effects of child maltreatment in various developmental domains (e.g., biology, cognition, self-development, attachment) has grown considerably, with particularly notable gains in the areas of neuroendocrinology and physiology. Maltreatment negatively influences developmental processes across multiple levels, including the self-system (e.g., self-other distinctions, body image, self-representation), affect regulation and impulse control (e.g., behavior toward self and others,

dissociation, memory), relational patterns (e.g., distrust, rejection sensitivity, withdrawal), and neurophysiology (e.g., sympathetic and parasympathetic arousal modulation, brain structure; see Cicchetti & Valentino, 2006, for a review). Thus, it is not surprising that child maltreatment is associated with a range of disorders across both internalizing (e.g., anxiety, depression) and externalizing (e.g., aggression, substance abuse) dimensions of behavior (Briere & Elliott, 2003; Mullen, Martin, Anderson, Romans, & Herbison, 1996), as well as with NSSI (Santa Mina & Gallop, 1998; Yates, Carlson, & Egeland, 2008).

Retrospective relations between child sexual abuse and NSSI have been widely observed and almost entirely replicated in published research (e.g., see Boudewyn & Huser Liem, 1995; Noll, Horowitz, Bonanno, Trickett, & Putnam, 2003; van der Kolk et al., 1991; Zlotnick, Shea, & Pearlstein, 1996). This relation is especially pronounced in cases of intrafamilial abuse, especially parent-child incest. Percentages of incest survivors who engage in NSSI range from 17% (Briere & Zaidi, 1989) to 25% (Albach & Everaerd, 1992) to 58% (de Young, 1982).

Relative to sexual abuse, fewer studies have examined the role of child physical abuse in the etiology of NSSI, and still fewer have studied the potential contribution of child neglect or emotional maltreatment to self-injurious outcomes. Published reports support a relation between a history of child physical abuse and NSSI (e.g., see Carroll, Schaffer, Spensley, & Abramowitz, 1980; Green, 1978; van der Kolk et al., 1991; Wiederman et al., 1999; cf. Boudewyn & Huser Liem, 1995). Studies evaluating the role of child neglect in NSSI have yielded equivocal findings, with some reporting significant relations (e.g., see Dubo, Zanarini, Lewis, & Williams, 1997; Lipschitz et al., 1999; van der Kolk et al., 1991), but others not (e.g., see Wiederman et al., 1999). With respect to emotional maltreatment, recent studies demonstrating predictive relations between child-directed parental criticism and NSSI among high school students suggest that negative emotional exchanges in the family may contribute to adolescent NSSI (Wedig & Nock, 2007; Yates, Tracy, & Luthar, 2008). However, the potential contribution of child emotional abuse to NSSI awaits further clarification.

Beyond main effect models, few studies have examined whether and how different forms of maltreatment shape developmental pathways toward NSSI. Preliminary evidence suggests that specific forms of maltreatment are differentially related to NSSI (Lipschitz et al., 1999; Wiederman et al., 1999). In a study of individuals with personality disorders, for example, Dubo et al. (1997) found that both child sexual abuse and child neglect individually explained variation in NSSI. However, when considered together, sexual abuse predicted suicidal behavior, whereas neglect emerged as the strongest predictor of NSSI. With respect to the specific features of maltreatment, the association between child maltreatment and NSSI is strongest in cases in which there has been an extended period of abuse, perpetrated by a person

known to the victim, and, in the case of sexual abuse, involving the use of force or penetration (e.g., see Trickett, Noll, Reiffman, & Putnam, 2001).

In addition to the heterogeneity of maltreatment experiences, recent studies point to meaningful differences in NSSI as a function of its form, frequency, function, etiology, or a combination of these. For example, a recent study of child maltreatment and NSSI in a community sample suggested specific pathways between child physical abuse and NSSI that occurs intermittently and subserves primarily interpersonal functions (e.g., seeking attention, communicating with others), whereas child sexual abuse appeared more salient in recurrent NSSI that subserves primarily intrapsychic functions related to self-soothing, self-regulation, or self-punishment (Yates, Carlson, & Egeland, 2008). The possibility that different kinds of maltreatment may differentially predict specific kinds of NSSI (as categorized on the basis of form, frequency, or function) introduces yet another level of complexity to this area of research. Moreover, the preponderance of retrospective methods in this work brings the need for longitudinal studies of pathways toward and away from NSSI into full relief. Even in the context of prospective data, however, demonstrating the etiological contribution of maltreatment to NSSI does little to facilitate understanding of the processes involved in its initiation, maintenance, or desistance over time.

#### DEVELOPMENTAL PROCESS MODELS OF CHILD MALTREATMENT AND NONSUICIDAL SELF-INJURY

Classical approaches to NSSI tend to fall within the purview of discrete psychological paradigms, including psychoanalytic, neo-analytic-psychoanalytic, psychosomatic, behavioral, cognitive, and neurobiological approaches to psychopathology. Drawing on all these theories, the integrative macroparadigm of developmental psychopathology is a promising framework for conceptualizing and evaluating developmental pathways toward and away from NSSI in the aftermath of maltreatment (see Yates, 2004, for a discussion). The remainder of this chapter uses a developmental psychopathology framework to explicate three pathways toward NSSI in the aftermath of childhood maltreatment through representations of self and others, regulation of affective experience, physiological reactivity, or a combination of these.

#### **An Organizational View of Development and Psychopathology**

A central feature of a developmental psychopathology framework is a recognition that development proceeds through successive cycles of differentiation and hierarchical integration within and across the behavioral and biological systems of the individual (Werner & Kaplan, 1964). Within this

organizational model of development, adaptation reflects the quality of integration within and across systems as it influences the individual's capacity to negotiate salient developmental issues. Whereas positive adaptation promotes the flexible and effective negotiation of developmental issues, maladaptation (i.e., psychopathology) occurs when a developmental deviation from normal patterns of adaptation constrains or compromises their negotiation (Sroufe & Rutter, 1984). It is important to note that the relations among successive adaptations follow probabilistic rather than deterministic pathways, such that there is a tendency for development to stay the same, but there is always a potential for change. Moreover, as a product of dynamic transactions across multiple systems, developmental pathways evidence structural and meaningful heterogeneity toward and away from disorder. However, early experience lies at the root of all pathways as the foundation on which subsequent adaptations are formed (Gottlieb & Willoughby, 2006; Sroufe, Egeland, & Kreutzer, 1990).

Developmental pathways take their prototypic patterning from early exchanges in the caregiving milieu. Recurrent patterns of exchange in the caregiving milieu guide processes of differentiation and integration across cognitive, emotional, social, and neurobiological systems, such that the dyadic organization of the infant-caregiver relationship (i.e., attachment) gives rise to self-organization (Sroufe, 1995; Stern, 1985). A secure attachment organization develops in the context of a sensitive and responsive caregiving environment from which the child can actively engage and explore the world and to which she or he can turn when frightened, threatened, or fatigued (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969/1982). In the context of insensitive care, however, children adopt nonoptimal balances between exploration and proximity-seeking behaviors, tending to favor exploration in the context of a rejecting caregiver (i.e., avoidant) and proximity seeking in the context of an inconsistent caregiver (i.e., resistant). In both patterns of insecure attachment, the child develops a strategy that allows her or him to self-regulate and maintain a functional relationship with the caregiver despite her or his limitations. Yet insecure strategies are costly because either the child is not able to engage in behaviors that will elicit comfort (i.e., avoidant), or the child's need for comfort cannot be gratified (i.e., resistant; Sroufe, 1990). Nevertheless, insecure patterns of attachment are coherent and organized, although somewhat less effective, strategies to regulate proximity to the caregiver under stress.

The maintenance of an organized attachment strategy, whether secure or insecure, may not be possible in cases in which the parent has repeatedly operated as a source of alarm. In the face of a frightening caregiver, the child is confronted with "the simultaneous needs to approach, and take flight from, the parent" (Hesse & Main, 2000, p. 1118). The child who encounters repeated situations of "fright without solution" in the caregiving milieu cannot develop

an organized strategy for satisfying her or his attachment needs. When faced with attachment needs, these children exhibit an array of odd, fearful, disjointed, or contradictory behaviors that reflect a collapse in attentional and behavioral strategies for coping with distress and suggest a fundamental disorganization of the attachment system (Hesse & Main, 2000; Main & Solomon, 1990). As a profound disturbance of the caregiving milieu, maltreatment is likely to have enduring and negative ramifications for attachment and the developing self (Carlson, Yates, & Sroufe, in press; Harter, 1999). Relative to their nonmaltreated peers, maltreated children are more likely to be insecurely attached, evidencing particularly high rates of disorganized attachment (Cicchetti & Barnett, 1991; Egeland & Sroufe, 1981; van Ijzendoorn, Scheunel, & Bakermans-Kranenburg, 1999).

Despite suggestions that a lack of secure attachments may contribute to NSSI (Farber, 2000; van der Kolk et al., 1991; Zlotnick, Mattia, & Zimmerman, 1999), research has yet to examine relations between infant attachment quality and NSSI. A prospective analysis of the relation between attachment quality and NSSI revealed a modest relation between insecure attachment organization in infancy and self-injurious outcomes in young adulthood. However, disorganized attachment was significantly overrepresented in the developmental histories of individuals who self-injure, with a history of disorganization increasing the odds of engaging in NSSI more than threefold (Yates, 2005). Not surprisingly, participants with a history of disorganized attachment were more likely to have experienced maltreatment. These data point to the salience of the caregiving milieu, and of deviations in that milieu, for understanding NSSI.

In the context of the caregiving milieu, the child internalizes a sense of the caregiving other as reliable or unreliable, as protective or threatening, and a complementary self-representation as deserving or undeserving of care, as effective or inept at eliciting adequate nurturance, support, and protection (Bowlby, 1969/1982; Sroufe, 1990). At the representational level, these exchanges form the basis of working models of the self, of others, and of the self-with-others that guide future behavior and shape subsequent experiences in the interpersonal milieu (Carlson, Sroufe, & Egeland, 2004). Regulatory processes are similarly influenced by early relational patterns that lay the foundation for cognitive and affective processing, the integration of thinking with feeling, and the capacity to share self and feeling states with important others in the psychosocial milieu (Fonagy, Gergely, Jurist, & Target, 2002; Sroufe, 1995). Finally, early exchanges in the caregiving environment directly regulate the child's psychobiological reactivity by entraining excitatory and inhibitory neural processes that form the foundation for basic patterns of reactivity and resources for arousal modulation and state integration (Gunnar, Brodersen, Nachmias, Buss, & Rigatuso, 1996; Hofer, 1994; Schore, 1994; Spangler & Grossmann, 1999). Acting in isolation from, or interacting with,



attachment history, child maltreatment may undermine development in one or more of these domains, thereby initiating representational, regulatory, or reactive pathways toward self-injurious outcomes (see Table 7.1).

### The Representational Path: Self and Other in Self-Injury

A representational pathway toward NSSI holds that maltreatment causes or exacerbates negative representations of the self, of others, and of the self in relation to others that, in turn, contribute to self-injurious outcomes. As described previously, exchanges in the early caregiving relationship lay the foundation for children's core beliefs about self-worth and self-efficacy, expectations of others' responsiveness and care, and general schemas of relationships as safe and nurturing or dangerous and hurtful. Theoretical and empirical evidence converges to suggest that maltreatment contributes to a hostile and critical view of the self as defective, unlovable, or loathsome (Fischer & Ayoub, 1994; Toth, Cicchetti, Macfie, & Emde, 1997). In the context of maltreatment, the child faces a conflict between internalizing the blame for the abuse, thereby yielding a representation of the self as bad, or externalizing the blame for the abuse, thereby yielding a representation of others as unsafe and of the self as unworthy of care (Fonagy et al., 2002; Murthi, Servaty-Seib, & Elliott, 2006). In this way, negative self-representations may be compounded by similar distortions in

TABLE 7.1  
Possible Pathways Underlying Observed Associations  
Between Child Maltreatment and Nonsuicidal Self-Injury

Developmental pathway	Core systems	Role of body
Representational	Representations of self as defective Representations of others as malevolent Representations of relationships as dangerous	Site for punishment and/or soothing in lieu of relationships
Regulatory	Thwarted integration of affect and cognition Reduced symbolization of affect through language Decreased capacity to reflect on feeling states of self and others	Medium for symbolizing affect, particularly in an impulsive way given the reduction of cognitive input
Reactive	Neurophysiological dysregulation in biochemical and neuroendocrine processes underlying stress reactivity and regulation	Tool to alter biological reactivity and arousal

representations of others such that, in anticipation of unavailable, critical, or ineffective soothing agents during times of distress, the maltreated child may behave in ways that preclude potentially restorative relational experiences (e.g., withdrawal, wariness, manipulation, aggression; Crittenden, 1990). Through representational processes, what was once external to the child becomes internalized and operational in actively shaping subsequent development.

Negative representational processes may eventuate in self-injurious outcomes as the individual turns to the body for self-punishment or absolution in the face of perceived infractions or as a tool for self-soothing and definition in the absence of positive relational resources. Evidence evaluating representational pathways in NSSI is scarce. Several studies have documented lower levels of self-esteem and self-efficacy among both maltreated youth (Egeland, Sroufe, & Erikson, 1983; Schneider-Rosen & Cicchetti, 1991; Toth et al., 1997) and persons who self-injure (Brown, Comtois, & Linehan, 2002; Haines & Williams, 1997; Low et al., 2000; Suyemoto, 1998). Similarly, both maltreated youth (Toth et al., 1997) and persons who self-injure often articulate a pervasive sense of distrust in their view of others (Levenkron, 1998; Simeon & Favazza, 2001). In a recent study of high school students, youth-reported feelings of alienation and mistrust toward their parents significantly explained the observed relation between parental criticism and self-injury (Yates, Tracy, & Luthar, 2008). However, the partial mediating effect of representational processes in this study points to the multidetermined nature of NSSI and the likelihood that multiple pathways and processes contribute to self-injurious outcomes.

### **The Regulatory Path: Integrative, Symbolic, and Reflective Capacities**

Prominent theories of self and emotional development emphasize the importance of early caregiving for the child's emerging capacities for cognitive-affective integration, symbolization, reflection, and, ultimately, regulation (Bowlby, 1969/1982; Cicchetti & Beeghly, 1987a; Fonagy et al., 2002; Harter, 1999; Schore, 1994; Sroufe, 1995; Stern, 1985). The caregiver's sensitive and contained or containing response to the child's affective expression teaches her or him that emotion will not overwhelm the parent (and by extension the child) and that affect can be shareable, knowable, and tolerable (Bion, 1962; Sroufe, 1995). Over time and in the context of an empathic caregiving relationship, affects become increasingly differentiated, complex, and symbolized (Krystal, 1988; Sroufe, 1995). In the case of maltreatment, however, a deviation occurs such that increasingly sophisticated defensive processing of affect develops rather than the adaptive processing that typifies normative development. In this view, NSSI may constitute an action and bodily based emotion regulation strategy in the absence of adaptive integrative, symbolic, and reflective capacities.

Children with a history of sensitive care and a secure organization of attachment behavior have access to both affectively and cognitively generated information. These children possess a sense of safety and flexibility that enables them to know what they feel and to feel what they know. In contrast, children with a history of insensitive caregiving may learn to depend on cognitively generated information to the relative exclusion of affect (i.e., avoidant) or to operate on the basis of unmoderated affect that is not tempered or informed by cognition (i.e., resistant; Crittenden, 1994). In the case of aversive care (i.e., maltreatment), the disruption in this early organization (i.e., disorganization) reflects more than an imbalance between cognition and affect; it is a splitting such that affect may be separated from cognition. In these instances, a dissociation between thinking and feeling may arise. Thus, maltreatment, especially when it occurs in the context of an insecure or disorganized caregiving organization, may contribute to an enduring pattern of dissociative coping (Carlson et al., in press; Fischer & Ayoub, 1994).

Coupled with a disintegration between affect and cognition, maltreatment may subvert the child's normative progression toward the use of symbols, particularly language, to share emotional experiences with others. In this way, maltreatment may leave affect to be symbolized through the body rather than language and relationships (Farber, 2000; Miliora, 1998; van der Kolk et al., 1996). The typically developing child acquires increasing capacities for symbolization and reflection through fantasy, play, and language (Cicchetti & Beeghly, 1987a; Sroufe, 1990; Stern, 1985). Over time, language serves to contain affect, facilitating its transition from the body to the mind to the intersubjective space of relationships with others (Krystal, 1997). Mounting evidence suggests that insensitive caregiving and maltreatment undermine developing symbolic capacities (Allessandri, 1991), particularly the ability to process emotional experiences through language. Maltreated toddlers engage in lower levels of verbal dialogue and use less descriptive speech than their nonmaltreated peers (Coster, Gersten, Beeghly, & Cicchetti, 1989), particularly with respect to feeling states, such as hunger, anger, or fatigue (Cicchetti & Beeghly, 1987b).

Failure to organize experience linguistically leaves it to be symbolized on a somatosensory level through sensation, behavior, and somatization. Moreover, maltreated youth may remain psychologically and physiologically hyper-responsive to arousal cues because they move from perception (i.e., arousal) to action (i.e., fight or flight) without intervening moderation by cognition, symbolization, and, ultimately, reflection (Crittenden, 1994; Fonagy et al., 2002; van der Kolk et al., 1996). It is not surprising, then, that deficits or distortions in reflective functioning and affective processing have been connected with violence and aggression broadly (Fonagy & Target, 1995) and with NSSI in particular (Paivio & McCulloch, 2004; van der Kolk et al., 1996; Zlotnick et al., 1996).

A regulatory perspective on NSSI holds that children must resolve the challenge of affective processing through alternative methods when maltreatment has stymied or distorted the development of normative integrative, symbolic, and reflective capacities. Compensatory strategies may entail separating what one feels from what one thinks (i.e., dissociation) or processing affect through the body somatization rather than in relationships. In this view, dissociation and somatization may reflect deficits in affective processing and distortions in the developing self that follow from maltreatment and contribute to NSSI. In support of this hypothesis, evidence suggests that dissociation and somatization follow from antecedent risks (e.g., disorganized attachment, child maltreatment) that preclude normative affective processing (Atlas, Wolfson, & Lipschitz, 1995). Furthermore, both dissociation and somatization have been connected to deficits in affective processing (e.g., alexithymia; Berenbaum & James, 1994; Krystal, 1988), to one another (Saxe et al., 1994; van der Kolk et al., 1996), and to NSSI (van der Kolk et al., 1996; Yates, Carlson, & Egeland, 2008).

### **The Reactive Path: Trauma, Neurobiology, and Arousal Modulation**

In addition to representational or regulatory processes, adverse experience in the caregiving milieu may alter core systems underlying physiological reactivity, thereby activating or changing biological systems that may contribute to self-injurious outcomes. Growing evidence indicates that maltreatment influences the structure, organization, and function of neurobiological stress response systems (De Bellis, 2001; Gunnar, 2000; Perry & Pollard, 1998; Yates, 2007). At the same time, physiological processes underlying NSSI have become a central focus of examination (Schroeder, Oster-Granite, & Thompson, 2002). Although NSSI is multiply determined at both behavioral and physiological levels, the current literature points to the influence of maltreatment on physiological reactivity as a potentially salient process underlying self-injurious pathways.

As discussed previously, safe and predictable exchanges in early caregiving lay the groundwork for patterns and processes of biological reactivity (Gunnar et al., 1996; Hofer, 1994; Schore, 1994; Spangler & Grossmann, 1999). Among these systems, the limbic-hypothalamic-pituitary-adrenal (L-HPA) axis, which regulates long-term stress responses, and the norepinephrine-sympathetic-adrenal-medullary (NE-SAM) system, which regulates acute stress responses, evidence significant alterations in the wake of child maltreatment (Cicchetti, 2003; Gunnar, 2000; Yates, 2007). Under normal circumstances, reciprocal connections within and between the L-HPA and NE-SAM systems serve to modulate behavioral, emotional, cognitive, metabolic, immunological, autonomic, and endocrine responses to stressful stimuli (C. A. Nelson & Carver, 1998; Vasquez, 1998). However, maltreatment

may induce alterations in these systems that contribute to indiscriminate flight–fight reactions, depression, anxiety, suicidal behavior, and other symptoms of pathology (see Cicchetti & Walker, 2003, for a review). With respect to NSSI, preliminary evidence suggests that trauma-induced alterations in the L-HPA, NE-SAM, or both systems may contribute to NSSI (Novak, 2003; Sachsse, von der Hyde, & Huether, 2002). Moreover, interactions between these systems and other biological processes known to underlie NSSI (e.g., opioid and serotonergic functioning; see van der Kolk, 1987) strongly suggest that maltreatment may instantiate a reactive path toward NSSI, in part through alterations in L-HPA or NE-SAM stress responses.

The endogenous opioid system (EOS) has received considerable attention from researchers interested in NSSI (see Symons, 2002, for a review; see also chap. 6, this volume), although empirical studies of its role in NSSI have yielded mixed results (Russ et al., 1992; Russ, Roth, Kakuma, Harrison, & Hull, 1994). Given its integral role in the formation and maintenance of primary attachment relationships, the EOS is a likely target of maltreatment-induced alterations in neurobiological reactivity (E. E. Nelson & Panksepp, 1998; Panksepp, Herman, & Conner, 1978; van der Kolk, 1987). Yet the EOS has been largely ignored in the extant maltreatment literature. Alterations in EOS functioning as a consequence of maltreatment may contribute to NSSI by alleviating feelings of isolation and alienation (Panksepp et al., 1978), providing positive physiological reinforcement for self-injury (Grossman & Siever, 2001) or inducing states (e.g., dissociation) that, in turn, precipitate NSSI (Saxe, Chawla, & van der Kolk, 2002).

In addition to core stress response systems, recent findings from genetically informed studies suggest that gene–environment interactions influence individual trajectories toward and away from specific pathological outcomes, including antisocial behavior and violence (Caspi et al., 2002; Jaffee et al., 2005) and depression and suicidality (Caspi et al., 2003; Gibb, McGeary, Beevers, & Miller, 2006). For example, genetic variants of serotonergic genes have been connected to low levels of serotonin and impulsivity, depressed mood, and self-harming behavior (Meyer et al., 2003; Pooley, Houston, Hawton, & Harrison, 2003). Serotonergic genes have also been implicated in the developmental sequelae of child maltreatment (Kaufman et al., 2004). Although interactions between serotonergic genes and maltreating environments may contribute to self-injurious outcomes, research suggests that the relation between serotonergic function and NSSI is complex, likely involves other systems (e.g., dopaminergic, noradrenergic), and requires further empirical evaluation (Rujescu, Thalmeier, Moller, Bronisch, & Giegling, 2007).

As described in chapter 6, efforts to identify pathophysiological processes underlying pathways between maltreatment and NSSI join a new wave of research that aims to elucidate neurodevelopmental mechanisms in the pathophysiology of mental disorders (see Cicchetti & Walker, 2003, for a review),

including NSSI (Grossman & Siever, 2001; Schroeder et al., 2002). Yet the processes by which trauma-induced alterations in neurobiological reactivity contribute to NSSI remain to be determined. In all likelihood, reactive processes contribute to NSSI directly at a physiological level, as well as indirectly by increasing subjective states of distress and arousal that may, in turn, magnify representational or regulatory pathways toward NSSI.

## FUTURE DIRECTIONS

In the context of the caregiving milieu, prototypic representations of self, of others, and of self-with-others are laid down; core capacities for the integration, symbolization, and reflection of cognitive and affective states develop to enable self-regulation; and basic physiological reactivity is entrained. In isolation or in combination, maltreatment-induced alterations in representational, regulatory, and reactive processes shape pathways toward NSSI. These pathways are important foci for future research that aims to clarify the relation between child maltreatment and NSSI. With its emphasis on multiple levels of analysis, patterns of continuity and discontinuity, and transactional exchanges between the individual and her or his environment over time, the framework of developmental psychopathology will inform innovative research initiatives aimed at furthering our understanding of child maltreatment, NSSI, and the relations between them.

### **A Multidimensional Perspective**

Specific types of maltreatment (e.g., sexual, physical, emotional) evidence different relations with pathological outcomes (Briere & Elliott, 2003; Mullen et al., 1996; Trickett & McBride-Chang, 1995). Moreover, a variety of factors within maltreatment subtypes (e.g., sexual abuse) moderate pathways toward such outcomes (Trickett et al., 2001). Thus, specific types of maltreatment likely contribute to NSSI in qualitatively or quantitatively different ways. For example, child sexual abuse appears especially prominent in etiological paths toward NSSI. One hypothesis for why NSSI is associated with sexual abuse is that this form of violation tends to elicit dissociative defenses and posttraumatic symptoms that, in turn, motivate or enable tension-reducing behaviors such as self-injury (Briere & Gil, 1998). Furthermore, sexual abuse localizes trauma squarely in the domain of the body, which later serves as the target of self-harm. Future research should examine whether (a) different kinds of maltreatment contribute to NSSI through different pathways (e.g., see Gibb et al., 2006), (b) whether some kinds of maltreatment contribute to NSSI whereas others relate to other patholog-

ical outcomes (e.g., see Dubo et al., 1997), and (c) whether specific forms of maltreatment contribute to different types of NSSI (Yates, Carlson, & Egeland, 2008).

Researchers typically conceptualize NSSI as a homogeneous phenomenon that is either present or absent. However, research points to meaningful variation within the broad domain of NSSI as a function of its severity, frequency, age of onset, and motivations for injury in both clinical (Brodsky, Clotre, & Dulit, 1995; Zlotnick et al., 1999) and community settings (Cyr, McDuff, Wright, Theriault, & Cinq-Mars, 2005; Whitlock, Eckenrode, & Silverman, 2006). As discussed previously, recent findings suggest that child sexual abuse contributes to recurrent NSSI, whereas child physical abuse may be more salient for intermittent NSSI. Moreover, recurrent and intermittent NSSI appeared to be motivated by different factors (Yates, Carlson, & Egeland, 2008). Similarly, a recent study by Nock and Prinstein (2005) revealed predictable variation in psychiatric correlates of NSSI as a function of the motivational processes underlying it. Thus, a profitable direction for future research lies in studies that examine whether and how different forms of maltreatment or specific features of the maltreating environment explain variation in the form, function, or frequency of NSSI.

### Sensitivity and Specificity

Given evidence that both maltreatment and NSSI are more heterogeneous than originally thought, pathways between maltreatment and NSSI may be similarly variable. Beyond normative developmental patterns, developmental psychopathology strives to identify and explain individual differences in developmental outcomes and pathways. Efforts to ascertain the sensitivity and specificity of maltreatment experiences leading to NSSI, as well as of the developmental pathways underlying these relations, are important for understanding the development of NSSI.

Child maltreatment is a powerful player in the etiology of NSSI, but it is neither necessary nor sufficient for self-injurious outcomes. There is a need to clarify the factors that differentiate among maltreated individuals who engage in NSSI, maltreated individuals who do not engage in NSSI, and persons who engage in NSSI but do not have a history of maltreatment. Similarly, research must examine the sensitivity and specificity of self-injurious pathways to understand how and when representational, regulatory, or reactive processes contribute to NSSI versus other forms of psychopathology. Finally, there is a need to determine whether observed relations between maltreatment and NSSI reflect a specific association or merely a broader relation between multiple risk environments and NSSI. To this end, preliminary data point to the unique contribution of child maltreatment to NSSI above and beyond a host of potential comorbid risks, including child cognitive ability,

child temperament, exposure to partner violence in the home, familial instability, economic status, and maternal life stress (Yates, Carlson, & Egeland, 2008). Moreover, relatively little work has been done to understand when and why particular developmental processes may be activated in pathways between maltreatment and self-injurious outcomes.

Along similar lines, developmental psychopathology encourages and informs investigations of factors associated with the initiation, persistence, and desistance of adaptational pathways, recognizing that there may be meaningful variation across these factors. For example, the initiating conditions for NSSI may be distinct from those that underlie its persistence over time (e.g., see Suyemoto, 1998). In one study, social contagion effects contributed to the initiation of NSSI, but other factors emerged as more salient for determining its course over time (Yates, Carlson, & Egeland, 2008). With respect to the process-level pathways discussed here, representational processes may render individuals vulnerable to peer influence as a function of a heightened desire to belong and need for external validation, whereas reactivity processes may underlie continuity over time, particularly as reactive systems become stronger with repeated injury. Clarifying issues of sensitivity and specificity is essential to inform appropriate practice.

### Translating Process to Practice

Overwhelming evidence points to robust relations between child maltreatment and NSSI. As discussed here, representational, regulatory, or reactive processes may underlie these relations to varying degrees. The application of process models to practice will increase practitioners' understanding of how best to intervene with persons who self-injure and of how best to prevent self-injurious pathways in the aftermath of maltreatment. At the representational level, efforts to foster positive representational processes and to challenge negative beliefs and expectations of self and others may prove important for treatment. Regulatory processes are central to many contemporary approaches to treatment that focus on self-reflection, distress tolerance, and affect regulation (Bateman & Fonagy, 2004; Linehan, 1993). However, resources to help child victims express their experiences through symbol (e.g., play, art) and language may be especially salient for efforts to stymie self-injurious pathways in the aftermath of maltreatment. Finally, at the level of reactivity, both pharmacotherapeutic interventions and bodily based interventions that lend coherence within and across neurobiological systems will likely prove to be effective. In sum, the extant literature suggests that NSSI is multiply determined such that successful prevention and intervention efforts must be multifaceted and flexible to permit their tailoring to the specific process or processes that are relevant for understanding, and by extension intervening with, any single self-injurious pathway.



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