Self-Injury

Matthew K. Nock

Department of Psychology, Harvard University, Cambridge, Massachusetts 02138; email: nock@wjh.harvard.edu

Annu. Rev. Clin. Psychol. 2010. 6:339–63

First published online as a Review in Advance on January 4, 2010

The *Annual Review of Clinical Psychology* is online at clinpsy.annualreviews.org

This article's doi: 10.1146/annurev.clinpsy.121208.131258

1548-5943/10/0427-0339$20.00

Key Words

self-harm, self-mutilation, self-destructive behavior, suicide

Abstract

People have engaged in self-injury—defined as direct and deliberate bodily harm in the absence of suicidal intent—for thousands of years; however, systematic research on this behavior has been lacking. Recent theoretical and empirical work on self-injury has significantly advanced the understanding of this perplexing behavior. Self-injury is most prevalent among adolescents and young adults, typically involves cutting or carving the skin, and has a consistent presentation cross-nationally. Behavioral, physiological, and self-report data suggest that the behavior serves both an intrapersonal function (i.e., decreases aversive affective/cognitive states or increases desired states) and an interpersonal function (i.e., increases social support or removes undesired social demands). There currently are no evidence-based psychological or pharmacological treatments for self-injury. This review presents an integrated theoretical model of the development and maintenance of self-injury that synthesizes prior empirical findings and proposes several testable hypotheses for future research.

Contents

INTRODUCTION

All animals are believed to be imbued with an innate drive for self-preservation. This *conatus*, or natural impulse to survive and adapt over time, has been an organizing principle for philosophers and scientists for thousands of years, figuring prominently in our understanding of evolution and in the entire range of animal and human behaviors (Dawkins 1976, Lorenz 1963, Wilson 1978). In the interest of our own survival and that of our genes, we select the healthiest mating partners we can find, make enormous sacrifices for our children, and make decisions every day aimed at keeping ourselves alive and well. However, there is a puzzling twist to this story. People often behave in ways that are inconsistent with this organizing principle and in some cases do things that are completely antithetical to it. One of the most confounding such behaviors is the performance of non-suicidal self-injury (hereafter referred to as NSSI or self-injury), which refers to the direct and deliberate destruction of one's own body tissue in the absence of lethal intent—a behavior seemingly at odds with a desire for health and longevity.

Self-injury: the direct and deliberate destruction of body tissue in the absence of suicidal intent

Self-injury has been described throughout recorded history. One of the earliest written reports of this behavior appears in the biblical story of a man possessed by a demon who was "crying out and cutting himself with stones" and subsequently was cured by Jesus via exorcism. Other descriptions of self-injury have appeared in clinical case descriptions, anthropological accounts, and in artistic and literary sources over the years (see Favazza 1996; Favazza 2009). Scientific, clinical, and societal interest in self-injury has increased significantly in recent years. For instance, in the past 10 years alone, the number of scientific papers published annually on this topic more than tripled (from 117 in 1998 to 386 in 2008; using the terms "self-injury," "self-harm," or "self-mutilation" as keywords) (ISI Web of Knowledge 2009). Understanding why people engage in self-injury is an essential scientific goal for several reasons. First, this behavior causes significant psychological and physical harm to self-injurers and often is distressing to their friends and family. Second, beyond this, understanding why people engage in direct forms of self-injury may provide the added benefit of illuminating why people do things that are harmful to themselves more broadly, such as engaging in unhealthy behaviors including smoking and abusing alcohol and drugs. This review examines what is currently known about self-injury, highlights gaps in our understanding of this behavior, presents an integrated theoretical model of self-injury that synthesizes past findings and makes several novel hypotheses, and proposes an agenda for future work on this perplexing behavior problem.

CLASSIFICATION AND DEFINITIONS

One of the greatest obstacles in the study of self-injurious behaviors is that researchers and clinicians often use vague and inconsistent terms and definitions for the different phenomena under examination. For instance, it is not uncommon to see terms such as "suicidality" or "deliberate self-harm" used to refer to different types of self-injurious thoughts and behaviors across different studies. Even if the focus is restricted to studying non-suicidal self-injury, one sees various terms across studies, including "self-mutilation," "self-harm," "deliberate self-harm," "cutting," and "parasuicide." Fortunately, over the past several years, as research on self-injurious thoughts and behaviors has increased, scientists and clinicians have begun to make more careful distinctions and to use clearer and more consistent terms and definitions for these behaviors.

At the broadest level, all behaviors that are performed intentionally and with the knowledge that they can or will result in some degree of physical or psychological injury to oneself could be conceptualized as self-injurious behaviors. Within this general class, most researchers and scholars draw a clear distinction between behaviors in which bodily injury is the intended purpose of one's behavior (i.e., directly self-injurious behaviors) and those in which it is an unintended by-product (i.e., indirectly harmful or risky behaviors).

Directly Self-Injurious Behaviors

Within the class of direct self-injurious behaviors, an important distinction is made between phenomena that are suicidal in nature, in which there is some intent to die from the behavior, and those that are non-suicidal, in which there is no intent to die (see **Figure 1**). Because determination of a person's intent during self-injury is based primarily on self-report—which is an imperfect method that is likely to include bias, inaccuracy, and ambivalence about dying—the convention used by most researchers and clinicians is to classify behaviors in which there is any evidence of any intent to die (i.e., at a "nonzero" level) as suicidal. This errs on the side of classifying ambivalent behaviors as suicidal in nature, but does so intentionally so as not to underestimate risk and likelihood of death in any case.

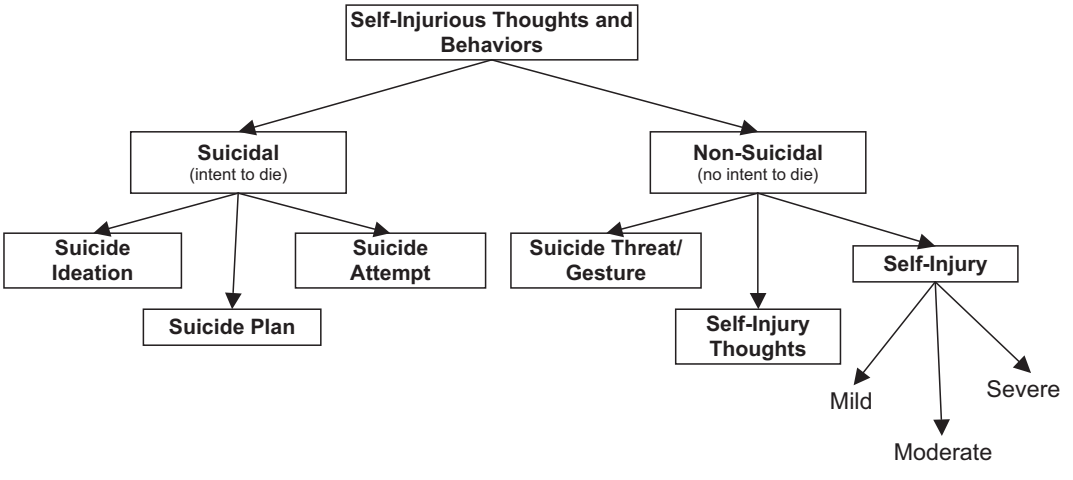

Figure 1

Classification of self-injurious thoughts and behaviors. Copyright © 2009 by the American Psychological Association. Adapted with permission. Source: Nock MK, ed. 2009a. *Understanding Nonsuicidal Self-Injury: Origins, Assessment, and Treatment*. Washington, DC: Am. Psychol. Assoc. The use of APA information does not imply endorsement by APA.

Suicide ideation: thoughts of killing oneself

Suicide plan: consideration of a specific method through which a person intends to kill oneself

Suicide attempt: engagement in potentially self-injurious behavior in which there is some intent to die from the behavior

Suicide threat or gesture: behavior in which a person leads others to believe they intend to die from a behavior when they have no intention of doing so

NSSI: non-suicidal self-injury

Suicidal phenomena can be further classified into three primary types. Suicide ideation refers to having thoughts about killing oneself; a suicide plan refers to the consideration of a specific method through which one intends to die; and a suicide attempt refers to engagement in potentially self-injurious behavior in which there is some intent to die.

Non-suicidal phenomena also can be further classified into three primary types. A suicide threat or gesture refers to behavior in which individuals lead others to believe they intend to die from their behavior when really they have no intention of doing so. The purpose of the behavior is instead to communicate distress and/or to seek help from others (Nock & Kessler 2006). NSSI refers to direct and deliberate destruction of body tissue in the absence of any observable intent to die. Self-injury thoughts refer to having thoughts of engaging in the behavior but not doing so, which itself is typically only studied as a precursor to self-injury.

There is not yet a formalized system for further classifying subtypes of self-injury; however, there is general agreement among researchers and clinicians that the behavior typically varies on a scale from mild (e.g., low frequency and severity), to moderate (e.g., more frequent and severe, perhaps requiring medical attention), to severe (e.g., high frequency, severe injury, and resulting impairment). Several recent empirical studies provide some initial evidence for such distinctions (Klonsky & Olino 2008, Whitlock et al. 2008). A distinction also is made among researchers and clinicians between self-injury as it is performed among typically developing people and self-injury (*a*) performed stereotypically among people with developmental disabilities (e.g., high-frequency head banging) or (*b*) resulting in major injury among those with psychotic disorders (e.g., single-episode castration, eye enucleation). Further detail regarding the classification of direct forms of self-injurious behaviors is provided in other papers devoted specifically to this topic (Nock & Favazza 2009, Nock et al. 2008d, Posner et al. 2007, Silverman et al. 2007). This review, and the area of scholarly work described, is focused on direct self-injury; however, it is useful to briefly discuss indirect forms of self-harm and to consider how they relate to direct self-injury.

Indirectly Harmful Behaviors

Although directly self-injurious behaviors are performed by only a small segment of the general population, we all engage in behaviors that indirectly cause us some degree of bodily or psychological harm. We may drink alcohol, eat high-fat foods, smoke tobacco, and so on. These behaviors typically are not performed with the intention of causing ourselves harm, but instead are performed because they result in pleasure, enjoyment, or sustenance, and the resulting harm is an indirect and unintended side effect. Such behaviors typically are not referred to as self-injury or self-harm, but rather as indirectly self-damaging, self-defeating, or simply unhealthy behaviors (Baumeister & Scher 1988, Twenge et al. 2002, Vazire & Funder 2006). In an earlier review of such behaviors, Baumeister & Scher (1988) distinguished between two types of self-defeating behaviors: (*a*) tradeoffs, in which some level of injury/harm is a known and acceptable consequence of a behavior that has desired benefits (e.g., drinking alcohol, smoking tobacco), and (*b*) counterproductive strategies, in which a person engages in goal-directed behavior but uses a strategy that results in injury/harm that is neither foreseen nor desired (e.g., learned helplessness, procrastination, self-handicapping) (Berglas & Jones 1978, Steel 2007, Vohs et al. 2008). Risk-taking behaviors are a third type of indirectly harmful behavior (or alternatively could be conceptualized as a type of trade-off) in which rather than performing a desired behavior in which a person accepts a high likelihood of a small amount of harm (e.g., smoking), a person engages in a pleasurable behavior in which there is a small likelihood of a large amount of harm (e.g., skydiving, bungee-jumping).

Studying the Continuum of Self-Harm Behaviors

On one hand, there is a clear distinction between direct and indirect forms of self-harm (e.g., deciding to have a cigarette after dinner is a far cry from choosing to end one's own life), and as a result, the literatures on these two different classes of behavior are largely nonoverlapping. On the other hand, these behaviors share common elements: They all represent attempts to modify one's affective/cognitive or social experience, they cause bodily harm, and they are associated with other forms of mental disorders (e.g., depressive, anxious, externalizing disorders). To date, few attempts have been made to integrate findings from these disparate literatures in order to achieve a common understanding of why people engage in self-injurious behaviors. However, the commonality of these behaviors raises the question of whether these and other potentially harmful behaviors should be considered on the same continuum. And perhaps more importantly, can research findings from these apparently diverse areas be integrated in a way that provides increased insight into why people intentionally behave in ways that are harmful to themselves (see Hayes et al. 1996, Marsh et al. 2009, Nock et al. 2010)? Throughout this review, links are made between research on direct self-injury and indirect forms of self-harm, as well as between self-injury among animals and humans, and between those with developmental disabilities and those without, with the assumption that the cross-fertilization of ideas and integration of findings across these currently disparate areas will lead to significant advances in our understanding of why people harm themselves.

ASSESSMENT

Similar to other forms of psychopathology, the assessment of self-injury involves the use of multiple measurement methods, including structured and semistructured interviews, rating scales, and performance-based tests (Hunsley & Mash 2007). The method and measurement strategy used in any given case will differ based on whether the purpose of assessment is (*a*) to determine if a person has engaged in the behavior, (*b*) to monitor the occurrence of the behavior over time, or (*c*) to understand what factors may be influencing the onset and maintenance of self-injury (see Nock et al. 2008d).

Presence of Self-Injury

As in most areas of psychopathology, the presence of self-injury is assessed primarily using a person's self-report, either by clinical interview or rating scale. Like suicidal behaviors, self-injury occurs in the context of a wide range of different Axis I and II mental disorders (Herpertz 1995, Hintikka et al. 2009, Nock et al. 2006); therefore, assessment of the presence of self-injury should occur whenever a clinical interview is conducted and not only in the context of specific mental disorders such as borderline personality disorder (of which self-injury is a criterion). A common concern is that asking about the presence of self-injury will have an iatrogenic effect by giving individuals the idea to engage in this behavior when they would not have otherwise thought to do so. However, recent research has shown that asking questions about self-injurious behaviors does not increase the likelihood of self-injurious thoughts or behaviors or even lead to increased levels of distress (Gould et al. 2005, Reynolds et al. 2006), so such concerns appear unwarranted. Nevertheless, it is recommended that the assessment of self-injurious thoughts and behaviors follows the assessment of less-sensitive constructs such as the presence of depressive and anxious symptoms in order to gradually work up to questions that may be more difficult to discuss. A number of psychometrically sound measures are available to researchers and clinicians interested in assessing the presence of self-injury, including the Suicide Attempt Self-Injury Interview (Linehan et al. 2006a), the Self-Injurious Thoughts and Behaviors Interview (Nock et al. 2007a), and the Deliberate Self-Harm Inventory (Gratz 2001).

The reliability, validity, and clinical utility of these and other measures are reviewed in detail elsewhere (Nock et al. 2008d).

These measures assess the presence of self-injury in the prior days, months, years, or lifetime and typically gather additional information such as the age of onset of the behavior, recency of the last episode, and the methods of self-injury that the person has used. Because self-injury currently is considered a harmful behavior but not a mental disorder in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM; Am. Psychiatr. Assoc. 2000), the presence and characteristics of the behavior are the only things assessed consistently across studies, as researchers do not have an agreed upon set of symptoms to assess. There has been longstanding interest in including self-injury in the DSM (Favazza 1996, Muehlenkamp 2005, Pattison & Kahan 1983), and if this occurs, it consequently will lead to modifications in the assessment of self-injury.

Monitoring Self-Injury

The vast majority of studies of self-injury have focused on assessing the presence of this behavior, and few have examined the form of this behavior over time. Therefore, methods for monitoring self-injury over days, weeks, and months are not well-developed. The few studies that have done so provide a useful starting point for future research. Monitoring of self-injury is especially relevant in the context of treatment, and some of the most useful approaches to monitoring this behavior have been developed by researchers studying treatment of self-injurious behaviors. Linehan and colleagues have reported on the use of the Suicide Attempt Self-Injury Interview to monitor the presence and frequency of self-injury at four-month intervals within the context of a treatment study (Linehan et al. 2006b) and on the use of a "diary card" to measure self-injurious thoughts and behaviors on a daily basis in clinical settings (Linehan 1993). Notably, the use of diary cards to record daily thoughts and behaviors also can be useful for monitoring these events for research purposes (Wallenstein & Nock 2007). Recent technological advances have significantly improved the capabilities for monitoring self-injury, as reported in several recent studies on the real-time monitoring of self-injury using electronic diaries (Muehlenkamp et al. 2009, Nock et al. 2009).

Conceptualizing Self-Injury

The final goal of assessment is to understand how the behavior develops and is maintained and to provide guidance regarding how the behavior can be brought under experimental control. As a small step in this direction, several assessment measures include items that obtain the self-injurer's report of why the individual engages in this behavior or inquire about the immediate antecedents and consequences of the behavior in an attempt to understand the factors that may influence its occurrence. For instance, the Suicide Attempt Self-Injury Interview (Linehan et al. 2006a), the Self-Injurious Thoughts and Behaviors Interview (Nock et al. 2007a), and the Functional Assessment of Self-Mutilation (Lloyd et al. 1997) are three commonly used interview-based measures that ask about the antecedents and consequences of self-injury in an attempt to understand the common precipitants and potential reinforcers of the behavior. Of course, self-injury is a complex and multidetermined behavior that is influenced by a wide range of factors, and ultimately measures of self-injury must expand further to include potential causal factors as they are revealed.

PREVALENCE, AGE-OF-ONSET, AND COURSE

Estimates of the prevalence of self-injury have varied broadly across studies. Studies among community samples suggest that approximately 13%–45% of adolescents (Lloyd-Richardson et al. 2007, Plener et al. 2009a, Ross & Heath 2002) and 4% of adults (Briere & Gil 1998, Klonsky et al. 2003) report having engaged in self-injury at some point in their lifetime. These rates are even higher among clinical samples

of adolescents (40%–60%) (Darche 1990, DiClemente et al. 1991) and adults (19%–25%) (Briere & Gil 1998). The wide variation in the estimated rate of self-injury is in large part due to the fact that measures of this behavior have not been included in any of the large-scale epidemiologic surveys that are used to generate prevalence estimates for mental and physical disorders (e.g., Kessler et al. 2005) and so researchers have had to rely on estimates generated from small, regional studies that vary regarding the definition of self-injury used (i.e., rates are higher when a broader definition is used), the assessment method used (i.e., rates are higher when rating scales are used rather than interview), the frequency of self-injury required to meet criteria (i.e., rates are higher when only a single episode is required), and the characteristics of the sample and recruitment methods (i.e., rates are likely higher among undergraduate psychology majors responding to an ad for a study of self-injury than in the general population). Obtaining accurate estimates of the rate of self-injury in community and clinical samples is essential for understanding the scope of this problem, allocating services and other resources, and for monitoring changes in this behavior over time.

Notwithstanding these limitations, several conclusions can be drawn from existing studies. First, whatever the actual prevalence of self-injury, this behavior occurs at an alarmingly high rate, as even the lower-bound estimates obtained from existing studies suggest that self-injury occurs more frequently than a wide range of other mental disorders (estimated lifetime prevalence), including anorexia and bulimia nervosa (<2%), panic disorder (<2%), obsessive-compulsive disorder (<3%), and borderline personality disorder (2%) (Am. Psychiatr. Assoc. 2000). Second, the age-of-onset of self-injury consistently is reported to be between 12 and 14 years (Nock 2009b). Suicidal thoughts and attempts also typically begin during adolescence, suggesting that this is a time of high risk for self-injurious thoughts and behaviors more generally (Nock et al. 2008a,b). Third, rates are consistently higher among adolescents than among adults. The fact that this is true for lifetime rates as well suggests that either (*a*) rates have increased in recent years, (*b*) people are less likely to report self-injury as they get older due to forgetting or reporting bias, or (*c*) both of these factors influence the reporting of self-injury. Anecdotally, clinicians, teachers, and other health professionals report that self-injury appears to have increased dramatically in recent years. Empirically, surveillance systems that maintain information on the number of hospital presentations for cases of nonlethal self-injury (i.e., both suicidal and non-suicidal) show an increasing trend in these behaviors over the past 10 to 20 years (Cent. Disease Control 2008, Hawton et al. 2003, Nock et al. 2008b). However, no longitudinal data are currently available on prevalence rates of non-suicidal self-injury in particular, so the trends and course of this form of self-injury remain unknown.

PHENOMENOLOGY

Understanding Unobserved Behavior

The symptoms of many mental disorders, such as schizophrenia, bipolar disorder, and major depressive disorder, are persistent when the disorder is in the acute phase—typically lasting weeks, months, or years at a time—and so the nature and characteristics of these disorders can be studied fairly easily. However, disorders or clinical behavior problems characterized by the repeated performance of harmful acts, such as alcohol and substance use, eating disorders, impulse-control disorders (e.g., pyromania, compulsive gambling, intermittent explosive disorder), and self-injury, are much more difficult to study because these behaviors are episodic in nature and typically are performed in private, outside the view of scientists and clinicians. Moreover, it is unethical to elicit or even observe these behaviors in the laboratory, as doing so would mean causing or allowing people to harm themselves, which violates the fundamental purpose of clinical research. As a result, scholars, scientists, and clinicians have

EMA: ecological momentary assessment

been left to formulate theories about the occurrence of a behavior that they have rarely (if ever) observed empirically. This has been done by asking people to provide their retrospective, aggregate self-report of episodes of self-injury. This approach has provided useful information but is limited by a wide range of reporting errors and biases. In order to address this limitation, researchers have begun using ecological momentary assessment (EMA; Shiffman et al. 2008) methods to study self-injury as it occurs in real-time outside the research laboratory (Muehlenkamp et al. 2009, Nock et al. 2009). Such approaches can yield previously unavailable data about the characteristics, precipitants, and consequences of this confounding behavior, which added to existing retrospective self-report data can provide a more complete picture of how, when, and why people do things to hurt themselves.

Characteristics of Self-Injury

The most commonly used method of self-injury described across virtually all studies is cutting or carving oneself with a sharp implement such as a knife or razor, with most self-injury occurring on the arms, legs, and stomach (Favazza 1996, Klonsky & Muehlenkamp 2007, Nock & Prinstein 2004, Whitlock et al. 2008). Most people report using multiple methods of self-injury, and other common methods include scratching or scraping the skin until it bleeds, burning the skin, and inserting objects under the skin (e.g., safety pins). In most instances, this last behavior involves inserting and removing objects from under the surface of the skin; however, in some cases such objects are left there and ultimately may be removed via surgical intervention (Shiels et al. 2009). Other methods less frequently reported include hitting oneself, biting oneself, picking at wounds, and pulling out one's hair. However, some of these behaviors are more normative in the general population (e.g., biting one's lip, picking at a wound) and so their inclusion in some studies could help to explain the surprisingly high prevalence estimates obtained in some studies.

Some of the characteristics of self-injury, such as the frequency and severity of the behavior, vary depending on the population being studied. For instance, studies using community or school-based samples of adolescents and adults report that most people who engage in self-injury do so only a few times (e.g., <10 lifetime episodes) (Whitlock et al. 2008), whereas studies using inpatient psychiatric samples report that the majority of self-injurers have engaged in the behavior much more frequently (e.g., average of >50 episodes in the past year) (Nock & Prinstein 2004). In a recent EMA study among self-injurious adolescents from the community recruited to participate in a study of this behavior, participants reported having thoughts of engaging in self-injury approximately five times per week and engaged in the behavior one to two times per week (Nock et al. 2009). This study also revealed that when present, thoughts of self-injury typically ($\sim$85% of the time) last less than one hour. The severity of physical injury also varies across samples, but is more difficult to quantify given that most studies rely on self-report of the extent of one's injuries (e.g., rated on a 0–4 scale or described qualitatively). Nevertheless, even among community or school-based samples, many self-injurers report moderate to severe tissue damage as a result of their behavior (Nock et al. 2007a, Whitlock et al. 2008).

Thoughts of engaging in self-injury typically occur when the person is alone and experiencing negative thoughts or feelings (e.g., having a bad memory, feeling anger, self-hatred, or numbness) in response to a stressful event (Nock et al. 2009). The presence of negative thoughts and feelings immediately prior to engaging in self-injury has been reported consistently across studies and supports the widely held belief that self-injury is performed in most cases as a means of self-soothing or of help-seeking (i.e., with the end goal of enlisting others to help one cope with negative thoughts or feelings) (Klonsky 2009, Muehlenkamp et al. 2009, Nock et al. 2009). Although people who engage in self-injury are more likely

than noninjurers to have drug and alcohol use disorders (Herpertz 1995, Nock et al. 2006), those who engage in self-injury report using drugs or alcohol during less than five percent of self-injurious thoughts, suggesting that self-injurious thoughts and behavior typically occur during periods of sobriety (Nock et al. 2009). Interestingly, when self-injurious thoughts occur, adolescents report simultaneously having thoughts of using drugs or alcohol and of engaging in bingeing and purging approximately 15%–35% of the time (Nock et al. 2009), suggesting that these behaviors may represent different forms of behavior that serve the same function.

The most obvious negative consequence of self-injury is the physical harm involved; however, somewhat paradoxically, most self-injurers report feeling little or no pain during episodes of this behavior (Favazza 1996, Nock & Prinstein 2004). This is surprising because cutting, burning, or otherwise injuring one's own body would seem to be a very painful event. However, this decreased pain sensitivity has been confirmed in multiple behavioral studies in which relative to noninjuring controls, those with a history of self-injury show less pain sensitivity and higher thresholds to various types of pain (e.g., pressure, thermal) (Bohus et al. 2000, Kemperman et al. 1997, Russ et al. 1999). Potential explanations for this decreased pain sensitivity are that it results from habituation to physical pain, the release of endorphins during self-injury, or the belief that one deserves to be injured (Comer & Laird 1975, Goldberg & Sakinofsky 1988, Nock et al. 2006); however, the actual mechanism is not known. Regardless of why it occurs, the absence of painful consequences for engaging in self-injury makes treating this behavior even more difficult. Self-injurers do report several negative consequences of this behavior, the most prominent being feelings of anger, guilt, and shame about having engaged in this behavior (Klonsky 2009). Theoretical models of self-injury propose that despite these negative consequences, this behavior is reinforcing in several different ways, and that when the rewards of this behavior outweigh the negative consequences, the behavior is maintained.

AN INTEGRATED THEORETICAL MODEL OF SELF-INJURY

Scholars, scientists, and clinicians have struggled for centuries with the question of why people do things to intentionally hurt themselves. A wide array of theoretical models has been advanced over the years proposing that self-injury is performed to demonstrate control over urges about sex or death (Cross 1993, Friedman et al. 1972), to define the boundary between self and other (Simpson & Porter 1981, Suyemoto 1998), to end dissociative episodes (Herpertz 1995, Miller & Bashkin 1974), or to protect others from one's own anger or rage (Simpson & Porter 1981, Suyemoto 1998). In addition, clinical and colloquial explanations often describe the influence of low self-esteem or the desire to manipulate others. Unfortunately, most of these theoretical accounts lack any empirical support. On the other hand, most empirical studies of self-injury that have attempted to identify correlates and risk factors for this behavior by comparing samples of self-injurers with matched noninjurers have been fairly atheoretical to date. This work has yielded a long list of factors that are associated with self-injury; however, it has been unclear how or why they may lead to self-injury either alone or in concert with each other. For instance, a diverse set of factors including a history of childhood abuse, the presence of a mental disorder, poor verbal skills, and an identification with Goth subculture are associated with the presence of self-injury (Klonsky & Moyer 2008, Nock 2008, Nock et al. 2006, Young et al. 2006); yet, it has not been clear how or why this particular set of factors leads to self-injurious behavior. This section describes a theoretical model that integrates these seemingly diverse findings and describes how they may lead to the development and maintenance of self-injury. In describing this model, I review recent empirical findings that support different components of the model and outline several

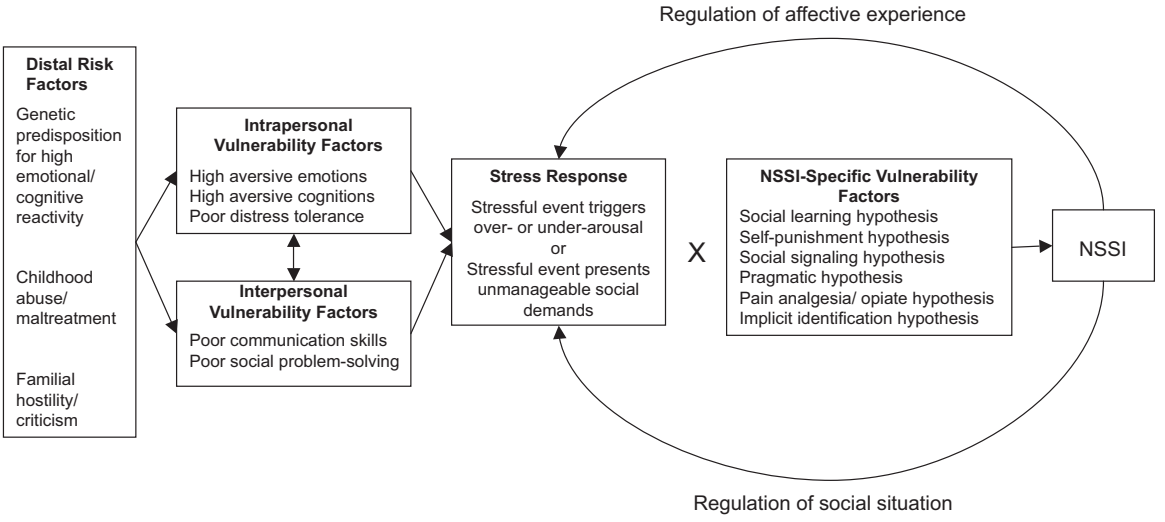

Figure 2

Integrated theoretical model of the development and maintenance of self-injury. Copyright © 2009 by Wiley-Blackwell Publishing. Reproduced with permission. Source: Nock MK. 2009b. Why do people hurt themselves? New insights into the nature and function of self-injury. *Curr. Dir. Psychol. Sci.* 18:78–83

as yet untested hypotheses suggested by this model.

The proposed theoretical model makes three major propositions (see **Figure 2**). First, self-injury is repeatedly performed because it functions as an immediately effective method of regulating one's affective/cognitive experience and/or influencing one's social environment in a desired way. Second, the risk of self-injury is increased by factors that create a predisposition to have problems regulating one's affective/cognitive state or influencing one's social environment in general (e.g., physiological hyperarousal in response to stressful events, poor verbal and social skills). These general risk factors also increase the likelihood of other maladaptive behaviors performed for the same function (e.g., alcohol use, drug use, eating disorders), which is why these disorders typically co-occur with self-injury. Third, the risk of self-injury in particular is increased by several self-injury-specific factors that lead a person to choose this behavior, rather than other maladaptive behaviors, to serve the aforementioned functions (e.g., social modeling, desire for self-punishment). This model has been described previously (Nock 2009b) and is expanded upon in greater detail here.

Functions of Self-Injury

A functional approach proposes that behaviors are caused by the events that immediately precede and follow them. This perspective, which is rooted in the tradition of behavioral psychology, has generated major advances in the understanding, assessment, and treatment of a wide range of mental disorder and clinical behavior problems. Indeed, some of the best understood and most effectively treated forms of psychopathology are those for which a functional approach has served as the guiding model, including anxiety disorders (Barlow 2002), depressive disorders (Dimidjian et al. 2006, Martell et al. 2001), child conduct problems (Kazdin 2001, 2005), and substance use disorders (Dutra et al. 2008, Hayes et al. 1996). This use of the term "function" differs somewhat from the colloquial use of the term, which typically refers more generally to the alleged purpose of a behavior without regard for the antecedent and

consequent events that may have influenced the behavior.

From a functional perspective, self-injury is proposed to be maintained via four possible reinforcement processes. These processes differ according to whether the reinforcement is positive or negative, and whether the consequent events are intrapersonal or interpersonal. As such, self-injury may be maintained by intrapersonal negative reinforcement, in which the behavior is followed by an immediate decrease or cessation of aversive thoughts or feelings (e.g., tension relief, decrease in feelings of anger). Self-injury also may be maintained by intrapersonal positive reinforcement, in which the behavior is followed by the occurrence or increase in desired thoughts or feelings (e.g., self-stimulation, feeling satisfied from having "punished" oneself). In contrast, self-injury can be maintained by interpersonal positive reinforcement, in which the behavior is followed by the occurrence or increase in a desired social event (e.g., attention, support). Finally, self-injury may be maintained by interpersonal negative reinforcement, in which the behavior is followed by a decrease or cessation of some social event (e.g., peers stop bullying, parents stop fighting).

This four-function model of self-injury can help to organize and understand descriptions of the behavior, and it has been supported by self-report, behavioral, and physiological data collected across a wide range of studies, samples, and contexts. For decades, clinical accounts of self-injury have described the tension-releasing properties of this behavior and sometimes describe the use of self-injury as a means of signaling to others that one is in need of help or support (Favazza 1989, 1996; Pattison & Kahan 1983; Strong 1998; Walsh & Rosen 1988). More recently, empirical studies have more systematically examined the reported functions of self-injury using structured interviews and rating scales, and such studies have shown consistently that the motives reported for engaging in self-injury fit closely with the four-function model outlined above (e.g., in confirmatory factor analysis) (Brown et al. 2002, Lloyd-Richardson et al. 2007, Nock & Prinstein 2004). Moreover, endorsement of these four functions is associated in expected ways with clinical correlates of this behavior. For instance, scores on measures of negative thoughts are uniquely associated with self-injury to escape negative thoughts, whereas scores on measures of social problems are uniquely associated with the interpersonal functions of self-injury (Nock & Prinstein 2005). However, because people are not able to accurately report on all of the processes influencing their behavior (Nisbett & Wilson 1977, Wilson 2009), it is important to consider self-report data only a starting point for understanding why people engage in self-injury.

The case for this functional model would be significantly strengthened with the existence of experimental data showing that the presentation and removal of stimuli believed to reinforce self-injury could decrease and increase this behavior in the expected direction. Experimental studies conducted among people with developmental disabilities who engage in high-frequency (stereotypic) self-injury show exactly this pattern (Iwata et al. 1994). Although self-injury among people with developmental disabilities often is considered to be a completely different phenomenon than that observed among normally developing people due to differences in form (e.g., high-frequency head-banging in front of others versus low-frequency cutting in private), the functions of the behavior appear to be quite similar across these groups. A notable distinction, though, is that intrapersonal functions (especially intrapersonal negative reinforcement) are most frequently reported in normally developing populations, whereas social functions appear to be most important in those with developmental disabilities. There also is some consistency across the apparent functions of self-injury in humans and that seen in nonhuman primates. Specifically, in both groups self-injury is associated with a decrease in elevated physiological arousal (i.e., return to baseline) following the experience of a stressor (Dellinger-Ness & Handler 2006,

Novak 2003). Other similarities between human and nonhuman primate self-injury, such as typical onset during adolescence, increased prevalence following childhood adversity and proximal stressors, and responsiveness to social support and medication effects, underscore the importance of synthesizing research on self-injury from these different areas (Dellinger-Ness & Handler 2006, Novak 2003).

Recent observational studies have provided additional evidence of the proposed reinforcement processes. Laboratory-based studies have demonstrated that self-injurers show decreased physiological arousal following imaginal exposure to self-injury (i.e., listening to prerecorded scripts of self-injury episodes), supporting the intrapersonal negative reinforcement function (Haines et al. 1995, Welch et al. 2008). Community-based self-report studies have revealed improvements in family relationships following adolescents' self-injury, supporting the interpersonal positive reinforcement function (Hilt et al. 2008b). To date, less focus has been placed on examining the intrapersonal positive or interpersonal negative reinforcement functions of self-injury, and these remain key directions for future work. Overall, prior studies have yielded substantial support for the four-function model of self-injury. However, such studies have largely ignored the question of how or why some people come to experience the aversive cognitive/affective or social antecedents that precipitate the use of self-injury.

General Risk Factors for Maladaptive Behaviors

Although an increasing amount of work has examined how the effects of self-injury may serve to reinforce the behavior, surprisingly little research has been directed at understanding how and why some people come to the point of having to cut their skin in order to cope with their affective/cognitive and social experiences. The proposed theoretical model suggests that some people possess intrapersonal and/or interpersonal vulnerability factors that limit their ability to respond to challenging and stressful events in an adaptive way and thus increase the odds of using self-injury, or some other maladaptive behavior, to regulate their affective/cognitive or social experience. In doing so, this model suggests a natural link between research on the functions of self-injury and other maladaptive behaviors (Jackson et al. 2003, Koob & Kreek 2007, Nock 2009b, Wedig & Nock 2010) with the rich literature on diathesis-stress/vulnerability-stress models of psychopathology (Hankin & Abela 2005, Kessler et al. 1985, Monroe & Simons 1991).

The vulnerabilities proposed to increase the likelihood that someone will engage in self-injury map onto the associated functions of this behavior. If people engage in self-injury primarily as a means of decreasing aversive affective/cognitive experiences, then self-injurers should possess a predisposition to respond to stressful or challenging events with affective/physiological hyperarousal and high levels of negative thoughts and should show a poor ability to tolerate such distress. Similarly, if people engage in self-injury as a means of communicating with others or solving social problems, then self-injurers should possess poor communication and problem-solving skills. Recent laboratory-based studies have revealed evidence of precisely these vulnerabilities. Relative to demographically matched controls, people with a recent history of self-injury show intrapersonal vulnerabilities characterized by higher physiological arousal in response to a frustrating task (Nock & Mendes 2008), higher self-reported arousal in response to stressful events (Nock et al. 2008c), greater efforts to suppress aversive thoughts and feelings (Najmi et al. 2007), and a poorer ability to tolerate experienced distress (Nock & Mendes 2008). They also show the hypothesized interpersonal vulnerabilities, such as poor verbal, communication, and social problem-solving skills (Hilt et al. 2008a, Nock & Mendes 2008, Photos & Nock 2006). Similar vulnerabilities have been reported among those with

other behavior disorders that can be similarly conceptualized as serving affective/cognitive and social regulation functions, such as eating (Jackson et al. 2003, Wedig & Nock 2010), drinking (Hussong 2003, Read et al. 2003), and drug use (Koob & Kreek 2007) disorders. This model proposes that these different behaviors are related to self-injury, and to each other, because they represent different forms of behavior that serve the same functions, and as such, likely share vulnerability factors (see also Hayes et al. 1996, Marsh et al. 2009).

The vulnerability factors described above are proposed to develop as a result of the presence and interaction of earlier environmental and genetic factors. Accumulating evidence from animal and human studies has linked the experience of early stressors with the development of psychopathology, and the nature of the resulting neurobiological effects (e.g., increased stress response, decreased activity in the frontal cortex) map on well to the occurrence of problems regulating affective/cognitive and social responses to stress (Kaufman & Charney 2001, Sanchez et al. 2001, Teicher et al. 2003). It is critical to keep in mind, however, that the development of such characteristics is complex, and current data are only just beginning to provide an understanding of the mechanisms through which these vulnerabilities emerge. The popular notion that there may be "a gene for" behaviors such as self-injury is unrealistic and inaccurate given the complex and multidetermined nature of both gene-behavior relations and of suicidal behaviors themselves (Kendler 2005). In addition, although prior research has shown that the effects of early stressors are especially powerful in the presence of a pre-existing genetic vulnerability (Caspi et al. 2003, Perroud et al. 2008), more recent work has challenged the reliability of these findings (Risch et al. 2009), and even if accepted, other data have shown that these moderated effects can themselves be further moderated by factors such as social support (Kaufman et al. 2004). Beyond their potential impact on intrapersonal vulnerabilities, early stressors, such as being raised in a hostile/critical or abuse environment, also can lead to problems communicating with others or developing social problem-solving skills, contributing to the interpersonal vulnerabilities described above.

The genetic, environmental, and neurobiological factors that create the vulnerabilities described above are not proposed to be specific to self-injury, but instead cause the arousal, impulsiveness, and poor cognitive/behavioral control that lead to the experience of problematic affective/cognitive and social situations, which then set the stage for the use of self-injury and other forms of maladaptive coping. The presence of some of these vulnerability factors (e.g., high negative affect, high negative cognitions, poor social skills) increases the likelihood that a person is diagnosed with a depressive, anxiety, or externalizing disorder, and it is proposed that these disorders are associated with self-injury precisely because of the intrapersonal and interpersonal dysregulation that leads to these diagnoses. This would explain why these disorders are repeatedly shown to be associated with self-injury across studies. Several recent studies support this conceptualization by showing that factors such as high emotion reactivity mediate the association between mental disorders such as depression, anxiety, and externalizing behaviors and self-injury (Nock et al. 2008c). Following the proposed pathway back even further, similar factors (i.e., emotional distress and numbing) have been shown to mediate the association between early stressors (i.e., childhood abuse) and self-injury (Klonsky & Moyer 2008, Weierich & Nock 2008). Taken together, these findings provide initial evidence that distal risk factors (e.g., genetic risk factors, early stressors) increase the likelihood of vulnerability factors (e.g., high emotion reactivity, poor social skills) that in turn increase the odds of mental disorders and maladaptive coping skills including self-injury.

Specific Risk Factors for Self-Injury

Most of the correlates and risk factors of self-injury identified and studied to date predict many forms of maladaptive behavior—not just

self-injury. What has been severely lacking from the literature is a compelling explanation of why people choose the behaviors that they do to regulate their affective/cognitive experiences and social relationships. The final proposition of this integrated theoretical model is that several specific processes influence the use of self-injury as a means of serving the proposed functions. This component of the model generally has not been submitted to empirical testing and so the influences on self-injury proposed below primarily represent key testable hypotheses for future research on this topic.

Social learning hypothesis. Many of the behaviors we perform are learned by observing those around us (Bandura 1977, 2006). This is true in the case of both nonpathological behaviors (e.g., learning how to interact with others, dance, and throw a football) as well as potentially pathological behaviors (e.g., purging, binge drinking, and drug use). At the broadest level, people's decision to engage in self-injury is likely to be largely influenced by what they have observed or learned about this behavior from others. Indeed, it is well known that the behavior of one's peers can have an especially strong effect during adolescence and can influence one's own engagement in a range of maladaptive and risky behaviors including alcohol and drug use, risky sexual behaviors, and self-injury (Prinstein & Dodge 2008, Prinstein et al. 2009). The media also can provide a powerful means of spreading information about self-injury, and while often done with good intentions, messages about self-injury in the media may actually serve to increase the occurrence of this behavior. For instance, recent evidence suggests that there has been a dramatic increase in the frequency of references to self-injury in various media including songs, movies, newspaper stories, and the Internet (Whitlock et al. 2009). It is possible that this increase may partially explain why rates of self-injury appear to have been on the rise in recent years. This explanation is speculative, as this idea has not been tested, and it is possible that media coverage is merely the result of an increasing rate of self-injury. This remains a vital area of focus for future research. Initial self-report data provide support for the social learning hypothesis, as most adolescents and young adults who engage in this behavior report having initially learned about it from their friends, siblings, and the media (Deliberto & Nock 2008). However, more rigorous tests of this hypothesis are needed to better understand how information from friends, family, and the media can increase, and potentially decrease, this behavior.

Self-punishment hypothesis. People may choose to engage in self-injury as a means of affect/cognitive regulation and social influence because it simultaneously provides a vehicle for punishing oneself for some perceived wrongdoing or responding to general self-hatred or self-deprecation (Favazza 1996, Strong 1998, Walsh & Rosen 1988). Anecdotally, this can be seen in instances in which self-injurers carve words into their skin such as "failure," "loser," and "disgrace." Empirically, recent studies testing the potential influence of self-punishment have revealed that (*a*) self-punishment is among the primary reasons self-injurers give for engaging in the behavior (Nock & Prinstein 2004), (*b*) "self-hatred" and "anger at self" are reported as the thoughts/feelings precipitating nearly half of self-injury episodes in EMA studies (Nock et al. 2009), and (*c*) those who engage in self-injury report significantly higher levels of self-criticism than do noninjurers (Glassman et al. 2007). The presence of a self-punitive or self-critical style may emerge as a result of major depression and/or could be the result of earlier abuse or criticism from others that results in a person learning to respond to perceived failures with self-criticism and ultimately "self-abuse" in the form of self-injury. Consistent with such a model, a self-reported self-critical cognitive style has been found to mediate the association between childhood abuse and self-injury and to predict self-injury above and beyond the effect of depression (Glassman et al. 2007). Moreover, self-criticism has been shown to moderate the association between parental criticism and self-injury, such that the association between

parental criticism and self-injury is especially strong among those with a self-critical cognitive style (Wedig & Nock 2007). Self-punishment, self-criticism, and self-deprecation are somewhat complex constructs that do not lend themselves to easy empirical investigation; however, several studies have provided potential models for doing so (Comer & Laird 1975, McCloskey & Berman 2003). Available anecdotal and empirical evidence suggests that these constructs may prove vital to understanding why people inflict harm upon themselves. This represents an essential direction for future research.

Implicit attitude/identification hypothesis. When faced with the option of choosing one of several different behaviors that all serve the same function, people's decision also may be influenced by their implicit attitude about, or identification with, the available options. By way of example, if I want to decrease feelings of anxiety, I am unlikely to drink a glass of scotch because I do not perceive myself to be a scotch drinker. Instead, I am likely to go for a motorcycle ride because I identify more with that behavior (i.e., that's what I do, I am a biker). A growing body of evidence suggests that the implicit associations and identifications a person holds are predictive of subsequent behavior (Greenwald et al. 2009), and it is possible that people decide to engage in self-injury as a means of emotion/cognitive or social regulation because of their implicit associations about this behavior relative to other possible behaviors. Consistent with this hypothesis, one recent study revealed that people with a recent history of self-injury possess more favorable implicit attitudes about self-injury and have a stronger implicit identification with self-injury than do matched controls (Nock & Banaji 2007). Within the context of the model presented in **Figure 2**, these findings suggest than when individuals desire to regulate their emotional/cognitive or social experience, their implicit attitude/identification regarding different coping strategies influences which one they will choose. Data so far are cross-sectional, and it is not yet clear if implicit cognitions about self-injury are causally related to self-injury or instead are a consequence of repeated self-injury (i.e., people come to identify with a behavior that they have repeatedly performed). A causal explanation is plausible, as people may come to identify with self-injury over time or to develop a positive attitude about it because their peers engage in the behavior (i.e., social modeling), because the behavior is perceived to satisfy the intended function (e.g., social signaling), or through some other mechanism. These questions await empirical testing in future studies.

Social signaling hypothesis. A fundamental question that must be addressed in understanding the potential interpersonal functions of self-injury is: Why would people cut their skin as a means of communicating with others rather than using language or some less harmful means of expression? A proposed explanation is that people use self-injury as a means of communicating or signaling distress because it is more effective at eliciting help from others than milder forms of communication, such as speaking, yelling, or crying. Surprisingly little research has focused on the social communication/signaling function of self-injury, perhaps owing to concerns about invalidating or further stigmatizing those who engage in the behavior; however, support for this hypothesis comes from two sources.

First, clinical descriptions of self-injurers have depicted the use of self-injury as a means of communication and help-seeking when words fail to adequately do so (Conterio et al. 1998, Favazza 1996, Strong 1998, Walsh & Rosen 1988). This idea has been captured most concisely (and most famously) in one patient's description of self-injury as a "bright red scream" (Conterio et al. 1998, p. 67; Strong 1998). Second, theoretical and empirical work from diverse areas has illustrated the different ways in which behavior can provide an effective means of communicating and influencing others when the faculty of language is absent (Hauser 1996, Maynard Smith & Harper 2003), limited (Iwata et al. 1994), or is an unacceptable or

ineffective means of communicating one's distress (Kleinman 1982, Nichter 1981). This work has been helpful for understanding the development and expression of multiple forms of psychopathology such as depression (Gilbert 2006, Nesse 2000, Price et al. 2004, Watson & Andrews 2002); anxiety (Clark 1989, Guarnaccia & Farias 1988, Hinton et al. 2007); and care-eliciting behaviors such as somatization disorders, some personality disorders, and self-injury (Hagen et al. 2008, Henderson 1974, McGuire & Troisi 1998, Nock 2008), and it provides a useful point of departure for future empirical work on the social signaling function of self-injury.

Drawing from this earlier work, it has been proposed that self-injury can develop through a process of escalation in which the failure of weaker signals (e.g., talking) to achieve some desired social outcome leads individuals to escalate the strength of their social signal (e.g., yelling) or change from verbal to physical forms of communication (e.g., crying → gesturing → self-injuring), which if reinforced will be strengthened and maintained over time (Nock 2008). Such a process can occur both for the purposes of signaling distress (e.g., social positive reinforcement) and for signaling strength (e.g., social negative reinforcement). As an example of the latter, an adolescent may respond to teasing from peers by first ignoring it, then by escalating to verbal requests to stop (e.g., speaking → yelling), then to physical forms of communication such as dressing in a more threatening manner (e.g., Gothic style, characterized by black, death-themed clothing and jewelry), and ultimately engaging in self-injury as a display of strength or resilience (Nock 2008). In general, this process of escalation bears some similarity to that proposed in coercion theory, through which aggressive and antisocial behavior has been proposed to develop (Patterson 1982), but the process differs in that it does not necessarily involve intensification by both members of a dyad.

Several studies provide preliminary evidence for this escalation model in the development of self-injury. Self-injurers show deficits in their abilities for word generation (Photos & Nock 2006) and emotional expression (Gratz 2006), suggesting a poorer ability to produce a clear and effective verbal signal. Moreover, families of self-injurers show higher levels of hostility and criticism than those of matched controls (Wedig & Nock 2007), suggesting potential problems with the reception of weak verbal signals. In addition, adolescents who engage in self-injury report higher levels of peer victimization and identification with Goth subculture (Hilt et al. 2008a, Young et al. 2006). Although these findings are consistent with the conditions under which the proposed escalation can occur, the proposed escalation process has not yet been well studied among those who engage in self-injury, and this represents another area ripe for future examination.

Pain analgesia/opiate hypothesis. In addition to obtaining a better understanding of what leads some people to engage in self-injury, it is important also to consider why many people do not—it is violent and painful. The anticipated pain and gruesome nature of the behavior are likely to deter many would-be self-injurers from engaging in it. However, people without this aversion may be less likely to experience such a barrier. Consistent with this idea, people who engage in self-injury typically report experiencing little or no pain during episodes of self-injury (Nock & Prinstein 2005). The cause of this paradoxical finding has not yet been determined, but it has been confirmed in several laboratory-based studies showing that compared to noninjurers, those who engage in self-injury have a lower sensitivity to pain, meaning that it takes them longer to experience stimuli as painful, and they can tolerate pain longer relative to noninjurers (Bohus et al. 2000, Kemperman et al. 1997, Russ et al. 1999).

It is possible that this lower pain sensitivity is present before a person ever engages in self-injury or that it develops over time via habituation to repeated self-injury, although lifetime frequency of self-injury is not related to the experience of pain, which argues against

the habituation hypothesis (Nock et al. 2006). Regardless of the cause of this lower sensitivity to pain, it has been suggested that the mechanism of this effect is the presence of elevated levels of endogenous opiates in the body. Endogenous opiates (endorphins) are released in the bloodstream following bodily injury; they reduce the experience of pain and also can lead to a feeling of euphoria (Van Ree et al. 2000). The analgesic effect of endorphins is adaptive from an evolutionary perspective, as it allows an organism to continue to function following injury. It is possible that some people are predisposed to have higher levels of endorphins in the body or that repeated self-injury leads to higher baseline levels of endorphins, thus decreasing pain sensitivity and increasing feelings of pleasure, both of which may serve to increase the likelihood of self-injury. There is some evidence that opiate antagonists such as naltexone decrease engagement in self-injury; however, this finding has not replicated consistently across studies (Plener et al. 2009b, Sandman 2009). The role of pain and endorphins in self-injury represents one of the most intriguing, but as yet understudied, aspects of self-injury.

Pragmatic hypothesis. Finally, and most parsimoniously, people may choose to engage in self-injury over other self-regulating strategies because it is a rapid, effective, and easily implemented method of regulating one's affective/cognitive and social experiences. These aspects of the behavior are especially important to consider in the case of adolescent self-injury, as adolescents are less likely than adults to have the coping skills required to deal effectively with stressful situations, are less likely to be skilled at effectively communicating concerns to members of their social network, and are less likely to have access to other maladaptive methods of affective/cognitive regulation (e.g., alcohol and drugs). In contrast, adolescents have ready access to the use of self-injury, which can be performed quickly, quietly, and in private in virtually any setting (e.g., home, school/work restroom).

INTERVENTION AND PREVENTION

The good news about the intervention and prevention of self-injury is that the majority of people who engage in this behavior with some regularity report receiving psychological or pharmacological treatment (Deliberto & Nock 2008, Favazza & Conterio 1988). The bad news is that there currently are no evidence-based interventions or prevention programs for self-injury (Klonsky & Muehlenkamp 2007, Muehlenkamp 2006, Nock et al. 2007b). To be sure, a range of different psychological treatment approaches have been modified to target self-injury, including different forms of behavior therapy (Lynch & Cozza 2009), cognitive therapy (Newman 2009), and psychodynamic therapy (Levy et al. 2007). Although several clinical trials have shown that people receiving several specific forms of these treatments demonstrate a decrease in self-injury, the change observed in the experimental condition has not been significantly greater than in the control condition (Linehan et al. 2006b, Rathus & Miller 2002, Tyrer et al. 2003). The sole exception is a study by Wood and colleagues (Wood et al. 2001) that reported that adolescents randomly assigned to a specific group therapy were significantly less likely than those assigned to a routine care condition to repeatedly engage in self-injury. However, a recent attempt to replicate this effect by the same group yielded the opposite result—that those in the group therapy condition were more likely to have engaged in self-injury after the intervention (Hazell et al. 2009). Similarly, a fairly wide range of psychologically based prevention programs have been developed for implementation in the community and in educational settings; however, evidence for their efficacy or effectiveness is lacking (Lieberman et al. 2009, Whitlock & Knox 2009). This means that there currently is no compelling evidence for the effectiveness of any of the psychological intervention or prevention programs being provided to those who engage in self-injury. This is among the most essential directions for future research on this topic.

There currently is no evidence-based pharmacological treatment of self-injury; however, there is preliminary evidence that several different types of medications may be useful in decreasing self-injury. Most research on pharmacological interventions for self-injury to date has focused on the effects of medications targeting the serotonergic, dopaminergic, and opioid systems, with the goal of improving mood, decreasing impulsive-aggressive urges, and decreasing the potential pleasurable effects of engaging in self-injury (for reviews, see Plener et al. 2009b, Sandman 2009). The majority of published studies on the pharmacological treatment of self-injury are individual case studies or small sample case series showing somewhat modest decreases in self-injury, which must be balanced against the limitations of the designs used and the likelihood that many null studies with similar designs have been done but not published in the literature. The most encouraging findings to date have been among studies demonstrating the effects of selective serotonin reuptake inhibitors (Markowitz 1992), partial agonists for dopamine and serotonin receptors (Nickel et al. 2006), and opioid antagonists (Roth et al. 1996, Sandman et al. 2003). These findings fit nicely with the theoretical model of self-injury presented previously, as these pharmacological agents are believed to decrease the high aversive arousal hypothesized to lead to self-injury and to eliminate potential pleasurable effects of the behavior resulting from the release of endorphins. Overall, however, systematic reviews of pharmacological interventions for self-injury have concluded that evidence of effectiveness is encouraging but still preliminary. As is the case with psychological intervention and prevention approaches, the development and evaluation of effective pharmacological treatments represent a high-priority area for future research on self-injury.

CONCLUSIONS

Self-injurious behavior has confounded philosophers, scientists, and clinicians for thousands of years. Until fairly recently, most of what has been known about the prevalence, characteristics, potential causes, and treatment of self-injury has been based on anecdotal information and clinical case reports. The dramatic increase in systematic and rigorous research on self-injury—perhaps resulting from the apparent increase in the prevalence of this behavior—has led to exciting advances in the understanding of why people hurt themselves. Although impressive gains have been made, there is still much to learn about why people intentionally and repeatedly harm themselves. Future research on self-injury will not only advance the understanding, assessment, and treatment of this behavior problem, but will also improve the understanding of self-harm more broadly and of how to decrease such behaviors in order to help people live healthier and more adaptive lives.

SUMMARY POINTS

1. Self-injury has appeared throughout recorded history but appears to have increased dramatically in the past several decades, which has led to increased interest from scientists, clinicians, and the public.
2. It is important to distinguish between directly self-injurious behaviors (e.g., self-injury, suicide) and indirectly harmful behaviors (e.g., alcohol and substance use); however, these different forms of self-harm commonly co-occur, and it may be useful to consider them on a continuum of self-harm behaviors.

3. Self-injury typically begins in early adolescence and is most prevalent among adolescents and young adults. It most often is performed in private, using a sharp implement to cut or carve the surface of the skin, and varies significantly in frequency and severity.
4. Self-injury appears to serve two primary functions: (*a*) an affective/cognitive regulation function in which self-injury leads to an immediate decrease in an aversive internal state or increase in a desired state, and (*b*) a social regulation function in which self-injury leads to a desired increase in social support or removal of some undesired social situation. Self-report, physiological, and behavioral data support such a model.
5. The risk of self-injury is increased by general factors that predispose individuals to have problems regulating their affective/cognitive or social experiences (e.g., distal factors such as childhood abuse, proximal factors such as physiological hyperarousal in response to stress) and by self-injury-specific factors (e.g., social learning) that lead a person to use self-injury rather than some other method of self-regulation.
6. Despite the scope and significance of this problem, there currently are no evidence-based psychological or pharmacological treatments for self-injury.

FUTURE ISSUES

1. What is the prevalence of self-injury in the general population? How does this rate differ across groups? And how has this rate changed over time?
2. Is repetitive self-injury best conceptualized as a mental disorder, a symptom of a mental disorder, or simply as a harmful behavior?
3. Accumulating evidence suggests that self-injury functions primarily as a means of decreasing aversive affective and cognitive states. What is the mechanism through which this occurs (e.g., distraction, endorphin release)?
4. What are the processes or mechanisms through which interpersonal factors (e.g., social modeling, support from others) influence the development and maintenance of self-injury?
5. What psychological and pharmacological intervention and prevention approaches can decrease the occurrence of this behavior?
6. How can findings on self-injury best inform (and be informed by) research in related areas such as self-injury among animals, stereotypic self-injury among those with developmental disabilities, and indirectly harmful behaviors?

DISCLOSURE STATEMENT

The author is not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

LITERATURE CITED

Am. Psychiatr. Assoc. 2000. *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision*. Washington, DC: Am. Psychiatr. Assoc.

Bandura A. 1977. *Social Learning Theory*. New York: Gen. Learn. Press
Bandura A, ed. 2006. *Psychological Modeling: Conflicting Theories*. Piscataway, NJ: Aldine
Barlow DH. 2002. *Anxiety and Its Disorders*. New York: Guilford. 2nd ed.
Baumeister RF, Scher SJ. 1988. Self-defeating behavior patterns among normal individuals: review and analysis of common self-destructive tendencies. *Psychol. Bull.* 104:3–22
Berglas S, Jones EE. 1978. Drug choice as a self-handicapping strategy in response to noncontingent success. *J. Personal. Soc. Psychol.* 36:405–17
Bohus M, Limberger M, Ebner U, Glocker FX, Schwarz B, et al. 2000. Pain perception during self-reported distress and calmness in patients with borderline personality disorder and self-mutilating behavior. *Psychiatr. Res.* 95:251–60
Briere J, Gil E. 1998. Self-mutilation in clinical and general population samples: prevalence, correlates, and functions. *Am. J. Orthopsychiatr.* 68:609–20
Brown MZ, Comtois KA, Linehan MM. 2002. Reasons for suicide attempts and nonsuicidal self-injury in women with borderline personality disorder. *J. Abnorm. Psychol.* 111:198–202
Caspi A, Sugden K, Moffitt TE, Taylor A, Craig IW, et al. 2003. Influence of life stress on depression: moderation by a polymorphism in the 5-HTT gene. *Science* 301:386–89
Cent. Disease Control. 2008. *Web-Based Injury Statistics Query and Reporting System (WISQARS) Nonfatal Injuries: Nonfatal Injury Reports*. Atlanta, GA: Nat. Cent. Injury Prev. Control, Cent. Disease Control Prev.
Clark MH. 1989. Nevra in a Greek village: idiom, metaphor, symptom, or disorder? *Health Care Women Int.* 10:195–218
Comer R, Laird JD. 1975. Choosing to suffer as a consequence of expecting to suffer: Why do people do it? *J. Personal. Soc. Psychol.* 32:92–101
Conterio K, Lader W, Bloom JK. 1998. *Bodily Harm*. New York: Hyperion
Cross LW. 1993. Body and self in feminine development: implications for eating disorders and delicate self-mutilation. *Bull. Menninger Clin.* 57:41–68
Darche MA. 1990. Psychological factors differentiating self-mutilating and nonself-mutilating adolescent inpatient females. *Psychiatr. Hosp.* 21:31–35
Dawkins R. 1976. *The Selfish Gene*. New York: Oxford Univ. Press
Deliberto TL, Nock MK. 2008. An exploratory study of correlates, onset, and offset of nonsuicidal self-injury. *Arch. Suicide Res.* 12:219–31
Dellinger-Ness LA, Handler L. 2006. Self-injurious behavior in human and nonhuman primates. *Clin. Psychol. Rev.* 26:503–14
DiClemente RJ, Ponton LE, Hartley D. 1991. Prevalence and correlates of cutting behavior: risk for HIV transmission. *J. Am. Acad. Child Adolesc. Psychiatr.* 30:735–39
Dimidjian S, Hollon SD, Dobson KS, Schmaling KB, Kohlenberg RJ, et al. 2006. Randomized trial of behavioral activation, cognitive therapy, and antidepressant medication in the acute treatment of adults with major depression. *J. Consult. Clin. Psychol.* 74:658–70
Dutra L, Stathopoulou G, Basden SL, Leyro TM, Powers MB, Otto MW. 2008. A meta-analytic review of psychosocial interventions for substance use disorders. *Am. J. Psychiatr.* 165:179–87
Favazza AR. 1989. Why patients mutilate themselves. *Hosp. Commun. Psychiatr.* 40:137–45
Favazza AR. 1996. *Bodies Under Siege: Self-Mutilation and Body Modification in Culture and Psychiatry*. Baltimore, MD: Johns Hopkins Univ. Press
Favazza AR. 2009. A cultural understanding of nonsuicidal self-injury. See Nock 2009a, pp. 19–35
Favazza AR, Conterio K. 1988. The plight of chronic self-mutilators. *Commun. Ment. Health J.* 24:22–30
Friedman M, Glasser M, Laufer E, Laufer M, Wohl M. 1972. Attempted suicide and self-mutilation in adolescence: some observations from a psychoanalytic research project. *Int. J. Psychoanal.* 53:179–83
Gilbert P. 2006. Evolution and depression: issues and implications. *Psychol. Med.* 36:287–97
Glassman LH, Weierich MR, Hooley JM, Deliberto TL, Nock MK. 2007. Child maltreatment, nonsuicidal self-injury, and the mediating role of self-criticism. *Behav. Res. Ther.* 45:2483–90
Goldberg J, Sakinofsky I. 1988. Intropunitiveness and parasuicide: prediction of interview response. *Br. J. Psychiatr.* 153:801–4

Provides an excellent review of indirectly harmful behaviors.

Provides a comprehensive historical, cultural, and clinical understanding of self-injury.

Gould MS, Marrocco FA, Kleinman M, Thomas JG, Mostkoff K, et al. 2005. Evaluating iatrogenic risk of youth suicide screening programs: a randomized controlled trial. *J. Am. Med. Assoc.* 293:1635–43

Gratz KL. 2001. Measurement of deliberate self-harm: preliminary data on the Deliberate Self-Harm Inventory. *J. Psychopathol. Behav. Assess.* 23:253–63

Gratz KL. 2006. Risk factors for deliberate self-harm among female college students: the role and interaction of childhood maltreatment, emotional inexpressivity, and affect intensity/reactivity. *Am. J. Orthopsychiatr.* 76:238–50

Greenwald AG, Poehlman TA, Uhlmann EL, Banaji MR. 2009. Understanding and using the Implicit Association Test: III. Meta-analysis of predictive validity. *J. Personal. Soc. Psychol.* 97:17–41

Guarnaccia PJ, Farias P. 1988. The social meanings of nervios: a case study of a Central American woman. *Soc. Sci. Med.* 26:1223–31

Hagen EH, Watson P, Hammerstein P. 2008. Gestures of despair and hope: a view on deliberate self-harm from economics and evolutionary biology. *Biol. Theory* 3:123–38

Haines J, Williams CL, Brain KL, Wilson GV. 1995. The psychophysiology of self-mutilation. *J. Abnorm. Psychol.* 104:471–89

Hankin BL, Abela JR, eds. 2005. *Development of Psychopathology: A Vulnerability-Stress Perspective*. Thousand Oaks, CA: Sage

Hauser MD. 1996. *The Evolution of Communication*. Cambridge, MA: MIT Press

Hawton K, Hall S, Simkin S, Bale L, Bond A, et al. 2003. Deliberate self-harm in adolescents: a study of characteristics and trends in Oxford, 1990–2000. *J. Child Psychol. Psychiatr.* 44:1191–98

Hayes SC, Wilson KG, Gifford EV, Follette VM, Strosahl K. 1996. Experimental avoidance and behavioral disorders: a functional dimensional approach to diagnosis and treatment. *J. Consult. Clin. Psychol.* 64:1152–68

Hazell PL, Martin G, McGill K, Kay T, Wood A, et al. 2009. Group therapy for repeated deliberate self-harm in adolescents: failure of replication of a randomized trial. *J. Am. Acad. Child Adolesc. Psychiatr.* 48:662–70

Henderson S. 1974. Care-eliciting behavior in man. *J. Nerv. Ment. Dis.* 159:172–81

Herpertz S. 1995. Self-injurious behavior. Psychopathological and nosological characteristics in subtypes of self-injurers. *Acta Psychiatr. Scand.* 91:57–68

Hilt LM, Cha CB, Nolen-Hoeksema S. 2008a. Non-suicidal self-injury in young adolescent girls: moderators of the distress-function relationship. *J. Consult. Clin. Psychol.* 76:63–71

Hilt LM, Nock MK, Lloyd-Richardson E, Prinstein MJ. 2008b. Longitudinal study of nonsuicidal self-injury among young adolescents: rates, correlates, and preliminary test of an interpersonal model. *J. Early Adolesc.* 28:455–69

Hintikka J, Tolmunen T, Rissanen ML, Honkalampi K, Kylma J, Laukkanen E. 2009. Mental disorders in self-cutting adolescents. *J. Adolesc. Health* 44:464–67

Hinton DE, Chong R, Pollack MH, Barlow DH, McNally RJ. 2007. Ataque de nervios: relationship to anxiety sensitivity and dissociation predisposition. *Depress. Anxiety* 25:489–95

Hunsley J, Mash EJ. 2007. Evidence-based assessment. *Annu. Rev. Clin. Psychol.* 3:29–51

Hussong AM. 2003. Social influences in motivated drinking among college students. *Psychol. Addict. Behav.* 17:142–50

ISI Web of Knowledge. 2009. Thomson Reuters

Iwata BA, Pace GM, Dorsey MF, Zarcone JR, Vollmer TR, et al. 1994. The functions of self-injurious behavior: an experimental-epidemiological analysis. *J. Appl. Behav. Anal.* 27:215–40

Presents experimental evidence for the behavioral functions of self-injury.

Jackson B, Cooper ML, Mintz L, Albino A. 2003. Motivations to eat: scale development and validation. *J. Res. Personal.* 37:297–318

Kaufman J, Charney D. 2001. Effects of early stress on brain structure and function: implications for understanding the relationship between child maltreatment and depression. *Dev. Psychopathol.* 13:451–71

Kaufman J, Yang BZ, Douglas-Palumberi H, Houshyar S, Lipschitz D, et al. 2004. Social supports and serotonin transporter gene moderate depression in maltreated children. *Proc. Natl. Acad. Sci. USA* 101:17316–21

Kazdin AE. 2001. *Behavior Modification in Applied Settings*. Belmont, CA: Wadsworth/Thompson Learn. 6th ed.

Kazdin AE. 2005. *Parent Management Training: Treatment for Oppositional, Aggressive, and Antisocial Behavior in Children and Adolescents*. New York: Oxford Univ. Press

Kemperman I, Russ MJ, Clark WC, Kakuma T, Zanine E, Harrison K. 1997. Pain assessment in self-injurious patients with borderline personality disorder using signal detection theory. *Psychiatr. Res.* 70:175–83

Kendler KS. 2005. "A gene for. . .": the nature of gene action in psychiatric disorders. *Am. J. Psychiatry* 162:1243–52

Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. 2005. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Arch. Gen. Psychiatry* 62:593–602

Kessler RC, Price RH, Wortman CB. 1985. Social factors in psychopathology: stress, social support, and coping processes. *Annu. Rev. Psychol.* 36:531–72

Kleinman A. 1982. Neurasthenia and depression: a study of somatization and culture in China. *Culture Med. Psychiatry* 6:117–90

Klonsky ED. 2009. The functions of self-injury in young adults who cut themselves: clarifying the evidence for affect-regulation. *Psychiatr. Res.* 166:260–68

Klonsky ED, Moyer A. 2008. Childhood sexual abuse and nonsuicidal self-injury: meta-analysis. *Br. J. Psychiatry* 192:166–70

Klonsky ED, Muehlenkamp JJ. 2007. Self-injury: a research review for the practitioner. *J. Clin. Psychol.* 63:1045–56

Klonsky ED, Olino TM. 2008. Identifying clinically distinct subgroups of self-injurers among young adults: a latent class analysis. *J. Consult. Clin. Psychol.* 76:22–27

Klonsky ED, Oltmanns TF, Turkheimer E. 2003. Deliberate self-harm in a nonclinical population: prevalence and psychological correlates. *Am. J. Psychiatry* 160:1501–8

Koob G, Kreek MJ. 2007. Stress, dysregulation of drug reward pathways, and the transition to drug dependence. *Am. J. Psychiatry* 164:1149–59

Levy KN, Yeomans FE, Diamond D. 2007. Psychodynamic treatments of self-injury. *J. Clin. Psychol.* 63:1105–20

Lieberman RA, Toste JR, Heath NL. 2009. Nonsuicidal self-injury in the schools: prevention and intervention. In *Self-Injury in Youth: The Essential Guide to Assessment and Intervention*, ed. MK Nixon, NL Heath, pp. 195–216. New York: Taylor & Francis Group

Describes the treatment most commonly used to treat self-injury.

Linehan MM. 1993. *Cognitive-Behavioral Treatment of Borderline Personality Disorder*. New York: Guilford

Linehan MM, Comtois KA, Brown MZ, Heard HL, Wagner A. 2006a. Suicide Attempt Self-Injury Interview (SASII): development, reliability, and validity of a scale to assess suicide attempts and intentional self-injury. *Psychol. Assess.* 18:302–12

Linehan MM, Comtois KA, Murray AM, Brown MZ, Gallop RJ, et al. 2006b. Two-year randomized controlled trial and follow-up of dialectical behavior therapy vs therapy by experts for suicidal behaviors and borderline personality disorder. *Arch. Gen. Psychiatry* 63:757–66

Lloyd-Richardson EE, Perrine N, Dierker L, Kelley ML. 2007. Characteristics and functions of nonsuicidal self-injury in a community sample of adolescents. *Psychol. Med.* 37:1183–92

Lloyd EE, Kelley ML, Hope T. 1997. *Self-mutilation in a community sample of adolescents: descriptive characteristics and provisional prevalence rates*. Presented at Soc. Behav. Med., New Orleans, LA

Lorenz K. 1963. *On Aggression*. San Diego, CA: Harcourt Brace

Lynch TR, Cozza C. 2009. Behavior therapy for nonsuicidal self-injury. See Nock 2009a, pp. 221–50

Markowitz PI. 1992. Effect of fluoxetine on self-injurious behavior in the developmentally disabled: a preliminary study. *J. Clin. Psychopharmacol.* 12:27–31

Marsh R, Maia TV, Peterson BS. 2009. Functional disturbances within frontostriatal circuits across multiple childhood psychopathologies. *Am. J. Psychiatry* 166:664–74

Martell CR, Addis ME, Jacobson NS. 2001. *Depression in Context: Strategies for Guided Action*. New York: Norton

Maynard Smith J, Harper D. 2003. *Animal Signals*. New York: Oxford Univ. Press

McCloskey MS, Berman ME. 2003. Alcohol intoxication and self-aggressive behavior. *J. Abnorm. Psychol.* 112:306–11

McGuire M, Troisi A. 1998. *Darwinian Psychiatry*. New York: Oxford Univ. Press
Miller F, Bashkin EA. 1974. Depersonalization and self-mutilation. *Psychoanal. Q.* 43:638–49
Monroe SM, Simons AD. 1991. Diathesis-stress theories in the context of life stress research: implications for the depressive disorders. *Psychol. Bull.* 110:406–25
Muehlenkamp JJ. 2005. Self-injurious behavior as a separate clinical syndrome. *Am. J. Orthopsychiatr.* 75:324–33
Muehlenkamp JJ. 2006. Empirically supported treatments and general therapy guidelines for nonsuicidal self-injury. *J. Ment. Health Couns.* 28:166–85
Muehlenkamp JJ, Engel SG, Wadeson A, Crosby RD, Wonderlich SA, et al. 2009. Emotional states preceding and following acts of nonsuicidal self-injury in bulimia nervosa patients. *Behav. Res. Ther.* 47:83–87
Najmi S, Wegner DM, Nock MK. 2007. Thought suppression and self-injurious thoughts and behaviors. *Behav. Res. Ther.* 45:1957–65
Nesse RM. 2000. Is depression an adaptation? *Arch. Gen. Psychiatry* 57:14–20
Newman CF. 2009. Cognitive therapy for nonsuicidal self-injury. See Nock 2009a, pp. 201–20
Nichter M. 1981. Idioms of distress: alternatives in the expression of psychosocial distress. A case study from South India. *Cult. Med. Psychiatry* 5:379–408
Nickel MK, Muehlbacher M, Nickel C, Kettler C, Pedrosa Gil F, et al. 2006. Aripiprazole in the treatment of patients with borderline personality disorder: a double-blind, placebo-controlled study. *Am. J. Psychiatry* 163:833–38
Nisbett RE, Wilson TD. 1977. Telling more than we can know: verbal reports on mental processes. *Psychol. Rev.* 84:231–59
Nock MK. 2008. Actions speak louder than words: an elaborated theoretical model of the social functions of self-injury and other harmful behaviors. *Appl. Prev. Psychol.* 12:159–68
Nock MK, ed. 2009a. *Understanding Nonsuicidal Self-Injury: Origins, Assessment, and Treatment*. Washington, DC: Am. Psychol. Assoc.
Nock MK. 2009b. Why do people hurt themselves? New insights into the nature and function of self-injury. *Curr. Dir. Psychol. Sci.* 18:78–83
Nock MK, Banaji MR. 2007. Assessment of self-injurious thoughts using a behavioral test. *Am. J. Psychiatry* 164:820–23
Nock MK, Borges G, Bromet EJ, Alonso J, Angermeyer M, et al. 2008a. Cross-national prevalence and risk factors for suicidal ideation, plans, and attempts in the WHO World Mental Health Surveys. *Br. J. Psychiatry* 192:98–105
Nock MK, Borges G, Bromet EJ, Cha CB, Kessler RC, Lee S. 2008b. Suicide and suicidal behaviors. *Epidemiol. Rev.* 30:133–54
Nock MK, Cha CB, Dour HJ. 2010. Disorders of impulse-control and self-harm. In *Oxford Handbook of Clinical Psychology*, ed. DH Barlow. New York: Oxford Univ. Press. In press
Nock MK, Favazza A. 2009. Non-suicidal self-injury: definition and classification. See Nock 2009a, pp. 9–18
Nock MK, Holmberg EB, Photos VI, Michel BD. 2007a. Self-Injurious Thoughts and Behaviors Interview: development, reliability, and validity in an adolescent sample. *Psychol. Assess.* 19:309–17
Nock MK, Joiner TE Jr, Gordon KH, Lloyd-Richardson E, Prinstein MJ. 2006. Non-suicidal self-injury among adolescents: diagnostic correlates and relation to suicide attempts. *Psychiatr. Res.* 144:65–72
Nock MK, Kessler RC. 2006. Prevalence of and risk factors for suicide attempts versus suicide gestures: analysis of the National Comorbidity Survey. *J. Abnorm. Psychol.* 115:616–23
Nock MK, Mendes WB. 2008. Physiological arousal, distress tolerance, and social problem-solving deficits among adolescent self-injurers. *J. Consult. Clin. Psychol.* 76:28–38
Nock MK, Prinstein MJ. 2004. A functional approach to the assessment of self-mutilative behavior. *J. Consult. Clin. Psychol.* 72:885–90
Nock MK, Prinstein MJ. 2005. Clinical features and behavioral functions of adolescent self-mutilation. *J. Abnorm. Psychol.* 114:140–46
Nock MK, Prinstein MJ, Sterba SK. 2009. Revealing the form and functions of self-injurious thoughts and behaviors: a real-time ecological assessment study among adolescents and young adults. *J. Abnorm. Psychol.* 118:816–27

Provides a comprehensive review of recent scientific and clinical advances in understanding of self-injury.

Presents real-time data on the occurrence and predictors of self-injurious thoughts and behaviors.

Nock MK, Teper R, Hollander M. 2007b. Psychological treatment of self-injury among adolescents. *J. Clin. Psychol.* 63:1081–89

Nock MK, Wedig MM, Holmberg EB, Hooley JM. 2008c. The Emotion Reactivity Scale: development, evaluation, and relation to self-injurious thoughts and behaviors. *Behav. Ther.* 39:107–16

Nock MK, Wedig MM, Janis IB, Deliberto TL. 2008d. Self-injurious thoughts and behaviors. In *A Guide to Assessments that Work*, ed. J Hunsely, E Mash, pp. 158–77. New York: Oxford Univ. Press

Novak MA. 2003. Self-injurious behavior in Rhesus monkeys: new insights into its etiology, physiology, and treatment. *Am. J. Primatol.* 59:3–19

Patterson GR. 1982. *Coercive Family Process*. Eugene, OR: Castalia Publ.

Pattison EM, Kahan J. 1983. The deliberate self-harm syndrome. *Am. J. Psychiatry* 140:867–72

Perroud N, Courtet P, Vincze I, Jaussent I, Jollant F, et al. 2008. Interaction between BDNF Val66Met and childhood trauma on adult's violent suicide attempt. *Genes Brain Behav.* 7:314–22

Photos VI, Nock MK. 2006. *Impairments in executive functioning among self-injurious adolescents*. Presented at annu. convention Assoc. Behav. Cogn. Ther., Chicago, IL

Plener PL, Libal G, Keller F, Fegert JM, Muehlenkamp JJ. 2009a. An international comparison of adolescent nonsuicidal self-injury (NSSI) and suicide attempts: Germany and the USA. *Psychol. Med.* 39:1549–58

Plener PL, Libal G, Nixon MK. 2009b. Use of medication in the treatment of nonsuicidal self-injury in youth. In *Self-Injury in Youth: The Essential Guide to Assessment and Treatment*, ed. MK Nixon, NL Heath, pp. 275–308. New York: Taylor & Francis

Presents a widely used system for classifying self-injurious behaviors.

Posner K, Oquendo MA, Gould M, Stanley B, Davies M. 2007. Columbia Classification Algorithm of Suicide Assessment (C-CASA): classification of suicidal events in the FDA's pediatric suicidal risk analysis of antidepressants. *Am. J. Psychiatry* 164:1035–43

Price JS, Gardner R Jr, Erickson M. 2004. Can depression, anxiety and somatization be understood as appeasement displays? *J. Affect. Disord.* 79:1–11

Prinstein MJ, Dodge KA, eds. 2008. *Understanding Peer Influence in Children and Adolescents*. New York: Guilford

Prinstein MJ, Guerry JD, Browne CB, Rancourt D. 2009. Interpersonal models of self-injury. See Nock 2009a, pp. 79–98

Rathus JH, Miller AL. 2002. Dialectical behavior therapy adapted for suicidal adolescents. *Suicide Life Threat. Behav.* 32:146–57

Read JP, Wood MD, Kahler CW, Maddock JE, Palfai TP. 2003. Examining the role of drinking motives in college student alcohol use and problems. *Psychol. Addict. Behav.* 17:13–23

Reynolds SK, Lindenboim N, Comtois KA, Murray A, Linehan MM. 2006. Risky assessments: participant suicidality and distress associated with research assessments in a treatment study of suicidal behavior. *Suicide Life Threat. Behav.* 36:19–34

Risch N, Herrell R, Lehner T, Liang KY, Eaves L, et al. 2009. Interaction between the serotonin transporter gene (5-HTTLPR), stressful life events, and risk of depression: a meta-analysis. *J. Am. Med. Assoc.* 301:2462–71

Ross S, Heath N. 2002. A study of the frequency of self-mutilation in a community sample of adolescents. *J. Youth Adolesc.* 31:67–77

Roth AS, Ostroff RB, Hoffman RE. 1996. Naltrexone as a treatment for repetitive self-injurious behavior: an open-label trial. *Am. J. Psychiatry* 57:233–37

Russ MJ, Campbell SS, Kakuma T, Harrison K, Zanine E. 1999. EEG theta activity and pain insensitivity in self-injurious borderline patients. *Psychiatr. Res.* 89:201–14

Sanchez MM, Ladd CO, Plotsky PM. 2001. Early adverse experience as a developmental risk factor for later psychopathology: evidence from rodent and primate models. *Dev. Psychopathol.* 13:419–49

Sandman CA. 2009. Psychopharmacologic treatment of nonsuicidal self-injury. See Nock 2009a, pp. 291–322

Sandman CA, Touchette PE, Lenjavi M, Marion S, Chicz-DeMet A. 2003. B-endorphin and ACTH are dissociated after self-injury in adults with developmental disabilities. *Am. J. Ment. Retard.* 108:414–24

Shiels MK, Shiels WE, Young AS, Lorenz EA, Lofthouse N, Campo J. 2009. *Self-embedding behavior: a picture is worth a thousand words*. Presented at Annu. Meet. Am. Psychol. Assoc., Toronto, Canada

Shiffman S, Stone AA, Hufford MR. 2008. Ecological momentary assessment. *Annu. Rev. Clin. Psychol.* 4:1–32

Silverman MM, Berman AL, Sanddal ND, O'Carroll PW, Joiner TE. 2007. Rebuilding the Tower of Babel: a revised nomenclature for the study of suicide and suicidal behaviors. Part 1: background, rationale, and methodology. *Suicide Life Threat. Behav.* 37:248–63

Simpson CA, Porter GL. 1981. Self-mutilation in children and adolescents. *Bull. Menninger Clin.* 45:428–38

Steel P. 2007. The nature of procrastination: a meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychol. Bull.* 133:65–94

Strong M. 1998. *A Bright Red Scream: Self-Mutilation and the Language of Pain*. New York: Penguin

Provides a clear and engaging description of self-injury via interviews with those engaging in the behavior.

Suyemoto KL. 1998. The functions of self-mutilation. *Clin. Psychol. Rev.* 18:531–54

Teicher MH, Andersen SL, Polcari A, Anderson CM, Navalta CP, Kim DM. 2003. The neurobiological consequences of early stress and childhood maltreatment. *Neurosci. Biobehav. Rev.* 27:33–44

Twenge JM, Catanese KR, Baumeister RF. 2002. Social exclusion causes self-defeating behavior. *J. Personal. Soc. Psychol.* 83:606–15

Tyrer P, Thompson S, Schmidt U, Jones V, Knapp M, et al. 2003. Randomized controlled trial of brief cognitive behavior therapy versus treatment as usual in recurrent deliberate self-harm: the POPMACT study. *Psychol. Med.* 33:969–76

Van Ree JM, Niesink RJ, Van Wolfswinkel L, Ramsey NF, Kornet MM, et al. 2000. Endogenous opioids and reward. *Eur. J. Pharmacol.* 405:89–101

Vazire S, Funder DC. 2006. Impulsivity and the self-defeating behavior of narcissists. *Personal. Soc. Psychol. Rev.* 10:154–65

Vohs KD, Baumeister RF, Schmeichel BJ, Twenge JM, Nelson NM, Tice DM. 2008. Making choices impairs subsequent self-control: a limited-resource account of decision making, self-regulation, and active initiative. *J. Personal. Soc. Psychol.* 94:883–98

Wallenstein MB, Nock MK. 2007. Physical exercise for the treatment of nonsuicidal self-injury: evidence from a single-case study. *Am. J. Psychiatry* 164:350–51

Walsh BW, Rosen PM. 1988. *Self-Mutilation: Theory, Research, and Treatment*. New York: Guilford

Watson PJ, Andrews PW. 2002. Toward a revised evolutionary adaptationist analysis of depression: the social navigation hypothesis. *J. Affect. Disord.* 72:1–14

Wedig MM, Nock MK. 2007. Parental expressed emotion and adolescent self-injury. *J. Am. Acad. Child Adolesc. Psychiatry* 46:1171–78

Wedig MM, Nock MK. 2010. The Functional Assessment of Maladaptive Behaviors: a preliminary evaluation of binge eating and purging among women. *Psychiatr. Res.* In press

Weierich MR, Nock MK. 2008. Posttraumatic stress symptoms mediate the relation between childhood sexual abuse and nonsuicidal self-injury. *J. Consult. Clin. Psychol.* 76:39–44

Welch SS, Linehan MM, Sylvers P, Chittams J, Rizvi SL. 2008. Emotional responses to self-injury imagery among adults with borderline personality disorder. *J. Consult. Clin. Psychol.* 76:45–51

Whitlock J, Knox KL. 2009. Intervention and prevention in the community. In *Self-Injury in Youth: The Essential Guide to Assessment and Intervention*, ed. MK Nixon, NL Heath, pp. 173–94. New York: Taylor & Francis

Whitlock J, Muehlenkamp J, Eckenrode J. 2008. Variation in nonsuicidal self-injury: identification and features of latent classes in a college population of emerging adults. *J. Clin. Child Adolesc. Psychol.* 37:725–35

Whitlock J, Purington A, Gershkovich M. 2009. Media and the Internet and nonsuicidal self-injury. See Nock 2009a, pp. 139–55

Reviews the potential influence of media and the Internet on self-injury.

Wilson EO. 1978. *On Human Nature*. Cambridge, MA: Harvard Univ. Press

Wilson TD. 2009. Know thyself. *Perspect. Psychol. Sci.* 4:384–89

Wood A, Trainor G, Rothwell J, Moore A, Harrington R. 2001. Randomized trial of group therapy for repeated deliberate self-harm in adolescents. *J. Am. Acad. Child Adolesc. Psychiatry* 40:1246–53

Young R, Sweeting H, West P. 2006. Prevalence of deliberate self harm and attempted suicide within contemporary Goth youth subculture: longitudinal cohort study. *BMJ* 332:1058–61

Annual Review of
Clinical Psychology
Volume 6, 2010

Contents