

## Nonsuicidal Self-Injury as a Predictor of Suicidal Behavior in Depressed Adolescents

Conventional wisdom has viewed suicidal behavior as much more ominous than nonsuicidal self-injury. The thoughtful and clearly written article in this issue by Wilkinson and colleagues (1) from the Adolescent Depression Antidepressants and Psychotherapy Trial (ADAPT) should make us view nonsuicidal self-injury more seriously, as it was a stronger predictor of future suicidal behavior than was a previous history of a suicide attempt. While this may be surprising, it is not an isolated finding. Previous studies have found that nonsuicidal self-injury predicts persistence of suicidal ideation and that these two types of self-destructive behaviors are highly associated, especially in clinical populations (2). There are at least three possible explanations for this relationship: nonsuicidal self-injury and suicidal behavior are on the same spectrum of self-destructive behavior; nonsuicidal self-injury and suicidal behavior have similar correlates; or engaging in nonsuicidal self-injury somehow predisposes to suicidal behavior.

Nonsuicidal self-injury and suicide attempts have been grouped under the term *deliberate self-harm* because the two behaviors frequently co-occur. When nonsuicidal self-injury occurs in community samples, it is often sporadic and can occur without serious psychopathology. In contrast, in clinically referred populations, the observed frequency and severity of nonsuicidal self-injury are much greater than in community samples and nonsuicidal self-injury is associated with more severe psychopathology (2). There is no dispute that nonsuicidal self-injury and suicidal behavior have similar diatheses: poor social problem solving, high levels of arousal in response to frustration, difficulty with emotion regulation and with distress tolerance, frequent self-critical cognitions, and high rates of both internalizing and externalizing disorders (2). In the Wilkinson et al. study, high levels of depression, suicidal ideation, and hopelessness characterized participants who engaged in either type of self-destructive behavior.

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However, nonsuicidal self-injury and suicidal behavior show differences in neurobiology, motivations, and treatment response. While alteration in central serotonergic neurotransmission has been well documented in suicidal behavior, nonsuicidal self-injury has been shown to be associated with lower levels of CSF opioids and a greater number of  $\mu$ -opioid receptors (3). Altered central opioid homeostasis may explain the decreased pain sensitivity and greater reinforcing properties of nonsuicidal self-injury, since self-injury may release endogenous opioids under conditions of central  $\mu$ -opioid up-regulation (3). The most common motivation for nonsuicidal self-injury is to achieve immediate relief of negative affect (2). In contrast, suicide attempts often occur because of a belief that only death will provide a permanent escape from emotional pain (4). Although both types of behavior can be motivated by a desire to influence others, interpersonal motivations may be more common among adolescent suicide attempters than among those who engage in nonsuicidal self-injury (4). Consistent with these overlap-

ping but distinct patterns in motivation between nonsuicidal self-injury and suicidal behavior, the ADAPT study found that future nonsuicidal self-injury was predicted by negative affect—namely, anxiety and persistently high levels of depressive symptoms—whereas poor family functioning was uniquely associated with suicidal behavior. Also, a reduction in depressive symptom severity was associated with a concomitant reduction in nonsuicidal self-injury but did not reduce the frequency of suicide attempts.

The interpersonal theory of suicide posits that nonsuicidal self-injury, as well as traumatic experiences like child abuse and combat exposure, desensitizes the individual to pain and fear of self-destruction and thus makes suicidal behavior more likely to occur (5). Consistent with this theory, an elevated pain threshold is associated with nonsuicidal self-injury. However, those whose nonsuicidal self-injury is more frequent and severe experience more pain while engaging in it, not less, as would be expected if nonsuicidal self-injury resulted in desensitization to pain (2). Also, one of the main motivations for engaging in nonsuicidal self-injury is self-punishment, as a result of a self-critical cognitive style, which could also predispose to suicidal behavior. The desensitization theory would also not explain why females engage in nonsuicidal self-injury more often, but men are more likely to kill themselves, and why so many individuals who commit suicide do so in ways that attempt to minimize the experience of pain. Other empirically demonstrated pathways between traumatic experiences and suicidal behavior include mediation by posttraumatic stress symptoms and by impulsivity (6, 7).

However, the interpersonal theory of suicide may be onto something. Perhaps nonsuicidal self-injury is an early signal of a diathesis that can eventually lead to suicidal behavior. In some community studies, the age at onset of nonsuicidal self-injury is younger than the age at onset for suicidal behavior (8). Those with a history of both nonsuicidal self-injury and a suicide attempt, compared to those with nonsuicidal self-injury alone, show higher levels of depression, suicidal ideation, impulsivity, and family dysfunction (8). Therefore, it is possible that with a lower loading for the diathesis, one sees only nonsuicidal self-injury, but with the development of greater loading for psychopathology and family difficulties, one sees more frequent and persistent nonsuicidal self-injury—and eventually, suicidal behavior. A second possible explanation for the transition from nonsuicidal self-injury to suicidal behavior is based on the observation that those with nonsuicidal self-injury have difficulties with verbal expression (2). Since there are intra- and interpersonal motivations for both nonsuicidal self-injury and suicidal behavior, it is possible that if nonsuicidal self-injury does not achieve the desired result, adolescents may, in desperation, “turn up the volume” and engage in suicidal behavior (2). Therefore, nonsuicidal self-injury may not directly lead to suicidal behavior, but if the needs and deficits reflected in nonsuicidal self-injury are not addressed, suicidal behavior may ensue.

What about treatment? There is a nugget of good news in this follow-up of the ADAPT study, as well as some suggestions for future work. Wilkinson and colleagues found that continued high levels of depressive symptoms were associated with nonsuicidal self-injury, which means that, conversely, the relief of depression and of nonsuicidal self-injury went hand in hand. The same was not true for suicidal behavior, which recurred independent of depressive response. The divergence between treatment response for depression and for suicidal behavior is now well known, and it supports the view that the diatheses for depression and for suicidal behavior are not completely isomorphic and therefore require distinct treatment targets.

Elegant work has elaborated the motivations for nonsuicidal self-injury and shown that these motivations predict the circumstances under which adolescents will engage in nonsuicidal self-injury (2). Consequently, treatments will need to be personalized to target the diverse reinforcement contingencies associated with nonsuicidal self-injury, which might be interpersonal in one individual and intrapersonal in another. Measurement of nonsuicidal self-injury in real time and assessment of changes in putative mediators of this behavior, such as self-critical thoughts, thought suppression, poor prob-

lem solving, and emotion overarousal, can help us learn whether proposed treatments are hitting their targets and whether changes in putatively important ingredients for nonsuicidal self-injury actually mediate treatment response.

We have not yet found successful treatments for suicidal behavior in adolescents, and these data demonstrate that the treatment of depression may be insufficient to reduce the risk of reattempt. Two of the most successful treatments aimed at reducing recurrence of suicide attempt in adults, while quite different theoretically, both individualize treatment based on a chain analysis, which identifies the thoughts, behaviors, emotions, and context that occurred before, during, and after suicidal behavior (9, 10). Therefore, a similar approach identifying and targeting the diverse precursors, motivations, and reinforcers for suicidal behavior may be necessary to reduce the risk of recurrence of suicide attempts in adolescents as well. It will also be of interest to learn whether an intervention that targets the deficits and motivations of those who engage in nonsuicidal self-injury but have not yet attempted suicide can also prevent the emergence of suicidal behavior, and if so, by what mechanisms.

Wilkinson and colleagues have made an important contribution to our understanding of nonsuicidal self-injury and suicidal behavior. This article teaches us that in clinical samples, nonsuicidal self-injury is a strong predictor of suicidal behavior, that relief of depression may be sufficient to reduce the risk for nonsuicidal self-injury, but that other factors beyond depression, such as family difficulties, must also be addressed to prevent the recurrence of suicidal behavior.

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