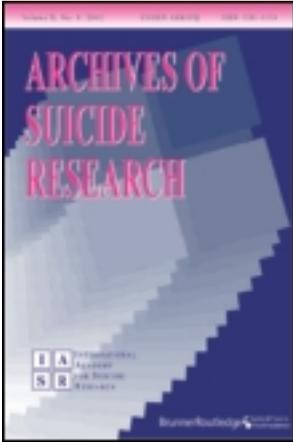


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The Impact of Social Contagion on Non-Suicidal Self-Injury: A Review of the Literature

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The Impact of Social Contagion on Non-Suicidal Self-Injury: A Review of the Literature

Stephanie Jarvi, Benita Jackson, Lance Swenson, and Heather Crawford

In this review, we explore social contagion as an understudied risk factor for non-suicidal self-injury (NSSI) among adolescents and young adults, populations with a high prevalence of NSSI. We review empirical studies reporting data on prevalence and risk factors that, through social contagion, may influence the transmission of NSSI. Findings in this literature are consistent with social modeling/learning of NSSI increasing risk of initial engagement in NSSI among individuals with certain individual and/or psychiatric characteristics. Preliminary research suggests iatrogenic effects of social contagion of NSSI through primary prevention are not likely. Thus, social contagion factors may warrant considerable empirical attention. Intervention efforts may be enhanced, and social contagion reduced, by implementation of psychoeducation and awareness about NSSI in schools, colleges, and treatment programs.

Keywords adolescents, non-suicidal self-injury, prevention, psychoeducation, social contagion, young adults

In this article we explore, in both psychiatric and community populations, whether the prevalence of non-suicidal self-injury (NSSI) increases by social contagion. We begin with an overview of the related area of social contagion and suicidality. We also review prevalence rates of and observed risk factors for NSSI, as these factors may inform who is most vulnerable to NSSI via social contagion. We then summarize the impact of exposure to NSSI through peer and media influences on the social contagion of NSSI in adolescents and young adults. Next, we consider social contagion in the context of primary prevention efforts through school-based psychoeducational programs

for NSSI. We conclude by addressing gaps in the literature and directions for future work.

Empirical evidence suggests social contagion of NSSI has been observed in inpatient units (e.g., Matthews, 1968; Nock & Prinstein, 2005), prisons (Rada & James, 1982), group homes, and special education schools (Rosen & Walsh, 1989; Walsh & Rosen, 1985), among community samples of adolescents (e.g., Nock, Prinstein, & Sterba, 2009; Prinstein, Heilbron, Guerry et al., 2010), young adults (e.g., Yates, Carlson, & Egeland, 2008), and college students (Heath, Ross, Toste et al., 2009; Muehlenkamp, Hoff, Licht et al., 2008).

NSSI involves the direct, deliberate self-inflicted destruction of one's own body tissue in the absence of suicidal intent (Favazza, 1987, 2012), which excludes practices accepted as cultural norms such as ear piercing, tattooing, circumcision, or culturally sanctioned healing rituals (Nock & Favazza, 2009). In this article, *social contagion* refers to the presence of NSSI in at least two people in the same group in a 24-hour time period (Rosen & Walsh, 1989) or statistically significant clusters of NSSI in the same group (Walsh & Rosen, 1985). In the context of social contagion, the terms *social learning* (Bandura, 1977), *imitation*, and *modeling* refer to an observer's inclination "to imitate a behavior of a model if the observer can identify with the model through shared common characteristics" (Insel & Gould, 2008, p. 305).

SOCIAL CONTAGION AND SUICIDALITY: IMPLICATIONS FOR NSSI

NSSI is considered part of the larger spectrum of thoughts and behaviors referred to as self-harm, which also includes suicidality (Nock & Favazza, 2009). The distinction between suicidality and NSSI involves intent, as suicidality involves some intent to die (Andover, Morris, Wren et al., 2012). In contrast to NSSI, suicidality is an outcome for which there is mounting evidence for the impact of direct exposure to suicidal behavior, suicide clusters, and media influences on subsequent imitation and modeling in adolescent suicidal behavior (see Insel & Gould, 2008 for a review). First, the majority of literature available supports positive associations between exposure to peer suicidal behavior and adolescent suicide attempts (Insel & Gould, 2008). For example, Bearman and Moody (2004) found that having a friend who attempted suicide increased adolescent suicidal ideation and attempts. Second, the available research on suicide clustering suggests that this phenomenon

occurs in the adolescent population with support for both time (temporal proximity of suicide clusters) and time-space (temporal-spatial proximity of suicide clusters) clustering (Insel & Gould, 2008). The consistency of these findings suggests that social learning, which produces imitation effects through identification with the observed model(s) (Bandura, 1977), plays a role in the onset and/or maintenance of adolescent suicidality.

Assortative relating has been proposed as an alternative explanation for the existence of social contagion (Joiner, 2003). This theory proposes that suicides appear to cluster because individuals form peer groups on the basis of shared similarities and vulnerabilities (i.e., selection; Brechwald & Prinstein, 2011; Kandel, 1978), including vulnerabilities to suicidal behavior (Joiner, 1999, 2003). However, it is unclear if assortative relating is a mutually exclusive factor versus a process complementary to modeling and exposure on suicidality in adolescents (Insel & Gould, 2008). Preliminary evidence suggests both socialization and selection effects are observable among self-injuring adolescents (Prinstein, Heilbron, Guerry et al., 2010).

The evidence supporting the social contagion of suicidality can inform the study of NSSI. Suicidality and NSSI both involve deliberate self-harm (Nock & Favazza, 2009) and commonly co-occur (e.g., Andover, Morris, Wren et al., 2012; Baetens, Claes, Muehlenkamp et al., 2011). However, despite their conceptual overlap, NSSI and suicidality are distinct behaviors that appear to be associated with unique risk factors (Andover, Morris, Wren et al., 2012; Ferrera, Terrinoni, & Williams, 2012), highlighting the need to specifically examine whether social contagion is also linked with NSSI.

PREVALENCE, ASSOCIATED RISK FACTORS, AND FUNCTIONS OF NSSI

Adolescence and early adulthood have been identified as periods of particular risk

for NSSI (Lloyd-Richardson, Perrine, Dierker et al., 2007). NSSI onset typically occurs between the ages of 12 and 14 (Jacobson & Gould, 2007). Recent longitudinal evidence suggests that the majority of adolescent NSSI will spontaneously remit in adulthood (Moran, Coffey, Romaniuk et al., 2012). For non-psychiatric preadolescents in grades six, seven, and eight, about 7.5% report having engaged in NSSI at least once in the past year (Hilt, Nock, Lloyd-Richardson et al., 2008). In high-school-aged community samples, prevalence estimates range from 13.9% to 21.4% (Muehlenkamp, Claes, Havertape et al., 2012; Ross & Heath, 2002; Zoroglu, Tuzun, Sar et al., 2003), while higher estimates between 30% and 40% have been observed in adolescent psychiatric populations (Darche, 1990; Jacobson, Muehlenkamp, Miller et al., 2008). Furthermore, about 25% of college student samples report having engaged in NSSI (Glenn & Klonsky, 2010; Klonsky & Olino, 2008; Whitlock, Eckenrode, & Silverman, 2006; Whitlock, Muehlenkamp, Purington et al., 2011).

Considerable attention has been placed upon identifying additional risk factors for NSSI. Some evidence suggests that females are at greater risk than males (Andover, Morris, Wren et al., 2012); however, it has yet to be determined if NSSI-specific gender differences exist across the lifespan (Miller, Muehlenkamp, & Jacobson, 2009). Depression, anxiety, emotional dysregulation, childhood abuse/trauma, posttraumatic stress, and substance use are associated with increased risk for NSSI (Andover, Morris, Wren et al., 2012; Jacobson, Muehlenkamp, Miller et al., 2008; Nock, Joiner, Gordon, et al., 2006; Yates, Carlson, & Egeland, 2008), as are dissociative and eating disorders, externalizing behaviors, and suicidal ideation and attempts (Jacobson, Muehlenkamp, Miller et al., 2008; Nock, Joiner, Gordon et al., 2006; Nock, Prinstein, & Sterba, 2009).

Importantly, many of these factors have also been found to increase susceptibility to social contagion. For example, adolescents appear to be particularly susceptible to social contagion of delinquency, and this susceptibility decreases with the transition to adulthood (Monahan, Steinberg, & Cauffman, 2009; Steinberg & Monahan, 2007). Adolescent males may be particularly sensitive to peer socialization of risky behaviors (e.g., substance use; Duncan, Boisjoly, Kremer et al., 2005; Erickson, Crosnoe, & Dornbusch, 2000), and among female adolescents social anxiety exacerbates susceptibility to peer contagion for depressive symptoms (Prinstein, 2007). Other individual characteristics found to enhance vulnerability to social contagion include difficulties with self-regulation (Gardner, Dishion, & Connell, 2008) and perceived susceptibility to peer influence (Prinstein, Brechwald, & Cohen, 2011). The potential mechanisms by which known risk factors may affect and be affected by NSSI social contagion are currently understudied and warrant further attention.

Recent research investigating *why* people self-injure also has implications for NSSI social contagion and warrants mention. Specifically, the four-function model for NSSI (Nock & Prinstein, 2004, 2005) identifies the consequences of self-injurious behavior as serving automatic and/or social functions, which are maintained by positive and/or negative reinforcement. Although automatic functions are reported more frequently as motivations for NSSI (Nock & Prinstein, 2004; Rodham, Hawton, & Evans, 2004), social functions are consistently endorsed (Nock, Prinstein, & Sterba, 2009) and may be of particular importance when considering social contagion. *Social negative reinforcement* occurs when the individual is faced with an interpersonal demand that he or she perceives as unpleasant and wishes to escape from or avoid. *Social positive*

reinforcement is observed in individuals motivated to engage in the behavior for attention from others or to change the status of their current environment (Nock & Cha, 2009). Gaining social support and feeling increased affiliation with others who self-injure may serve as contingencies providing strong social reinforcement for NSSI (Nock, 2008). The degree to which the attainment of these NSSI-related contingencies is visible to others has particular relevance to social contagion. Contagion within peer groups may be most apparent when adolescents observe a peer who has used NSSI successfully (i.e., has influenced others to act desirably; Nock, 2008; Suyemoto, 1998) and may contribute to others' initial engagement in NSSI.

EVIDENCE OF SOCIAL CONTAGION
FOR NSSI

Peer Influences

Consistent with social learning theory (Bandura, 1973), peer influence predicts a wide range of adolescent behaviors, attitudes, and symptoms through social learning and modeling (see Brechwald & Prinstein, 2011; Heilbron & Prinstein, 2008). Exposure to peer NSSI may put vulnerable adolescents (e.g., persons with comorbid conditions) at particular risk for perceiving the behavior as an effective coping strategy, especially because adolescents often identify with similar peers (Nock, 2008).

In order to examine peer influences of NSSI risk via social contagion, empirical investigations that examined NSSI and social contagion were identified via online searches in *PsychInfo* and cited reference searches (see Table 1). Of the 16 reports identified, seven involved psychiatrically impaired participants (six adolescent samples; one adult sample from a maximum-security hospital), seven included community participants (one high school

sample; three samples of online message board posters; one adolescent community sample; one middle school sample; one young adult community sample), and two involved college student participants. Importantly, all 16 studies found evidence supporting the link between NSSI and social contagion.

A notable portion of the empirical support for social contagion of NSSI was published two decades ago, or more (Ghaziuddin, Tsai, Naylor et al., 1992; Matthews, 1968; Rada & James, 1982; Rosen & Walsh, 1989; Walsh & Rosen, 1985; see Table 1). NSSI contagion was observed to increase and decrease according to the presence/absence of NSSI “initiators” in an inpatient setting (Matthews, 1968), occur in patients following direct contact with other self-injurers in a maximum-security hospital, often used to obtain specific gains (e.g., transfer to a different unit or hospital; Rada & James, 1982), transpire in significant, nonrandom clustering among residential in- and outpatients (Rosen & Walsh, 1989; Walsh & Rosen, 1985), and was evident in both time and time-space proximity among adolescent female inpatients (Ghaziuddin, Tsai, Naylor et al., 1992).

This older literature on the social contagion of NSSI includes important strengths. One strength is documentation of “epidemics” of NSSI among inpatient (e.g., Rosen & Walsh, 1989) and prison (Rada & James, 1982) samples that were observed from the initial onset of the contagion episode to its decline (e.g., Matthews, 1968). Another is the use of sociograms—pictorial representations of NSSI contagion among specific individuals—to provide information about how participants are linked to one another (e.g., direct contact vs. knowledge of other patient NSSI; Matthews, 1968; also see Rada & James, 1982; Rosen & Walsh, 1989). Another strength is documentation of participant interaction and NSSI

TABLE 1. Studies Reporting an Association of Social Contagion and Non-Suicidal Self-Injury (NSSI)

Investigator	Sample demographics	N	Assessment of NSSI	Assessment of social factors	Evidence of social contagion
Claes et al. (2010)	Community: High school ($M_{age} = 15.6$) 60% Female; Percent White not reported	150	Self-report: <i>Self-Harm Inventory</i> (22 yes/no items)	1. "Whether they knew other persons who perform NSSI" 2. "How many self-injuring acquaintances they have, indicating their perceived level of familiarity with each one (1 = <i>not at all familiar</i> to 5 = <i>very familiar with</i>)"	Self-injurers ($n = 34$; 73.9%) knew more peers who self-injured than non-injurers ($n = 45$; 43.4%)
Ghaziuddin et al. (1992)	Psychiatric: Inpatient ($M_{age} = 15.4$) 100% Female; Percent White not reported	12	Chart review: Investigators had access to staff reports and initial semi-structured interview data at patient admission	Chart review of staff reports and observations of patient behavior	Two patients engaged in NSSI together on two separate occasions; two patients engaged in NSSI within 3 days of another incident of NSSI on the unit
Heath et al. (2009)	Community: College ($M_{age} = 20.2$) 91% Female; Percent White not reported	23	Self-report: One question embedded in a coping measure assessing frequency on a 4-point scale (<i>frequently, a few times, once, or never</i>)	Investigator-generated yes/no questions (e.g., "How did you first think of the idea?" "Do you have friends who do it?") and an "other" choice for an open-ended response	58.8% reported that a peer had engaged in NSSI before he/she had; 65% endorsed using the same/some of the same method(s) of NSSI as peers; 21.7% endorsed self-injuring in front of/with friends; 43.6% reported social learning factors as contributing to initial thoughts about NSSI

(Continued)

TABLE 1. Continued

Investigator	Sample demographics	N	Assessment of NSSI	Assessment of social factors	Evidence of social contagion
Hodgson (2004)	Community: Self-selected message board members online (M_{age} not reported) 82% Female; Percent White not reported	22	No assessment: Investigator-generated questions asked via email (e.g., "When participants first began cutting and what was going on in their life at that time?")	Assessed knowledge of "anyone who cut prior to cutting themselves;" directly asked participants if they "thought cutting was a learned behavior"	Participants endorsed "other learning" (number of participants not reported) through books, friends, and the Internet
Matthews (1968)	Psychiatric: Inpatient ($M_{age} = 14.5$) 63.6% Female; Percent White not reported	11	Staff report and observation of patients	Staff report of the occurrence of NSSI on the unit; direct questioning of patients about reasons for NSSI	One patient reported a diminished desire to self-injure when the two NSSI "initiators" left the unit; one patient reported engaging in NSSI because another patient had; the observed epidemic of NSSI lasted for 7 months when the two "initiators" left the unit; 10 of 11 patients involved in the epidemic endorsed being directly influenced by others; 9 of 11 patients had indirect "knowledge of other participant" NSSI; two patients described NSSI as "imitation of someone else"

Muehlenkamp et al. (2008)	Community: College ($M_{age} = 19.3$) 65.7% Female; 94.1% White	1,965	Self-report: <i>Deliberate Self-Harm Inventory</i> (17 yes/no items assessing NSSI, onset, frequency, timing of last episode)	"Have you ever known someone who has purposefully injured themselves (e.g., cutting) without wanting to die?" (yes/no)	Exposure compared to non-exposure to NSSI in others was significantly associated with a higher prevalence of NSSI
Nock & Prinstein (2005)	Psychiatric: Inpatient ($M_{age} = 14.7$) 74% Female; 76.4% White	89	Self-report: <i>Functional Assessment of Self-Mutilation</i> (FASM)	Endorsement of "knowledge of performance of self-injurious behavior by their friends"	82.1% reported having at least one friend outside of the unit who self-injured in the previous year; social reinforcement items on the FASM were significantly correlated with number of friends' episodes of NSSI
Nock et al. (2009)	Community: ($M_{age} = 17.3$) 86.7% Female; 86.7% White	30	<i>Self-Injurious Thoughts and Behavior Interview</i> ; self-reported form & function of individual NSSI episodes	"Who were you with; what were you doing?" (option for why he/she engaged in NSSI: "other encouraged" NSSI)	1.7% of participants who did not self-injure and 3.8% of those who did at that time-point endorsed "being encouraged by someone" as an antecedent of the associated NSSI-related incident
Prinstein et al. (2010): Study 1	Community: Middle school (M_{age} not reported) 50% Female; 86% White	377	Self-report: (1 item) In the past year, how often have you "harmed or hurt your body on purpose (for example, cutting or burning your skin,	Collection of independent report of best friend's NSSI	Best friends' independent reports of frequency of NSSI were significant predictors of NSSI over time (for girls and sixth graders only)

(Continued)

TABLE 1. Continued

Investigator	Sample demographics	N	Assessment of NSSI	Assessment of social factors	Evidence of social contagion
Prinstein et al. (2010): Study 2	Psychiatric: Inpatient ($M_{age} = 13.5$) 72% Female; 74% White	140	hitting yourself, or pulling out your hair) without wanting to die?" (0 = <i>Never</i> to 5 = <i>Once a day</i>) Self-report: 5 item scale assessing frequency and type of NSSI in the past year	"List the number of close friends who have talked about wanting to hurt themselves or about suicide" (from the <i>Peer Behavior Inventory</i>)	Socialization and selection effects were detected: a reciprocal relationship was observed between participant NSSI and their perceptions of friends' NSSI; adolescents who self-injure befriend those with similar histories, which may promote future NSSI
Rada & James (1982)	Psychiatric: Patients at a maximum-security hospital for the "criminally insane" ($M_{age} = 24$); 0% Female Percent White not reported	6	Medical examination evaluation by staff psychiatrist, examination by at least one of the investigators (both held a medical degree), review of medical records and psychometric evaluations	Staff report of patient behavior, occurrence of urethral insertion, (i.e., self-mutilation), and patient and staff communication of an incident of urethral insertion	"Analysis of the temporal sequence and relationships among urethral self-mutilators indicates that each new incident occurred following direct personal contact with a previous self-mutilator;" news of the occurrence of an act of urethral insertion spread quickly in the hospital NSSI appeared to occur in a "nonrandom fashion" over the 10 month period, with
Rosen & Walsh (1989)	Psychiatric: Residential and outpatient ($M_{age} = 17.6$) 91.7%	12	No assessment: Data collected from daily staff reports that documented occurrence of	11 independent chi-square analyses were performed to examine whether "two or	

Walsh & Rosen (1985)	Female; Percent White not reported	NSSI over a 10 month period	more acts of self-mutilation (e.g., NSSI) that involved two or more individuals and occurred on the same day or consecutive days"	only 1 of the 12 participants never being part of NSSI contagion
Psychiatric: In- and outpatient ($M_{age} = 16.1$) Female; Percent White not reported	25	No assessment: Data collected from daily staff reports that documented 9 high-risk behaviors over 1 year	Examination of clustering of behaviors via sample runs tests for each of the 9 behaviors documented; consecutive days of occurrence of a behavior were considered a "run"	NSSI evidenced significant, distinct clustering among participants/patients over the one year time period
Whitlock et al. (2006): Study 1	Community: Members of Six message boards; 3,219 posts; 2,942 posts coded with themes about NSSI over the course of 2 months Percent White not collected	No assessment	Thematic categories used to code posts: "Requesting, sharing techniques;" "References to popular culture" (e.g., posting of song lyrics about NSSI)	200 occurrences (6.2%) of "Requesting, sharing techniques" were identified; 137 occurrences (4.2%) of "References to popular culture" were observed
Whitlock et al. (2006): Study 2	Community: Individual posters from online message boards; Age, percent Female, and percent White not reported	No assessment	Posts coded by type of exchange: "Soliciting and sharing techniques"	"Sharing techniques" was significantly, positively correlated with exchanges that "Discouraged disclosure" (of NSSI) and "Disclosed that someone knows" (about his/her NSSI)

(Continued)

TABLE 1. Continued

Investigator	Sample demographics	N	Assessment of NSSI	Assessment of social factors	Evidence of social contagion
Yates et al. (2008)	Community: <i>Minnesota Longitudinal Study of Parents and Children</i> (Age 26) 49% Female 68.3% White	164	<i>Self-Injurious Behavior Questionnaire</i> (SIBQ); “Spontaneously” reported motivation for NSSI: “Why do you think you (insert form(s) of self-injurious behavior)?” “Endorsed” motivations for NSSI: investigator-generated list	SIBQ: Interviewers questioned “whether participants had friends who engaged in self-injurious behavior” (yes/no)	53.8% of intermittent and 61.5% of recurrent self-injurers had a friend who self-injured at age 26

through staff chart notes and medical records (e.g., Ghaziuddin, Tsai, Taylor et al., 1992; Rosen & Walsh, 1989). This collection of studies offers strong evidence supporting the social contagion of NSSI in psychiatric and incarcerated samples via modeling and imitation.

More recent studies including inpatient samples also provide evidence for the social contagion of NSSI (Nock & Prinstein, 2005; Prinstein, Heilbron, Guerry et al., 2010; see Table 1). Among adolescent inpatients who engage in NSSI, the majority reported having a friend outside of the hospital setting who had engaged in NSSI in the past year (Nock & Prinstein, 2005) and both socialization and selection effects were observed for NSSI (Prinstein, Heilbron, Guerry et al., 2010). This literature is noteworthy for its focus on peer influence in the form of close friends of participants rather than peers within the unit (Nock & Prinstein, 2005; Prinstein, Heilbron, Guerry et al., 2010). Additionally, this evidence sheds light on participant NSSI prior to admission and speaks to the tendency for self-injurers to have friends who self-injure (Nock & Prinstein, 2005) and befriend individuals similar to themselves (i.e., friends with past or present NSSI; Prinstein, Heilbron, Guerry et al., 2010). Also, these results suggest that NSSI typically precedes hospitalization, indicating that initial onset is not attributable to imitation behavior adopted post-admission and/or motivated to obtain specific gains within the psychiatric unit. Rather, these psychiatrically impaired adolescents were previously exposed to NSSI through interactions with non-hospitalized peers and friends and may have extensive NSSI histories. Thus, social contagion factors that influence non-psychiatric self-injurers (e.g., exposure to NSSI in school, through the media, and via peer/dyadic influence) may also act as powerful determinants of NSSI among psychiatrically distressed populations.

Empirical support for the social contagion of NSSI also exists among community (Claes, Houbon, Vandereycken et al., 2010; Nock, Prinstein, & Sterba et al., 2009; Prinstein, Heilbron, Guerry et al., 2010; Yates, Carlson, & Egeland, 2008) and college samples (Heath, Ross, Toste et al., 2009; Muehlenkamp, Hoff, Licht et al., 2008; see Table 1). Contagion has been reported in the form of evidence for social learning (e.g., peer NSSI preceded onset of participant NSSI), overlap in method used to self-injure between friends, engagement in NSSI in front of or with others (Heath, Ross, Toste et al., 2009), and observation of a link between exposure to NSSI and increased prevalence of NSSI (Muehlenkamp, Hoff, Licht et al., 2008). Additional studies not limited to college populations also found that both adolescent and young adult self-injurers report greater affiliation with peers (Claes, Houbon, Vandereycken et al., 2010) and close friends who have engaged in NSSI (Prinstein, Heilbron, Guerry et al., 2010; Yates, Carlson, & Egeland, 2008) than non-injurers. Furthermore, Nock and colleagues (2009) found evidence that “encouragement by other(s)” acted as an antecedent of NSSI for a small percentage of adolescent participants recruited from community settings. Although accounting for only a small percentage, direct encouragement for NSSI by others (Nock, Prinstein, & Sterba, 2009) is a concerning method for the social transmission of NSSI.

Media Influences

Dramatic increases both in types of and exposure to popular media have transformed how we communicate. These increases have changed the impact of media from distal experiences (e.g., unidirectional forms like television and newspapers; Bronfenbrenner, 1979) to more proximal, interactive exposure (e.g., bidirectional forms like the Internet and social

networking sites; Whitlock, Purington, & Gershkovich, 2009). Novel behaviors like NSSI can be disseminated and normalized through media exposure, which may lead to priming effects in some susceptible individuals without a history of NSSI (Whitlock, Purington, & Gershkovich, 2009).

The Internet may be a particular area of concern for youth exposure to NSSI (Lewis, Heath, St. Denis et al., 2011; Lewis, Heath, Michal et al., 2012; Whitlock, Powers, & Eckenrode, 2006). Adolescents use the Internet for communication and socializing more than any other age group (Gross, 2004; Lenhart, Rainie, & Lewis, 2001) and may use virtual communities to disclose personal information to strangers going through similar difficulties (Ybarra, Alexander, & Mitchell, 2005; Zinoviev, Stefanescu, Swenson et al., 2012). Research on the individual experience of self-injurers involved in online communities (e.g., message boards) suggests that participants learned about NSSI from peers, books, and the Internet (Hodgson, 2004, see Table 1). Internet forums also appear to provide a venue for communication about NSSI including the sharing of techniques and discussion of popular culture considered “pro-NSSI” (e.g., song lyrics; Whitlock, Powers, & Eckenrode, 2006 [Table 1]; see also Zinoviev, Stefanescu, Swenson et al., 2012). Thus, the Internet may be involved in both initial exposure to NSSI and act as a vehicle for ongoing communication about NSSI among self-injurers. Further work in the online communicability of NSSI, including examinations of the processes by which communications initiate, reinforce, and/or help to extinguish NSSI, is needed.

Alcohol use, smoking, and sexual content in popular movies predict onset of these risky behaviors in adolescence (O’Hare, Gibbons, Gerrard et al., 2012; Sargent, Tanski, & Stoolmiller, 2012; Stoolmiller, Wills, McClure et al., 2012). In a similar effort to examine NSSI-related content in popular media, Whitlock and colleagues

(2009) documented the frequency of NSSI-related images and stories in movies, songs, and print news. Between 1966 and 2005, images and stories about NSSI across all three forms of media showed major and steady increases each year (e.g., over 50 songs were identified from 2000 to 2005 with reference to NSSI, while only 19 were identified between 1986 and 1995; Whitlock, Purington, & Gershkovich, 2009). Additionally, the “typical” character depicted in movies engaging in NSSI behaviors was found to be a White female between 12 and 30 years of age, of middle socioeconomic status, who used cutting as her primary method of NSSI (e.g., Evan Rachel Wood’s character in *Thirteen*; Levy-Hinte, London, & Hardwicke, 2003). The character was most often portrayed as being a strong individual with high character appeal. The majority of movie characters had implied comorbid mental disorders, did not attempt or complete suicide in addition to engaging in NSSI, and were not shown to be in or seeking formal treatment. In light of these findings, Whitlock and colleagues (2009) suggest that media exposure may be the original source of exposure to NSSI behavior for some individuals at risk. For individuals with current or lifetime histories of NSSI, media depictions (i.e., behavioral modeling) may reinforce NSSI behavior, particularly when characters in the media are portrayed as likable, similar to the individual, and whose stories align with the individual’s personal experiences with NSSI (Whitlock, Purington, & Gershkovich, 2009).

Prevention Efforts and Psychoeducation

Regardless of the concerning prevalence rates of NSSI in community samples of adolescents (Lloyd-Richardson, Perrine, Dierker et al., 2007; Nock, Prinstein, & Sterba, 2009), awareness of and comfort with addressing NSSI do not appear to be increasing in schools and among adults

interacting consistently with adolescents, like teachers and counselors (Best, 2005; Heath, Toste, & Beettam, 2006), or among students faced with peer disclosure of NSSI (Muehlenkamp, Walsh, & McDade, 2010). It is problematic that schools and institutions should seek training and awareness building for staff only *after* NSSI has become a prevalent issue (Best, 2005). When adolescents are asked how they think NSSI can be prevented, responses indicate that schools are an ideal setting to focus primary prevention efforts in light of the central role that schools have in adolescents' lives (Fortune, Sinclair, & Hawton, 2008; Hawton, Rodham, Evans et al., 2009). Previous research examining youth suicide prevention programs suggests that successful prevention programs comprehensively educate both school staff and students to increase knowledge and mental health awareness by addressing stigma, confidentiality, disclosure, and encouraging positive help-seeking attitudes (Chagnon, Houle, Marcoux et al., 2007; Portzky & van Heeringen, 2006).

Social contagion may be of concern in primary and secondary prevention efforts, which often include discussion and increased awareness of risk behaviors like NSSI (i.e., fears that discussing NSSI with youth may lead to NSSI behavior). On the other hand, NSSI social contagion may be exacerbated by the *lack* of awareness and knowledge about the behavior among individuals exposed to NSSI. For example, adolescents may be at increased risk for engaging in NSSI if they understand the behavior as serving a social function (e.g., to elicit desirable support from others by engaging in NSSI rather than asking for help; see Nock & Prinstein, 2004, 2005). Through carefully developed primary prevention efforts, awareness and knowledge can be increased without unwittingly glorifying health-damaging behaviors (cf. Mann, Nolen-Hoeksema, Huang et al., 1997) by providing accurate information

about the pathology of NSSI. The first study to explore a school-based prevention program specifically for NSSI found that the program was well received by school staff, feasible to implement in a school setting, effective in improving knowledge about NSSI, and successful in increasing help-seeking attitudes for high school students (Muehlenkamp, Walsh, & McDade, 2010). Importantly, no iatrogenic contagion effects were noted 6 weeks after the program was implemented. In fact, reported acts of NSSI showed a trend toward a decrease in frequency following implementation of the program (Muehlenkamp, Walsh, & McDade, 2010). This is consistent with related research reporting that assessing for suicidality does not lead to an increased risk for subsequent suicidal thoughts or behaviors (Gould, Marrocco, Kleinman et al., 2005). Although limited in scope, this evidence suggests that prevention efforts targeting NSSI can be implemented without contributing to social contagion.

CRITICAL EVALUATION OF THE CURRENT LITERATURE

As shown in Table 1, early key studies exploring contagion epidemics of NSSI in inpatient and incarcerated samples generally share many of the same limitations: small sample sizes, limited to all male (Rada & James, 1982) or all female participants (Ghaziuddin, Tsai, Naylor et al., 1992), failure to report racial and ethnic demographic information (Ghaziuddin, Tsai, Naylor et al., 1992; Rada & James, 1982), lack of standardized assessment or no assessment of NSSI (Rosen & Walsh, 1989), staff/researcher determination of intent of self-injurious behavior (Rada & James, 1982), lack of information regarding initial onset of NSSI outside of the study context (Walsh & Rosen, 1985), limited generalizability due to occurrence of contagion in

specific unit/facility of interest, and inability to infer causality from exposure to NSSI and initiation of NSSI behavior. Additionally, *NSSI* was not the term used to describe self-injurious behavior in earlier studies, nor did the working definition used for the purpose of this review exist; investigators typically used the term *self-mutilation* and employed varying methods to classify the behavior with regard to intent (e.g., according to staff vs. participant report; Rosen & Walsh, 1989). Unfortunately, several investigators did not clarify whether incidents of self-injurious behavior involved suicidal intent (e.g., Offer & Barglow, 1960; Taiminen, Kallio-Soukainen, Nokso-Koivisto et al., 1998) and are therefore not included in this review. Finally, participants in early studies of NSSI contagion had documented severe psychopathology, were hospitalized or incarcerated, and likely represent a distinct subgroup of self-injurers. Thus, results may not generalize to non-psychiatric populations or to self-injurers with less severe and enduring psychopathology. Notably, these studies provide evidence for patterns of contagion before the explosion of online connectivity and social media communication of today's culture.

Limitations across more recent studies (Table 1) also warrant attention. Common limitations include: cross-sectional study designs that hinder determination of causality, examination of social contagion factors as a secondary versus primary focus, lack of studies focused on initial onset of NSSI (i.e., retrospective vs. prospective designs), reliance on convenience samples (e.g., college students), small samples, lack of diversity (e.g., racial/ethnic, socioeconomic status, sexual orientation) among participants, self-report measures used for assessment of NSSI and exposure to NSSI, lack of application of standardized measures to assess NSSI (i.e., no psychometrics available), single item assessment of NSSI,

and absence of reports of effect size. Additionally, with the exception of Prinstein and colleagues (2010), most studies assess participant *perception* of other person and/or friend NSSI, without obtaining independent reports of NSSI by those individuals who may be identified as potential "initiators" of NSSI. As Prinstein and colleagues (2010) note, the impact of perception of other person NSSI and knowledge of actual NSSI behavior by others is a critical distinction to consider in understanding the mechanisms of peer influence involved in the social contagion of NSSI. Further, online research is limited by the study of a subset of self-injurers involved in online communities related to NSSI (i.e., selection bias; Hodgson, 2004), lack of demographic information about participants involved, and an absence of follow-up data on individual participants/posters over time (i.e., difficulties tracking anonymous posters).

RECOMMENDATIONS FOR FUTURE RESEARCH

Our aim was to review, in both psychiatric and community populations, whether the prevalence of non-suicidal self-injury (NSSI) increases by social contagion among adolescents and young adults, populations with a high prevalence of NSSI. Research to date suggests that—although the maintenance of NSSI is most likely due to reinforcement contingencies that develop over time (see Nock & Prinstein, 2004, 2005)—the *initial* engagement in NSSI may be particularly influenced by social contagion factors (Suyemoto, 1998; Yates, Carlson, & Ege-land, 2008). Contagion influences may include exposure to NSSI via friend NSSI (e.g., Nock & Prinstein, 2005; Prinstein, Heilbron, Guerry et al., 2010), selection and/or socialization effects (i.e., we select friends and then they socialize us; Claes,

Houben, Vandereycken et al., 2010; Prinstein, Heilbron, Guerry et al., 2010), and the media, including the Internet (Lewis, Heath, St. Denis et al., 2011; Whitlock, Powers, & Eckenrode, 2006; Whitlock, Purington, & Gershkovich, 2009). While this body of NSSI literature has expanded in recent years, considerable further attention is warranted.

We offer several directions for future research regarding specific contexts that involve the study of social contagion and NSSI, as well as for the field of NSSI research in general. First, the causal relationship between exposure to NSSI and onset of NSSI behavior requires further investigation through longitudinal study designs. For example, online research may benefit from longitudinal designs that allow researchers to evaluate the impact of participation in NSSI-related online communities (e.g., whether online discussion of sharing techniques to self-injure translates into actual use of those techniques; Whitlock, Powers, & Eckenrode, 2006). Second, rigorous multi-item assessments of NSSI, and the consistent use of shared terminology, will allow for more reliable, comparable examinations of the same behavioral phenomena across studies. Similarly, consistent examination of the specific self-injury methods employed rather than simply identifying presence/absence of NSSI may reveal important differences between social contagion, for example, in an individual who bites his/her nails until blood is drawn compared to someone who cuts his/her body with a razor blade (i.e., compulsive vs. impulsive NSSI; see Favaro & Santonastaso, 1998). Third, mediators and moderators involved in the association between exposure to NSSI and actual NSSI behavior is an area of critical importance to enhance our understanding of the mechanisms involved in the prevalence of NSSI (Prinstein, Heilbron, & Guerry, 2010) and the identification of individuals particularly

susceptible to contagion (Muehlenkamp, Hoff, Licht et al., 2008). Relatedly, recruitment of diverse samples (e.g., racial and sexual minorities) is critical to this growing field and has the potential to expand our knowledge of NSSI across various populations and provide accurate information about NSSI for individuals outside of the scientific and clinical community (e.g., school counselors, teachers, and parents). It is also clear that further work is needed to explore differences in types of exposure to NSSI (e.g., direct contact with an individual who self-injures, knowledge of other person's NSSI, observing a dialogue in an NSSI-related online social network) and whether certain types of exposure are causally linked to NSSI onset and/or future NSSI behaviors. Prevention and intervention efforts will likely benefit from ongoing explorations of these issues and how social contagion differentially affects onset versus maintenance factors for NSSI (e.g., whether "triggering" of NSSI differs from social contagion of NSSI, see Walsh & Rosen, 1985; functions of NSSI, see Nock & Prinstein, 2004, 2005).

The study of social contagion and NSSI among psychiatric inpatient samples provides an ideal, controlled context for careful exploration of dose-response effects for NSSI (i.e., more exposure to NSSI leads to heightened risk for NSSI behavior; see Claes, Houben, Vandereycken et al., 2010). Such research has the potential to replicate and significantly expand upon earlier work providing evidence for the social contagion of NSSI among patients exposed to a high number of daily contact hours with one another (Rosen & Walsh, 1989; Walsh & Rosen, 1985). Further, documenting NSSI with onset post-admission to inpatient settings provides a particularly powerful test of the causal impact of exposure to NSSI practiced by others.

Review of the available empirical research examining the impact of modeling

and imitation on NSSI among adolescents and young adults suggests that NSSI is a socially transmitted behavior. While the etiology of NSSI remains unknown, it appears that for some individuals, exposure to NSSI through peers and/or the media may contribute to onset and maintenance of the behavior. Carefully constructed psychoeducational programs, skills groups, and general awareness building (e.g., in mainstream health courses) have the potential to combat misrepresentation of NSSI as an effective coping strategy and therefore decrease social contagion of these behaviors.

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The Impact of Social Contagion on Non-Suicidal Self-Injury

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