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Investigating the Co-Occurrence of Self-Mutilation and Suicide Attempts among Opioid-Dependent Individuals

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Abstract

The prevalence and risk factors associated with self-mutilation among opioid dependent cases and controls were determined, and the co-occurrence of self-mutilation and attempted suicide was examined. The prevalence of self-mutilation among cases and controls did not differ significantly (25% vs. 23%, respectively), with gender differences identified among cases only. A number of risk factors were found to be associated with self-mutilation, including borderline personality disorder, alcohol dependence, childhood sexual abuse, and multiple suicide attempts. Not only is self-mutilation a clinically significant problem, but when combined with a history of attempted suicide, the psychological dysfunction observed is markedly high.

Self-mutilation has been defined as the "deliberate, direct destruction or alteration of body tissue without conscious suicidal intent" (Favazza, 1998, p. 260). It has been estimated that around 2% to 4% of individuals in the general population have engaged in at least one episode of self-mutilation over their lifetime (Briere & Gil, 1998; Suyemoto, 1998). Self-mutilation can vary greatly, but includes cutting and burning the skin, banging the head and limbs, picking at wounds, chewing fingers, needle-sticking, inserting objects under the skin, and self-biting (Favazza, 1998; Gratz, 2001; Ross & McKay, 1979; Winchel & Stanley, 1991). Self-mutilation is a clinically significant problem which poses a great strain on the health care system due to multiple hospital admissions.

Elevated levels of self-mutilation have been identified among samples of drug users (estimates range from 10% to 46%; Cumming, Covic, & Murrell, 2006; Evans & Lacey, 1992; Evren & Evren, 2005; Harned, Najavitis, & Weiss, 2006; Langbehn & Pfohl, 1993; Turell & Armsworth, 2000; Zlotnick, Mattia, & Zimmerman, 1999; Zlotnick et al., 1997), but few studies, if any, have examined opioid users. Given that studies have suggested that opioid users are more likely to attempt suicide (Darke & Ross, 2002), and that suicide attempts are highly predictive of self-mutilation in other groups (Evren & Evren, 2005; Langbehn & Pfohl, 1993; Parker et al., 2005; Roy, 1978; Stanley, Gameroff, Michalsen, & Mann, 2001; Suyemoto, 1998), it might be assumed that opioid users would be more likely

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to self-mutilate. Considering the research examining self-mutilation among opioid users is limited, it is difficult to know if this assumption is true.

A number of other risk factors for self-mutilation have been identified, including demographic characteristics, psychological disorders, and childhood trauma. A majority of studies have identified that self-mutilation begins during middle to late adolescence, with being single often identified as a risk factor (Favazza & Conterio, 1989; Pattison & Kahan, 1983; Suyemoto, 1998; Wilhelm et al., 1999). The evidence on whether females are at an increased risk of self-mutilation compared to males is mixed (Gratz, 2001; Nijman et al., 1999; Pattison & Kahan, 1983; Suyemoto, 1998; Tantam & Whittaker, 1992; Wilhelm et al., 1999; Zlotnick et al., 1999). A number of psychological disorders have been identified as associated with significant risk for self-mutilation, including borderline personality disorder (BPD); depression; and anxiety disorders, particularly posttraumatic stress disorder (PTSD) (Andover, Pepper, Ryabchenko, Orrico, & Gibb, 2005; Chapman, Specht, & Cellucci, 2005; Gunderson, 2001; Klonsky, Oltmanns, & Turkheimer, 2003; Parker et al., 2005; Sansone, Songer, & Miller, 2005; Sansone, Wiederman, & Sansone, 2000; Skegg, Nada-Raja, & Moffitt, 2004; Suyemoto, 1998; Wilhelm et al., 1999; Zlotnick et al., 1999). Additionally, childhood abuse and neglect have been consistently identified as risk factors for self-mutilation, with childhood sexual abuse receiving the most attention (Akyuz, Sar, Kugu, & Dogan, 2005; Gratz, 2003; Langbehn & Pfohl, 1993; Nijman et al., 1999; Turell & Armsworth, 2000). It has been estimated that among those who reported at least one subtype of abuse (physical, sexual, or emotional) or neglect, the rate of self-mutilation increased 39 times (Akyuz et al., 2005).

Despite self-mutilation being acknowledged as a clinically significant issue, it is poorly understood and under researched. Our study aimed to examine the prevalence of self-mutilation among an opioid-dependent case group and a non-opioid-dependent control group. The control group was used to determine if opioid-dependence per se was related to a history of self-mutilation. Our aim was to explore the clinical characteristics among those with a history of self-mutilation, and determine if those with a history of both self-mutilation and suicide attempts had a more severe clinical profile than others. The specific aims of the current study were: (1) to determine if opioid-dependent cases were more likely to report a history of self-mutilation compared to non-opioid-dependent controls; (2) to compare the characteristics of the four subgroups: (a) those with a history of self-mutilation only (SM); (b) those with a history of suicide attempts only (SA); (c) those with a history of both self-mutilation and suicide attempts (BOTH); and (d) those with a history of neither behavior (NONE); and (3) to examine the factors associated with risk for self-mutilation.

Method

Procedure

We utilized data collected from a large retrospective case-control study examining genetic and environmental factors contributing to opioid dependence liability. Cases and controls were required to have an adequate understanding of English (essential for informed consent and the structured interview used), and to be aged 18 years old or over. Additionally, cases had to have participated in pharmacotherapy maintenance treatment for opioid dependence at some point in their lives, with no minimum time of enrollment required. Controls were additionally required to have used opioids illicitly less than five times over their lifetime.

Cases were recruited from both public and private opioid maintenance treatment clinics in New South Wales (NSW), Australia, with flyers and posters used to invite individuals to participate. Controls were recruited from employment centers and community centers, open street malls, and local press servicing the same geographical area as the opioid maintenance

treatment clinics. Recruitment was targeted at matching cases and controls on age, gender, and employment status. The matching criteria and the recruitment of the groups from the same geographical areas were techniques employed as proxy measures for ethnicity and social disadvantage. Data reported here were collected from December 2004 to September 2006. The major demographic characteristics were identified as similar to the NSW sample of heroin users enrolled in the Australian Treatment Outcome Study (ATOS) and the 2005 national Illicit Drug Reporting System (IDRS) sample (Ross et al., 2003; Stafford et al., 2005).

All interviews were conducted by trained interviewers with graduate and postgraduate qualifications in psychology or social sciences and who had received comprehensive training in the administration of the structured diagnostic interview used in the study. All participants were guaranteed any information given to the researchers would be kept strictly confidential as part of the consent protocol that was approved by the institutional review boards of the University of New South Wales, Washington University, Queensland Institute of Medical Research, and, for case group, the ethics committee responsible for oversight of research at the opioid maintenance treatment clinics.

Structured Interview

Researchers administered a structured interview to all participants containing 16 sections. *DSM-IV* lifetime diagnoses of substance use disorders (dependence on cannabis, sedatives, opioids, stimulants, cocaine, nicotine, and alcohol), *DSM-IV* diagnoses of lifetime PTSD, major depressive episode, anti-social personality disorder (ASPD), and panic disorder were obtained using sections adopted and modified from the Collaborative Study on the Genetics of Alcoholism (COGA) Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA-II) (Bucholz et al., 1994; Hesselbrock, Easton, Bucholz, Schuckit, & Hesselbrock, 1999). The BPD screener was adapted from the International Personality Disorder Examination (IPDE) for use in the Australian National Survey of Mental Health and Wellbeing using *ICD-10* criteria (Jackson & Burgess, 2000; Loranger et al., 1994; World Health Organization, 1993). Additional questions relating to the participants' heroin use were based on sections of the COGASSAGA-II (Bucholz et al., 1994; Hesselbrock et al., 1999).

Sections adapted from the Christchurch Trauma Assessment, used in the Christchurch Health and Development Study (Fergusson, Horwood, & Woodward, 2000), elicited information related to physical abuse as a child, domestic violence, physical revictimization after 18 years old, external support seeking, adult physical aggression, reduced child presence in the home, sexual abuse as a child, and unwanted sexual activity after 18 years old. Questions related to emotional abuse and neglect as a child were also included to elicit how the respondent was made to feel during their childhood in terms of factors such as self-worth, being wanted in the family, and lack of support.

Consistent with previous research (Darke, Ross, Lynskey, & Teesson, 2004), *attempted suicide* was defined as deliberate self-harm with the intention of causing death. *Persistent suicidal thoughts* were defined as those lasting 7 days or longer. Similarly, *self-mutilation* was defined consistent with previous research (Favazza, 1998) as deliberate self-injury (e.g., slashing a limb or burning oneself) with no intention of causing death. The section on attempted suicide and self-harm was adapted from the COGA SSAGA-II (Bucholz et al., 1994; Hesselbrock et al., 1999), with additional questions included to assess, in more depth, the characteristics of the participants' most serious suicide attempt.

Participants also completed the Barratt Impulsiveness Scale version 11 (BIS-11; Patton, Stanford, & Barratt, 1995). The BIS is the most frequently used self-report measure of

impulsivity (Dougherty, Mathias, Marsh, Moeller, & Swann, 2004), and has been found to be valid and reliable in a number of different languages (Moeller et al., 2002; Patton et al., 1995). In order to make the scale more clinically useful, the 75th percentile total BIS-11 score was used as a cut off to differentiate between high and low impulsivity (Doran, Spring, McChargue, Pergadia, & Richmond, 2004). Although no established cut offs exist for the BIS-11, other studies have suggested the use of the 75th percentile score (Baca-Garcia et al., 2004).

Statistical Analyses

T tests were used for continuous variables, while chi-square statistics were reported for nondichotomous categorical variables, with odds ratios and 95% confidence intervals reported. Case and control data were pooled after the initial analyses considering no statistically significant differences were identified, and also to increase statistical power given the small numbers reporting each of the behaviors identified. Participants were split into four groups to enable comparisons to be made: those with a history of self-mutilation only (SM); those with a history of suicide attempts only (SA); those with a history of both self-mutilation and suicide attempts (BOTH); and those with no history of self-harm (NONE). A multiple logistic regression using backwards elimination was performed to determine the risk factors for self-mutilation. The independent variables chosen for inclusion were selected as those that have been identified within the literature as risk factors for self-mutilation. All statistical analyses were conducted using SPSS for Windows (version 14.0).

Results

Sample Characteristics

The sample consisted of 686 opioid-dependent cases and 280 non-opioid-dependent controls. Cases were significantly older (36.7 vs. 34.1, $p<0.001$, $t_{471}=-2.63$) and more likely to be male (61% vs. 41%, OR 2.21, 95% CI 1.66-2.93). Cases were also significantly more likely than controls to have a prison history (54% vs. 4%, OR 26.46, 95% CI 14.56–48.09), to have completed 10 years or less of education (49% vs. 15%, OR 5.70, 95% CI 3.96–8.19), and to be unemployed at the time of the interview (84% vs. 54%, OR 4.33, 95% CI 3.18–5.91).

Cases were significantly more likely to be dependent on any of the drug classes examined (see Table 1). Cases were also significantly more likely to screen positive for BPD and to meet criteria for a diagnosis of PTSD, ASPD, or a depressive episode, compared to controls. Cases were significantly more likely to report the experience of childhood physical and sexual maltreatment, as well as neglect. There were no significant group differences for a panic disorder diagnosis or for experiencing emotional maltreatment as a child.

Prevalence and Characteristics of Self-Mutilation

After controlling for age, gender, and employment status, no significant differences were found in the reported prevalence of self-mutilation among cases and controls (25% vs. 23%, respectively). Female cases were significantly more likely to report a history of self-mutilation compared to male cases (31% vs. 18%, OR 2.12, 95% CI 1.48–3.04), but there were no gender differences among controls. Additionally, both cases and controls reported that their first episode of self-mutilation occurred during adolescence (16 years vs. 17 years old, respectively).

Features of Those With and Without a History of Self-Harm

To investigate the features of individuals with a history of self-mutilation (without attempted suicide), the characteristics of those in the NONE group were compared to those in the SM

group. Compared to those in the NONE group, those in the SM group were significantly more likely to be female, younger, and to have completed more than 10 years of schooling. Additionally, those in the SM group were significantly more likely to report every childhood maltreatment subtype (Table 2). Those in the SM group were significantly more likely to meet criteria for alcohol dependence and to meet criteria for dependence on more lifetime drug classes, compared to those in the NONE group (Table 3). Those in the SM group were significantly more likely to meet criteria for a depressive episode and to screen positively for BPD, compared to those in the NONE group (Table 4).

The characteristics the BOTH group were examined to determine if those with a history of both self-mutilation and suicide attempts had a more severe clinical profile. Those in the BOTH group were more likely to report multiple lifetime suicide attempts compared to those in the SA group (Table 4). The results also showed that the highest proportion of participants reporting most of the mental health and substance dependence disorders examined had a history of both behaviors (Table 3 and Table 4). Additionally, those reporting a history of both behaviors were also more likely to report a history of childhood maltreatment (particularly childhood sexual abuse and neglect) (Table 2). The addition of suicide attempts to self-mutilation appeared to be associated with increased risk for most mental health disorders and characteristics examined, above having a history of either behavior alone (Table 4). In fact, a significantly increased risk for screening positively for BPD was identified in the BOTH group compared to the SA only group. The finding that the risk of each disorder occurring was found to increase incrementally across the range of group severity (Table 4) is also noteworthy.

Risk Factors Associated with Self-Harm

The study results identified six unique risk factors for self-mutilation, which included younger age, alcohol dependence, persistent suicidal thoughts, screening positively for BPD, a reported history of childhood sexual maltreatment, and multiple lifetime suicide attempts (Table 5).

Discussion

Self-mutilation has been acknowledged to be a clinically significant problem, particularly among adolescents. In this study, we found that opioid dependent cases and non-opioid dependent controls were equally likely to report self-mutilation. While previous research has suggested that opioid users are at an increased risk of suicide attempts compared to the general population (Darke & Ross, 2002; Maloney, Degenhardt, Darke, Mattick, & Nelson, 2007), our research highlights that self-mutilation and suicide attempts are distinct behaviors which need to be considered independently of each other.

Due to the lack of previous research in this area, it is difficult to comment further as to why no differences were identified among cases and controls in terms of self-mutilation. It is not surprising, however, that a high prevalence of self-mutilation was identified among controls (compared to general population samples) given the severe clinical profile identified among this group. A number of studies have identified an association between self-mutilation and a substance use or a psychological disorder (Cumming et al., 2006; Evans & Lacey, 1992; Evren & Evren, 2005; Harned et al., 2006; Langbehn & Pfohl, 1993; Turell & Armsworth, 2000; Zlotnick et al., 1999; Zlotnick et al., 1997); however, our findings suggest that it is not opioid dependence specifically that increases an individual's risk of self-mutilation, but the social disadvantage which can be associated with a drug dependent lifestyle. The same risk factors identified for self-mutilation are often seen at elevated levels among drug dependent individuals, which increases the risk of self-mutilation occurring.

The assessment of suicidal ideation, plans, and attempts are a routine aspect of clinical care; our findings suggest the need for self-mutilation to also be routinely assessed among individuals presenting with substance use or mental health problems. The reverse could also be suggested. If an individual discloses a history of self-mutilation it is important for clinicians to assess the possibility of co-occurring substance use or mental health disorders as these may be driving the self-harm, and could assist in the treatment of both disorders.

BPD was identified here as a unique predictor of self-mutilation. It could be argued that this association is a product of the self-harm criterion within the BPD diagnosis. When this criterion was removed from the analysis, BPD was still found to be highly predictive of self-mutilation. Other studies have found similar results after removing this criterion from the BPD diagnosis (Darke, Williamson, Ross, Teesson, & Lynskey, 2004). Furthermore, many of the other symptom criteria within the BPD diagnosis have elements of the feelings identified within the literature as driving self-mutilation, such as escape from emotional pain and relief from unpleasant feelings (guilt, anger, loneliness, etc.) (Cumming et al., 2006; Gratz, 2003; Suyemoto, 1998; Walsh & Rosen, 1988). It has also been suggested that suicide attempts among individuals with a personality disorder and a history of self-mutilation are often viewed as manipulative and non-serious (Pattison & Kahan, 1983; Stanley et al., 2001); considering the high rates of completed suicide among this population (Stanley et al., 2001) and the levels of psychological dysfunction identified in this study, this view is highly debatable.

Our findings suggest that all self-mutilation is deserving of clinical attention and that the co-occurrence of self-mutilation and suicide attempts is associated with substantial risk of comorbid psychopathology. The presence of comorbid psychiatric and substance use disorders and a history of traumatic childhood experiences greatly complicates clinical management. The need to address all of these problems, whether simultaneously or sequentially, is made more difficult since the presence of one disorder or problem may drive the occurrence of other disorders and self-harm behaviors. For example, childhood maltreatment is associated with risk for BPD, and both of these are associated with risk for poor coping and problematic adult relationships which often drive both self-mutilation and suicide attempts.

A number of limitations exist in the current study. The case and control groups were not balanced entirely in terms of age, sex, and employment status; however, these factors were controlled for statistically. The reliance on self-report and the amount of recall bias introduced in assessing lifetime prevalence could be highlighted as a limitation, yet these measures are commonly used in studies on illicit drug users and have been shown to be adequately valid and reliable (Darke, 1998; Dougherty et al., 2004). It has also been suggested that underreporting may exist when assessing sensitive issues such as childhood abuse, but studies have shown developmental outcomes are not affected by such underreporting (Fergusson et al., 2000). Risk estimates obtained from opioid-dependent individuals receiving maintenance treatment are likely to be somewhat conservative versus those including individuals who are actively using opioids. The degree of psychopathology and adversity reported by our control group was surprising; the risk estimates we have presented here, may be conservative because we have overly controlled for life adversity. Because lifetime measures of psychopathology were used, it is difficult to determine whether self-harm preceded the occurrence of the risk factors assessed.

Conclusions

To our knowledge, this study is the first to examine self-mutilation among an opioid dependent case group and a non-opioid control group. Although more research is needed, it

is possible to conclude that not only is self-mutilation a clinically significantly problem but when combined with a history of attempted suicide, the psychological dysfunction observed is markedly high. Routine assessment of self-harm should be implemented for those presenting with any of the highlighted risk factors. This assessment should consider both suicide attempts and self-mutilation, with the two recognized as distinct behaviors. The reverse is also true in that if disclosure of self-harm is made, clinicians should assess for any underlying comorbid conditions.

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References

Akyuz G, Sar V, Kugu N, Dogan O. Reported childhood trauma, attempted suicide and self-mutilative behavior among women in the general population. European Psychiatry. 2005; 20:268–273. [PubMed: 15935427]

Andover MS, Pepper CM, Ryab-chenko KA, Orrico EG, Gibb BE. Self-mutilation and symptoms of depression, anxiety, and borderline personality disorder. Suicide and Life-Threatening Behavior. 2005; 35:581–591. [PubMed: 16268774]

Baca-Garcia E, Vaquero C, Diaz-Sastre C, Garcia-Resa E, Saiz-Ruiz J, Fernandez-Piqueras J, et al. Lack of association between the serotonin transporter promoter gene polymorphism and impulsivity or aggressive behaviour among suicide attempters and healthy volunteers. Psychiatry Research. 2004; 126:99–106. [PubMed: 15123389]

Briere J, Gil E. Self-mutilation in clinical and general population samples: Prevalence, correlates and functions. American Journal of Orthopsychiatry. 1998; 68:609–620. [PubMed: 9809120]

Bucholz KK, Cadoret R, Cloninger RC, Dinwiddie SH, Hesselbrock VM, Nurnberger JI, et al. A new, semi-structured psychiatric interview for use in genetic linkage studies: A report on the reliability of SSAGA. Journal of Studies on Alcohol. 1994; 55:149–158. [PubMed: 8189735]

Chapman AL, Specht MW, Cellucci T. Borderline personality disorder and deliberate self-harm: Does experimental avoidance play a role? Suicide and Life-Threatening Behavior. 2005; 35:388–399. [PubMed: 16178694]

Cumming S, Covic T, Murrell E. Deliberate self-harm: Have we scratched the surface? Behaviour Change. 2006; 23:186–199.

Darke S. Self-report among injecting drug users: A review. Drug and Alcohol Dependence. 1998; 51:253–263. [PubMed: 9787998]

Darke S, Ross J. Suicide among heroin users: Rates, risk factors and methods. Addiction. 2002; 97:1383–1394. [PubMed: 12410779]

Darke S, Ross J, Lynskey MT, Teesson M. Attempted suicide among entrants to three treatment modalities for heroin dependence in the Australian Treatment Outcome Study (ATOS): Prevalence and risk factors. Drug and Alcohol Dependence. 2004; 73:1–10. [PubMed: 14687954]

Darke S, Williamson A, Ross J, Teesson M, Lynskey M. Borderline personality disorder, antisocial personality disorder and risk-taking among heroin users: Findings from the Australian Treatment Outcome Study (ATOS). Drug and Alcohol Dependence. 2004; 74:77–83. [PubMed: 15072810]

Doran N, Spring B, McChargue D, Pergadia M, Richmond M. Impulsivity and smoking relapse. Nicotine and Tobacco Research. 2004; 6:641–647. [PubMed: 15370160]

Dougherty DM, Mathias CW, Marsh DM, Moeller GF, Swann AC. Suicidal behaviors and drug abuse: Impulsivity and its assessment. Drug and Alcohol Dependence. 2004; 76(Supplement 1):s93–s105. [PubMed: 15555820]

Evans C, Lacey JH. Multiple self-damaging behaviour among alcoholic women: A prevalence study. British Journal of Psychiatry. 1992; 161:643–647. [PubMed: 1330191]

Evren C, Evren B. Self-mutilation in substance-dependent patients and relationship with childhood abuse and neglect, alexithymia and temperament and character dimensions of personality. Drug and Alcohol Dependence. 2005; 80:15–22. [PubMed: 16157228]

Favazza AR. The coming of age of self-mutilation. The Journal of Nervous and Mental Disease. 1998; 186:259–268. [PubMed: 9612442]

Favazza AR, Conterio K. Female habitual self-mutilators. Acta Psychiatrica Scandinavica. 1989; 79:283–289. [PubMed: 2711856]

Fergusson DM, Horwood LJ, Woodward LJ. The stability of child abuse reports: A longitudinal study of the reporting behaviour of young adults. Psychological Medicine. 2000; 30:529–544. [PubMed: 10883709]

Gratz KL. Measurement of deliberate self-harm: Preliminary data on the Deliberate Self-Harm Inventory. Journal of Psychopathology and Behavioral Assessment. 2001; 23:253–263.

Gratz KL. Risk factors for and functions of deliberate self-harm: An empirical and conceptual review. Clinical Psychology. 2003; 10:192–205.

Gunderson, JG. Borderline personality disorder: A clinical guide. Washington: American Psychiatric Publishing; 2001.

Harned MS, Najavitis LM, Weiss RD. Self-harm and suicidal behavior in women with comorbid PTSD and substance dependence. The American Journal on Addictions. 2006; 15:392–395. [PubMed: 16966196]

Hesselbrock M, Easton C, Bucholz KK, Schuckit M, Hesselbrock V. A validity study of the SSAGA—A comparison with the SCAN. Addiction. 1999; 94:1361–1370. [PubMed: 10615721]

Jackson HJ, Burgess PM. Personality disorders in the community: A report from the Australian national survey of mental health and wellbeing. Social Psychiatry and Psychiatic Epidemiology. 2000; 35:531–538.

Klonsky DE, Oltmanns TF, Turkheimer E. Deliberate self-harm in a nonclinical population: Prevalence and psychological correlates. American Journal of Psychiatry. 2003; 160:1501–1508. [PubMed: 12900314]

Langbehn DR, Pfohl B. Clinical correlates of self-mutilation among psychiatric inpatients. Annals of Clinical Psychiatry. 1993; 5:45–51. [PubMed: 8348198]

Loranger AW, Sartorius N, Andreoli A, Berger P, Buchheim P, Channabasavanna SM, et al. The international personality disorder examination: The World Health Organization/Alcohol, Drug Abuse, and Mental Health Administration international pilot study of personality disorders. Archives of General Psychiatry. 1994; 57:215–224. [PubMed: 8122958]

Maloney E, Degenhardt L, Darke S, Mattick RP, Nelson EC. Suicidal behaviour and associated risk factors among opioid dependent persons: A case-control study. Addiction. 2007; 102:1933–1941. [PubMed: 17784898]

Moeller GF, Dougherty DM, Barratt ES, Oderinde V, Mathias CW, Harper AR, et al. Increased impulsivity in cocaine dependent subjects independent of antisocial personality disorder and aggression. Drug and Alcohol Dependence. 2002; 68:105–111. [PubMed: 12167556]

Nijman HLI, Dautzenberg M, Merckelbach HLGJ, Jung P, Wessel I, Campo J. Self-mutilating behaviour of psychiatric inpatients. European Psychiatry. 1999; 17:1–7.

Parker G, Malhi G, Mitchell P, Kotze B, Wilhelm K, Parker K. Self-harming in depressed patients: Pattern analysis. Australian and New Zealand Journal of Psychiatry. 2005; 39:899–906. [PubMed: 16168017]

Pattison EM, Kahan J. The deliberate self-harm syndrome. American Journal of Psychiatry. 1983; 140:867–872. [PubMed: 6859301]

Patton JH, Stanford MS, Barratt ES. Factor structure of the Barratt Impulsiveness Scale. Journal of Clinical Psychology. 1995; 51:768–774. [PubMed: 8778124]

Ross, J.; Teesson, M.; Darke, S.; Lynskey, M.; Hetherington, K.; Mills, K., et al. Characteristics of heroin users entering three treatment modalities in New South Wales: Baseline findings from the Australian Treatment Outcome Study (ATOS) (Technical Report No 139). Sydney: National Drug and Alcohol Research Centre, University of New South Wales; 2003.

Ross, RR.; McKay, HB. Self-mutilation. Lexington: Lexington Books; 1979.

Roy A. Self-mutilation. British Journal of Medical Psychology. 1978; 51:201–203. [PubMed: 646965]

Sansone RA, Songer DA, Miller KA. Childhood abuse, mental healthcare utilization, self-harm behavior, and multiple psychiatric diagnoses among inpatients with and without a borderline diagnosis. Comprehensive Psychiatry. 2005; 46:117–120. [PubMed: 15723028]

Sansone RA, Wiederman MW, Sansone LA. Medically self-harming behavior and its relationship to borderline personality symptoms and somatic preoccupation among internal medicine patients. The Journal of Nervous and Mental Disease. 2000; 188:45–47. [PubMed: 10665460]

Skegg K, Nada-Raja S, Moffitt TE. Minor self-harm and psychiatic disorders: A population-based study. Suicide and Life-Threatening Behavior. 2004; 34:187–196. [PubMed: 15191275]

Stafford, J.; Degenhardt, L.; Black, E.; Bruno, R.; Buckingham, K.; Fetherston, J., et al. Australian drug trends 2005: Findings from the Illict Drug Reporting System (IDRS) (monograph no 59). Sydney: National Drug and Alcohol Research Centre, University of New South Wales; 2005.

Stanley B, Gameroff MJ, Michalsen V, Mann JJ. Are suicide attempters who self-mutilate a unique population? The American Journal of Psychiatry. 2001; 158:427–432. [PubMed: 11229984]

Suyemoto KL. The functions of self-mutilation. Clinical Psychology Review. 1998; 18:531–554. [PubMed: 9740977]

Tantam D, Whittaker J. Personality disorder and self-wounding. British Journal of Psychiatry. 1992; 161:451–464. [PubMed: 1393332]

Turell SC, Armsworth MW. Differentiating incest survivors who self-mutilate. Child Abuse & Neglect. 2000; 24:237–249. [PubMed: 10695518]

Walsh, BW.; Rosen, PM. Self-mutilation: Theory, research, and treatment. New York: Guilford; 1988.

Wilhelm S, Keuthen NJ, Deckersbach T, Engelhard IM, Forker AE, Baer L, et al. Self-injurious skin picking: Clinical characteristics and comorbidity. Journal of Clinical Psychiatry. 1999; 60:454–459. [PubMed: 10453800]

Winchel RM, Stanley M. Self-injurious behavior: A review of the behavior and biology of self-mutilation. The American Journal of Psychiatry. 1991; 148:306–317. [PubMed: 1847025]

World Health Organization. The International Classification of Diseases, version 10 (ICD-10). Geneva: World Health Organization; 1993.

Zlotnick C, Mattia JI, Zimmerman M. Clinical correlates of self-mutilation in a sample of general psychiatric patients. The Journal of Nervous and Mental Disease. 1999; 187:296–301. [PubMed: 10348084]

Zlotnick C, Shea TM, Recupero P, Bidadi K, Pearlstein T, Brown P. Trauma, dissociation, impulsivity, and self-mutilation among substance abuse patients. American Journal of Orthopsychiatry. 1997; 61:650–653. [PubMed: 9361872]

TABLE 1
Mental Health Characteristics of Whole Sample

	Case (*N*=686)	Control (*N*=280)	Comparisons (Adjusted OR and 95% CI)^
Lifetime Drug Dependence			
% Cannabis	57	31	2.94 (2.13– 4.07)**
% Sedative	39	2	33.40 (13.50–82.63)**
% Stimulants	51	19	4.31 (3.02– 6.14)**
% Cocaine	36	3	17.79 (8.56–36.96)**
% Alcohol	42	30	1.43 (1.04– 1.97)**
Mean drug classes ever#	2.1	0.8	$t_{724} = -1.32$**
% Tobacco	67	44	2.42 (1.79– 3.29)**
Psychopathology			
% Borderline personality disorder	58	35	2.36 (1.73– 3.21)**
% Depressive episode	59	51	1.37 (1.01– 1.85)*
% Posttraumatic stress disorder	36	19	2.39 (1.66– 3.43)**
% Panic disorder	23	26	ns
% Anti-social personality disorder	46	17	3.45 (2.40– 4.97)**
Childhood Maltreatment			
% Physical	59	40	1.95 (1.44– 2.64)**
% Emotional	74	70	ns
% Sexual	49	48	1.50 (1.09– 2.07)*
% Neglect	42	30	1.61 (1.17– 2.21)*
% Any maltreatment type	86	81	1.63 (1.09– 2.45)*

Includes alcohol; does not include opioid dependence.

^ Adjusted for age, gender, and employment status.

* $p < 0.05$,

** $p < 0.001$

TABLE 2

Socio-Demographic Correlates by Degree of Self-Harm

	NONE[1] (*n* = 580)	SM (self-mutilation only) (*n*=117)	OR[1] (95% CI)[2]	SA (suicide attempt only) (*n*=184)	OR[1] (95% CI)[2]	BOTH (both self-mutilation and attempted suicide (*n*=111)	OR[1] (95% CI)[2]
% Female	39	53	1.51 (1.00–2.27)*	46	ns	61	2.23 (1.46– 3.41)**
Mean age (in years)	37	33	0.96 (0.93–0.98)**	38	ns	33	0.96 (0.94– 0.99*
% Prison history	43	25	0.54 (0.33–0.88)*	44	ns	33	ns
% Unemployed	73	65	ns	84	1.95 (1.25–3.03)*	81	1.80 (1.07– 3.02)*
% 10 or fewer years of education	42	28	0.62 (0.39–0.98)*	42	ns	35	ns
% Physical abuse	46	59	1.82 (1.20–2.75)*	65	2.11 (1.48–3.00)**	65	2.14 (1.38– 3.30)**
% Emotional abuse	65	79	2.06 (1.26–3.35)*	84	2.72 (1.76–4.21)**	88	3.79 (2.06– 6.97)**
% Sexual abuse	39	59	2.24 (1.45–3.46)**	59	2.25 (1.57–3.23)**	77	5.38 (3.22– 8.99)**
% Neglect	30	44	1.93 (1.27–2.93)*	47	1.96 (1.39–2.78)**	63	3.88 (2.50– 6.01)**
% Any subtype	78	92	3.29 (1.60–6.74)*	94	3.97 (2.08–7.57)**	96	5.27 (2.08–13.31)**

[1] Reference group: no self-harm history;

[2] Adjusted for age, gender, and employment status.

* $p < 0.05$,

** $p < 0.001$

TABLE 3

Lifetime Drug Dependence by Degree of Self-Harm

	NONE[1] (*n* = 580)	SM (self-mutilation only) (*n* = 117)	OR[1] (95% CI)[2]	SA (suicide attempt only) (*n* = 184)	OR[1] (95% CI)[2]	BOTH (both self-mutilation and attempted suicide (*n* = 111)	OR[1] (95% CI)[2]
% Cannabis	43	47	ns	60	2.16 (1.52–3.09)**	64	2.36 (1.51–3.68)**
% Sedative	22	28	ns	33	1.62 (1.11–2.36)*	53	4.20 (2.70–6.54)**
% Stimulants	37	39	ns	48	1.61 (1.14–2.27)*	60	2.87 (1.86–4.42)**
% Cocaine	22	26	ns	36	1.89 (1.32–2.74)*	33	1.94 (1.22–3.07)*
% Opioids	69	63	ns	78	ns	76	ns
% Alcohol	33	44	1.85 (1.22–2.81)*	41	ns	53	2.63 (1.72–4.04)**
Mean number of drug classes#	1.5	1.7	1.25 (1.06–1.47)*	2.0	1.39 (1.22–1.59)**	2.4	1.84 (1.55–2.19)**

[1] Reference group: no self-harm history;

[2] Adjusted for age, gender, and employment status.

* $p < 0.05$,

** $p < 0.001$

Includes alcohol; does not include opioid dependence.

TABLE 4

Mental Health Correlates by Degree of Self-Harm

	NONE (no history of self-harm)[1] (*n* = 580)	SM (self-mutilation only) (*n* = 117)	OR[1] (95% CI)[2]	SA (suicide attempt only) (*n* = 184)	OR[1] (95% CI)[2]	BOTH (both self-mutilation and attempted suicide) (*n* = 111)	OR[1] (95% CI)[2]
% Depressive episode	46	65	2.13 (1.39–3.24)**	72	2.91 (2.02–4.21)**	78	3.77 (2.31–6.14)**
% Posttraumatic stress disorder	24	29	ns	40	1.98 (1.38–2.84)**	53	3.20 (2.06–4.95)**
% Panic disorder	18	26	ns	26	1.56 (1.05–2.33)*	45	3.50 (2.14–5.47)**
% Anti-social personality disorder	34	35	ns	43	1.49 (1.05–2.13)*	53	2.50 (1.62–3.88)**
% Screening for borderline personality disorder	39	55	2.09 (1.38–3.16)*	66	2.89 (2.02–4.12)**	84	8.03 (4.67–13.80)**
% High impulsivity	23	24	ns	33	1.65 (1.13–2.39)*	50	3.05 (1.98–4.71)**
% Multiple lifetime suicide attempts	0	0		55	11.16 (7.54–16.52)**	76	22.72 (13.84–37.30)**

[1] Reference group: no self-harm history;

[2] Adjusted for age, gender, and employment status.

* $p < 0.05$,

** $p < 0.001$

TABLE 5

Risk Factors for Self-Mutilation

	Any self-mutilation history (*n* = 226) OR (95% CI)[^]
Age	0.94 (0.92–0.96)**
Alcohol dependence	1.61 (1.15–2.25)*
Persistent suicidal thoughts	1.67 (1.13–2.48)*
Screening positively for borderline personality disorder	1.76 (1.23–2.51)*
Childhood sexual maltreatment	2.22 (1.56–3.14)**
Multiple suicide attempts (lifetime)	2.02 (1.34–3.05)*
Opioid dependence	ns

[^] OR from multiple logistic regression including all variables listed here: age, gender, employment status, persistent suicidal thoughts, screening positively for BPD, childhood sexual maltreatment, childhood physical maltreatment, multiple suicide attempts (lifetime), depression, illicit drug dependence, opioid dependence, alcohol use disorder, high impulsivity, ASPD, an anxiety disorder (PTSD or panic disorder).