



## Research paper

## Non-suicidal self-injury and suicide attempts in a New Zealand birth cohort

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## ABSTRACT

**Background:** Non-suicidal self-injury (NSSI) and suicide attempts are related, but distinct behaviors. The primary aim of the current study was to identify factors that distinguish those with different lifetime histories of self-injury. A secondary aim was to test whether lifetime history of self-injury at age 26 predicted current suicide ideation at age 32.

**Methods:** Participants were 26 year olds from a large birth cohort with a lifetime history of no self-injury ( $n = 466$ ), a lifetime history of NSSI ( $n = 191$ ), or a lifetime history of NSSI and a suicide attempt (NSSI + SA;  $n = 52$ ). They were compared on a history of psychiatric disorders, 12-month suicide ideation, lifetime history of childhood sexual abuse, and lifetime exposure to suicide.

**Results:** An anxiety disorder, a substance dependence disorder, suicide ideation, and a history of childhood sexual abuse distinguished the NSSI + SA and NSSI only groups. Longitudinal results demonstrated that a history of NSSI predicted future suicide ideation after adjusting for other selected risk factors.

**Limitations:** The majority of analyses are cross-sectional which limits inferences about causality. The retrospective self-report for lifetime behavior could be subject to reporting biases.

**Conclusions:** Adults with a history of NSSI and adults with a history of NSSI and a suicide attempt are clinically distinct groups that are both at risk of future suicide ideation. Identifying and treating NSSI could be a key preventive factor in reducing subsequent suicide risk.

## 1. Introduction

Non-suicidal self-injury (NSSI) and suicide attempts are both significant public health issues. NSSI has been defined as the direct and deliberate destruction of body tissue in the absence of any observable intent to die (Nock, 2010). A suicide attempt refers to engagement in potentially self-injurious behavior in which there is some intent to die from the behavior (Nock, 2010). The lifetime prevalence of NSSI among adults and adolescents is approximately 5.5% and 17.2% respectively (Swannell et al., 2014). The lifetime prevalence of suicide attempts among adults and adolescents is approximately 1.9 to 8.7% and 3.1–8.8% respectively (Nock et al., 2008a, 2008b). Both NSSI and suicide attempts are associated with numerous negative life outcomes and have significant economic and social consequences (Goldman-Mellor et al., 2014; Plener et al., 2015; Shepard et al., 2016).

NSSI and suicide attempts are related, but distinct behaviors (Grandclerc et al., 2016). NSSI and suicidal behaviors appear to co-occur at high rates and NSSI is a strong predictor of suicide attempts (Klonsky et al., 2014). Estimates of the co-occurrence of a lifetime

history of NSSI and a lifetime history of suicide attempt range from 17% to 70% (Andover and Gibb, 2010; Cheung et al., 2013; Cloutier et al., 2010; Nock et al., 2006). A large study with four samples varying in age and clinical severity found a robust relationship between NSSI and attempted suicide (Klonsky et al., 2013). A comprehensive review found that regardless of participant age, sex and socioeconomic status, engaging in NSSI increases risk of attempting suicide (Hamza et al., 2012).

Every person who engages in NSSI, however, does not go on to attempt suicide. Understanding, among those with a history of self-injury, what specific factors are associated with risk of attempting suicide would have significant clinical utility. A growing number of studies have investigated this research question, but the evidence base is still limited (Nock, 2014). These studies have attempted to identify unique risk factors for NSSI and suicide attempts through comparing self-injury groups (e.g. a history of NSSI alone versus a history of NSSI and a suicide attempt) on various clinical, cognitive, and psychosocial factors (Asarnow et al., 2011; Brausch and Gutierrez, 2010; Jacobson et al., 2008; Muehlenkamp and Gutierrez, 2007, 2004; Stewart et al., 2017; Wong et al., 2007). Individuals with a history of NSSI and a suicide

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attempt have been found to have higher rates of psychiatric diagnoses, especially depression and PTSD, more severe psychiatric symptoms, and higher rates of suicide ideation than individuals with a history of NSSI alone (Brausch and Gutierrez, 2010; Claes et al., 2010; Jacobson et al., 2008; Muehlenkamp et al., 2011; Muehlenkamp and Gutierrez, 2004; Taliaferro et al., 2012; Wong et al., 2007). Additionally individuals with a history of NSSI and a suicide attempt report more adverse childhood experiences (e.g. physical abuse) and stressful life events (e.g. exposure to suicide) than individuals with a history of NSSI alone (Baetens et al., 2011). Several reviews have summarized all potential differences between self-injury groups (Andover et al., 2012; Grandclerc et al., 2016; Hamza et al., 2012) and concluded that individuals with a history of NSSI and a suicide attempt could be considered a more clinically severe population than individuals with a history of a suicide attempt alone.

While previous studies have elucidated valuable potential differences between those with a history of NSSI and those with a history of suicide attempts, there are several limitations and gaps in the literature. The vast majority of these studies have been conducted with adolescents and in clinical settings (Jacobson and Gould, 2007). While clinical adolescents are the population with the highest rates of NSSI (Andover et al., 2012; Jacobson and Gould, 2007; Klonsky et al., 2014), NSSI and suicide attempts are still prevalent among adults in the general population (Nock et al., 2008a, 2008b; Swannell et al., 2014). The lack of large scale studies with representative samples of adults has been highlighted as an area of concern in NSSI research (Nock, 2012). Developmental and clinical factors might restrict the generalizability of previous findings. From a methodological perspective, the studies are largely cross-sectional and often lack a self-injury control group, which limits the conclusions that can be drawn about causality. Additionally, numerous studies rely on self-report measures of psychopathology (Brausch and Gutierrez, 2010; Muehlenkamp and Gutierrez, 2007). Semi-structured and structured interviews, however, are considered the gold-standard for ascertaining psychiatric diagnoses (Beck and Perry, 2008). Therefore, there would be significant value in comparing self-injury groups for psychiatric diagnoses determined by use of a structured clinical interview. Finally, as Stewart et al. (2017) noted, previous studies have often tested risk factors in isolation, which might hinder the identification of unique risk factors for suicide attempts. Comparing those with a history of NSSI and a history of NSSI and suicide attempts on numerous risk factors in the same study could advance our understanding of risk factors for suicide attempts among those with a history of self-injury.

The aim of the current study is to identify factors that distinguish those with different lifetime histories of self-injury. We compared individuals with a lifetime history of no self-injury, a lifetime history of NSSI, or a lifetime history of NSSI and a suicide attempt (NSSI + SA) in a large birth cohort of 26 year olds on current psychiatric disorders, 12 month suicide ideation, lifetime history of childhood sexual abuse, lifetime exposure to suicide of a family member, and lifetime exposure to suicide of a friend. First, we hypothesized that both the NSSI alone group and NSSI + SA group would have higher rates on all variables than the no self-injury group. Additionally, we expected that the NSSI + SA group would have the highest rates on all variables. Second, we hypothesized that a current diagnosis of a depressive disorder, a substance dependence disorder, suicide ideation, lifetime history of childhood sexual abuse, and exposure to suicide of a family member would distinguish those with a history of NSSI + SA from those with a history of NSSI alone. Our prediction of these specific factors is based on prior research (Andover et al., 2012; Fox et al., 2015; Nock et al., 2008a, 2008b; Ribeiro et al., 2016). Finally, we sought to test if lifetime history of self-injury at age 26 predicted current suicide ideation at age 32. Based on prior research (Ribeiro et al., 2016), we hypothesized that there would be a dose-response relationship between self-injury history and later suicide ideation and that those who also had a history of SA would be at the greatest risk for future suicide ideation.

## 2. Method

### 2.1. Participants

The participants are part of a birth cohort ( $n = 1037$ ) born in Dunedin, New Zealand between 1 April 1972 and 31 March 1973 and enrolled in the Dunedin Multidisciplinary Health and Development Study. They were assessed at age 3, and thereafter biennially until 15, and at ages 18, 21, 26, 32, and 38 years (Poulton et al., 2015). At age 26 (1998–1999), 472 women and 494 men, consented to an interview on self-harm behaviors (Nada-Raja et al., 2004). The sample represents all socioeconomic levels (Poulton et al., 2015). Of the 966 participants who consented to the self-harm interview, 257 were excluded from the current study for the following reasons. 229 participants were excluded as they reported no NSSI or SA, but reported another form of self-harm behavior as a way of dealing with emotional pain or stress. The other forms of self-harm were intoxication with alcohol/other substances, self-denial, and exercising with the purpose of hurting oneself. These participants were excluded to ensure the control group was a pure control group that had no history of self-injury or self-harm. Another 12 participants were excluded because the intent of their self-injury could not be ascertained from their self-harm interview and 16 participants were excluded from the NSSI alone group because they reported both traditional NSSI methods (e.g. cutting) and suicide attempt methods (e.g. drowning), but did not report a suicide attempt. The incongruence between type of self-injury method and suicide attempt history could be due to the limits of retrospective self-report. To ensure that participants in the NSSI group had only engaged in NSSI, these participants were excluded from analyses. The final sample for this study is 709 participants.

For the purposes of analyses, participants were categorized into the following groups on the basis of their history at age 26: no self-injury, NSSI only, and NSSI and suicide attempt (NSSI + SA). Inclusion criteria in the no self-injury group was no lifetime history of any self-injury or self-harm behavior. Inclusion criteria for the NSSI only group was a lifetime history of an NSSI behavior and no lifetime suicide attempt. Inclusion criteria for the NSSI + SA group was a lifetime history of an NSSI behavior and a reported lifetime suicide attempt. We did not include a suicide attempt only group because the sample size for this group was underpowered for analyses.

### 2.2. Measures at age 26

#### 2.2.1. Self-harm interview

At age 26, participants completed a 20 min semi-structured in-person interview on self-harm thoughts and behaviors (Nada-Raja et al., 2004). Self-harm questions were asked about behaviors with the intent of hurting oneself in the context of dealing with mental or psychological pain, emotions, or stress. Participants were presented with a set of specific behaviors identified in the International Classification of Diseases, 9th Revision Clinical Modification as intentional self-harm (e.g. cutting) as well as other self-harm behaviors (e.g. self-battery). Questions on suicide ideation and suicide attempts were included in the same interview. Lifetime history of suicide attempt was assessed with the question of, “Have you ever attempted suicide in your life?” 12-month history of suicide ideation was assessed with the question of, “In the past year have you thought about committing suicide?” This interview has been used in several previous studies on self-harm and suicidal behaviors in the Dunedin Study (Goldman-Mellor et al., 2014; Nada-Raja et al., 2004; Skegg et al., 2003). From the original list of self-harm behaviors the following methods were included as a form of NSSI: cutting self, burning self, stabbing self, banging own head/fist against something, hitting or bruising any part of self, picking own skin, piercing own skin, and biting self. All of these behaviors are included in the Deliberate Self-Harm Interview (Gratz, 2001), a measure with strong psychometric properties that has been used in several studies of NSSI

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