Psychiatry Research 276 (2019) 196–202

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Non-suicidal self-injury and co-occurring suicide attempt in male prisoners

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ARTICLE INFO

Keywords:
Prison
Self-harm
Suicide attempt
Non-suicidal self-injury

ABSTRACT

High rates of non-suicidal self-injury (NSSI) and suicide attempts (SA) are well documented in prisoners, however, few studies examined their co-occurrence in this high-risk population. Study participants were 1203 adult men randomly selected from 15 Belgian prisons, representing 12% of the national male prison population. Lifetime prevalence rates for NSSI and SA are 17% and 20% respectively, with half (55%) of self-injurers reporting a SA history. Bivariate analyses show that NSSI and SA are significantly related to one another, and many risk factors are common to both. Multivariate analysis comparing prisoners who engaged in NSSI with (n = 109) and without (n = 90) co-occurring SA indicates that suicidal ideation is the strongest independent correlate of SA among self-injurers. Additionally, relative to those with a history of NSSI only, prisoners with co-occurring NSSI and SA are significantly more likely to be violent offenders, being prescribed psychotropic medication, and report a psychiatric diagnosis; suggesting that they constitute a more clinically severe subgroup. Collectively, these findings highlight the marked overlap between NSSI and SA in prisoners, both in terms of prevalence and correlates, with suicidal ideation being an important predictor of suicide risk among self-injurers.

1. Introduction

Suicide is a leading cause of mortality among prisoners worldwide, with rates substantially higher than in the general population (Favril et al., 2019; Fazel et al., 2017). Self-harm is a robust predictor of prison suicide, as well as an important health concern in its own right (Fazel et al., 2008; Hawton et al., 2014; Humber et al., 2013). The burden of self-harm in prisoners is substantial, affecting 5–6% of male and 20–24% of female prisoners every year (Hawton et al., 2014). In their systematic review on risk factors for self-harm in prisoners, Lohner and Konrad (2007) identified heterogeneous and inconsistent findings across 51 studies, which they attributed (in part) to varying definitions of self-harm. Indeed, due to the absence of a universally shared nomenclature, there remains a lack of consensus over how self-harm should be conceptualised (Skegg, 2005). More specifically, some researchers (Butler and Malone, 2013; Nock, 2010) argue that a clear distinction can be made between acts of self-harm that occur with intent to die (suicide attempt; SA) and those that occur with no intent to die (non-suicidal self-injury; NSSI), whereas others argue that the motives underpinning NSSI and SA are multiple and fluid, and should thus be conceptualised along a continuum of self-harm irrespective of intent (Kapur et al., 2013). In support of the former school of thought advocating an intent-based dichotomy, empirical studies highlight that NSSI and SA phenomenologically differ in many important ways, most notably with regard to chronicity, frequency, lethality of methods, and functions (Hamza et al., 2012; Muehlenkamp, 2014). Despite being operationally distinct from one another, an abundant body of evidence indicates that these behavioural phenomena frequently co-occur, and that NSSI is prospectively associated with increased risk of SA across populations and settings (Asarnow et al., 2011; Benjet et al., 2017; Cox et al., 2012; Georgiades et al., 2019; Grandclerc et al., 2016; Guan et al., 2012; Hamza et al., 2012; Hamza and Willoughby, 2016; Kiekens et al., 2018; Klonsky et al., 2013; Ribeiro et al., 2016; Turner et al., 2019; Whitlock et al., 2013; Wilkinson et al., 2011).

This overall high co-occurrence has stimulated a growing body of empirical research on the association between NSSI and SA, and the factors that differentiate these two behaviours involving deliberate injury to the body (Hargus et al., 2009; Larsson and Sund, 2008; Mars et al., 2014; Wichstrom, 2009). Researchers seeking to examine the overlap between NSSI and SA have taken several approaches; the majority of whom comparing individuals who engage in NSSI only with those who have a history of both NSSI and SA (e.g., Asarnow et al., 2011; Brausch and Gutierrez, 2010; Coppersmith et al., 2017; Dougherty et al., 2009; Jacobson et al., 2008; Lloyd-Richardson et al., 2007; Muehlenkamp and Gutierrez, 2007). Collectively, these studies suggest that individuals who report both a history of NSSI and SA are characterized by more severe psychiatric symptoms and psychosocial impairment than individuals exclusively engaging in NSSI (Andover et al., 2012; Grandclerc et al., 2016; Hamza et al., 2012). Along these lines, a meta-analysis of 52 studies concluded that suicidal ideation was

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https://doi.org/10.1016/j.psychres.2019.05.017
Received 22 January 2019; Received in revised form 9 May 2019; Accepted 10 May 2019
Available online 10 May 2019
0165-1781/

the strongest identified risk factor for attempted suicide among self-injurers, whereas hopelessness, mental health symptomatology, and impulsivity were only moderately associated with SA among those engaging in NSSI (Victor and Klonsky, 2014).

While many community-based studies have elucidated potential differences between individuals who engage in NSSI only and those who also attempt suicide, very few sought to examine such differences in prisoners—a vulnerable population characterized by disproportionally high rates of NSSI (Dixon-Gordon et al., 2012) and SA (Jenkins et al., 2005) compared with their non-incarcerated peers. Moreover, methodologically-sound studies have either not distinguished prisoners according to suicidal intent (Hawton et al., 2014) or have focused on one behaviour specifically (Carli et al., 2011; Jenkins et al., 2005). The paucity of studies that do directly compare NSSI and SA in adult prisoners is however flawed by small and non-random samples. For example, a recent study involving a sample of 87 men incarcerated in two Australian prisons compared prisoners with both NSSI and SA histories ($n = 28$) to those with either of those self-harming behaviours alone, concluding that the presence of both NSSI and SA is an indicator of increased psychopathology (Barton et al., 2017). Similarly, among 49 incarcerated women with a history of NSSI, Chapman et al. (2014) found that hopelessness and childhood sexual abuse were uniquely associated with attempted suicide. Other prison-based studies remain largely descriptive in nature by comparing characteristics of NSSI and SA (Fulwiler et al., 1997; Lohner and Konrad, 2006; Snow, 2002) or examined both behaviours separately in a single sample without accounting for co-occurring NSSI and SA (Bani et al., 2019; Penn et al., 2003; Power et al., 2016; Stewart et al., 2018). Taken together, although some studies suggest that there may be important differences between prisoners who engage in NSSI with or without co-occurring SA, they are marked by methodological limitations, and findings across studies have failed to yield clear conclusions. Yet, identifying which self-injuring prisoners may be at greater risk of SA is important from both a clinical and research perspective.

The present study sought to addresses this empirical gap by identifying factors that distinguish those with different lifetime histories of self-harm in a large random sample of male prisoners. First, individuals with a history of NSSI or SA were compared separately to those without such a history on a range of established risk factors. Second, in order examine factors uniquely associated with co-occurring NSSI and SA relative to those only engaging in NSSI, a subsample of prisoners with a history of NSSI was compared according to SA status. Given the limited body of research among prisoner populations, the current study was largely exploratory in nature. However, based on the above-mentioned reviews in non-incarcerated populations (Andover et al., 2012; Grandclerc et al., 2016; Hamza et al., 2012; Victor and Klonsky, 2014), it was hypothesised that clinical risk factors would most clearly differentiate self-injurers with (NSSI + SA) and without (NSSI only) a history of attempted suicide.

2. Methods

2.1. Procedure and participants

Eligible study participants were men (aged 18 years and over) residing in 15 out of all 36 correctional facilities in Belgium (Favril et al., 2017). Prisons were selected based on their geographical proximity—the Flanders region of Belgium, serving roughly half of all 10,134 male offenders in 2016 (Favril et al., 2019). At each prison consecutively, an up-to-date list of all prisoners detained in the facility was obtained from the respective prison administration. Between October 2015 and May 2016, a total of 3636 men were incarcerated in the 15 selected prisons, of whom 1414 (38.9%) were randomly selected by a computer to participate in the study. Each prisoner included in this random sample was personally (face-to-face) approached by the researcher. After providing informed consent, participants completed a self-report questionnaire (available in Dutch, French, and English). Ethical approval for the study protocol was granted by the Ethics Committee of Ghent University, Faculty of Law and Criminology.

2.2. Measures

2.2.1. Background variables

Socio-demographic and criminological details collected from participants included age, nationality (Belgian *vs.* other), partnership (dichotomized in single/divorced/widowed *vs.* married/partner), any prior incarceration (none *vs.* one or more), criminal status (remand *vs.* sentenced), and offence type leading to the current period of imprisonment. This latter variable was recoded into non-violent (e.g., drug offences, theft, and fraud) *vs.* violent (e.g., murder, manslaughter, and rape) offences.

2.2.2. Self-harm and suicidal ideation

Based on oft-cited studies investigating self-harm in prisoners (e.g., Jenkins et al., 2005; Völlm and Dolan, 2009), a history of NSSI was assessed asking participants "Have you ever deliberately harmed yourself in any way, but not with the intention of killing yourself?", which was dichotomously coded (no/yes). Regardless of the answer to the question about NSSI, respondents were also asked whether they ever attempted suicide (coded no/yes). Both items were used to further categorize participants in two mutually exclusive groups: prisoners who engage in NSSI with (NSSI + SA) and without (NSSI only) co-occurring SA. Self-harm history was defined as any self-reported SA or NSSI (or both). In addition, endorsement of suicidal thoughts ("Have you ever thought of taking your life, even if you would not really do it?") was taken as indicative of suicidal ideation (coded no/yes). One binary item was also included to inquire about a family history of suicidal behaviour, asking participants whether there was anyone in their family they knew of who ever attempted or died by suicide.

2.2.3. Clinical variables

A self-reported diagnosis of mental disorder was assessed by asking participants "Have you ever been told by a mental health professional, such as a psychiatrist or psychologist, that you had one or more of the following mental disorders?" followed by a comprehensive list of diagnostic labels (including affective, psychotic, eating, and personality disorders). The wording of the question and choice of a self-report measure of lifetime psychiatric diagnoses is consistent with previous research in prison samples (Binswanger et al., 2010). Next, following the *New South Wales Inmate Health Survey* (Indig et al., 2010), participants were asked about their illicit substance abuse (in the 12 months prior to incarceration and/or during imprisonment) and current psychotropic medication on prescription.

2.3. Statistical analysis

The statistical plan consisted of two consecutive phases. First, in order to examine differences in risk factors for self-harm with (SA history *vs.* controls) and without (NSSI history *vs.* controls) suicidal intent, correlates of SA and NSSI were examined separately in the total sample ($n = 1203$), while controlling for co-occurring NSSI and SA, respectively. For subsequent analyses, the sample was restricted to the subgroup of prisoners with a history of NSSI, irrespective of SA status ($n = 199$). To determine whether there were statistically significant differences between prisoners who engaged in NSSI with (NSSI + SA; $n = 109$) and without (NSSI only; $n = 90$) co-occurring SA on a range of putative risk factors, bivariate associations were conducted using Pearson's χ^2-test for categorical variables. Multivariate logistic regression analysis was then adopted to identify independent associations between the outcome (SA history) and all predictor variables significant in bivariate analyses, while simultaneously controlling for potential confounds. For all analyses, crude (OR) or adjusted (aOR) odds ratios,

Table 1
Sample characteristics (%) by self-harm history.

	Total sample (n = 1203)	Self-harm history		
		No self-harm (n = 869)	NSSI (n = 199)	SA (n = 244)
Age category				
18–24	12.3	12.6	13.3	8.8
25–34	34.2	32.7	45.1	32.5
35–44	26.1	24.9	31.8	31.3
45–54	18.0	19.1	7.2	20.0
55–64	6.3	6.9	2.6	6.3
≥65	3.1	3.9	0	1.3
Belgian nationality	72.1	67.2	83.3	88.1
Partnership	40.0	42.6	33.2	32.4
Prior incarceration	58.9	57.7	63.8	63.1
Sentenced status	65.7	63.3	73.9	73.0
Violent offence	25.5	21.5	32.1	41.2
Substance abuse	61.0	54.2	82.4	78.7
Any psychiatric diagnosis	34.5	27.3	65.3	66.8
Psychotropic medication	34.4	25.2	58.8	63.9
Suicidal ideation	43.1	26.9	78.4	95.5
Family suicide history	24.7	19.4	38.2	41.8

NSSI = non-suicidal self-injury; SA = suicide attempt.

and their 95% confidence intervals (CI), are presented as estimates of the strength of the associations, with p-values <0.05 considered as statistically significant. Since there were minimal cases with missing data (n = 80), these were list-wise deleted for all analyses. Those who were excluded did not significantly differ from the sample as a whole on demographic and criminological characteristics, and self-harm history.

3. Results

3.1. Sample characteristics

In total, 1203 male prisoners with complete data on self-harm items were included in the study. The majority of them had the Belgian nationality (72.1%), and their modal age was 25–34 years (mean = 37.7, range 18–77). One in three (34.3%) was currently on remand, while the remaining 790 men (65.7%) were sentenced. One-fourth (25.5%) of participants was charged with, or convicted of, a violent offence. More than half (58.9%) had a prior history of incarceration. Further details on respondents' clinical characteristics are presented in Table 1, stratified by their self-harm history.

3.2. Self-harm prevalence

As shown in Table 2, one-fifth (n = 244; 20.3%) of participants had ever attempted suicide, and 16.5% (n = 199) self-report a lifetime history of NSSI. Ninety men (7.5%) had engaged in NSSI only, and 135 (11.2%) had attempted suicide but not ever self-harmed without suicidal intent. Collapsing NSSI and SA variables, an estimated 27.8% (n = 334) of male prisoners ever self-harmed (regardless of suicidal intent). Of those reporting any self-harm, one-third (n = 109; 32.6%) ever engaged in both SA and NSSI, equating to 9.1% of the total study sample. More than half (54.8%) of those with a history of NSSI also report a SA in their lifetime.

Table 2
Lifetime prevalence of NSSI and SA in 1203 male prisoners.

Self-harm history	n	%	95% CI
NSSI (irrespective of SA)	199	16.5	14.0–19.0
SA (irrespective of NSSI)	244	20.3	18.0–22.6
NSSI only (no SA)	90	7.5	6.0–9.0
SA only (no NSSI)	135	11.2	9.4–13.0
Both NSSI and SA	109	9.1	7.4–10.7
Any self-harm (NSSI or SA)	334	27.8	25.2–30.3

NSSI = non-suicidal self-injury; SA = suicide attempt.

3.3. Differences in risk factors for NSSI and SA

In the total study sample, associations between predictor variables and self-harm with (SA history *vs.* controls) and without (NSSI history *vs.* controls) suicidal intent were first examined separately (Table 3). In bivariate analyses, all investigated variables (violent offending, substance abuse, psychiatric diagnosis, psychotropic medication, lifetime SA or NSSI, suicidal ideation, and family suicide history) were associated with increased odds of both outcome variables. Odds ratios ranged from 1.49 (violent offending) to 7.80 (SA history) for NSSI, and from 2.57 (violent offending) to 50.09 (suicidal ideation) for SA.

Controlling for SA history slightly attenuated effect sizes of predictors for NSSI, but most retained statistical significance. One exception was violent offending which, after controlling for SA history, was no longer significantly associated with NSSI history (p = 0.989). Similarly, although the strength of associations with SA history slightly decreased when adjusting for NSSI engagement, all remained significant ($p < 0.001$). For substance abuse, however, the odds for SA history rose from 2.84 to 6.76 when NSSI engagement was accounted for. For violent crime, the odds ratio (2.57) remained unchanged after adjusting for NSSI history.

In summary, NSSI and SA were significantly related to one another (OR = 7.80) and most factors were common to both behaviours, but associations were generally stronger in relation to SA compared with NSSI.

3.4. Correlates of attempted suicide among self-injurers

In order to examine factors uniquely associated with co-occurring NSSI and SA relative to NSSI engagement alone, a subsample of prisoners with a history of NSSI was compared according to SA status (NSSI + SA *vs.* NSSI only). In bivariate analysis, all but one (substance abuse) of the variables significantly distinguished those with a history of both NSSI and SA from those with a history of NSSI only. Suicidal ideation was associated with the greatest odds (OR = 20.07, 95% CI 6.80–59.23) for SA among those with a history of NSSI. The latter observation remained when other risk factors were controlled for. Specifically, in the multivariate analysis, suicidal ideation (aOR = 17.69, 95% CI 5.71–54.85) was independently associated with SA among self-injurers. Although cross-sectional, this suggests that suicidal ideation among prisoners with a history of NSSI confers an 18-fold increase in the odds of attempting suicide. Furthermore, prisoners with co-occurring NSSI and SA were two to three times more likely to be incarcerated for a violent offence (aOR = 2.18, 95% CI 1.02–4.65), being prescribed psychotropic medication (aOR = 2.07, 95% CI 1.01–4.23) and report a psychiatric diagnosis (aOR = 3.32, 95% CI 1.55–7.10) as compared to those with a history of NSSI only. A family suicide history was no longer significant in the multivariate analysis once other variables were controlled for. Only suicidal ideation ($p < 0.001$) and psychiatric diagnosis (p = 0.002) were associated with increased odds of suicide attempts among self-injurers after correcting for multiple comparisons (that is, $p < 0.0083$ with Bonferroni correction).

4. Discussion

4.1. Main findings

The current study identified comparable lifetime prevalence estimates for NSSI (17%) and SA (20%) in a random sample of 1203 men

Table 3
Factors associated with NSSI and SA history in the total sample (n = 1203).

	NSSI history (n = 199) OR (95% CI)	aOR[a] (95% CI)	SA history (n = 244) OR (95% CI)	aOR[b] (95% CI)
Violent offending	1.49 (1.07–2.08)*	1.00 (0.69–1.45)	2.57 (1.90–3.48)***	2.57 (1.85–3.56)***
Substance abuse	3.57 (2.43–5.25)***	2.72 (1.81–4.07)***	2.84 (2.04–3.96)***	6.76 (4.82–9.49)***
Psychiatric diagnosis	4.51 (3.25–6.25)***	2.76 (1.93–3.93)***	5.97 (4.37–8.15)***	4.48 (3.23–6.21)***
Psychotropic medication	3.40 (2.48–4.65)***	2.09 (1.48–2.94)***	4.82 (3.58–6.49)***	3.83 (2.79–5.25)***
NSSI history	—	—	7.80 (5.59–10.88)***	—
SA history	7.80 (5.59–10.88)***	—	—	—
Suicidal ideation	6.43 (4.48–9.23)***	3.25 (2.13–4.96)***	50.09 (26.94–93.16)***	38.86 (20.79–72.64)***
Family suicide history	2.19 (1.59–3.02)***	1.52 (1.06–2.16)*	2.81 (2.09–3.80)***	2.43 (1.76–3.36)***

NSSI = non-suicidal self-injury; SA = suicide attempt.
[a] Odds ratios adjusted for SA history.
[b] Odds ratios adjusted for NSSI history.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

across 15 Belgian prisons. Prior large-scale studies found highly similar rates in randomly selected men from the mainstream prisoner population; 17–18% for NSSI (Carli et al., 2011; Maden et al., 2000; Verdolini et al., 2017) and 15–22% for SA (Jenkins et al., 2005; Larney et al., 2012; Sarchiapone et al., 2009). More than a quarter (28%) of participants in this study self-report *any* self-harm over the life span, and one in ten (9%) endorse a history of *both* NSSI and SA (Table 2). More specifically, half (55%) of those with a history of NSSI also report having ever attempted suicide.

Correlates of NSSI and SA were first examined separately (Table 3), highlighting that these self-harming behaviours are significantly related to one another (OR = 7.80). This further supports the well-documented association between NSSI and SA in both clinical and non-clinical populations (Asarnow et al., 2011; Grandclerc et al., 2016; Guan et al., 2012; Hamza et al., 2012; Kiekens et al., 2018; Klonsky et al., 2013; Wilkinson et al., 2011). Moreover, a comprehensive meta-analysis, pooling 365 longitudinal studies published in the past five decades, found that NSSI is the single most important predictor of subsequent SA (weighted OR = 4.15), even more so than a history of SA itself (Franklin et al., 2017). Furthermore, corroborating findings from a population-based birth cohort study (Mars et al., 2014), many risk factors examined in the current study were common to both behaviours, but associations were generally stronger in relation to SA compared to NSSI. These findings suggest that, like in non-incarcerated populations (Hamza et al., 2012), there are shared risk factors predisposing to both NSSI and SA in prisoners.

Next, independent associations of empirically established risk factors with SA were examined in a subsample of participants with a lifetime history of NSSI (Table 4). Of all investigated variables, suicidal ideation was found to be most strongly related to SA among prisoners with a history of NSSI (aOR = 17.69). This is in keeping with prior studies suggesting that self-injuring individuals who also attempt suicide exhibit greater levels of suicidal ideation than those with a history of NSSI alone (Brausch and Gutierrez, 2010; Coppersmith et al., 2017; Jacobson et al., 2008; Lloyd-Richardson et al., 2007; Muehlenkamp and Gutierrez, 2007). This ability of suicidal ideation to distinguish between self-injurers with and without co-occurring SA was also highlighted by a recent meta-analysis, concluding that suicidal ideation was the strongest correlate of SA among those with a history of NSSI (Victor and Klonsky, 2014). The observation that self-injuring prisoners who attempt suicide report suicidal ideation more often than their peers who do not attempt suicide appears intuitive and replicates meta-analytical findings that suicidal thoughts are strongly associated with increased risk of suicide, in prison (Fazel et al., 2008) and elsewhere (Castellví et al., 2017; Hubers et al., 2018). However, recent *ideation-to-action* theories of suicide (Klonsky et al., 2018) suggest that suicidal ideation is only one component of risk and, on its own, is unlikely to result in suicidal behaviour. More specifically, this framework postulates that both a desire (suicidal ideation) and a *capability for suicide* are two necessary conditions in order for a person to engage in suicidal behaviour. This latter component is hypothesized to be acquired through repeated exposure to painful and provocative events, and empirical evidence suggests that NSSI may be a particularly important contributor to this capability (Joiner et al., 2012; May and Victor, 2018; Willoughby et al., 2015). Accordingly, it could be expected that those with a history of both NSSI and suicidal ideation are at greatest risk for attempting suicide as compared to those with neither or only one of these risk factors (Scott et al., 2015), which tallies with the current results. In support of such findings, a recent prospective study found that NSSI was the strongest identified predictor of future suicide attempt among adolescents with suicidal thoughts at baseline (Mars et al., 2019). Clinically, these results provide empirical evidence supporting

Table 4
Bivariate and multivariate analysis for SA among those with NSSI history (n = 199).

	Bivariate NSSI only (%)	NSSI + SA (%)	OR (95% CI)	Multivariate B	SE	aOR[a] (95% CI)
Violent offending	30.2	69.8	2.65 (1.40–5.01)**	0.779	0.387	2.18 (1.02–4.65)*
Substance abuse	43.3	56.7	1.56 (0.75–3.24)	—	—	—
Psychiatric diagnosis	36.0	64.0	3.31 (1.77–6.18)***	1.199	0.389	3.32 (1.55–7.10)**
Psychotropic medication	33.3	66.7	3.29 (1.83–5.93)***	0.726	0.366	2.07 (1.01–4.23)*
Suicidal ideation	32.7	67.3	20.07 (6.80–59.23)***	2.873	0.577	17.69 (5.71–54.85)***
Family suicide history	34.2	65.8	2.09 (1.16 – 3.77)*	0.318	0.368	1.37 (0.67–2.82)

NSSI = non-suicidal self-injury; SA = suicide attempt.
[a] Odds ratios adjusted for all other factors in the multivariate model.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

the importance of monitoring suicidal ideation when working with self-injuring prisoners in order to identify heightened risk of suicide, and potentially to prevent future SA in this high-risk group.

Of note, while NSSI is by definition not enacted with a conscious intent to die, this study also found that NSSI and suicidal ideation were interrelated in the total sample of prisoners, even after controlling for SA history (OR = 3.25). Converging evidence indicates a robust relationship between NSSI and suicidal ideation, both cross-sectionally (Benjet et al., 2017; Georgiades et al., 2019; Kiekens et al., 2018; Turner et al., 2019; Whitlock and Knox, 2007) and prospectively (Coppersmith et al., 2017; Cox et al., 2012; Guan et al., 2012; Hamza and Willoughby, 2016). Similarly, among 996 Australian prisoners, Larney et al. (2012) found that NSSI was the strongest independent correlate of suicidal ideation (aOR = 9.81). NSSI and suicidal ideation may exhibit strong overlap to the degree that they share a genetic predisposition (Maciejewski et al., 2014; Richmond-Rakerd et al., 2019b) and are common manifestations of the same underlying cause that precedes suicidal behaviour—psychological distress (Hamza et al., 2012). Taken together, the current results suggest that self-harm without suicidal intent is, even in the absence of co-occurring SA, significantly associated with suicidal thoughts in prisoners, albeit cross-sectionally. Prospective studies in custodial samples are warranted in order to clarify the longitudinal relationship between NSSI, SA, and suicidal ideation among prisoners.

Furthermore, male prisoners in Belgium who report both a history of NSSI and SA are characterized by more psychiatric morbidity—both current (psychotropic medication use) and lifetime (psychiatric diagnoses)—than their incarcerated peers who engaged in NSSI only. Supporting findings from literature reviews summarizing potential differences between self-harm groups (Andover et al., 2012; Hamza et al., 2012), this study reiterates that individuals with a history of NSSI and SA could be considered a more clinically severe population relative to those with a history of a NSSI alone. This mandates early identification and mental health care of prisoners who engage in self-harm, as well as the development of evidence-based prevention programs in correctional settings (Favril and Dirkzwager, 2019; Fazel et al., 2016).

The current study further suggests that self-harm is positively associated with violent crime. Consistent with findings from population-based cohorts (Goldman-Mellor et al., 2014; Richmond-Rakerd et al., 2019a; Sahlin et al., 2017; Steeg et al., 2019), prison studies indicate that violent offenders are at increased risk of suicide compared with their non-violent peers (Fazel et al., 2008; Humber et al., 2013; Völlm and Dolan, 2009), with a shared (neurobiological) vulnerability to aggressive behaviour being a likely explanation. Importantly, in a large sample of male prisoners in Italy, violent crime was significantly associated with SA (Sarchiapone et al., 2009) but not with NSSI (Carli et al., 2011). This parallels findings from the current study, in that violent offending was no longer associated with NSSI engagement once SA history was controlled for (Table 3). In support of this, a recent longitudinal study found that the link between self-harm and violent crime was meditated by co-occurring suicidality, at least among adolescents (Bjureberg et al., 2019). Generalizing such community-based findings to custodial samples is however challenging, since prison studies inherently lack a comparison group of non-offending individuals. Further disentangling the link between NSSI, SA, and violent crime thus presents an important avenue of future research. Examining differential associations with other types of violence, notably incidents of in-prison assault (Slade, 2018), may also be relevant in order to better predict risk of violence—directed towards others and oneself—and target interventions accordingly.

4.2. Methodological issues

Several limitations must be considered when interpreting these findings. First, the cross-sectional study design limits causal inferences since the observed associations do not account for temporal ordering. Second, data were based on retrospective self-report and thus may be subject to biased recall, social desirability, and underreporting. The use of self-reported psychiatric diagnoses is likely to have underestimated the true prevalence of disorders, and may have introduced bias since not all participants may recognize or acknowledge their mental health condition (Binswanger et al., 2010). Diagnostic interviews, conducted by clinically trained psychiatrists or psychologists, would provide a more accurate assessment of psychiatric morbidity in this population. With regard to self-harm, questions have been raised about the reliability of assessing suicidal intent as reports may be biased by current mood state, individuals may have been ambivalent, or may not truly intend to end their life (Kapur et al., 2013). Acknowledging this limitation, however, the approach used in this study is in accordance with a compelling body of research (Hamza et al., 2012; Mars et al., 2014; Victor and Klonsky, 2014). Relatedly, a single binary item was used for self-harm engagement. Although this is consistent with oft-cited studies in prisoner populations (Jenkins et al., 2005; Larney et al., 2012; Völlm and Dolan, 2009), such an approach is unable to assess dimensions of frequency, chronicity, and methods—characteristics that have been shown to correlate with suicide risk (Grandclerc et al., 2016; Hamza et al., 2012; Victor and Klonsky, 2014). In a similar vein, most predictors in the analyses were dichotomous clinical variables, as opposed to more fine-grained continuous scales, limiting the ability to detect between-group differences. Although not a study objective, the analysis did not distinguish whether self-harm events occurred prior or subsequent to incarceration (or both). Last, data for this study were drawn from a male-only sample. Since female prisoners differ from their male counterparts in many important ways (Favril and Dirkzwager, 2019), one being that incarcerated women exhibit higher rates of self-harm compared to men in prison (Hawton et al., 2014; Jenkins et al., 2005; Knight et al., 2017), caution should be exercised in generalizing these findings to female prisoners.

Each of these limitations restricts the inferences that can be drawn from this study and represents areas for improvement in future research. Nonetheless, the present study makes a solid contribution to the literature as it provides one of the few rigorous explorations of co-occurring NSSI and SA in a large random sample of male prisoners.

4.3. Conclusion and future directions

Both involving deliberate injury to the body, self-harm with (SA) and without (NSSI) suicidal intent each pose a major public health concern that affects a large number of individuals passing through the criminal justice system. This study highlights the significant overlap between NSSI and SA in a large sample of male prisoners—both behaviours frequently co-occur and share multiple risk factors. Furthermore, pending replication in other prison samples, the current results indicate that incarcerated men engaging in NSSI who also attempt suicide may be differentiated from those with a history of NSSI only on measures of suicidal ideation, psychiatric morbidity, and violent crime. These factors, although of interest, are however unlikely to be of much clinical use because they are comparatively common in mainstream prisoner populations (Favril and Dirkzwager, 2019; Fazel et al., 2016), making the identification of those at highest risk of suicide a complex task. Owing to a lack of specificity, screening instruments incorporating such variables are therefore likely to be over-inclusive, erroneously flagging risk of suicide among prisoners in general, and self-injurers more specifically (Lohner and Konrad, 2007). Consequently, future studies should focus on other (modifiable) psychosocial risk factors which can improve the predictive power of screening instruments. In this regard, comparing self-harm groups on more specific constructs from the *Research Domain Criteria* (Glenn et al., 2018) may elucidate novel risk factors that could be ameliorated through treatment (Coppersmith et al., 2017). Such research will allow for a continued aetiological understanding of common and differential pathways to NSSI and SA in prisoners, which could assist researchers and

clinicians alike to identify unique predictors with greater precision. Ultimately, this will advance our ability to intervene with these prevalent yet preventable behaviours in this at-risk population, and forestall adverse outcomes in the long run.

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