

What differentiates prisoners who attempt suicide from those who experience suicidal ideation? A nationally representative study

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ABSTRACT

Objective: Many people who think about suicide do not engage in suicidal behavior. Identifying risk factors implicated in the process of behavioral enactment is crucial for suicide prevention, particularly in high-risk groups such as incarcerated offenders. **Method:** Cross-sectional data were drawn from a nationally representative sample of 17,891 prisoners (79% men) in the United States. We compared prisoners who attempted suicide ($n = 2496$) with those who thought about suicide but never made an attempt ($n = 1716$) on a range of established risk factors. **Results:** More than half (59%) of participants who experienced suicidal ideation had also attempted suicide. Violent offending, trauma, brain injury, alcohol abuse, and certain mental disorders independently distinguished attempters from ideators. **Conclusion:** Our results fit within recent ideation-to-action theories that emphasize the role of a capability for suicide in the transition from thoughts to acts of suicide.

INTRODUCTION

Suicide is a global public health concern (Turecki et al., 2019) which disproportionately impacts on the most vulnerable members of society, including people in contact with the criminal justice system (Webb et al., 2011). Specifically, suicide is a leading cause of death in prisoners (Favril et al., 2019), with rates at least three times higher than in age-equivalent peers outside prison (Fazel, Ramesh, & Hawton, 2017). Prisoners who die by suicide only represent the tip of the iceberg; many more consider or attempt suicide without a fatal outcome. Large-scale studies from Australia (Larney et al., 2012), Belgium (Favril & O'Connor, 2019), England and Wales (Jenkins et al., 2005), Italy (Sarchiapone et al., 2009), and New Zealand (Favril et al., 2020) suggest that at least one-third (34–44%) of prisoners seriously considered suicide in their lifetime, and one-fifth (15–22%) has ever attempted suicide. These suicide-related exposures are among the strongest risk factors for suicide in prisoners (Fazel et al., 2008), which concurs with a process-oriented view of suicide risk. This concept of a *suicidal process* implies the transition from thoughts to acts of suicide, in which suicidal ideation is considered an initial step in the pathway towards suicidal behavior (Sveticic & De Leo, 2012; van Heeringen, 2001).

Extant research seeking to identify suicide risk factors in prisoners tends to compare those who attempted suicide with their non-attempting peers, irrespective of suicidal ideation (e.g., Favril, 2019; Jenkins et al., 2005; Sánchez, Fearn, & Vaughn, 2018; Sarchiapone et al., 2009; Stoliker, 2018). However, as suicidal behavior rarely occurs in the absence of suicidal thoughts (Larney et al., 2012; May & Klonsky, 2016), these studies have neglected to account for the shared variance with suicidal ideation when examining risk factors for suicide attempt. Consequently, it is plausible that identified risk factors predict suicide attempt solely through their association with suicidal ideation, hence limiting their utility in understanding the transition from ideation to attempt. In support of this claim, a mounting body of epidemiological (Mars et al., 2019; Nock et al., 2010; Wetherall et al., 2018) and meta-analytical (May & Klonsky, 2016) evidence highlights that many oft-cited risk factors for suicide are in fact strong predictors of suicidal thoughts, but are less relevant in predicting which individuals are at greatest risk of acting on their thoughts and progress to suicidal behavior (Klonsky, May, &

Saffer, 2016). This distinction is paramount because most people who think about suicide do not go on to attempt suicide (Nock et al., 2008; ten Have et al., 2009). In light of this, recent theoretical models of suicide embedded within an *ideation-to-action* framework (Klonsky, Saffer, & Bryan, 2018) stipulate that factors and processes underpinning the development of suicidal ideation are distinct from those that govern the transition from thought to enactment (Appendix).

Pinpointing factors which differentiate between individuals who attempt suicide (attempters) and those who experience suicidal ideation without acting on these thoughts (ideators) is clinically important to improve risk assessment and identify actionable targets for intervention in the early stages of the suicidal process—that is, before thoughts progress to acts of suicide. This is particularly relevant in high-risk populations such as prisoners, where many individuals present with suicidal ideation (Favril et al., 2017), and the challenge faced by clinicians is to identify who is at greatest risk for acting on such thoughts. However, our literature review identified only three studies adopting an ideation-to-action framework to discern risk of suicide in prisoners (see Table 1 for a summary). Results suggest that, relative to those who only think about suicide, prisoners who also attempt suicide are significantly more likely to report traumatic brain injury, non-suicidal self-injury, violent offending, indicators of childhood trauma, substance abuse, and certain mental disorders (Favril et al., 2020; Favril & O'Connor, 2019; Larney et al., 2012). These studies further indicate that approximately half (47–58%) of those who considered suicide had progressed to making a suicide attempt at some point. Given the paucity of this specific line of research in prisoners, further delineating differences between ideators and attempters could shed light on factors that act as catalysts in the transition from thoughts to acts of suicide, which has important implications for both clinical practice and suicide theory. Against this background, the present study sought to advance knowledge of factors associated with suicide attempt above and beyond their association with suicidal ideation in a nationally representative sample of prisoners.

Table 1. Ideation-to-action studies in prisoners.

	Larney et al. (2012)	Favril & O'Connor (2019)	Favril et al. (2020)
Country	Australia	Belgium	New Zealand
Sample (n)	996 (199 women)	1326 (123 women)	1212 (119 women)
Lifetime prevalence (%)			
SI	34 (30–38)	44 (42–47)	35 (32–37)
SA	21 (17–24)	22 (17–24)	19 (17–22)
SA in those with SI	58 (51–64)	47 (43–51)	56 (51–60)
Risk factors*	Traumatic brain injury	Non-suicidal self-injury	Alcohol dependence
	Depression	Violent offending	Drug dependence
	Parental incarceration	Mental disorder	PTSD
	Out-of-home care	Substance abuse	

SI = suicidal ideation; SA = suicide attempt; PTSD = posttraumatic stress disorder.

* Risk factors for suicide attempt among prisoners with suicidal ideation.

METHODS

Procedure and participants

Data for this study came from the 2004 *Survey of Inmates in State and Federal Correctional Facilities* (SISFCF), a cross-sectional epidemiological survey designed to monitor characteristics and health of prisoners in the United States (US). This is the latest survey in a series of data collection efforts designed by the US Bureau of Justice Statistics, previously used in research on suicidal behavior in prisoners (Katsman & Jeglic, 2019; Stoliker, 2018). This survey collected data between October 2003 and May 2004 from a nationally representative sample of 18,185 prisoners housed within 287 state and 39 federal correctional facilities throughout the US. Separately, the male sample consisted of 14,297 prisoners nested within 221 state and 30 federal correctional facilities; the female sample comprised 3888 prisoners nested within 66 state and 9 federal institutions.

A two-stage multi-level sampling procedure was used to obtain the sample and conduct the survey. In the first stage, *prisons* were selected using stratified random sampling. This procedure ensured that the probability of prison selection was greater for larger prisons, that there was an

adequate representation of female prisons, and that prisons with reported medical, mental health, and geriatric care functions were well represented. In the second stage, *prisoners* were selected using random sampling (state prisoners) and stratified random sampling (federal prisoners; to ensure an equitable distribution of drug offenders and non-drug offenders).

Prisoners selected to participate in the survey were informed verbally and in writing that participation was fully voluntary and that all information provided would be confidential. Prisoners who agreed to participate were interviewed using computer-assisted personal-interviewing, which gathered extensive self-report information from prisoners on a wide range of topics, including sociodemographic and personal characteristics, criminal background, and health factors. There was a 10.9% and 15.4% non-response rate among state and federal prison(er)s, respectively.

For further information on sampling and data collection procedures for this survey, we refer to the 2004 SISFCF codebook (Bureau of Justice Statistics, 2004).

Measures

Suicidal outcomes. Consistent with similar ideation-to-action studies conducted in prisoners (Table 1) and in the general population (Mars et al., 2019; Wetherall et al., 2018), our outcome measure was lifetime history of suicidal ideation and attempt. Specifically, the survey asked respondents whether they had ever attempted suicide (no/yes) and followed up by asking those who did not provide a positive response to this question whether they ever considered suicide (no/yes). In line with Favril and colleagues (Favril et al., 2020; Favril & O'Connor, 2019), both dichotomous items were used to categorize participants in three mutually exclusive groups: those without any suicidal history (*controls*), those who had thought about suicide but never made a suicide attempt (*ideators*), and those who had experienced suicidal ideation and attempted suicide in the past (*attempters*).

Background variables. The survey included details on age (continuous), sex (male/female), and race/ethnicity (white/other). Education (continuous) was based on highest level of school attended

prior to current admission to prison ranging from 0 (never attended or kindergarten only) to 18 (two or more years of graduate school). The analysis included one criminological variable; offence type. This variable was recoded into violent (e.g., homicide, assault, robbery) vs. non-violent (e.g., property, drug, and public order offences).

Clinical variables. Respondents were asked whether they had ever been told by a mental health professional, such as a psychiatrist or psychologist, that they had one or more of the following mental disorders: depressive disorder; bipolar disorder; psychotic disorder; posttraumatic stress disorder (PTSD); anxiety (e.g., panic) disorder; personality (e.g., antisocial or borderline) disorder; other mental disorders not listed. The wording of the question and choice of a self-report measure of lifetime psychiatric diagnoses is consistent with previous prison research (Binswanger et al., 2010; Favril & O'Connor, 2019).

Though the survey did not capture substance use disorders, respondents were asked about their lifetime history of alcohol and drug use. Alcohol use was based on the CAGE-questionnaire, a 4-question screening test for alcohol dependence (Bush et al., 1987; Cronbach's $\alpha = 0.851$; mean inter-item correlation = 0.589) with two or more positive responses indicating alcohol abuse (coded as no/yes). Drug use (no/yes) was based on whether respondents had ever used different types of drugs (e.g., opiates, amphetamines, tranquilizers, crack/cocaine).

Anger/aggression (continuous) was assessed according to four survey questions which asked prisoners if, in the past 12 months, they had: lost their temper easily; been angry more often than usual; hurt/broken things due to anger; thought about getting revenge on someone they were angry at (Cronbach's $\alpha = 0.733$; mean inter-item correlation = 0.405). Learning disability (no/yes) was assessed according to the survey question "Do you have a learning disability, such as dyslexia or attention deficit disorder?". The current study also assessed prisoners according to whether they had suffered a brain injury, including stroke (no/yes).

A history of trauma was assessed by asking participants whether, before the current admission to prison, they had ever been pressured or forced into any sexual contact against their will (sexual trauma; no/yes) or had ever been physically abused (physical trauma; no/yes).

Statistical analysis

The analytical sample comprised 17,891 prisoners with complete data on suicidal outcomes, as responses on these items were missing for 294 (1.6%) of all 18,185 participants. Individuals included in this study ($n = 17,891$) were more likely than those excluded ($n = 294$) to be white and to report alcohol abuse, but less likely to report a mental disorder and brain injury. No statistically significant differences were noted between both groups in terms of other characteristics listed in Table 2.

Contingency tables were used to describe characteristics of the total sample, further stratified by participants' suicidal history. Differences between groups (controls, ideators, and attempters) were investigated using one-way analysis of variance for continuous variables and chi-square tests for categorical variables. For subsequent analyses, we excluded participants that reported no suicidal history (controls; $n = 13,679$) in order to account for the shared variance with suicidal ideation when examining risk factors for suicidal attempt. As such, the independent contribution of risk factors for suicide attempt can be more rigorously established, as the potential confounding with suicidal ideation is accounted for by excluding non-suicidal controls. Specifically, bivariate analyses compared attempters ($n = 2496$) to ideators ($n = 1716$) on all study measures. Next, all predictor variables (regardless whether they significantly distinguished between ideators and attempters at the bivariate level) were entered into a multivariate logistic regression to determine their independent contributions. Consistent with earlier work (Favril et al., 2020), we additionally examined men and women separately due to the marked sex differences in suicidal outcomes among prisoners (Favril & O'Connor, 2019; Jenkins et al., 2005). Robust standard errors were estimated for the final multivariate model given the clustered nature of the data (i.e., prisoners nested within prisons), which violates the assumption of independence. Crude (OR) and adjusted (aOR) odds ratios, and their 95% confidence

intervals (CI), are reported as estimates of the likelihood that individuals with suicidal ideation attempted suicide. A missing values analysis was conducted, showing that variables contained few missing cases, with less than 1% missing values for all items. This was deemed ignorable missingness and listwise deletion was used to handle missing cases for all analyses. All tests were two-tailed, and p values < 0.05 were considered statistically significant.

RESULTS

Sample characteristics

Of the 17,891 participants whose data were included in the analysis, 78.6% were men ($n = 14,069$) and their age ranged from 16 to 84 years ($M = 35.8$ years; $SD = 10.5$). The majority identified themselves as white (49.1%) or black (42.5%), with the remaining participants identifying as either Hispanic (19%) or 'other' race/ethnicity (11.4%). On average, the highest level of school attended prior to incarceration was 10.96 ($SD = 2.49$; range 0–18). Four out of ten participants (40.5%) were charged with, or convicted of, a violent offence. Further details on respondents' clinical characteristics are presented in Table 2, stratified by suicidal history (controls, ideators, and attempters). Sample characteristics for men (Table S1) and women (Table S2) separately are provided as supplementary material, available online.

Prevalence estimates

The lifetime prevalence of suicidal ideation and suicide attempt was 23.5% (95% CI 22.9–24.1) and 13.9% (95% CI 13.4–14.4), respectively (Table 3). Women were more likely than men to report a lifetime history of suicidal ideation (36.8% *v.* 19.9%; OR = 2.34, $p < 0.001$) and suicide attempt (26.4% *v.* 10.5%; OR = 3.03, $p < 0.001$). Of the 17,891 prisoners with complete data on suicidal outcomes, 13,679 (76.4%) had no suicidal history (*controls*), 1716 (9.6%) reported suicidal ideation only (*ideators*), and 2496 (13.9%) attempted suicide in their lifetime (*attempters*). Among the subsample of those with

suicidal ideation ($n = 4212$), more than half (59.3%, 95% CI 58.5–59.9) had ever attempted suicide; significantly more women than men (71.7% v. 53.0%; OR = 2.25, $p < 0.001$).

Table 2. Participants' characteristics stratified by suicidal history.

	Total sample ($n = 17,891$)	Suicidal history			Test statistic
		Controls ($n = 13,679$)	Ideators ($n = 1716$)	Attempters ($n = 2496$)	
Age, years	35.82 (10.51)	35.87 (10.69)	36.53 (10.36)	35.07 (9.58)	12.08*
Female sex	21.4	17.7	23.2	40.4	655.25*
White ethnicity	49.3	45.6	60.1	62.0	315.13*
Education, years	10.96 (2.49)	10.96 (2.47)	11.26 (2.55)	10.72 (2.52)	22.94*
Violent offence	40.5	38.1	48.5	48.5	144.72*
Any mental disorder	27.2	16.2	49.0	72.6	3843.26*
<i>Depressive disorder</i>	20.3	10.9	38.1	60.1	3518.46*
<i>Bipolar disorder</i>	10.7	4.6	18.1	38.8	2715.43*
<i>Psychotic disorder</i>	4.3	1.8	6.3	16.5	1130.60*
<i>PTSD</i>	6.4	3.0	11.3	21.8	1329.40*
<i>Anxiety disorder</i>	8.1	4.1	14.6	25.4	1405.22*
<i>Personality disorder</i>	6.0	2.7	10.7	21.0	1326.93*
<i>Other disorder</i>	1.9	1.1	2.8	5.4	214.29*
Any substance use	83.6	81.7	89.0	90.7	160.49*
<i>Alcohol abuse</i>	30.7	27.0	40.5	44.4	385.05*
<i>Drug use</i>	81.1	79.0	86.8	88.6	162.24*
Anger/aggression	0.83 (1.17)	0.68 (1.07)	1.17 (1.29)	1.42 (1.39)	398.50*
Learning disability	11.5	8.6	17.9	23.3	533.42*
Brain injury	4.4	3.2	6.3	9.8	236.56*
Any trauma	24.3	16.3	40.7	56.9	2167.78*
<i>Sexual trauma</i>	12.6	7.2	21.4	35.9	1731.16*
<i>Physical trauma</i>	19.8	13.0	32.6	48.2	1848.39*

Note. Means and standard deviations in parentheses are presented for continuous variables, and percentages for categorical variables. Pearson chi-square test-statistic are reported for categorical variables, and Welch test-statistic (one-way ANOVA) for continuous variables.

* Significant at the 0.001 level.

Table 3. Lifetime history of suicidal ideation and attempt, by sex.

	All prisoners	Women	Men	OR (95% CI)
<i>In the total sample</i>				
Suicidal ideation	4212 (23.5%)	1407 (36.8%)	2805 (19.9%)	2.34 (2.16–2.53)
Suicide attempt	2496 (13.9%)	1009 (26.4%)	1487 (10.5%)	3.03 (2.77–3.32)
<i>Base</i>	<i>17,891</i>	<i>3822</i>	<i>14,069</i>	
<i>Among those with ideation</i>				
Suicide attempt	2496 (59.3%)	1009 (71.7%)	1487 (53.0%)	2.25 (1.96–2.58)
<i>Base</i>	<i>4212</i>	<i>1407</i>	<i>2805</i>	

Bivariate and multivariate analyses

As shown in Table 4, bivariate analyses indicate that all but three (race/ethnicity, violent offending, and drug use) variables were significantly associated with suicide attempt status among participants with suicidal ideation. Of those significant, ORs ranged from 1.15 (anger/aggression) to 2.95 (psychotic disorder) for positive associations, and from 0.99 (age) to 0.92 (education level) for negative associations. Results of the multivariate analysis are also presented in Table 4. There was good fit of the model to the data (likelihood-ratio $\chi^2_{(19)} = 529.26$, $p < 0.001$), indicating that the model was able to distinguish between ideators and attempters given the study variables. Controlling for all variables in the model, the background factors that independently distinguished attempters from ideators were age (aOR = 0.99, 95% CI 0.98–0.99), female sex (aOR = 1.84, 95% CI 1.55–2.19), education level (aOR = 0.93, 95% CI 0.90–0.95) and violent offending (aOR = 1.18, 95% CI 1.03–1.36). With regard to psychiatric diagnoses, only depressive (aOR = 1.52, 95% CI 1.30–1.78), bipolar (aOR = 1.67, 95% CI 1.39–1.99) and psychotic (aOR = 2.07, 95% CI 1.60–2.66) disorders were significantly associated with suicide attempt among those with suicidal ideation. Last, alcohol abuse (aOR = 1.15, 95% CI 1.00–1.32), brain injury (aOR = 1.45, 95% CI 1.11–1.90), sexual trauma (aOR = 1.27, 95% CI 1.06–1.51) and physical trauma (aOR = 1.25, 95% CI 1.08–1.46) each independently differentiated between ideators and attempters.

Table 4. Bivariate and multivariate analysis for suicide attempt among those with suicidal ideation ($n = 4212$).

	Bivariate analyses		Multivariate model			
	OR (95% CI)	p	B	SE	aOR (95% CI)	p
Age	0.99 (0.98–0.99)	< 0.001	–0.014	0.004	0.99 (0.98–0.99)	< 0.001
Female sex	2.25 (1.96–2.58)	< 0.001	0.612	0.088	1.84 (1.55–2.19)	< 0.001
White ethnicity	1.08 (0.95–1.22)	0.232	–0.009	0.072	0.99 (0.86–1.14)	0.899
Education level	0.92 (0.90–0.94)	< 0.001	–0.075	0.014	0.93 (0.90–0.95)	< 0.001
Violent offence	1.00 (0.88–1.13)	0.968	0.167	0.071	1.18 (1.03–1.36)	0.018
Depressive disorder	2.44 (2.15–2.77)	< 0.001	0.423	0.080	1.52 (1.30–1.78)	< 0.001
Bipolar disorder	2.89 (2.49–3.35)	< 0.001	0.512	0.091	1.67 (1.39–1.99)	< 0.001
Psychotic disorder	2.95 (2.36–3.69)	< 0.001	0.726	0.129	2.07 (1.60–2.66)	< 0.001
PTSD	2.19 (1.83–2.62)	< 0.001	0.205	0.106	1.22 (1.00–1.51)	0.054
Anxiety disorder	1.99 (1.69–2.34)	< 0.001	0.033	0.099	1.03 (0.85–1.25)	0.740
Personality disorder	2.21 (1.84–2.64)	< 0.001	0.136	0.110	1.14 (0.92–1.42)	0.216
Other disorder	1.97 (1.41–2.76)	< 0.001	0.371	0.189	1.45 (0.99–2.12)	0.050
Anger/aggression	1.15 (1.09–1.20)	< 0.001	0.004	0.027	1.01 (0.95–1.06)	0.888
Learning disability	1.39 (1.19–1.62)	< 0.001	0.012	0.091	1.01 (0.85–1.21)	0.890
Alcohol abuse	1.17 (1.03–1.33)	0.011	0.142	0.072	1.15 (1.00–1.32)	0.049
Drug use	1.18 (0.98–1.42)	0.082	–0.024	0.110	0.98 (0.79–1.21)	0.825
Brain injury	1.62 (1.28–2.05)	< 0.001	0.374	0.135	1.45 (1.11–1.90)	0.006
Sexual trauma	2.06 (1.79–2.38)	< 0.001	0.240	0.089	1.27 (1.06–1.51)	0.007
Physical trauma	1.94 (1.71–2.21)	< 0.001	0.229	0.078	1.25 (1.08–1.46)	0.004

Note. aOR = adjusted odds ratios (adjusted for all other factors in the multivariate model) and their 95% confidence intervals (CI).

Given that suicidal outcomes were more common in women than in men, we further conducted subgroup analyses by prisoners' sex, the results of which are provided in Tables S3 and S4 (available online). For both male ($n = 2805$) and female ($n = 1407$) prisoners with suicidal ideation, age (aOR = 0.99 for men and 0.98 for women), bipolar disorder (aOR = 1.41 and 2.19) and psychotic disorder (aOR = 2.07 and 2.04) were independently associated with suicide attempt. For men only, education level (aOR = 0.91), depressive disorder (aOR = 1.73), sexual trauma (aOR = 1.34) and physical trauma (aOR = 1.31) distinguished attempters from ideators. For women only, alcohol abuse (aOR = 1.36) and brain injury (aOR = 1.90) conferred an increased risk of suicide attempt among those with suicidal ideation.

DISCUSSION

This study sought to delineate factors associated with suicide attempt above and beyond their association with suicidal ideation in a representative national sample of 17,891 prisoners. Nearly a quarter (24%) of participants reported a lifetime history of suicidal ideation, and one in seven (14%) had ever attempted suicide. These prevalence estimates (especially for suicidal ideation) are lower than those documented in related cross-sectional studies from Europe (Favril & O'Connor, 2019; Jenkins et al., 2005; Sarchiapone et al., 2009) and Australasia (Favril et al., 2020; Larney et al., 2012). Despite this discrepancy, the ratio of suicide attempts to suicidal ideation (59%) is largely comparable to the 47–58% identified in previous ideation-to-action studies among offenders incarcerated in other high-income countries (Table 1). Of the 4212 participants in our study reporting suicidal ideation, incarcerated women were twice as likely as men to have attempted suicide—which aligns with recent Belgian findings by Favril and O'Connor (2019).

Several factors independently differentiated between prisoners who had attempted suicide (attempters) and those who had only thought about suicide (ideators) in a multivariate context. First, consistent with previous research in prisoners, attempters were more likely than ideators to be violent offenders (Favril & O'Connor, 2019) and have suffered traumatic brain injury (Larney et al., 2012). In support of these findings, population-representative cohort studies indicate that traumatic brain injury

(Madsen et al., 2018) and violent crime (Sahlin et al., 2017) increase the risk of suicide. These associations possibly reflect impulse control deficiencies, which have been linked to one's propensity to act on suicidal thoughts (Mars et al., 2019; Wetherall et al., 2018). Similarly, one Italian study suggests that violent index offences are associated with suicide attempt, but not with suicidal ideation, in male prisoners (Sarchiapone et al., 2009). The consistent finding that violent offenders are at an increased risk of suicide compared with their non-violent peers (Favril, 2019; Fazel et al., 2008; Webb et al., 2011) may be indicative of a common underlying vulnerability to violence—directed towards others and oneself (O'Donnell, House, & Waterman, 2015). Several shared risk factors and neurobiological underpinnings have been proposed in this regard, including childhood maltreatment, impulsive-aggressive traits, serotonergic dysfunction, and emotion regulation difficulties (Mann, 2003; McMahon et al., 2018; Turecki et al., 2019).

Second, we found that alcohol abuse, but not drug use, was independently associated with suicide attempt among (female) prisoners with suicidal ideation. Such differential associations of substance use types have been reported previously among attempters versus ideators (Favril et al., 2020; Mars et al., 2019; May & Klonsky, 2016; Nock et al., 2009). Use of psychoactive substances may lower behavioral inhibition and impair decision-making, making it more likely that one will act on their suicidal thoughts (Mars et al., 2019; Saffer & Klonsky, 2018). *Post hoc* analyses, however, suggest that there is no independent effect of substance use overall in distinguishing attempters from ideators; further substantiating the importance of examining different substances (and their distinct pharmacological properties) individually. In addition, it is conceivable that patterns of use (frequency and chronicity) and modes of administration (e.g., injecting) may influence risk of engaging in suicidal behavior, as opposed to simply the use versus non-use of psychoactive substances. Future research should look beyond this binary classification and shift focus towards a more fine-grained approach, considering different aspects of substance use, which may explain why some prisoners who experience suicidal ideation are propelled towards suicide, whereas others do not cross this behavioral threshold.

Third, results demonstrate that only three mental disorders (depression, bipolar and psychotic disorders) uniquely differentiated attempters from ideators. This finding contributes to a growing body of literature documenting that only a select subset of disorders predicts the transition from suicidal ideation to action (Batterham et al., 2018; Favril et al., 2020; May & Klonsky, 2016; Nock et al., 2009, 2010). Although findings are somewhat mixed regarding which specific disorders are implicated in this transition, these prior studies have identified PTSD as one of the few disorders to consistently predict suicide attempt among those with suicidal ideation. While significant in bivariate analysis, however, PTSD was only borderline significant ($p = 0.054$) in our study once other disorders were controlled for. This discrepancy between ours and related studies may lie in methodological differences in the assessment of mental disorders. Information about specific mental disorders in this study was based on self-reports of diagnosed disorders rather than clinician-administered interviews using validated diagnostic criteria, which likely introduced bias. Specifically, asking about formal diagnoses may exclude those with a disorder but without a diagnosis (i.e., those who meet diagnostic criteria but who are not diagnosed as such), which may underestimate true prevalence rates. Moreover, even when given a formal diagnosis by a health professional, prisoners may not acknowledge or recognize this disorder at the time of assessment, further skewing results by not reporting it. Therefore, caution should be exercised in generalizing results of the present study regarding which mental disorders distinguish attempters from ideators (Favril et al., 2020). Diagnostic interviews, conducted by clinically trained psychiatrists or psychologists, would provide a more accurate assessment of psychiatric morbidity in this population.

Fourth, although PTSD was not independently associated with suicide attempt among those with suicidal ideation, exposure to sexual and physical trauma did significantly discriminate between attempters and ideators, particularly in men. Similarly, in a representative national sample of 8841 Australian adults, sexual and physical violence was associated with increased odds of suicide attempt in those considering suicide (Afzali et al., 2017). Although the link between interpersonal trauma and suicide appears robust, causal mechanisms underpinning this association remain unclear. Some

authors suggest that the preventable nature of interpersonal trauma and feelings of personal responsibility contribute to suicide risk among trauma-exposed individuals (Panagioti, Gooding, & Tarrier, 2009), whereas others posit that disruptions in interpersonal and social bonds may be the mechanism through which trauma increases risk of suicidal behavior (Stein et al., 2010). Large-scale studies further indicate that the trauma–suicide relationship is largely mediated by comorbid mental disorders (Afzali et al., 2017; Belik et al., 2009). Notably, some investigators reported that trauma exposure is not an independent predictor of subsequent suicide attempt outside the context of PTSD (Wilcox, Storr, & Breslau, 2009), while data from 102,245 adults across 21 countries suggest that this association holds irrespective of whether or not PTSD is present (Stein et al., 2010). Our study supports the latter finding in that interpersonal trauma distinguished attempters from ideators regardless of PTSD diagnosis. An important next step, however, is to explore in detail the interactions between traumatic events and mental disorders, particularly PTSD, in the prediction of suicidal outcomes among male and female prisoners.

Relevance to suicide theory

Although explorative, our results fit within recent ideation-to-action theories that emphasize the role of a *suicide capability* in the progression from thoughts to acts of suicide, including the interpersonal theory (Van Orden et al., 2010), the integrated motivational–volitional model (O'Connor & Kirtley, 2018), and the three-step theory (Klonsky & May, 2015). A central premise shared across these theoretical models is that suicidal ideation is a necessary though not sufficient cause to attempt suicide—individuals will not act on their suicidal thoughts unless they have the (cap)ability to do so (Appendix). This capability for suicide is thought to be developed via multiple pathways, most notably through exposure to painful and provocative life events (May & Victor, 2018; Smith & Cukrowicz, 2010).

Our findings align with this assumption, as factors that most clearly distinguished attempters from ideators all include features associated with increased exposure to such painful and provocative

events. For example, studies indicate that attempters can be differentiated from ideators on the basis of perpetrating interpersonal violence (Gunn, Lester, & McSwain, 2011; Rooney et al., 2019; Stack, 2014). Theoretically, these findings suggest that enacting physical violence on others may build one's capability for suicide through increased pain tolerance and fearlessness about death (Bryan & Cukrowicz, 2011; Granato et al., 2018). Similarly, victimization of sexual and physical violence inherently represents exposure to a particularly painful and provocative event. Such trauma exposure may contribute to suicide risk through mechanisms of desensitization and habituation to pain, which in turn may serve to promote one's capability for suicide (Smith et al., 2016). Research also hints that suicide capability may be the mechanism through which alcohol abuse promotes risk of suicide (Wolford-Clevenger et al., 2015). Use of alcohol may increase suicide capability proximally through its disinhibiting effects, or distally by exposing users to painful and fear-inducing events resulting from its consumption (e.g., alcohol intoxication is associated with increased risk of interpersonal violence).

Taken together, experiences that induce physical pain and/or fearlessness about death may promote a capability for suicide—whether endured (interpersonal trauma), enacted on others (violent offending), or precipitated through self-destructive behavior (substance abuse). Prisoners are more likely than others to be exposed to such adverse events, either prior to or during incarceration (Favril, 2019; Fazel et al., 2008; Sarchiapone et al., 2009). As a result, prisoners may experience greater suicide capability (Smith et al., 2016), potentially explaining their increased risk of suicide (Favril et al., 2019; Fazel et al., 2017). While our data, however tentative, support the conceptual link between risk of suicide and painful and provocative events, we were unable to directly test the theoretical claims proposed because we used proxies to, rather than explicit measures of, suicide capability. Future theory-driven research should formulate inferential hypotheses directly testing aspects of suicide capability in prisoners, and examine whether these are associated with the development of suicidal ideation relative to those increasing the likelihood that suicidal thoughts will be acted upon.

Methodological limitations

A strength of the current study is its sizable and representative sample, which is five times larger than all previous ideation-to-action studies of prisoners combined (Table 1). Whilst our study adds to a growing body of literature regarding risk factors for suicide attempt among prisoners with suicidal ideation, findings should be considered in light of several limitations. First, the cross-sectional nature of our data did not permit temporal sequencing between predictors and outcome, precluding any causal inferences. Second, the survey relied upon retrospective self-reports, which is vulnerable to biased recall and social desirability. Even though research suggests that prisoners reliably report health (Schofield et al., 2011) and incarceration-related (Kroner, Mills, & Morgan, 2007) information, participants in our study may have underreported sensitive topics (e.g., psychiatric morbidity and suicidal history) due to stigma or fear of negative consequences. To the extent that this was the case, prevalence rates are likely to be lower bound estimates. Third, a single-item assessment for both suicidal ideation and attempt was adopted, which may bias results towards an inflation of prevalence estimates due to misclassification (Millner, Lee, & Nock, 2015). In doing so, we were unable to capture the frequency or severity of suicidal outcomes—both the attempt and ideation groups therefore reflect a heterogeneous composition of suicidal individuals. In a similar vein, most predictors variables in the analyses were based on dichotomous items, as opposed to more fine-grained and psychometrically validated scales. Fourth, several factors hypothesized to be linked to a capability for suicide were not included in this study, most notably childhood maltreatment (Angelakis, Austin, & Gooding, 2020) and impulsivity, which have been shown to be overrepresented in prisoners. Last, while suicide attempt history is a robust risk factor of suicide (Fazel et al., 2008), some differences exist in risk factors for fatal and non-fatal suicidal behaviors (Boren et al., 2018). Therefore, the current findings may not be generalizable to prisoners who have died by suicide. Each of these limitations restricts the inferences that can be drawn from this study and represents areas for improvement in future research.

Clinical and research implications

In a population marked by high rates of suicidal ideation, a common challenge faced by clinicians is to identify which suicidal prisoners are at greatest risk for progressing to a suicide attempt. Our results underline the need to focus on suicide capability as a key distinguishing factor for those who consider versus attempt suicide (Anestis et al., 2017; May & Victor, 2018). Targeting factors which reflect such a capability for suicide may be a pivotal means for preventing progression to suicidal behavior for those experiencing suicidal thoughts. For instance, clinicians should screen prisoners with a history of violence—both victims and perpetrators—as they may be at risk of enacting on suicidal thoughts. Our results further highlight the continued importance of identifying and treating mental health problems and substance abuse in prisoners (Fazel et al., 2016), as these are strongly associated with the development of suicidal ideation and likely have a role in the transition from thoughts to acts of suicide (Favril et al., 2020; Favril & O'Connor, 2019). However, many of these risk factors are equally prevalent among non-suicidal prisoners, raising important questions about how current screening tools incorporating such variables can detect those who are truly at risk for suicidal behavior with sufficient accuracy (Gould, McGeorge, & Slade, 2018). Relatedly, whilst we found that several variables uniquely distinguished attempters from ideators, effect sizes were fairly small (aOR range 1.15–2.07); statistically significant in a large sample but much less persuasive to a clinician faced with an individual prisoner. These modest effect sizes are equally reflective of the challenges encountered in predicting suicide risk (Belsher et al., 2019; Franklin et al., 2017), requiring the consideration of a broad array of variables to accurately characterize this risk, which may advance current screening procedures. Supporting this notion, recent research using machine learning methods suggests that differences between attempters and ideators are far more complex than theoretically assumed (Huang, Ribeiro, & Franklin, 2020).

In closing, an important recommendation for future studies relates to the measurement of suicidal outcomes in prisoners. Since risk of suicide fluctuates over time, research should move from focusing on prisoners' *lifetime* histories towards a better understanding of suicidal thoughts and

behavior as it occurs in the prison setting; especially with respect to dynamic drivers of risk as they unfold during the period of incarceration. By examining suicide attempt *in prison* as the outcome variable, whilst controlling for recent suicidal ideation, such work could identify modifiable prison-specific targets for intervention (Favril et al., 2017; Marzano et al., 2016). Potential custodial factors that may play a role in the progression from thoughts to acts of suicide during imprisonment include exposure to self-harm among incarcerated peers, single-cell occupation, solitary confinement, in-prison assault, and access to lethal means. Importantly, research should further investigate the ebbs and flows of suicide risk as it relates to specific prison-based events and prisoners' experiences while incarcerated. This would be a significant advancement in the field as it moves beyond describing individual-level factors towards identifying the role of environmental-level factors amendable to prison management. Ideally, future research should follow up prisoners with suicidal ideation at baseline, and explore whether such factors predict subsequent risk of behavioral enactment while incarcerated. Such prospective studies would require a major effort in terms of resources to be allocated, but represent a vital means for identifying longitudinal predictors as well as the development of tools that would be useful to clinicians challenged with the task of assessing risk of future suicidal behavior.

CONCLUSION

This nationally representative study adds to the nascent literature adopting principles of the ideation-to-action framework to discern risk of suicide in prisoners. Essentially, our data support the hypothesis that factors akin to suicide capability meaningfully distinguish attempters from ideators. Nonetheless, there are still many questions that remain unanswered. Research embedded within this framework should be prioritized in order to delineate mechanisms through which prisoners come to think about suicide and subsequently progress towards acts of suicide, with particular focus on suicide capability as a key determinant of behavioral enactment. Such efforts will not only advance our theoretical understanding of the suicidal process, but will also lay foundations for the timely development of suicide prevention interventions in this vulnerable group of incarcerated offenders

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Appendix. *Theoretical models of suicide adopting an ideation-to-action framework.*

	Interpersonal theory (Van Orden et al., 2010)	IMV model (O'Connor & Kirtley, 2018)	Three-step theory (Klonsky & May, 2015)
Ideation	The simultaneous presence of thwarted belongingness and perceived burdensomeness leads to a desire for suicide.	The experience of defeat and humiliation from which there is no escape (entrapment) is the key driver of suicidal ideation.	A combination of pain and hopelessness cause suicidal ideation, which escalates when pain exceeds connectedness.
Action	To act upon a suicidal desire, an individual must have an acquired capability for suicide, characterized by a lowered physical pain sensitivity and high fearlessness of death. This capability is acquired through repeated exposure to painful and provocative events (e.g., self-harm, childhood adversity, violence).	Volitional moderators govern the transition from ideation to action. The theory expands beyond an acquired capability and includes other factors that explain the propensity to act on suicidal thoughts (e.g., impulsivity, intent/planning, exposure to self-harm of others, access to lethal means, past suicidal behavior, mental imagery).	Suicidal ideation progresses to action when one has the capability to attempt suicide. The theory identifies three distinct contributors to increased suicide capability: dispositional (e.g., genetics, personality traits), acquired (e.g., fearlessness of death, habituation to pain), and practical (e.g., knowledge of and access to lethal means).

Table S1. Male participants' characteristics stratified by suicidal history.

	All men (n = 14,069)	Suicidal history			Test statistic
		Controls (n = 11,264)	Ideators (n = 1318)	Attempters (n = 1487)	
Age, years	36.70 (10.68)	35.63 (10.82)	36.49 (10.36)	35.50 (9.84)	4.41*
White race/ethnicity	47.4	44.0	60.0	62.0	261.59*
Education, years	10.87 (2.45)	10.87 (2.43)	11.21 (2.45)	10.59 (2.60)	20.91*
Violent offence	44.6	41.7	54.0	58.6	203.19*
Any mental disorder	22.4	13.6	45.8	68.7	2740.82*
<i>Depressive disorder</i>	16.2	8.7	35.2	57.1	2641.59*
<i>Bipolar disorder</i>	7.7	3.5	16.3	32.9	1723.05*
<i>Psychotic disorder</i>	3.9	1.7	6.7	18.9	1050.49*
<i>PTSD</i>	4.7	2.3	9.2	18.5	834.63*
<i>Anxiety disorder</i>	5.9	3.1	12.0	22.1	933.51*
<i>Personality disorder</i>	5.2	2.5	11.1	21.2	1023.26*
<i>Other disorder</i>	1.7	1.0	2.8	6.0	197.83*
Any substance use	84.6	83.2	90.7	92.1	120.39*
<i>Alcohol abuse</i>	31.3	28.0	42.9	46.1	291.13*
<i>Drug use</i>	81.9	80.4	88.4	90.0	119.62*
Aggression	0.78 (1.16)	0.66 (1.07)	1.16 (1.29)	1.37 (1.41)	245.53*
Learning disability	11.8	8.9	20.3	27.2	509.59*
Brain injury	4.1	3.1	6.7	9.9	179.53*
Any trauma	15.3	10.1	31.1	41.3	1263.36*
<i>Sexual trauma</i>	5.6	3.0	12.6	19.5	792.61*
<i>Physical trauma</i>	12.5	8.2	24.7	35.0	1052.05*

Note. Means and standard deviations in parentheses presented for continuous variables, and percentages presented for categorical variables. Pearson chi-square test-statistic reported for categorical variables, and Welch test-statistic (one-way ANOVA) reported for continuous variables. * Significant at the 0.05 level.

Table S2. Female participants' characteristics stratified by suicidal history.

	Suicidal history				Test statistic
	All women (n = 3822)	Controls (n = 2415)	Ideators (n = 398)	Attempters (n = 1009)	
Age, years	36.25 (9.86)	36.96 (9.95)	36.65 (10.37)	34.40 (9.16)	26.88*
White race/ethnicity	56.3	53.2	61.1	62.0	26.09*
Education, years	11.27 (2.57)	11.41 (2.59)	11.42 (2.83)	10.91 (2.39)	15.40*
Violent offence	25.4	21.2	30.2	33.6	63.47*
Any mental disorder	45.1	28.6	60.4	78.7	761.46*
<i>Depressive disorder</i>	35.5	21.3	48.5	64.6	612.12*
<i>Bipolar disorder</i>	21.5	10.0	24.5	48.2	613.38*
<i>Psychotic disorder</i>	5.7	2.7	5.1	13.4	151.02*
<i>PTSD</i>	12.9	6.2	18.5	27.1	286.09*
<i>Anxiety disorder</i>	16.0	8.7	23.4	30.7	272.15*
<i>Personality disorder</i>	8.9	3.8	9.8	21.0	254.66*
<i>Other disorder</i>	2.5	1.6	2.8	4.6	25.40*
Any substance use	80.1	76.2	83.7	88.9	75.87*
<i>Alcohol abuse</i>	28.7	22.5	32.4	42.0	135.17*
<i>Drug use</i>	78.0	74.0	82.2	86.8	73.25*
Aggression	0.98 (1.22)	0.74 (1.06)	1.18 (1.28)	1.49 (1.38)	128.74*
Learning disability	10.4	7.2	10.7	18.3	93.73*
Brain injury	5.6	3.9	5.0	9.8	47.66*
Any trauma	57.4	45.6	73.0	80.1	388.31*
<i>Sexual trauma</i>	38.2	27.0	51.3	61.0	377.08*
<i>Physical trauma</i>	46.4	35.7	58.8	68.1	326.21*

Note. Means and standard deviations in parentheses presented for continuous variables, and percentages presented for categorical variables. Pearson chi-square test-statistic reported for categorical variables, and Welch test-statistic (one-way ANOVA) reported for continuous variables. * Significant at the 0.05 level.

Table S3. Bivariate and multivariate analysis for suicide attempt among male prisoners with suicidal ideation ($n = 2805$).

	Bivariate analyses		Multivariate model			
	OR (95% CI)	p	B	SE	aOR (95% CI)	p
Age	0.99 (0.98–0.99)	0.008	–0.010	0.004	0.99 (0.98–0.99)	0.019
White race/ethnicity	1.09 (0.94–1.27)	0.256	0.002	0.086	1.01 (0.85–1.18)	0.978
Education level	0.91 (0.88–0.93)	< 0.001	–0.093	0.017	0.91 (0.88–0.94)	< 0.001
Violent offence	1.20 (1.03–1.39)	0.016	0.152	0.083	1.16 (0.99–1.37)	0.067
Depressive disorder	2.46 (2.11–2.87)	< 0.001	0.549	0.097	1.73 (1.43–2.09)	< 0.001
Bipolar disorder	2.52 (2.10–3.02)	< 0.001	0.348	0.114	1.41 (1.13–1.77)	0.002
Psychotic disorder	3.24 (2.51–4.16)	< 0.001	0.731	0.144	2.07 (1.56–2.75)	< 0.001
PTSD	2.23 (1.77–2.80)	< 0.001	0.261	0.137	1.30 (0.99–1.70)	0.057
Anxiety disorder	2.07 (1.68–2.54)	< 0.001	0.112	0.124	1.12 (0.87–1.43)	0.368
Personality disorder	2.16 (1.75–2.67)	< 0.001	0.056	0.131	1.06 (0.82–1.37)	0.668
Other disorder	2.18 (1.48–3.23)	< 0.001	0.425	0.215	1.53 (1.01–2.33)	0.048
Anger/aggression	1.12 (1.06–1.18)	< 0.001	–0.010	0.032	0.99 (0.93–1.05)	0.768
Learning disability	1.46 (1.22–1.74)	< 0.001	–0.052	0.104	0.95 (0.77–1.16)	0.618
Alcohol abuse	1.13 (0.97–1.31)	0.101	0.076	0.085	1.08 (0.91–1.27)	0.369
Drug use	1.18 (0.93–1.50)	0.173	–0.013	0.141	0.98 (0.75–1.30)	0.929
Brain injury	1.53 (1.16–2.01)	0.003	0.284	0.160	1.33 (0.97–1.82)	0.076
Sexual trauma	1.67 (1.35–2.05)	< 0.001	0.294	0.121	1.34 (1.06–1.70)	0.015
Physical trauma	1.65 (1.40–1.94)	< 0.001	0.272	0.095	1.31 (1.09–1.58)	0.004

Note. aOR = adjusted odds ratios (adjusted for all other factors in the multivariate model) and their 95% confidence intervals (CI).

Table S4. Bivariate and multivariate analysis for suicide attempt among female prisoners with suicidal ideation ($n = 1407$).

	Bivariate analyses		Multivariate model			
	OR (95% CI)	p	B	SE	aOR (95% CI)	p
Age	0.97 (0.96–0.99)	< 0.001	–0.023	0.007	0.98 (0.96–0.99)	0.001
White race/ethnicity	1.04 (0.82–1.32)	0.732	0.002	0.133	1.01 (0.77–1.30)	0.986
Education level	0.92 (0.88–0.97)	0.001	–0.030	0.028	0.97 (0.92–1.02)	0.293
Violent offence	1.17 (0.91–1.50)	0.225	0.179	0.140	1.19 (0.91–1.57)	0.200
Depressive disorder	1.95 (1.54–2.46)	< 0.001	0.139	0.145	1.15 (0.86–1.53)	0.337
Bipolar disorder	2.89 (2.23–3.75)	< 0.001	0.784	0.154	2.19 (1.62–2.96)	< 0.001
Psychotic disorder	2.89 (1.78–4.70)	< 0.001	0.716	0.284	2.04 (1.17–3.57)	0.012
PTSD	1.63 (1.22–2.18)	0.001	0.110	0.171	1.11 (0.80–1.56)	0.522
Anxiety disorder	1.44 (1.10–1.88)	0.008	–0.086	0.159	0.92 (0.67–1.25)	0.589
Personality disorder	2.42 (1.68–3.48)	< 0.001	0.361	0.213	1.43 (0.94–2.18)	0.090
Other disorder	1.67 (0.86–3.27)	0.129	0.162	0.385	1.17 (0.55–2.50)	0.674
Anger/aggression	1.19 (1.09–1.30)	< 0.001	0.027	0.051	1.03 (0.93–1.13)	0.597
Learning disability	1.87 (1.31–2.67)	0.001	0.245	0.199	1.28 (0.86–1.89)	0.220
Alcohol abuse	1.52 (1.19–1.95)	0.001	0.311	0.139	1.36 (1.04–1.79)	0.025
Drug use	1.43 (1.05–1.96)	0.025	–0.057	0.179	0.94 (0.66–1.34)	0.751
Brain injury	2.05 (1.25–3.37)	0.004	0.644	0.276	1.90 (1.11–3.27)	0.020
Sexual trauma	1.49 (1.18–1.88)	0.001	0.188	0.138	1.21 (0.92–1.58)	0.174
Physical trauma	1.50 (1.18–1.91)	0.001	0.158	0.140	1.17 (0.89–1.54)	0.260

Note. aOR = adjusted odds ratios (adjusted for all other factors in the multivariate model) and their 95% confidence intervals (CI).