Self-harm in New Zealand Prisons: Prevalence Rates and Individual and Situational-level Risk Factors

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Abstract

Self-harm is a serious public health concern in New Zealand and overseas due to its association with suicide and increasing prevalence rates. The prison population is known to be especially vulnerable to self-harm, with prisoners being 2-5 times more likely to self-harm compared to the general population. However, there is limited research available on how to identify at-risk prisoners. The current study aims to provide up-to-date prevalence rates of self-harm incidents across New Zealand prisons and highlight significant individual- and unit-level risk factors. This study is the first to use mixed-effects modelling to identify both individual- and unit-level risk factors that increase the likelihood of prisoners engaging in self-harm and its subcategories: threatening self-harm, non-life-threatening self-harm, life-threatening self-harm, and suicide. Two models were developed, the first included individual-level factors and unit as a random effect, the second also included unit-level fixed effects. Prisoners were at risk of self-harming the longer they spent in prison, not sharing a cell, were of European ethnicity, younger, had previous violent offences, and were in a high security unit and in units with multiple, opposing gangs in it. Prisoners in units with a high percentage of members from the same gang were less likely to self-harm. These identified predictive factors act as potential targets for risk assessments and treatment programmes to help reduce the risk of prisoners self-harming while incarcerated.

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Introduction

The act of self-harm is considered to be a world-wide public health concern; this is not only due to obvious physical damage that arises as a consequence but also because prevalence rates are continuing to rise. The prison population are a particularly vulnerable group when it comes to self-harm, with prevalence rates suggesting prisoners are 2-5 times more likely to self-harm compared to the general population (Hawton et al., 2014; Klonsky, 2011). Although global statistics show the prison population is at high-risk of self-harming and attempting suicide, there is little research available on how to identify those at-risk while incarcerated. There is also a large gap in the literature surrounding self-harm within New Zealand (NZ) prisons. The current study aims to provide up-to-date prevalence rates of self-harm incidents across NZ prisons, highlight significant individual and unit-level risk factors and use these risk factors to develop a predictive model that can help identify those at-risk of self-harming while in prison.

In this literature review, the topics that will be covered are the definition of self-harm and how it differs from suicide, the prevalence of self-harm in both the general and prison population, how self-harm is reported across NZ prisons, theorised models attempting to explain why individuals self-harm in prison and lastly, individual-level and prison-based factors that have been identified as increasing prisoners' risk of self-harm while incarcerated.

Definition of self-harm

Self-harm is typically defined as deliberate, direct injuring of one's own body tissue that is commonly associated with psychological dysfunction due to the desire to

damage oneself (Griller, 2014; Oxford University Press, 2004). Self-harm is also referred to as self-injurious behaviour, self-mutilation, non-suicidal self-injury, deliberate self-harm, and self-inflicted violence in the literature. These differing terms have had a significant impact on the accuracy of self-harm prevalence statistics and act as a limitation to prevalence research on self-harm (Klonsky et al., 2013; Muehlenkamp et al., 2012). However, the literature has grouped self-harm into two main classifications; deliberate self-harm (DSH) and its subsequent subset; non-suicidal self-injury (NSSI). Deliberate self-harm (DSH) encompasses all self-harming behaviours irrespective of the degree of suicidal intent or underlying motive (Horton et al., 2018; Muehlenkamp et al., 2012). Non-suicidal self-injury (NSSI) is defined as self-inflicted destruction of bodily tissue explicitly excluding all behaviours associated with suicidal intention (Muehlenkamp et al., 2012).

The theory behind excluding suicidal behaviour from the classification of self-harm is due to the idea that suicide and self-harm are mutually exclusive events. Although there is a correlation between self-harm and suicide, they differ in terms of frequency, methods, severity, and purpose (Klonsky et al, 2013). Self-harming behaviours occur more frequently, involve cutting, burning or self-hitting, are classed as less severe and may be used to avoid suicidal impulses (Klonsky et al., 2013). Comparatively, suicide attempts occur less frequently, involve alternate methods such as self-poisoning, are classed as more severe and lethal, and are motivated by an intent to die (Klonsky et al., 2013). Klonsky and colleagues (2014) concluded that the majority of individuals that self-harm do not have suicidal thoughts when self-injuring, however, self-harm can escalate into suicidal behaviour as the intent to die can change over time. Self-harm may lead to suicide when self-harming behaviours are no longer viewed as an effective coping strategy, whereby these behaviours cease to offset the feelings caused

by trauma or stress (Whitlock & Knox, 2007). Secondly, self-harmers who have become desensitised and habituated to pain through repeat harming episodes, may view suicide as less frightening (Stewart et al., 2014).

Despite the two distinct classifications of self-harm, research comparing NSSI and DSH in adolescents concluded that both classifications had comparable prevalence estimates suggesting they are measuring the same phenomena (Muehlenkamp et al., 2012). It was found that adolescents tend to alternate between reporting self-harming behaviours with and without suicidal intent, highlighting the idea that suicidal ideation may be a transient experience and adolescents may experience both NSSI and DSH in their lifetime (Muehlenkamp et al., 2012). Despite some studies suggesting suicide and self-harm are mutually exclusive events, both maladaptive behaviours have a close, reciprocal relationship and therefore in the current study suicidal behaviour is classed as a subcategory of self-harm.

The global average suicide rate is 10.7 per 100,000 with suicide ranked as the second cause of mortality amongst those 15-29 years of age, making it a global public health concern (Aggarwal et al., 2017). In a study by Tsaichristas et al., (2020), they recorded that there were 4727 deaths by suicide in England in 2013. They found that from that group, there were 48 self-harm presentations to hospitals per suicide and 34 patients presenting with self-harm before suicide (Tsaichristas et al., 2020). These ratios suggest that self-harm is a significant predictor of suicide (Dixon-Gordon et al., 2012; Klonsky et al., 2014; Lim et al., 2019; Tsaichristas et al., 2020) and therefore understanding self-harming behaviours is crucial in reducing the number of deaths by suicide worldwide.

Prevalence of self-harm

Self-harming behaviours typically emerge in early adolescence between the ages of 12-15 years and peak around 15-17 years (Lim et al., 2019). Past research has highlighted that approximately 22.1% of adolescents report NSSI and 13.7 - 16% report DSH over their lifetime (Muehlenkamp et al., 2012; Plener et al., 2015; Lim et al., 2019). However, due to adolescents reporting both DSH and NSSI interchangeably, prevalence estimates may be closer than anticipated (Muehlenkamp et al., 2012). Comparatively, between 4 - 5.9% of adults report self-harming during adulthood which is significantly lower than the adolescent age bracket (Klonsky, 2011; Martin et al., 2014). The reason for this disparity may be due to differences in underlying motive, sensitivity to environmental contexts, learned coping strategies and/or the presence or absence of protective factors (Stoliker, 2018). Data from the Dunedin Multidisciplinary Health and Development Study reported a lifetime prevalence of NSSI for adults living in New Zealand (NZ) as 34% which is significantly higher than international community samples, suggesting that self-harm in NZ is a national public health concern (Coppersmith et al., 2017). This high estimate of self-harm is thought to be linked to higher rates of psychiatric disorders, violence and abuse reported in this sample compared to other community samples (Coppersmith et al., 2017). According to Australian and NZ statistics the lifetime prevalence of DSH for females living in NZ is 16% compared to males 11%, which is still higher than international samples and supports the global view that females tend to exhibit higher rates of self-harm (Nada-Raja et al., 2004). Stats NZ (2019) reported that serious non-fatal injuries from self-harm in 2018 occurred at a rate of 5.9 injuries per 10,000 people, which is an increase of 2.4 injuries per 10,000 people, from 3.5 in 2013. These incidence rates provide support for the notion that self-harming behaviour is increasing within NZ.

Lim and colleagues (2019) have highlighted significant global and cultural differences in self-harm estimates. Eastern countries such as Hong Kong show decreased rates of self-harm compared to Western countries, such as the United States, which show significantly higher rates of self-harm. This difference is thought to be due to Eastern cultures having a stronger emphasis on family structures and rules (Law & Shek, 2013). Western countries also show a higher rate of attempted suicide than non-Western countries, this may be due to their higher rates of substance abuse, which is related to an increased risk of suicide (Snowdon, 2018). Individuals in Western countries also have easier access to suicidal means, such as firearms (Snowdon, 2018). Young indigenous people in Western countries are more likely to report internalised anger and despair due to social disruption and disempowerment and are therefore at higher risk of self-harm (Hunter & Milroy, 2006). This finding is consistent with NZ research where the Māori population show a higher rate of self-harm compared to non-Māori as well as higher rates of attempted and completed suicide, this is to a greater degree for young Māori (Black & Kisely, 2017; Nada-Raja 2004). Research within NZ has also shown that New Zealanders from low socioeconomic backgrounds are 31 times more likely to attempt suicide than individuals in the higher socioeconomic status (Beautrais et al., 1998). These statistics highlight self-harm as a national public health concern within NZ and identify Māori as an at-risk population.

Although self-harm within the general population has been identified as a significant point of concern, specifically for minority groups, the prison population has been identified as a particularly vulnerable group due to their use of high risk and often lethal self-harming behaviours (Hawton et al., 2014). Self-harm is considered the leading cause of morbidity in prisons worldwide and with global imprisonment rates increasing annually, self-harm prevalence rates are expected to rise (Borschmann et al.,

2018; Favril et al., 2020). The United Kingdom has reported a 45% increase in self-harm incidents from 2004 to 2010, with recent statistics showing an upward trend (Slade et al., 2014). The Ministry of Justice have provided recent incidence estimates for self-harm reports across prisons in England and Wales (Ministry of Justice, 2020). They found that self-harm incidents reached a record high of 61,461 incidents in the 12 months before September 2019, a 16% increase than the previous 12-month period. The number of individuals self-harming increased by 2% in the 12 months preceding September 2019, to 12,740, and the number of self-harm incidents per individual increased by 14% from 4.2 to 4.8 (Ministry of Justice, 2020).

Current prevalence estimates suggest that 5-6% of male prisoners and 20-24% of female prisoners self-harm while incarcerated (Hawton et al., 2014), which is significantly higher than the general population (Klonsky, 2011). Recurrent self-harm is common in prison with male prisoners self-harming twice a year on average and female prisoners repeating self-harm eight times per year (Hawton et al., 2014). Rates of suicide are also much higher in correctional facilities compared with the general population (Dye, 2011). Interestingly, prisons report a higher prevalence of suicidal attempts and suicidal ideation compared to completed suicides (Tartaro & Ruddell, 2006). This may be due to limited means to carry out suicide, the presence of prison officers who would intervene and limited access to a suitable place to carry out suicide, suggesting that suicides that occur in prison may be more opportunistic in nature (Cohen & Felson, 1979; Stoliker, 2018).

Within the general population, self-harm methodology differs between genders, with females more likely to use cutting methods compared to males who tend to burn or hit themselves (Klonsky et al., 2014). Comparatively, a study looking at self-harm methodology in prisons found that cutting was the most common form of self-harm for

males and females, accounting for 65% of incidents for male prisoners and 51% of incidents for female prisoners over the 6-year period (Hawton et al., 2014). From the same study it was found that male prisoners also use overdosing (9%), hanging (7%) and self-strangulation (5%) methods, compared to female prisoners who use self-strangulation (31%) and other methods such as wound aggravation and ligatures (5%) (Hawton et al., 2014). Slade and colleagues (2014) reported that approximately 92% of self-inflicted deaths that occur in prison are by ligature use, which may signify that different methodologies are used for self-harming compared to attempting suicide. The methods in which prisoners are self-harming or attempting suicide are significantly correlated with prison context, meaning how one self-harms is dependent on what is available to them (Slade et al., 2014).

Self-harming incidents are categorised in terms of lethality which is based on treatment outcome (Magaletta et al., 2008). Incidents categorised as high lethality involve resuscitation of an individual, an overnight stay in hospital, external hospitalisation on life support or a combination of these (Magaletta et al., 2008). Incidents classed as medium lethality involve an incident leading to external hospitalisation, but no life-support and low lethality is not needing resuscitation or external hospitalisation (Magaletta et al., 2008). In Hawton and colleague's (2014) case-control study, most self-harm incidents were classed as low lethality, with 10% of male and 3% of female prisoner's self-harm incidents being classed as medium or high lethality (Hawton et al., 2014). This supports previous work, highlighting apparent gender differences in the perceived lethality of self-harm (Tsirigotis et al., 2011). More specifically, males tend to self-harm with higher perceived lethality, which may contribute to males having a higher rate of successful suicides compared to females (Tsirigotis et al., 2011). These findings also suggest that the majority of prisoners who

self-harm while incarcerated have no intent to die as their self-harming behaviours are considered low lethality.

An interesting and unique finding from the case-control study conducted by Hawton and colleagues (2014) was that a substantial clustering effect was found (adjusted intra-class correlation of 15%). This finding suggested that contagion of self-harm may occur in prison due to social pressures, cries for help or intimidation tactics and ultimately may explain why self-harming behaviour is more prevalent among prisoners than among the general population.

Rates of self-harm are not only significantly higher among prisoners while incarcerated but also after they have been released. Borschmann and colleagues (2018) looked at the rates of self-harm associated with prisoners after they have been released from prison and found higher rates of ambulance attendance and emergency department presentation compared to the general population. These findings suggest that support should continue for prisoners who have a history of self-harm after they have been released from prison. Psychological assessments and interventions need to be carried out as prisoners enter prison, throughout their sentence, when incidents arise and after they are released back into society in order to reduce both self-harm and suicide rates associated with correctional facilities.

Reporting self-harm in prison

Most commonly defined across the literature, self-harm is damage to oneself irrespective of the degree of suicidal intent or underlying motive (Hawton et al., 2014). This is how prisons define self-harm with their reports going into further detail, breaking self-harm into subcategories (i.e., suicidal behaviour). In NZ, The Department of Corrections has two types of assessments for assessing prisoners' risk of self-harm, 1.

The Reception Risk Assessment and 2. The Review Risk Assessment (Department of Corrections, 2017). The Reception Risk Assessment is carried out following an individual's initial reception into custody or reception upon returning to custody from parole or bail. The risk assessment is in the form of an interview where the individual is asked a series of questions followed by the assessor using secondary sources, such as medical records, to cross reference the individual's statement. Considering all the available information, the assessor decides the at-risk status of the individual. Individuals that are intoxicated, have limited understanding of English, have a disability or another reason that prohibits their participation in the risk assessment interview, are automatically classed as at-risk. After the interview, the custodial assessor then consults with health staff to categorise an individual as *At Risk*, *No Apparent Risk at the Time,* or *No Agreement*. The classification *At Risk* means the individual is placed on observation (not exceeding 15 minutes) as well as moved to the Intervention and Support Unit. The classification *No apparent Risk at the Time*, means there is no risk identified and the individual continues with the induction process. The classification *No Agreement*, means the assessor and health staff cannot agree on the at-risk status of the individual. In this case, the Principal Corrections Officer (PCO) and Health Centre team leader reassess the case and make a joint decision. If the individual has a history of self-harming behaviour or suicide attempts the assessor places a *Risk of Suicide Alert* on the individual which is in place until the prisoner's sentence release date (Department of Corrections, 2017).

The second type of assessment used to assess the risk of an individual self-harming in prison is the Review Risk Assessment (Department of Corrections, 2017). This risk assessment is used when an inmate is returning from court, has further charges laid, their custodial status changes, changes in family circumstance, if an

incident has been heard of or witnessed and if they display negative changes in mood or behaviour (Department of Corrections, 2017). Similar to the Reception Risk Assessment, the assessor needs to consult with health staff to categorise the inmate as either *At Risk*, *No Apparent Risk at this Time*, or *No Agreement*. Individuals who have been categorised as being *At-Risk* must develop an at-risk management plan through the consultation with various health services. This plan must include the kind of placement to ensure their safety, their type of risk and reason for risk-status, access to support systems or programmes, restrictions from other prisoners and the names and roles of key people involved in the individual's risk management plan (Department of Corrections, 2017). The Department of Corrections use both subjective and objective means to identify self-harmers within NZ prisons, through the self-report reception screening as well as incident reports. Relying solely on self-report in custodial settings could mean self-harm rates are underrepresented due to many individuals experiencing acute distress at prison reception, resulting in difficulty accurately identifying those at risk. Prisoners may also be reluctant to disclose a history of self-harm due to concerns with being subjected to various restrictive practices (Borschmann et al., 2018). However, assessing individuals' risk of self-harm upon their arrival to prison is critical, past literature has found that self-harm rates and suicide attempts are significantly higher in the first few days and weeks of an individual's sentence or while on remand because of the increased distress they feel from being sent to prison, awaiting sentencing and being introduced to the prison environment (Liebling, 1993; Stoliker, 2018)).

Both types of risk assessments and any incident reports that involve self-harm, allow Department of Corrections to keep track of individuals who have previously engaged in self-harming behaviour and identify those who may be at risk. This

information is used in the current study to determine prevalence rates of self-harm across NZ prisons and how it has changed over time.

What causes someone to self-harm in prison?

The prison population is a superior group to study when looking at self-harm due to various restrictions in this environment, groups of antisocial individuals confined in one area, as well as the high prevalence and severity of assaults (Griller, 2014). Self-harm is known to correlate with feelings of stress, self-hatred, pain, depression, and a lack of sense of control (Klonsky & Muehlenkamp, 2007). Feelings which commonly occur within the prison population. Unlike the general population, self-harm in prison can also be used to manipulate people's attitudes and to convey various messages (Griller, 2014).

One theory that aims to explain self-harm within the prison population is Gambetta's costly signalling theory (Gambetta, 2009). Self-harm serves as a costly signal to transport private information, it is considered costly due to the damage, scars and disabilities produced as a result (Gambetta, 2009). There are two main messages hypothesised to be conveyed by prisoners engaging in self-harming behaviour; 1. Fearlessness and 2. Protection/Madness. Fearlessness is a message used to demonstrate to the attackers that they could not inflict more pain on the signaller than he/she can on themself (Griller, 2014). Gambetta's requirements for this message to be conveyed is that the self-harming behaviour must occur in the absence of any observable intent to die and that the injuries must be displayed and known to the attackers (Griller, 2014). Incarcerated persons have given various reasons for why they self-harm in prison; to change others behaviour or to shock or impress other prisoners (61%), to seek support from others (17%) and to control the reactions and behaviour of

others (5%) all of which support the idea of wanting to manipulate or control others (Brown et al., 2002).

The second message hypothesised to be conveyed through self-harm is signalling for either a need for protection from attackers or to portray signs of madness. This would result in a prison transfer, hospitalisation, or relocation to a mental institution, in which there are significantly less attacks (Griller, 2014). Unlike the message of fearlessness, the receivers of this message are the prison's administration team as they hold the power for all transfers. The message of madness may be conveyed if the prisoner appears more threatening and dangerous due to their unpredictability, however it has been noted that the likelihood of the message taken as madness is unlikely (Griller, 2014).

Gambetta's theory may help to partly explain the disparity between self-harm prevalence rates in prison compared to the general population. The general population have no need to convey messages of fearlessness or madness in order to deter attackers or ensure protection, therefore it is understandable that self-harming behaviours are more prevalent in violent, hostile environments like prison.

Another theory surrounding self-harm in prisons is the importation and deprivation paradigm (Dye, 2010). Sykes (1958) suggested that inmate's behaviour could be explained by the deprivations individuals face while in prison, such as, overcrowding, high level of violence, high security levels and disconnectedness from society (Stoliker, 2018). These prison deprivations decrease an inmate's sense of worth, shaping their maladaptive behaviour (i.e., self-harm) (Dye, 2010; Stoliker, 2018; Sykes, 1958). Sykes (1958) focused on how the prison context influenced prisoners' behaviour, whereas Irwin and Cressey (1962) were more interested prisoners' behaviour being

explained by the importation of various personality characteristics into prison. The idea of importations suggests prisoners' behaviour can be explained by an individual's pre-prison characteristics, experiences, values, and beliefs being carried with them into the prison setting (Irwin & Cressey, 1962; Stoliker, 2018). The importation and deprivation paradigm suggests that prisoners who enter prison with a predisposed risk of self-harm, may display this behaviour in prison, as well as prison context having the ability to shape prisoners' risk also (Stoliker, 208). Both theories provide insight into understanding prisoner behaviour, however, integrating these perspectives provides a stronger theoretical basis to help explain the motivations for self-harm in prison (Dye, 2010; Dye & Aday 2013).

O'Connor (2011) developed a model to help theorise how and why individuals engage in suicidal behaviour called 'the integrated motivational-volitional model of suicidal behaviour'. This model contains three phases: (1.) premotivational phase (i.e., background factors and triggering events), (2.) motivational phase (i.e., formation of ideas/intention), and (3.) volitional phase (i.e., behavioural enaction) (O'Connor, 2011; Stoliker, 2018). The premotivational phase refers to individual characteristics that predispose an individual to potentially engaging in suicidal behaviour (O'Connor, 2011). The motivational stage involves motivations toward suicidal ideation and intent, and the volitional phase is made up of three substages; (a) defeat and humiliation, (b) entrapment, and (c) suicidal ideation and intent (O'Connor, 2011). Suicidal ideation and intent can be determined by feelings of entrapment, feelings of entrapment can develop through defeat and humiliation and defeat and humiliation arise from premotivational stressors (O'Connor, 2011). O'Connor (2011) stated that the presence of moderating factors (e.g., broader prison context) could advance or prevent the transition between the motivational phase and volitional phase. Although this model specifically details

suicidal behaviour, the theory surrounding it may relate to other self-harming behaviours.

Slade and colleagues (2014) applied William and Pollock's (2001) Cry of Pain (CoP) model to theoretically explain self-harming behaviour in the early stages of imprisonment. The model was a broad biopsychosocial model which included biological processes, psychological aspects, and social interactions (Slade et al., 2014). The CoP model suggests that self-harm is motivated by the desire to escape rather than a cry for help and has been supported in hospital and adolescent samples (Rasmussen et al., 2010) as well as juvenile offenders (Penn et al., 2003). According to this model, there are four key components that need to be present to place an individual at high risk of self-harming; 1. Perceived stress (e.g., being imprisoned), 2. The presence of defeat (e.g., loss of social rank, humiliation), 3. Perception of entrapment (the use of avoidant-coping strategies) and 4. Perceived absence of rescue factors and feelings of isolation (Slade et al., 2014). Slade and colleagues (2014) found that all features the CoP model were supported as significant predictors of future self-harm in prison, after controlling for history of self-harm, depression, and hopelessness. This model provides a theoretical basis to understanding self-harming behaviours within the prison context, hospital setting and across age groups.

Risk factors for self-harm in prisons

Past research has identified numerous factors that have shown to significantly increase the risk of an individual self-harming while incarcerated. These studies highlight the importance of identifying potential risk factors in order to identify appropriate targets for interventions and future treatments, as well as to assist decision makers in allocating limited prison resources (Favril, 2020). The literature suggests that

both individual characteristics and prison context contribute to the risk of individuals self-harming while in prisons (Dye, 2010; Hawton et al., 2014; Stoliker, 2018).

Individual-level risk factors

Prisoners at risk of self-harm usually have a history of self-harming behaviours, including suicidal ideation and attempted suicide (Favril et al., 2020; Ivanoff, 1992). Prisoners who self-harm also tend to show higher levels of hopelessness, hostility, aggression, and low self-esteem (Gooding et al., 2017; Marzano, Hawton, et al., 2011). In multiple studies it has been reported that 25% of sampled prisoners stated their primary reason for self-harming was because of feeling depressed and hopeless (Marzano, Fazel, et al., 2011; Marzano, Hawton, et al., 2011). The presence of psychological disorders such as, Major Depressive Disorder (MDD), Borderline Personality Disorder (BPD), Schizophrenia and Anxiety disorders, significantly increase the likelihood of prisoners self-harming (Favril et al., 2020; Maden et al., 2000; Slade et al., 2014; Way et al., 2005).

Within the general population females show a higher prevalence of self-harm, suicidal ideation, and suicidal behaviour, whereas males show a higher rate of completed suicides (Canetto & Sakinofsky, 1998). Past studies have highlighted that in prison male and female prisoners have similar completed suicide rates, but female prisoners demonstrate significantly higher rates of self-harm (Dye, 2011; Hawton et al., 2014). However, Stoliker (2018) found that female prisoners were 2.12 times more likely to have attempted suicide compared to their male counterparts which contradicts trends in the general population and findings from past studies (Dye, 2011; Tsirigotis et al., 2011). This finding suggests a weak-to-moderate positive association between gender and attempted suicide (Stoliker, 2018). Nevertheless, female prisoners are self-

harming more than male prisoners. It has been suggested that there are various female-specific risk factors that increase the likelihood of female prisoners self-harming. These include separation from friends and family, restricted visitations, and lack of family support (phone calls, letters, visits), all of which are considered to be prison-based risk factors (Dye & Aday, 2013; Marzano, Hawton et al., 2014).

In terms of the relationship between race and self-harming behaviour, White prisoners are at higher risk compared to non-White prisoners (Daniel & Fleming, 2006; Hawton et al., 2014; Way et al., 2005). This may be due to the overrepresentation of White prisoners across prisons compared to other races (Hawton et al., 2014). Prisoners who are in prison for a violent offence are also at higher risk for self-harm (Daniel & Fleming, 2006; Hawton et al., 2014). Past studies have shown that self-harm and violence co-occur, with self-harm being associated with increased risk of conviction for a violent offense in males and females (Richmond-Rakerd et al., 2019; Sahlin et al., 2017).

Age is another significant predictor of self-harm, with younger prisoners more at risk for engaging in self-harming behaviours (Favril et al., 2020; Hawton et al., 2014). Favril et al. (2020) conducted a meta-analysis and found that being younger than 30 was one of the strongest risk factors for self-harm in prison (OR 2.0), a finding that has been supported by other studies (Hawton et al., 2014; Rivlin et al., 2012). Another sociodemographic factor that seems to be significantly related to suicidal behaviour is lower education (Daniel & Fleming, 2006; Marzano, Hawton et al., 2011). The New Zealand Department of Corrections estimates that for those in prison, 60% have literacy and numeracy below that of National Certificate in Educational Achievement (NCEA) Level One competency, meaning that the majority of NZ prisoners are severely

challenged in both literacy and numeracy which may increase their risk of self-harm (Banks, 2017).

Child sexual assault before the age of 18 has also shown to be associated with increased risk of self-harm, but its effects may be indirect (Nada-Raja & Skegg, 2011; Favril et al., 2020). Child sexual abuse has predicted later self-harming behaviours indirectly, by increasing anxiety disorders among men and of assault victimisation among women (Nada-Raja & Skegg, 2011).

The individual characteristics of incarcerated persons play an important role in predicting self-harm in prison, as these individuals enter prison with a predisposed risk of engaging in self-harm. Knowing what individual factors are significant predictors of self-harm allows prison staff and health professionals to flag at-risk individuals as they enter prison and intervene early.

Prison-based risk factors

Individuals may enter prison with a predisposed risk of self-harming behaviour, but prison experience and context alone has been found to shape prisoners' self-harm risk and behaviour (Dye, 2011). Hawton and colleagues (2014) conducted a case-control study to identify various risk factors for self-harm occurring in prisons across England and Wales. Prison context produced an intraclass correlation of 0.19, highlighting that one fifth of the variation in self-harming behaviour could be attributed to prison context (Hawton et al., 2014). This finding helps explain why self-harm prevalence rates are significantly higher in prisons compared to the general population.

Victimisation occurring while in prison has shown to be a significant predictor of self-harm (Favril et al., 2020) and Dye (2010) found that a higher assault rate within prisons correlated with an increased risk of completed suicides in male prisons.

Victimisation in prison includes sexual and physical abuse, being bullied, intimidated, and threatened with violence, all of which are associated with self-harming behaviour (Favril et al., 2020; Maden et al., 2000; Marzano, Hawton et al., 2011). Marzano, Fazel et al. (2011) found that general problems and fights with other prisoners were significant predictors of self-harm for female prisoners. This may reflect the importance females place on friendships and relationships and the difficulties they face when interpersonal conflict arises.

Past research has also highlighted that the "place" in which prisoners reside has a significant impact on their risk of self-harming. Prisoners in isolation, solitary confinement and segregated housing show increased levels of depression, suicidal ideation, and self-harming behaviours (Daniel & Fleming, 2006; Stoliker, 2018). Marzano, Hawton et al. (2011) reported that female prisoners who self-harm were more likely to be residing in single/safe-cell accommodation or did so because they spent too much time in their cells. Those who self-harm in isolation/segregation may self-harm prior to this or may engage in self-harming behaviours due to the deprivations associated with this sort of accommodation (Bonner, 2006). Prisoners spending time in isolation are alone, have nothing to stimulate them and have no contact with the outside world, this may provide an optimal environment to self-harm or attempt suicide (Way et al., 2005).

At an individual level, race seemed to be a significant predictor of self-harm in prison, where White prisoners were seen as more likely to engage in self-harming behaviours (Daniel & Fleming, 2006; Hawton et al., 2014; Way et al., 2005). However, Stoliker (2018) found that in prisons with a greater proportion of White prisoners, individual White prisoners are less likely to attempt suicide. It was proposed that the racial composition of the prison and one's identifying race might be important for social

cohesion due to racial "like others" or homophily (McPherson et al., 2001; Stoliker, 2018). That is, for an individual residing in a prison with a larger proportion of their identifying race, it might provide greater opportunities for social cohesion and developing social bonds, which ultimately may provide further benefits such as support, protection, and access to resources (Stoliker, 2018).

It has also been reported that the first few days and weeks of imprisonment or while an individual is on remand, is a critical time where individuals are at high risk of self-harming due to the acute stress they feel at this time (Liebling, 1993). It has been reported that the risk of suicide-related deaths is at its highest in the early period of a prisoner's sentence, specifically after prison reception (Forrester & Slade, 2014). These findings highlight an important time where accurate screening and assessment tools need to be utilised to flag individuals who are potentially at-risk of self-harm.

Favril and colleagues (2020) suggested that prisoners may import a vulnerability to self-harm into prison due to previous social disadvantage, trauma, violence, and poor health, that may interact with prison-specific stressors (e.g., isolation, victimisation, and life sentences) and therefore increase the likelihood of engaging in self-harming behaviours whilst incarcerated (Favril et al., 2020; Liebling, 1993). By understanding what factors influence prisoners to self-harm, interventions can be put in place to help reduce the effects that both individual-level and prison-based factors have on prisoners' risk of self-harming.

The current study

There are various gaps in the existing literature on prisoners who self-harm whilst incarcerated. The differing definitions of self-harm across the literature has affected the accuracy of self-harm prevalence estimates making comparisons across

studies difficult. Past research has also relied heavily on relatively small samples of prisoners and prisons, limiting the generalisability of results across prisoner populations and prison context. There is little to no research on prisoners who self-harm within NZ and due to the significantly high prevalence rates of self-harm within the general population (Coppersmith et al., 2017), it is important to report up-to-date prevalence rates, trends and risk factors associated with self-harm in NZ prisons. Both individual and situational variables have been shown to increase the risk of self-harm within prisons, recent studies have used mixed-effects modelling to assess the predictive validity of individual and situational factors on rates of violence within NZ prisons (Howard et al., 2020).

The present study aims to use the incident database provided by The New Zealand Department of Corrections for the Nga Tūmanakotanga project to identify prevalence rates of self-harm across NZ prisons as well as potential risk factors. The current study aims to use mixed-effects modelling to assess the predictive validity of individual-level and situational-level factors for identifying prisoners at risk of self-harming. The situational variable for the current study is prison units due to NZ prisons generally having different security level units within the same prison. Previous research has found that rates of violence varied substantially across units within NZ prisons compared to only across prisons, providing evidence to why we are assessing the predictive validity of individual- and situational (unit) level factors (Howard et al., 2020; Brabyn & Grace, 2021; Perry & Grace, 2022). Both individual-level and unit-level risk factors will be derived from the database using statistical analyses and will then be used to develop a model that will help identify individuals who might be at high risk of self-harming. If the developed model can accurately identify individuals at risk of self-harming while incarcerated, then custodial staff and health care professionals within

the prisons have a chance to intervene early and prevent self-harm events from occurring. The implication of this research could help reduce self-harm prevalence rates and completed suicides across NZ prisons.

Method

This study was conducted as part of Nga Tūmanakotanga project, which aims to reduce prison violence, including the associated physical, sexual, psychological, and structural harms, and to improve safety and wellbeing for those who reside and work in prison settings in Aotearoa, NZ (Brabyn & Grace 2021; Tamatea, 2019). Ethics approval for the current study was provided by the University of Waikato Human Research Ethics Committee (HREC2020#33).

The data for this study was obtained from the administrative database maintained by Ara Poutama/Department of Corrections (Corrections Business Reporting & Analysis; COBRA). COBRA includes information about all incidents reported across 18 prisons in NZ (15 with male prisoners, 3 with female prisoners). Each incident had a unique identifier and one or more category codes to describe it, as well as information about date, time, and location (prison and unit), and any offenders who were involved. There was a total of 243 different category codes, arranged hierarchically into primary, secondary, and tertiary categories. The codes related to self-harm incidents were: 1) Prison Security/After Hours Unlock/Self-Harm; 2) Prisoner Management/At Risk Assessment/Threatens Self-Harm; 3) Prisoner Safety-Welfare/Self Harm/Self Harm-no threat to life; 4) Prisoner Safety-Welfare/Self Harm/Self Harm-threat to life; and 5) Prisoner Safety-Welfare/Death in custody not natural causes/Apparent suicide.

The data for the study covered the period from 1 January 2016 to the 31 December 2020 and included all incidents recorded in COBRA during that time, as well as monthly 'snapshots' of offenders who were residents in prison.

Measures of Self-Harm

Self-harm was assessed with five binary variables. There was an omnibus self-harm variable which flagged all incidents with at least one of the five category codes noted above, and variables for codes 2-5: Threatening self-harm, Self-harm with no threat to life, Self-harm with threat to life, and Self-harm that resulted in suicide. These variables were then recorded for individual offenders if they were identified in at least one corresponding incident.

Individual-level variables

Individual-level variables for each offender were derived from the monthly snapshots. These included sociodemographic information such as age, gender (male or female) and ethnic group (European, Māori, Pacific and Other). Prisoners were categorised into age groups; under 20, 20-24, 25-29, 30-39, 40-49, 50-59 and 60+ years. Other variables included the number of months incarcerated during the study period (minimum = 1, maximum= 60), gang affiliation (1 = yes, 0 = no), whether they shared a cell (1 = yes, 0 = no) and ROC*ROI score (Bakker et al., 1999; a measure of static offence risk). A ROC*ROI score is a combination of two measures, risk of reconviction and risk of imprisonment and is the overall risk measure used by The Department of Corrections. A score of 0.7 means a prisoner has a 70% chance of reoffending and is classified as high risk, a score between 0.3 - 0.7 is considered medium risk and a score of below 0.3 is considered low risk. Any previous sexual offences, child sexual offences, violent, drug or family harm offences a prisoner had been convicted of prior to their current sentence was also recorded (each offence coded 1 for yes, 0 otherwise), as well as the number of orders included in the current aggregate sentence.

Unit-level variables

Data from different units within each prison were recorded. Due to NZ prisons including different security level units within a prison, unit-level variables were of interest in the current study compared to variables at the prison-level. Units were included in analyses if there were at least 10 prisoners per unit. The unit-level variables that were looked at in the current study were the average number of persons listed as a resident there per year (12 months; persons_yr), the average security classification of resident prisoners (minimum, low, low-medium, high, maximum), the proportion of prisoners on remand, affiliated with gangs, and housed in shared cells. A turnover index was calculated that indicated the number of different prisoners who had been housed in the unit during the study period, relative to the number that could have been housed given the total number of persons per month (0=minimum, 1=maximum). Gang entropy was a factor used to measure the lack of order within a unit caused by the presence of opposing gangs. This meant if there were multiple gangs within one unit there would be less order and more chaos, compared to a unit made up of a lot of gang members but from the same gang (where 0= all gang members affiliated with the same gang; 1= maximum uncertainty in terms of specific gang affiliation).

Statistical Analyses

Initial descriptive analyses were conducted to assess the prevalence rates of the five self-harm categories across the different levels of each factor of interest (e.g., gender, ethnic group, prison, ROC*ROI score etc.) as well as the demographic breakdown of the sample. The descriptive analyses were run on the statistical software package, SPSS Statistics. Multiple regression analyses were then carried out on the

statistical software, R studio. Regression analysis was used to come up with an intercept model that establish the overall rate of self-harm varied across units.

Mixed-effects modelling was then used to determine the predictive validity of individual-level and unit-level factors on self-harm within prison. The significant predictors identified were then used to develop a predictive model of self-harm.

Mixed-effects modelling was then used to identify significant predictive factors to ultimately develop predictive models for the other four self-harm categories: threatening self-harm, non-life-threatening self-harm, life-threatening self-harm, and self-harm resulting in suicide.

Results

There were 39,020 individuals incarcerated between 2016 and 2020 in New Zealand prisons. Table 1 presents descriptive statistics for a range of demographic offence-related variables for these individuals. (Note that for 603 prisoners, some data were missing so that percentages do not always add up to 100%). Of the total, 87.3% were male and 11.1% were female. With respect to ethnicity, half of the sample identified as Māori (50.8%), followed by European (31.6%) and Pacific (10.4%). The average age of those incarcerated was 33.8 years (SD=12.3 years) and the average ROC*ROI score of the sample was 0.36 (SD= 0.24). Approximately 21% had sentences of less than 2 years in prison in comparison to 3.7% of the sample who were sentenced to 11 or more years, including life sentences. The average amount of time individuals spent in prison was 15.1 months (SD = 15.96). Overall, 12.8% of offenders were gang affiliated. With respect to lead offences, the most common were violence offences (35.6%), followed by burglary (12.3%) and sexual offences (10.4%).

There was a total of 131,402 incidents recorded in the COBRA database from 2016-2020. Of these, 5.96% (N=8183) were related to self-harm. There were 1915 incidents recorded under the Prison Security/After Hours Unlock/Self-Harm code, 5194 incidents recorded under the Prisoner Management/At Risk Assessment/Threatens Self-Harm code, 2381 incidents recorded under the Prisoner Safety-Welfare/Self Harm/Self Harm-no threat to life code, 248 incidents under the Prisoner Safety-Welfare/Self Harm/Self Harm-threat to life code and 24 incidents under the Prisoner Safety-Welfare/Death in custody not natural causes/Apparent suicide code.

Table 1

Descriptive Statistics

Variables	Total N (%) or M(SD)	Self-harmers N (%) or M(SD)				
		Self-harm	Threat of self-harm	Self-harm + no threat to life	Self-harm + threat to life	Suicide
Prisoners	39020	3374 (8.6%)	2728 (7.0%)	1085 (2.8%)	170 (0.4%)	24 (0.06%)
Ethnicity						
European	12335 (31.6%)	1237 (36.7%)	1000 (36.7%)	407 (37.5%)	71 (41.8%)	8 (33.3%)
Māori	19838 (50.8%)	1695 (50.2%)	1399 (51.3%)	529 (48.7%)	81 (47.6%)	6 (25%)
Pacific	4039 (10.4%)	238 (7.1%)	182 (6.7%)	79 (7.3%)	10 (5.9%)	3 (12.5%)
Other/Not recorded	5962 (15.3%)	148 (4.45%)	114 (4.2%)	53 (4.9%)	6 (3.5%)	2 (8.3%)
Gender						
Male	34067 (87.3%)	2966 (87.9%)	2435 (89.3%)	905 (83.4%)	144 (84.7%)	17 (70.8%)
Female	4350 (11.1%)	352 (10.4%)	260 (9.5%)	163 (15%)	24 (14.1%)	2 (7.4%)
Age M(SD)	33.8 (12.3)	30.7 (11.2)	30.6 (10.9)	30 (11)	30.5 (11.2)	27.6 (17.1)
ROC*ROI M(SD)	0.36 (0.24)	0.46 (0.27)	0.46 (0.27)	0.45 (0.28)	0.42 (0.29)	0.37 (0.33)
Sentence Length						
Preventive detention	293 (0.8%)	36 (1.1%)	32 (1.2%)	13 (1.2%)	1 (0.6%)	0
<2 years	8246 (21.1%)	725 (21.5%)	594 (21.8%)	215 (19.8%)	24 (14.1%)	2 (8.3%)
2-5 years	4679 (12%)	417 (12.4%)	349 (12.8%)	138 (12.7%)	24 (14.1%)	4 (16.7%)
6-10 years	1923 (4.9%)	142 (4.2%)	114 (4.2%)	46 (4.2%)	7 (4.1%)	0
11+ years	1439 (3.7%)	120 (3.6%)	100 (3.7%)	42 (3.9%)	10 (5.9%)	3 (12.5%)
Not applicable	21837 (56%)	1878 (55.7%	1506 (55.2%)	614 (56.6%)	102 (60%)	10 (41.7%)
Gang Affiliation	4994 (12.8%)	441 (13.1%)	366 (13.4%)	127 (11.7%)	30 (17.6%)	3 (12.5%)

Note. 603 cases are missing demographic information resulting in some percentages not reaching 100%

Of the full sample (N = 39,020), 8.65% (N= 3374) had at least one self-harm incident recorded. Of these self-harm incidents, 81% (N= 2728) were threats of self-harm, 32% (N= 1085) were self-harm with no threat to their life, 5% (N= 170) were life-threatening self-harm, and 0.7% (N= 24) were suicides, shown in Table 1. In terms of demographic variables, 87.9% of the self-harming sample were male (10.4% female),

50.2% were Māori, 36.7% European, ~7% Pacific with the average age being 30.7 years (SD= 11.2 years). These findings were reasonably stable across the five self-harm categories, with only a few stand out findings. The rate of overall self-harm was slightly higher for males than females (8.71% and 8.09% respectively), but this finding was not statistically significant ($x^2(1, 38{,}417) = 1.845$, p=0.174). The rate of threatening self-harm was significantly higher for males than females (7.15% and 5.98% respectively) ($x^2(1, 38{,}417) = 8.104$, p=0.004). However, the rate of non-life-threatening self-harm was significantly greater for females than males (3.75% and 2.66% respectively), ($x^2(1, 38{,}417) = 16.976$, p<.001). The rate of life-threatening self-harm was slightly higher for females than males (0.55% and 0.42%), although not a statistically significant difference ($x^2(1, 38{,}417) = 1.475$, p=0.225). The suicide rate was not significantly different (0.05%).

There was a significant relationship between the ethnicity of a prisoner and their risk of self-harming ($x^2(5, 39{,}020) = 79.67$, p<.001), with European prisoners more at risk. Overall, 10% of Europeans, 8.5% of Māori and 5.9% of Pacific prisoners self-harmed. Suicides were also more likely to be European prisoners (33.3%) than Māori (25%) or Pacific (12.5%). The average age across the self-harm categories were approximately 30 years (SD= 11 years), with the exception of the suicide category which had the average age of 27.6 years (SD= 17.1 years). Of the prisoners who self-harmed, 16.6% were housed at the Mt Eden Correctional Facility, which is considered a remand security prison that holds male prisoners only, 10.7% were from Christchurch Men's Prison and 10.4% from Hawkes Bay Regional Prison, both of which hold medium to high security male prisoners. The average ROC*ROI score for prisoners who self-harmed was 0.46 (SD = 0.27), comparatively, the average ROC*ROI score for prisoners

who did not self-harm was 0.36 (SD = 0.24), this difference was significant, $t(35875) = 22.92$, $p<.001$.

The percentages of cases in different self-harm categories that were affiliated with gangs were: 13.1% of self-harmed, 13.4% of threatened to self-harm, 11.7% of self-harmed with no threat to life, 17.6% of self-harmed with threat to life and 12.5% of suicides. From the self-harming sample, the most frequent lead offence prisoners were sentenced for was a violent offence (39.2%), burglary (16.7%) and then sexual offence (11.5%).

Mixed-Modelling Analyses

Because our plan was to test individual and situational predictors for self-harm, we used a mixed-modelling approach in which offenders (L1) were grouped within the units (L2) where they resided. Units were selected as the grouping level (L2) because previous research as part of Nga Tumanakotanga found that rates of violence (including self-harm) varied more across units than prisons in NZ (Brabyn & Grace, 2021; Perry & Grace, 2022). We used a criterion such that only those units with at least 10 offenders listed as resident on average per year were included in the analysis. There was a total of 232 units (23% of all units) that met this criterion, which housed 91.9% of all offenders (n = 35,877). The self-harm rate (defined as the percentage of offenders with at least one self-harm incident noted) was 8.50% for offenders' resident in units that met the criterion (3,051/35,877) and was 9.32% (323/3,466) for offenders in smaller units. These rates were not significantly different, χ^2 (df = 1) = 2.678, *ns*.

We developed models to compare the predictive validity of individual and unit level risk factors for overall self-harm within NZ prisons. Subsequent models were then

developed for the other four self-harm categories: threatening self-harm, non-life-threatening self-harm, life-threatening self-harm, and self-harm resulting in suicide.

At least one self-harm incident:

Firstly, an intraclass correlation coefficient (ICC) was calculated to estimate how much of the variance in the probability of self-harm was accounted for by units. The ICC was 0.191, indicating that almost 20% of the variance in the probability of self-harm was associated with variation across units. Because this proportion was significant (z= -51.15, p<.001), inclusion of a random unit effects was justified in a mixed-models approach. Individual-level variables were then mean centered (by unit), and unit-level variables were centered by the grand mean before modelling. Mixed-effects modelling was used in which the individual-level variables in Table 2 were entered as fixed-effects predictors, with unit included as a random effect to predict overall self-harm. Estimates of the marginal R^2 and conditional R^2 provided measures of the proportion of variance in probability of self-harm associated with the individual-level predictors, and for those predictors associated with the random effect of the unit. Overall, the individual-level fixed effects accounted for 11.3% of the variance (marginal R^2) and when the random effect was included the proportion increased to 26.6% (conditional R^2). Note that gender was not included as an individual-level predictor in the model because units were either all male or all female, which created difficulties for estimating a fixed gender effect independently of the random unit effect.

There were several significant individual-level predictors of self-harm, as shown in Table 2. A unit increase in the months spent in prison corresponded to a 3% increase in the odds for self-harm (b=0.031, p<.001, OR=1.03). Sharing a cell made prisoners 22% less likely to self-harm compared to isolated housing (b=-0.249, p<.001, OR=0.78).

Pacific prisoners were 29% less likely to engage in self-harming behaviour (*b*=-0.349, *p*=0.003, OR=0.71) compared to European prisoners who were 1.25 times more likely to self-harm (*b*=0.223, *p*=0.029, OR=1.25). A unit increase in prisoners age significantly predicted a 3% decrease in the odds for self-harm (*b*=-0.033, *p*<.001, OR=0.97).

Table 2

Individual-level predictors and random effect of unit for overall self-harm

	b	**OR**	**CI**
Months Incarcerated	0.031***	1.03	1.03-1.03
Sharing Cell	-0.249***	0.78	0.71-0.85
Māori	-0.152	0.86	0.70-1.05
Pacific	-0.349**	0.71	0.56-0.89
European	0.223*	1.25	1.02-1.52
Age	-0.033***	0.97	0.96-0.97
Gang Affiliation	-0.065	0.94	0.83-1.06
ROC*ROI Score	0.864***	2.37	1.92-2.93
Sexual Offence	-0.020	0.98	0.81-1.19
Child Sexual Offence	0.087	1.09	0.86-1.39
Violent Offence	0.177***	1.19	1.09-1.31
Drug Offence	-0.291***	0.75	0.67-0.84
Family Harm Offence	-0.084	0.92	0.84-1.01
Number of Orders	0.052***	1.05	1.03-1.08
Marginal R^2	0.113		
Conditional R^2	0.266		

Note. OR= Odds Ratio, CI= Confidence Intervals, Number of Orders= Number of orders under sentence.
*p <.05. **p <.01. ***p < .001.

Prisoners who had a higher ROC*ROI score, identifying them as high risk were 2.37 times more likely to self-harm (*b*=0.864, *p*<.001, OR=2.37). Prisoners who had previously been convicted of a violent offence were 1.19 times more likely to self-harm (*b*=0.177, *p*<.001, OR=1.19), comparatively, those who had previously been convicted of a drug offence were 25% less likely to self-harm (*b*= -0.291, *p*<.001, OR=0.75). Prisoners

who had a higher order count associated with their sentence were more likely to engage in self-harming behaviour (*b*=0.052, *p*<.001, OR=1.05).

Table 3

Individual and Unit Predictor Model for overall self-harm

	b	**OR**	**CI**
Months Incarcerated	0.031***	1.03	1.03-1.03
Sharing Cell	-0.240***	0.79	0.72-0.86
Māori	-0.141	0.87	0.71-1.06
Pacific	-0.331**	0.72	0.57-0.91
European	0.230*	1.26	1.03-1.54
Age	-0.032***	0.97	0.96-0.97
Gang Affiliation	-0.060	0.94	0.83-1.06
ROC*ROI Score	0.877***	2.40	1.94-2.97
Sexual Offence	-0.036	0.97	0.79-1.17
Child Sexual Offence	0.100	1.11	0.87-1.41
Violent Offence	0.177***	1.19	1.09-1.31
Drug Offence	-0.284***	0.75	0.67-0.84
Family Harm Offence	-0.084	0.92	0.84-1.01
Number of Orders	0.051***	1.05	1.03-1.07
Security Scale	0.654***	1.92	1.67-2.22
Persons per year	-0.002	1.00	0.99-1.00
Turnover	0.338	1.40	0.62-3.16
% Gang Affiliated	-2.813***	0.06	0.03-0.12
Gang Entropy	-0.349**	0.71	0.57-0.87
Remand	-0.087	0.92	0.67-1.25
Marginal R^2	0.176		
Conditional R^2	0.252		

Note. OR= Odds Ratio, CI= Confidence Intervals, Number of Orders= Number of orders under sentence.
*p <.05. **p <.01. ***p < .001.

A model including the unit-level variables as fixed-effects was then run, with results shown in Table 3. The marginal R^2 for fixed effects increased to 17.6% from 11.3%, an increase of 6.3% from including unit-level variables. There were a number of significant unit-level predictors for overall self-harm, these are shown in Table 3.

Prisoners housed in higher security prisons were 1.92 times more likely to self-harm compared to those in lower security prisons (b=0.654, p<.001, OR= 1.92). Individuals who were affiliated with gangs or were part of a gang were 94% less likely to engage in self-harm (b=-2.813, p<.001, OR=0.06). Higher gang entropy scores (high proportion of different gangs within unit) were also associated with a lower risk of self-harm (b=-0.349, p=0 .001, OR=0.71).

Self-harm Subcategories:

Another aim of the current study was to develop multiple models that would test the predictive validity of individual- and unit-level factors in assessing the likelihood of the self-harm subcategories occurring: threatening self-harm, non-life-threatening self-harm, life-threatening self-harm, and suicide. Firstly, an ICC was calculated for each self-harm subcategory to estimate how much of the variance in the probability of that type of self-harm was accounted for by units. These values are shown in Table 4 and highlight that across all self-harm categories a large proportion of the variance in the probability of that type of self-harm occurring was associated with variation across units (18%, 20% and 29% respectively, p<0.001). No ICC was able to be calculated for the suicide subcategory due to there being so few cases (N=24).

Next, mixed-effects modelling was used to develop a model that would assess the predictive validity of the individual-level factors for each self-harm subcategory. The individual-level variables, shown in Table 4, were entered as fixed effects with unit included as a random effect. Marginal R^2 and Conditional R^2 estimates were calculated to assess whether the proportion of variance increased by the random effect of unit being included in the model. This was the case across all self-harm subcategories except

suicide in which no Conditional R^2 could be calculated, these estimates are shown in Table 4.

Table 4

Individual-level predictors across the five self-harm categories

Variables	SH (*b*)	SH threat (*b*)	SH no threat to life (*b*)	SH threat to life (*b*)	Suicide (*b*)
ICC	0.19	0.18	0.20	0.29	NA
Marginal R^2	0.113	0.115	0.133	0.106	0.258
Conditional R^2	0.266	0.279	0.309	0.366	NA
Months incarcerated	**0.031*** **	**0.030*** **	**0.038*** **	**0.042*** **	-0.024
Sharing cell	**-0.249*** **	**-0.264*** **	**-0.279*** **	-0.296	-1.115
Maori	-0.152	-0.135	-0.148	0.398	**-2.396***
Pacific	**-0.349** **	**-0.383** **	-0.331	-0.041	-0.616
European	**0.223***	**0.238***	0.240	0.845	-1.205
Age	**-0.033*** **	**-0.033*** **	**-0.038*** **	**-0.025** **	0.009
Gang Affiliated	-0.065	-0.046	-0.071	**0.572***	0.495
ROC*ROI	**0.864*** **	**0.947*** **	**0.549** **	-0.2.93	**3.062***
Sexual offence	-0.020	0.002	-0.007	0.115	0.885
Child sexual offence	0.087	0.097	-0.019	-0.643	0.586
Violent offence	**0.177*** **	**0.156** **	**0.228** **	0.071	-0.108
Drug offence	**-0.291*** **	**-0.324*** **	**-0.389*** **	-0.270	-0.207
Family harm offence	-0.084	**-0.126***	**-0.189***	0.277	0.033
Number of orders	**0.052*** **	**0.050*** **	**0.058*** **	0.034	0.017

Note. SH= Self-harm
*p <.05. **p <.01. ***p < .001.

There were numerous significant individual-level predictors that were common across the self-harm subcategories, shown in Table 4. Months incarcerated was a significant predictor across all self-harm subcategories except for suicide. A unit increase in the months a prisoner spent in prison corresponded to a 3% increase in the odds of threatening self-harm (b=0.030, p<.001, OR=1.03), a 4% increase in the odds of engaging in non-life-threatening self-harm (b=0.038, p<.001, OR=1.04) and a 4% increase in the odds of life-threatening self-harm (b=0.042, p<.001, OR=1.04). Sharing a

cell was also a significant common predictor, with prisoners sharing a cell being 23% less likely to threaten self-harm (b=-0.264, p<.001, OR=0.77) and 24% less likely to engage in non-life-threatening self-harm (b=-0.279, p<.001, OR=0.76). Prisoners who were Māori were 91% less likely to commit suicide (b=-2.396, p=0.010, OR=0.09), however this was not a significant predictor across the other self-harm categories. Prisoners identifying as Pacific were 32% less likely to threaten self-harm (b=-0.383, p=0.004, OR=0.68) compared to European prisoners who were 27% more likely to threaten self-harm (b=0.238, p=0.035, OR=1.27). Age was a significant predictor across all self-harm categories except for suicide. A unit increase in age significantly predicted a 3% decrease in the likelihood of individuals threatening self-harm (b=-0.033, p<.001, OR=0.97), a 4% decrease in the likelihood of prisoners engaging in non-life-threatening self-harm (b=-0.038, p<.001, OR=0.96) and a 2% decrease in the likelihood of prisoners engaging in life-threatening self-harm (b=-0.025, p=0.007, OR=0.98). Prisoners with gang affiliations were 1.77 times more likely to participate in life-threatening self-harm compared to prisoners who did not (b=0.572, p=0.012, OR=1.77). Prisoners with a higher ROC*ROI score were more likely to threaten self-harm (b=0.947, p<.001, OR=2.58), self-harm with no threat to their life (b=0.549, p=0.002, OR=1.73) and self-harm resulting in suicide (b=3.062, p=0.031, OR=21.38). Prisoners who had a previous violent conviction were 1.17 times more likely to threaten self-harm (b=0.156, p=0.002, OR=1.17) and were 1.26 times more likely to engage in non-life-threatening self-harm (b=0.228, p=0.003, OR=1.26). Comparatively, those with a previous drug offence were 28% less likely to threaten self-harm (b=-0.324, p<.001, OR=0.72) and were 32% less likely to engage in non-life-threatening self-harm (b=-0.389, p<.001, OR=0.68). Prisoners with a previous family harm offence were 12% less likely to threaten self-harm (b=-0.126, p=0.017, OR=0.88) and were 17% less likely to self-harm with no

threat to their life (*b*=-0.189, *p*=0.022, OR=0.83). Number of orders was a significant predictor for two self-harm subcategories, those prisoners with a higher order count associated with their sentence were more likely to threaten self-harm (*b*= 0.050, *p*<.001, OR=1.05) and engage in non-life-threatening self-harm (*b*=0.058, *p*<.001, OR=1.06).

Lastly, mixed-effects modelling was used to assess the predictive validity of both individual- and unit-level variables across the self-harm subcategories, both individual and unit-level variables were entered as fixed effects, shown in Table 5. The marginal R^2 for fixed effects increased across all self-harm categories from including unit-level variables, an increase of 5.9% for threatening self-harm, 11.6% for non-life-threatening self-harm, 13.6% for life-threatening self-harm and an increase of 5.1% for suicide. There were various significant unit-level predictors common across the self-harm subcategories, these are shown in Table 5. Security scale was a significant predictor across all self-harm categories except for suicide, with prisoners in high security units being 1.96 times more likely to threatening self-harm (*b*=0.673, *p*<.001, OR=1.96), 2.39 times more likely to engage in non-life-threatening self-harm (*b*=0.871, *p*<.001, OR=2.39) and 1.54 times more likely to engage in life-threatening self-harm (*b*=0.434, *p*=0.036, OR=1.54). Persons per year was significantly negatively associated with life-threatening self-harm, meaning prisoners in units where there were higher numbers of persons per year were less likely to engage in life-threatening self-harm (*b*=-0.010, *p*=0.030, OR=0.99). Another significant result was that the higher the percentage of prisoner's gang affiliated within a unit, the less likely they were to self-harm across all categories except suicide. Prisoners who were gang affiliated were 94% less likely to threaten self-harm (*b*=-2.840, *p*<.001, OR=0.06), 99% less likely to engage in non-life-threatening self-harm (*b*=-4.443, *p*<.001, OR=0.01) and 97% less likely to engage in life-

threatening self-harm (*b*=-3.546, *p*=0.001, OR=0.03). Gang entropy was a significant predictor at the unit-level across all self-harm categories, except suicide, with higher entropy scores associated with decreased risk of threatening self-harm (*b*=-0.302, *p*=0.011, OR=0.74), non-life-threatening self-harm (*b*=-0.432, *p*=0.002, OR=65) and life-threatening self-harm (*b*=-0.655, *p*=0.025, OR=0.52). Remand was a significant predictor of life-threatening self-harm only, individuals who were on remand were 3.14 times more likely to engage in life-threatening self-harm (*b*=1.133, *p*=0.018, OR=3.11).

Table 5

Individual- and unit-level predictors across the five self-harm categories

Variables	SH (*b*)	SH threat (*b*)	SH no threat to life (*b*)	SH threat to life (*b*)	Suicide (*b*)
Marginal R^2	0.176	0.174	0.249	0.242	0.309
Conditional R^2	0.252	0.262	0.312	0.371	NA
Months incarcerated	**0.031*** **	**0.031*** **	**0.039*** **	**0.045*** **	-0.024
Sharing cell	**-0.240*** **	**-0.255*** **	**-0.255*** **	-0.279	-1.127
Maori	-0.140	-0.123	-0.131	0.378	**-2.464** **
Pacific	**-0.331** **	**-0.362** **	-0.292	-0.081	-0.613
European	**0.230***	**0.246***	0.249	0.810	-1.270
Age	**-0.032*** **	**-0.033*** **	**-0.038*** **	**-0.025** **	0.007
Gang Affiliated	-0.060	-0.039	-0.065	**0.597***	0.473
ROCROI	**0.877*** **	**0.960*** **	**0.588** **	-0.272	**2.993***
Sexual offence	-0.036	-0.014	-0.038	0.118	0.926
Child sexual offence	0.100	0.109	0.008	-0.661	0.700
Violent offence	**0.178*** **	**0.156** **	**0.228** **	0.075	-0.109
Drug offence	**-0.284*** **	**-0.316*** **	**-0.372*** **	-0.253	-0.215
Family harm offence	-0.084	**-0.126***	**-0.189***	0.275	0.021
Number of orders	**0.051*** **	**0.048*** **	**0.055** **	0.032	0.021
Security scale	**0.654*** **	**0.673*** **	**0.871*** **	**0.434***	0.055
Persons/yr	-0.002	-0.001	-0.002	**-0.010***	-0.005
Turnover	0.338	0.572	0.555	-2.055	-2.790
% Gang affiliation	**-2.813*** **	**-2.840*** **	**-4.443*** **	**-3.546*** **	1.579
Gang entropy	**-0.349** **	**-0.302** **	**-0.432** **	**-0.655***	-1.078
Remand	-0.087	-0.231	-0.036	**1.133***	1.296

Note. SH= self-harm
*p <.05. **p <.01. ***p < .001.

Discussion

The current study aimed to assess how well individual and situational variables would predict risk of self-harm in NZ prisons. The major goal of the study was to develop various models that were able to test the validity of individual and situational risk factors for predicting overall self-harm and different subtypes of self-harm. Data was obtained from the administrative database, COBRA, maintained by Department of Corrections. COBRA included information of all incidents recorded between 2016 and 2020 across 18 prisons across NZ. From this database, there were five self-harm categories identified and all incidents in the database relating to self-harm were flagged. The five categories were (a) overall self-harm, (b) threat to self-harm, (c) non-life-threatening self-harm, (d) life-threatening self-harm and (e) suicide. Mixed-effects modelling was used to assess the predictive validity of individual- and unit-level factors across the self-harm categories.

The current study found that 8.65% of prisoners incarcerated between 2016 and 2020 in NZ were associated with at least one self-harm incident. Comparatively, past research by Vinokur & Levine (2019) looked at the rate of self-harm within an incarcerated sample (N=263,794) over a 7-year period and found that 0.7% of their sample had at least one recorded instance of self-harm. Vinokur & Levine (2019) based their analyses on reported incidents of non-suicidal self-injury, compared to the current study which included incidents where self-harm was only threatened. The majority of self-harm incidents in COBRA were for threatening self-harm rather than physical acts of self-harm. By excluding threatening self-harm, 3.1% of self-harming incidents were physical self-harm acts (non-life-threatening self-harm, life-threatening self-harm, and

suicide). Even with eliminating threats of self-harm from analyses, these findings indicate a greater prevalence rate of self-harm in NZ prisons compared to self-harm rates within prisons across Israel (Vinokur & Levine (2019).

Interestingly, other studies have found higher incidence rates for non-suicidal self-injury (NSSI), with 35% of adult offenders engaging in NSSI while in prison (Sakelliadis et l., 2010). Past research as well as findings from the current study highlight significantly higher prevalence rates of self-harm in the prison population compared to the general population, suggesting prison environment may foster this behaviour. Overall, current prevalence estimates of self-harm differ across country, prisoner sample and in terms of how self-harm is defined. The current study was able to give up-to-date prevalence rates of self-harm in NZ prisons, as well as, identifying individual and unit-level predictors across five self-harm categories in order to develop five predictive models of self-harm.

No significant differences between male and female prisoners were found for overall self-harm, life-threatening self-harm, and suicide. However, male prisoners showed a significantly higher rate of threatening self-harm (7.15%) compared to female prisoners (5.98%), and female prisoners showed a higher rate of non-life-threatening self-harm (3.75%) compared to male prisoners (2.66%). This finding is somewhat supported by past research which has reported significantly higher rates of self-harm for female prisoners than male prisoners (Hawton et al., 2014). However, it is worth noting that in the current study male prisoners threatened to self-harm more often than female prisoners which is interesting due to the literature suggesting males self-harm with higher perceived lethality and intent than females (Tsirigotis et al., 2011). Current prevalence estimates of self-harm from international literature suggests that 5-6% of

male prisoner's and 20-24% of female prisoner's self-harm (Hawton et al., 2014). Comparatively, the current study found a slightly higher prevalence rate for male prisoners, where 8.71% of males self-harmed. Surprisingly, data from the present study found that only 8.09% of female prisoners in NZ self-harmed, a significantly smaller proportion compared to overseas populations. Note that we were not able to include gender as an individual-level factor in the mixed-modelling analyses because units were either male or female, making it difficult to estimate a fixed gender effect independently of the random unit effect.

Individual-level Factors Predicting Self-harm

The first model that was developed included individual-level variables as fixed-effects with unit included as a random effect. This model was run for all five self-harm categories and then the results were compared to identify any common predictors across the categories. The results showed that the accuracy of four of the models was adequate, with between 17-28% of the variance in the probability of self-harm being associated with variation across units, except for suicide. No ICC was able to be calculated for the suicide category due to so few cases, this was a significant limitation of the study as the accuracy of both suicide models were highly affected. However, there were a number of significant individual-level predictors that were common across multiple self-harm categories. Firstly, months incarcerated was a significant predictor across all self-harm categories, except for suicide, highlighting the longer an individual spends in prison, the higher their risk of self-harm. This finding is supported by past research which has found that being sentenced to five or more years is associated with prisoners being 2.3 times more likely to self-harm (Favril, 2020) and individuals serving a life sentence are also more at risk of self-harming (Hawton et al., 2014).

Not sharing a cell was also a significant predictor across self-harm categories, except for threat to life and suicide. Incarcerated persons in isolation, segregated housing or solitary confinement were more at risk of overall self-harm, threatening self-harm and non-life-threatening self-harm. This finding has been supported by previous research which has found that prisoners in isolation show increased levels of depression, suicidal ideation, and self-harming behaviours (Daniel & Fleming, 2006; Stoliker, 2018). Kaba et al., (2014) conducted a study where they found that prisoners punished with solitary confinement were 6.9 times more likely to self-harm. Prisoners in isolation have nothing to stimulate them, no contact with others and are alone with their thoughts, an optimal environment to engage in self-harm (Way et al., 2005).

Although the accuracy of the suicide results should be interpreted with caution because of the small sample size, Māori prisoners were significantly less likely to commit suicide. Although research surrounding self-harm in NZ prisons is limited, the general Māori population show a higher rate of self-harm and suicides compared to non-Māori (Black & Kisely, 2017; Nada-Raja 2004). Data from the NZ Ministry of Health (2014) suggests Māori suicide rates were almost double those of non-Māori in 2010-2012. New Zealanders from low socioeconomic backgrounds are 31 times more likely to attempt suicide (Beautrais et al., 1998) and Māori are overrepresented in areas of socioeconomic disadvantage among both those in low education and those with low incomes (Ministry of Health, 2014). This racial disparity would be an interesting area for future research, especially with regard to self-harm in prison.

Pacific prisoners were less likely to engage in overall self-harm and threaten self-harm, comparatively, European prisoners were more likely to engage in both of those self-harm categories. This finding is in line with previous research which has found that White prisoners are at higher risk of self-harm than non-White prisoners (Daniel &

Fleming, 2006; Hawton et al., 2014; Way et al., 2005). However, it was previously believed that this finding was due to an overrepresentation of European prisoners across prisons. In the current study, there were actually more Māori prisoners (50.8%) incarcerated over the study period than European prisoners (31.6%).

Age was another significant predictor common across all self-harm categories, except for suicide, showing that younger prisoners were more at risk of self-harming, which is a finding supported by previous research (Favril et al., 2020; Hawton et al., 2014; Rivlin et al., 2012). Favril et al. (2020) conducted a meta-analysis and found that being 30 years or younger made prisoners 2 times more likely to self-harm in prison. In the current study the average age across all self-harm categories was 30 years, except for suicide which was 27.6 years, highlighting a large proportion of prisoners within this at-risk age group. A possible explanation for this finding is that for these younger prisoners, it may be their first time in prison compared to older prisoners who may be returnees, and therefore the initial stress of the prison environment makes them more at risk of self-harming. This finding further supports the idea that self-harm can occur across the lifespan and not only in the adolescent, juvenile population (Hawton & Harriss, 2008).

Individuals who had a previous violent offence were more likely to self-harm but not engage in life-threatening self-harm or suicide. This finding is supported by previous research that has found prisoners who are in prison for a violent offence are at higher risk for self-harm (Daniel & Fleming, 2006; Hawton et al., 2014). The co-occurrence of a history of violence and engaging in self-harm is a concept known as dual-harm (Slade, 2020). The prevalence rate of dual-harm in prisons is thought to be between 11%-16% for male prisoners and 2.6% for female prisoners (Kottler et al., 2018; Slade, 2018). Approximately 40-60% of incarcerated persons who self-harm

while in prison have a history of violence (Slade, 2020). It is also worth noting that a violent offence was the most common lead offence in the total sample (35.6%) and in the self-harmers sample (39.2%). This study has indicated that the majority of individuals being sent to prison in NZ is for a violent crime, highlighting a large proportion of incarcerated persons at risk of self-harm.

An interesting result was that prisoners who had a previous drug offence were less likely to engage in three self-harm categories: overall self-harm, threatening self-harm and non-life-threatening self-harm. This finding contradicts previous research which has found that a history of drug use and abuse increases the risk of self-harm in prison (Fotiadou et al., 2006; Vinokur & Levine, 2019). Prisoners with a previous family harm offence were also less likely to threaten self-harm and engage in non-life-threatening self-harm compared to individuals with other types of offences, such as prisoners with a previous violent offence. Lastly, the number of orders was a significant predictor across self-harm categories, except for life-threatening self-harm and suicide. This finding shows that the more court orders attached to a prisoner's sentence, the more likely they are to self-harm.

Unit-level Factors Predicting Self-harm

A model including unit-level variables as fixed-effects was then run to identify any significant unit-level predictors of self-harm. This model was then run for the other four self-harm categories to see if any common predictors could be identified. By adding in unit-level variables into the models, the marginal R^2 for fixed effects increased by between 5.1-13.5% across the five categories. There were numerous significant unit-level predictors that were common across self-harm categories.

Security scale was a significant predictor across self-harm categories, except for suicide. This finding highlights that units with a higher classification of security (e.g., maximum security) contain prisoners that are at higher risk for self-harm. This finding is supported by previous research which has found a higher rate of self-harm in high security prisons (Pope, 2018). This may be due to high security prisons or units housing more violent criminals or housing a higher proportion of prisoners serving life sentences, two significant predictors of self-harm (Lohner & Konrad, 2006; Pope, 2018).

Prisoners in units with less people listed as a resident there per year were more at risk of life-threatening self-harm. Various reasons for this may be due to minimum social support in those units or because these may be management or supervision units where prisoners may be sent if they demonstrate violent behaviour or commit offences while in prison.

The percentage of prisoners who were gang affiliated was strongly negatively associated with self-harm at the unit-level, being a significant predictor across all self-harm categories except suicide. This finding shows that in units with a higher percentage of individuals who were gang affiliated, there was a decrease in risk of self-harm. Perhaps there is greater social support in such units. Previous research has found that social support plays a protective role against suicidal ideation, feelings of hopelessness and self-harm (Tham et al., 2019). Tham and colleagues (2019) found that social support mediated the pathway between stressful life events and hopelessness, with hopelessness decreasing as social support increased. Being a part of a gang offers some social support and in this context is known to influence individuals social-psychological adjustments, mental health and pro-social behaviour (Day et al., 2015). More specifically, social support seems to reduce mental health problems (Day et al., 2015). Therefore, it is conceivable to think that in units with a high proportion of gang

members, the protective factor of social support may be reducing their risk of self-harming. Gang entropy was negatively associated with self-harm, across all self-harm categories except for suicide, meaning in units that contained a higher proportion of different gangs, there was a lower risk of self-harm. A possible explanation to this is perhaps the prisoners were too busy fighting one another to injure themselves, however, further research is needed to test this theory.

Lastly, remand was associated with increased risk of life-threatening self-harm, although not significantly so. Previous research has found that self-harm rates are substantially higher for those on remand (3.2%) compared to sentenced prisoners (1.4%) (Sloane, 1973). Remand prisoners are thought to be more at-risk of self-harming due to the acute stress and overwhelming emotions they feel at the time of entering prison (Hawton et al., 2014; Pope, 2018). However, in terms of remand as a unit-level predictor for self-harm, the current study found insignificant results. Remand may be correlated with other unit-variables (e.g., %GangAffiliated), that are explaining the unit-level variance. To test this theory, Model 2 was rerun with remand as the only unit-level variable. Remand then became a significant predictor for self-harming behaviour (excluding threatening self-harm and suicides). Individuals on remand were 1.45 times more likely to engage in non-life-threatening self-harm (b=0.370, p=0.016, OR=1.45) and 2.19 times more likely to engage in life-threatening self-harm (b=0.785, p=0.010, OR=2.19). The implication is that the variance in the proportion of prisoners on remand across units was correlated with proportion of gang members. A limitation to the current study is that all self-harm incidents for each offender were recorded over the 5-year period and the analyses we used did not specifically look at the self-harm incidents that occurred while prisoners were on remand. Future research should run an

alternative type of analysis to look at prisoners on remand and if they self-harmed during that time.

Implications of the current study

The current study is the first of its kind to use mixed-effects modelling to analyse predictors of self-harm in prisons, and the first to show that both individual- and unit-level factors are related to self-harming behaviour in NZ prisons. The identification of significant predictors across multiple levels of self-harm highlights specific targets to help reduce self-harm within NZ prisons. These identified targets may influence restructuring or changes to current risk assessment and treatment programmes so that the significant predictors in the current study are covered. The Department of Corrections aim to provide a safe and secure environment for those serving their sentences and they have a job to protect prisoners physical and mental health. By identifying various risk-factors of self-harm, the current study has given up-to-date information regarding how to reduce self-harm while in prison, information that can be used by Corrections to protect prisoners physical and mental health.

There are various implications that come with reducing the prevalence of self-harm in prison, starting with a reduced cost to prisons. Self-harmers present a significant cost to prisons due to individuals being transferred to mental health treatment programmes or mental health hospitals (Melzer et al., 2004). Then there is the personal cost, those that self-harm significantly increase their risk of committing suicide. Self-harm is the strongest predictor of suicide once controlling for sex, age, and psychopathology (Dixon-Gordon et al., 2012). Within this context, it is thought that 15% of suicide attempts ultimately succeed (Farmer et al., 1996). Therefore, by decreasing

self-harm prevalence rates, suicide attempts and completed suicides should also decrease.

Past literature also suggests that custodial staff and health care professionals that work in the prisons should undergo more comprehensive training surrounding self-harm (Gough & Hawkins, 2000). Staff members in a forensic psychiatric service were asked to rate their understanding of self-harming behaviour on a visual analogue scale, their average rating was 44%, however, ratings did increase with more training surrounding self-harm (Gough & Hawkins, 2000). Gough and Hawkins (2000) suggest that the training programmes for staff in correctional settings should include signs of imminent risk, a description of prevention and response procedures, basic first aid training and an overview of research to overcome any misconceptions regarding self-harm to thereby enhance awareness to the seriousness of self-harm. This extra training alongside the identification of the individual and unit-level risk factors from the current study lay a good foundation for reducing self-harm across NZ prisons.

Strengths of study

There are various strengths of the study, the biggest strength of the study would be that it is the first study attempting to use mixed-effects modelling, using the situational variable of unit, to predict self-harm in NZ prisons using administrative data. The developed models also had a good degree of predictive validity of self-harm, this was shown by reasonable marginal R^2 and conditional R^2 due to minimal base rate of self-harm. The dataset itself was also a strength of the study. The dataset sourced from the Department of Corrections was informative and large enough for comparisons to be drawn and conclusions to be reached. The dataset provided information on both the prisoners and incidents they were involved in. The data was collected between 2016

and 2020 and therefore results reflect current trends of self-harming behaviour in NZ prisons.

Limitations of study

There were also a few limitations of the current study. The accuracy of the models in identifying predictive factors of suicide was reduced due to such small cases of suicides across the prisons (N=24). Future research that has access to a larger number of suicides in prison could investigate potential individual and unit-level risk factors. However, it is a positive that there are so few suicides occurring in NZ prisons. Another limitation to the study was how remand was coded for as a unit-level variable and the way the statistical analyses were carried out, it was difficult to ascertain if the prisoners who self-harmed did so while on remand. Future research could investigate when self-harm is more likely to occur, across different periods of a prisoners' sentence or after particular events, for example, whether self-harm might be more likely to occur early in a sentence or after a difficult event such as receiving bad news or being victimized.

Future research

Future research could investigate the association between static risk levels, as measured by the ROC*ROI score, and self-harm. The current study found a significant association between higher ROC*ROI scores and increased risk of self-harm but was not able to accurately state what ROC*ROI score increased a prisoner's risk of self-harm. Future research using the COBRA dataset may want to include other variables, highlighted by past research, into the models as potential predictors such as a history of self-harm (Favril et al., 2020), childhood trauma (Carli et al., 2011), psychological

disorders (Maden et al., 2000; Slade et al., 2014), victimisation while in prison (Dye, 2010; Favril et al., 2020), education level (Daniel & Fleming, 2006; Marzano, Hawton et al., 2011), bad news and social support (Stoliker, 2018).

In conclusion, the current study was the first to attempt using mixed-effects modelling to assess the predictive validity of both individual and unit-level factors on predicting the likelihood of multiple categories of self-harm occurring in NZ prisons. The results of the study highlight that a prisoner is at risk of self-harming the longer they spend in prison, if they are in isolation, European, younger, have previous violent offences, placed in a high security unit and if that unit has a high proportion of different gangs within it. Prisoners placed in units with a high percentage of individuals with gang affiliations (the same gang) are significantly less likely to self-harm. These variables can now be used as targets for risk assessments and treatment programmes to help reduce self-harm rates within NZ prisons and protect those in the NZ correctional system from harming others and themselves.

References

Aggarwal, S., Patton, G., Reavley, N., Sreenivasan, S. A., & Berk, M. (2017). Youth self-harm in low- and middle-income countries: Systematic review of the risk and protective factors. *International Journal of Social Psychiatry*, *63*(4), 359–375. https://doi.org/10.1177/0020764017700175

Bakker, L., Riley, D., & O'Malley, J. (1999). Risk of reconviction: Statistical models predicting four types of re-offending. *Wellington, New Zealand: Department of Corrections Psychological Service*.

Banks, N. (2017, July 28). *Investing in prison education: New approaches to improving educational outcomes and reducing re-offending*. Www.corrections.govt.nz. https://www.corrections.govt.nz/resources/research/journal/volume_5_issue_1_july_2017/investing_in_prison_education_new_approaches_to_improving_educational_outcomes_and_reducing_re-offending

Beautrais, A. L., Joyce, P. R., & Mulder, R. T. (1998). Youth Suicide Attempts: A Social and Demographic Profile. *Australian & New Zealand Journal of Psychiatry*, *32*(3), 349–357. https://doi.org/10.3109/00048679809065527

Black, E. B., & Kisely, S. (2017). A Systematic Review: Non-Suicidal Self-injury in Australia and New Zealand's Indigenous Populations. *Australian Psychologist*, *53*(1), 3–12. https://doi.org/10.1111/ap.12274

Bonner, R. L. (2006). Stressful Segregation Housing and Psychosocial Vulnerability in Prison Suicide Ideators. *Suicide and Life-Threatening Behavior*, *36*(2), 250–254. https://doi.org/10.1521/suli.2006.36.2.250

Borschmann, R., Young, J. T., Moran, P. A., Spittal, M. J., & Kinner, S. A. (2018). Self-harm in the criminal justice system: a public health opportunity. *The Lancet Public Health*, *3*(1), e10–e11.

Brabyn, L., & Grace, R. C. (2021). *Prison violence: What the data are telling us.* Presentation at the Nga Tūmanakotanga symposium.

Brown, M. Z., Comtois, K. A., & Linehan, M. M. (2002). Reasons for suicide attempts and nonsuicidal self-injury in women with borderline personality disorder. *Journal of Abnormal Psychology*, *111*(1), 198.

Canetto, S. S., & Sakinofsky, I. (1998). The gender paradox in suicide. *Suicide and Life-Threatening Behavior*, *28*(1), 1–23.

Carli, V., Mandelli, L., Poštuvan, V., Roy, A., Bevilacqua, L., Cesaro, C., Baralla, F., Marchetti, M., Serretti, A., & Sarchiapone, M. (2011). Self-Harm in Prisoners. *CNS Spectrums*, *16*(3), 75–81. https://doi.org/10.1017/s1092852912000211

Cohen, L. E., & Felson, M. (1979). Social Change and Crime Rate Trends: A Routine Activity Approach. *American Sociological Review*, *44*(4), 588–608. https://doi.org/10.2307/2094589

Coppersmith, D. D. L., Nada-Raja, S., & Beautrais, A. L. (2017). Non-suicidal self-injury and suicide attempts in a New Zealand birth cohort. *Journal of Affective Disorders*, *221*, 89–96. https://doi.org/10.1016/j.jad.2017.06.029

Daniel, A. E., & Fleming, J. (2006). Suicides in a State Correctional System, 1992-2002: A Review. *Journal of Correctional Health Care*, *12*(1), 24–35. https://doi.org/10.1177/1078345806287541

Day, J. C., Brauer, J. R., & Butler, H. D. (2015). Coercion and Social Support Behind Bars. *Criminal Justice and Behavior*, *42*(2), 133–155. https://doi.org/10.1177/0093854814546352

Department of Corrections. (2017, July 27). *M.05 Prisoners at risk of self harm*. Prison Operations Manual. https://www.corrections.govt.nz/resources/policy_and_legislation/Prison-Operations-Manual/Movement/M.05-Prisoners-at-risk-of-self-harm

Dixon-Gordon, K., Harrison, N., & Roesch, R. (2012). Non-Suicidal Self-Injury Within Offender Populations: A Systematic Review. *International Journal of Forensic Mental Health*, *11*(1), 33–50. https://doi.org/10.1080/14999013.2012.667513

Dye, M. H. (2010). Deprivation, importation, and prison suicide: Combined effects of institutional conditions and inmate composition. *Journal of Criminal Justice*, *38*(4), 796–806. https://doi.org/10.1016/j.jcrimjus.2010.05.007

Dye, M. H. (2011). The Gender Paradox in Prison Suicide Rates. *Women & Criminal Justice*, *21*(4), 290–307. https://doi.org/10.1080/08974454.2011.609400

Dye, M. H., & Aday, R. H. (2013). "I Just Wanted to Die" preprison and current suicidal ideation among women serving life sentences. *Criminal Justice and Behavior*, *40*(8), 832–849. https://doi.org/10.1177/0093854813476266

Farmer, K. A., Felthous, A. R., & Holzer, C. E. (1996). Medically Serious Suicide Attempts in a Jail with a Suicide-Prevention Program. *Journal of Forensic Sciences*, *41*(2), 15421J. https://doi.org/10.1520/jfs15421j

Favril, L., Yu, R., Hawton, K., & Fazel, S. (2020). Risk factors for self-harm in prison: a systematic review and meta-analysis. *The Lancet Psychiatry*, *7*(8), 682–691. https://doi.org/10.1016/s2215-0366(20)30190-5

Forrester, A., & Slade, K. (2014). Preventing self-harm and suicide in prisoners: job half done. *The Lancet*, *383*(9923), 1109–1111. https://doi.org/10.1016/s0140-6736(13)62571-4

Fotiadou, M., Livaditis, M., Manou, I., Kaniotou, E., & Xenitidis, K. (2006). Prevalence of mental disorders and deliberate self-harm in Greek male prisoners. *International Journal of Law and Psychiatry*, *29*(1), 68–73. https://doi.org/10.1016/j.ijlp.2004.06.009

Gambetta, D. (2009). 5. Self-harm as a Signal. *Codes of the Underworld*, 111–146. https://doi.org/10.1515/9781400833610-008

Gooding, P. A., Tarrier, N., Dunn, G., Awenat, Y., Shaw, J., Ulph, F., & Pratt, D. (2017). Psychological Characteristics and Predictors of Suicide Probability in High-Risk Prisoners. *Criminal Justice and Behavior*, *44*(3), 321–335. https://doi.org/10.1177/0093854816650478

Gough, K., & Hawkins, A. (2000). Staff Attitudes to Self-harm and its Management in a Forensic Psychiatric Service. *The British Journal of Forensic Practice*, *2*(4), 22–28. https://doi.org/10.1108/14636646200000030

Griller, J. (2014). *The paradox of self-harm in prison : psychopathy or an evolved coping strategy?* Diplomica Verlag.

Hawton, K., & Harriss, L. (2008). The Changing Gender Ratio in Occurrence of Deliberate Self-Harm Across the Lifecycle. *Crisis*, *29*(1), 4–10. https://doi.org/10.1027/0227-5910.29.1.4

Hawton, K., Linsell, L., Adeniji, T., Sariaslan, A., & Fazel, S. (2014). Self-harm in prisons in England and Wales: an epidemiological study of prevalence, risk factors, clustering, and subsequent suicide. *The Lancet*, *383*(9923), 1147–1154. https://doi.org/10.1016/s0140-6736(13)62118-2

Horton, M. C., Dyer, W., Tennant, A., & Wright, N. M. J. (2018). Assessing the predictability of self-harm in a high-risk adult prisoner population: a prospective

cohort study. *Health & Justice*, *6*(1). https://doi.org/10.1186/s40352-018-0076-3

Howard, M. V. A., Corben, S. P., Raudino, A., & Galouzis, J. J. (2020). Maintaining Safety in the Prison Environment: A Multilevel Analysis of Inmate Victimisation in Assaults. *International Journal of Offender Therapy and Comparative Criminology*, *64*(10-11), 1091–1113. https://doi.org/10.1177/0306624x19871633

Hunter, E., & Milroy, H. (2006). Aboriginal and Torres Strait Islander Suicide in Context. *Archives of Suicide Research*, *10*(2), 141–157. https://doi.org/10.1080/13811110600556889

Irwin, J., & Cressey, D. R. (1962). Thieves, Convicts and the Inmate Culture. *Social Problems*, *10*(2), 142–155. https://doi.org/10.2307/799047

IVANOFF, A. (1992). Background Risk Factors Associated with Parasuicide among Male Prison Inmates. *Criminal Justice and Behavior*, *19*(4), 426–436. https://doi.org/10.1177/0093854892019004006

Kaba, F., Lewis, A., Glowa-Kollisch, S., Hadler, J., Lee, D., Alper, H., Selling, D., MacDonald, R., Solimo, A., Parsons, A., & Venters, H. (2014). Solitary Confinement and Risk of Self-Harm Among Jail Inmates. *American Journal of Public Health*, *104*(3), 442–447. https://doi.org/10.2105/ajph.2013.301742

Klonsky, E. D. (2011). Non-suicidal self-injury in United States adults: prevalence, sociodemographics, topography and functions. *Psychological Medicine*, *41*(9), 1981–1986. https://doi.org/10.1017/s0033291710002497

Klonsky, E. D., May, A. M., & Glenn, C. R. (2013). The relationship between nonsuicidal self-injury and attempted suicide: converging evidence from four samples. *Journal of Abnormal Psychology*, *122*(1).

Klonsky, E. D., & Muehlenkamp, J. J. (2007). Self-injury: A research review for the practitioner. *Journal of Clinical Psychology*, *63*(11), 1045–1056. https://doi.org/10.1002/jclp.20412

Klonsky, E. D., Victor, S. E., & Saffer, B. Y. (2014). Nonsuicidal Self-Injury: What We Know, and What We Need to Know. *The Canadian Journal of Psychiatry*, *59*(11), 565–568. https://doi.org/10.1177/070674371405901101

Kottler, C., Smith, J. G., & Bartlett, A. (2018). Patterns of violence and self-harm in women prisoners: characteristics, co-incidence and clinical significance. *The Journal of Forensic Psychiatry & Psychology*, *29*(4), 617–634. https://doi.org/10.1080/14789949.2018.1425475

Law, B. M. F., & Shek, D. T. L. (2013). Self-harm and Suicide Attempts among Young Chinese Adolescents in Hong Kong: Prevalence, Correlates, and Changes. *Journal of Pediatric and Adolescent Gynecology*, *26*(3), S26–S32. https://doi.org/10.1016/j.jpag.2013.03.012

Liebling, A., & Krarup, H. (1993). Suicide attempts and self-injury in male prisons. *HM Stationery Office*.

Lim, K.-S., Wong, C. H., McIntyre, R. S., Wang, J., Zhang, Z., Tran, B. X., Tan, W., Ho, C. S., & Ho, R. C. (2019). Global Lifetime and 12-Month Prevalence of Suicidal Behavior, Deliberate Self-Harm and Non-Suicidal Self-Injury in Children and Adolescents between 1989 and 2018: A Meta-Analysis. *International Journal of Environmental Research and Public Health*, *16*(22), 4581. https://doi.org/10.3390/ijerph16224581

Lohner, J., & Konrad, N. (2006). Deliberate self-harm and suicide attempt in custody: Distinguishing features in male inmates' self-injurious behavior. *International*

Journal of Law and Psychiatry, *29*(5), 370–385. https://doi.org/10.1016/j.ijlp.2006.03.004

Maden, A., Chamberlain, S., & Gunn, J. (2000). Deliberate self-harm in sentenced male prisoners in England and Wales: some ethnic factors. *Criminal Behaviour and Mental Health*, *10*(3), 199–204. https://doi.org/10.1002/cbm.357

Magaletta, P. R., Patry, M. W., Wheat, B., & Bates, J. (2008). Prison inmate characteristics and suicide attempt lethality: An exploratory study. *Psychological Services*, *5*(4), 351.

Martin, M. S., Dorken, S. K., Colman, I., McKenzie, K., & Simpson, A. I. F. (2014). The Incidence and Prediction of Self-Injury among Sentenced Prisoners. *The Canadian Journal of Psychiatry*, *59*(5), 259–267. https://doi.org/10.1177/070674371405900505

Marzano, L., Fazel, S., Rivlin, A., & Hawton, K. (2011). Near-lethal self-harm in women prisoners: contributing factors and psychological processes. *Journal of Forensic Psychiatry & Psychology*, *22*(6), 863–884. https://doi.org/10.1080/14789949.2011.617465

Marzano, L., Hawton, K., Rivlin, A., & Fazel, S. (2011). Psychosocial influences on prisoner suicide: A case-control study of near-lethal self-harm in women prisoners. *Social Science & Medicine*, *72*(6), 874–883. https://doi.org/10.1016/j.socscimed.2010.12.028

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a Feather: Homophily in Social Networks. *Annual Review of Sociology*, *27*(1), 415–444. https://doi.org/10.1146/annurev.soc.27.1.415

Melzer, D., Tom, B. D., Brugha, T., Fryers, T., Gatward, R., Grounds, A., Johnson, T., & Meltzer, H. (2004). Access to medium secure psychiatric care in England and

Wales. 1: A national survey of admission assessments. *Journal of Forensic Psychiatry & Psychology*, *15*(1), 7–31. https://doi.org/10.1080/14789940310001648203

Ministry of Health. (2014). *Annual Update of Key Results 2013/14 New Zealand Health Survey. Kia Puāwai Te Ararau, The Māori Mental Health Workforce Development Strategic Plan*. Wellington: Ministry of Health.

Ministry of Justice. (2020). *Safety in Custody Statistics, England and Wales: Deaths in Prison Custody to December 2019 Assaults and Self-Harm to September 2019*.

Muehlenkamp, J. J., Claes, L., Havertape, L., & Plener, P. L. (2012). International prevalence of adolescent non-suicidal self-injury and deliberate self-harm. *Child and Adolescent Psychiatry and Mental Health*, *6*(1). https://doi.org/10.1186/1753-2000-6-10

Nada-Raja, S., & Skegg, K. (2011). Victimization, posttraumatic stress disorder symptomatology, and later nonsuicidal self-harm in a birth cohort. *Journal of Interpersonal Violence*, *26*(18), 3667–3681.

Nada-Raja, S., Skegg, K., Langley, J., Morrison, D., & Sowerby, P. (2004). Self-Harmful Behaviors in a Population-Based Sample of Young Adults. *Suicide and Life-Threatening Behavior*, *34*(2), 177–186. https://doi.org/10.1521/suli.34.2.177.32781

O'Connor, R. C. (2011). The Integrated Motivational-Volitional Model of Suicidal Behavior. *Crisis*, *32*(6), 295–298. https://doi.org/10.1027/0227-5910/a000120

Oxford University Press. (2004). *The Oxford English dictionary.* Oxford University Press.

Penn, J. V., Esposito, C. L., Schaeffer, L. E., Fritz, G. K., & Spirito, A. (2003). Suicide Attempts and Self-Mutilative Behavior in a Juvenile Correctional Facility. *Journal*

of the American Academy of Child & Adolescent Psychiatry, *42*(7), 762–769. https://doi.org/10.1097/01.chi.0000046869.56865.46

Perry, A., & Grace, R. C. (2022). *Individual and situational risk factors for prison violence in women and men: A New Zealand study* [Manuscript submitted for publication.].

Plener, P. L., Schumacher, T. S., Munz, L. M., & Groschwitz, R. C. (2015). The longitudinal course of non-suicidal self-injury and deliberate self-harm: a systematic review of the literature. *Borderline Personality Disorder and Emotion Dysregulation*, *2*(1), 2. https://doi.org/10.1186/s40479-014-0024-3

Pope, L. (2018). Self-harm by adult men in prison: A rapid evidence assessment (REA). *Her Majesty's Prison and Probation Service. London: Ministry of Justice Analytical Series.*

Rasmussen, S. A., Fraser, L., Gotz, M., MacHale, S., Mackie, R., Masterton, G., McConachie, S., & O'Connor, R. C. (2010). Elaborating the cry of pain model of suicidality: Testing a psychological model in a sample of first-time and repeat self-harm patients. *British Journal of Clinical Psychology*, *49*(1), 15–30. https://doi.org/10.1348/014466509x415735

Richmond-Rakerd, L. S., Caspi, A., Arseneault, L., Baldwin, J. R., Danese, A., Houts, R. M., Matthews, T., Wertz, J., & Moffitt, T. E. (2019). Adolescents Who Self-Harm and Commit Violent Crime: Testing Early-Life Predictors of Dual Harm in a Longitudinal Cohort Study. *American Journal of Psychiatry*, *176*(3), 186–195. https://doi.org/10.1176/appi.ajp.2018.18060740

Rivlin, A., Fazel, S., Marzano, L., & Hawton, K. (2012). Studying survivors of near-lethal suicide attempts as a proxy for completed suicide in prisons. *Forensic Science International*, *220*(1-3), 19–26. https://doi.org/10.1016/j.forsciint.2012.01.022

Sahlin, H., Kuja-Halkola, R., Bjureberg, J., Lichtenstein, P., Molero, Y., Rydell, M., Hedman, E., Runeson, B., Jokinen, J., Ljótsson, B., & Hellner, C. (2017). Association Between Deliberate Self-harm and Violent Criminality. *JAMA Psychiatry*, *74*(6), 615. https://doi.org/10.1001/jamapsychiatry.2017.0338

Sakelliadis, E. I., Papadodima, S. A., Sergentanis, T. N., Giotakos, O., & Spiliopoulou, C. A. (2010). Self-injurious behavior among Greek male prisoners: Prevalence and risk factors. *European Psychiatry*, *25*(3), 151–158. https://doi.org/10.1016/j.eurpsy.2009.07.014

Slade, K. (2018). Dual harm: an exploration of the presence and characteristics for dual violence and self-harm behaviour in prison. *Journal of Criminal Psychology*, *8*(2), 97–111. https://doi.org/10.1108/jcp-03-2017-0017

Slade, K., Edelmann, R., Worrall, M., & Bray, D. (2014). Applying the C ry of P ain Model as a predictor of deliberate self-harm in an early-stage adult male prison population. *Legal and Criminological Psychology*, *19*(1), 131–146. https://doi.org/10.1111/j.2044-8333.2012.02065.x

Slade, K., Forrester, A., & Baguley, T. (2020). Coexisting violence and self-harm: Dual harm in an early-stage male prison population. *Legal and Criminological Psychology*, *25*(2), 182–198. https://doi.org/10.1111/lcrp.12169

Sloane, B. C. (1973). Suicide Attempts in the District of Columbia Prison System. *OMEGA - Journal of Death and Dying*, *4*(1), 37–50. https://doi.org/10.2190/0r7f-33ny-7uga-hbxv

Snowdon, J. (2018). Differences between patterns of suicide in East Asia and the West. The importance of sociocultural factors. *Asian Journal of Psychiatry*, *37*, 106–111. https://doi.org/10.1016/j.ajp.2018.08.019

Stats NZ. (2019, October 2). *Increase in life-threatening injuries from self-harm | Stats NZ*. Www.stats.govt.nz; Andrew Neal. https://www.stats.govt.nz/news/increase-in-life-threatening-injuries-from-self-harm

Stewart, S. L., Baiden, P., & Theall-Honey, L. (2014). Examining Non-Suicidal Self-Injury among Adolescents with Mental Health Needs, in Ontario, Canada. *Archives of Suicide Research*, *18*(4), 392–409. https://doi.org/10.1080/13811118.2013.824838

Stoliker, B. E. (2018). Attempted Suicide: A Multilevel Examination of Inmate Characteristics and Prison Context. *Criminal Justice and Behavior*, *45*(5), 589–611. https://doi.org/10.1177/0093854818754609

Sykes, G. M. (1958). *The society of captives: A study of a maximum security prison.* Princeton University Press.

Tamatea, A. (2019). *Home - Nga Tūmanakotanga – Turning the Tide on Prison Violence*. Www.waikato.ac.nz. https://www.waikato.ac.nz/turning-the-tide/

Tartaro, C., & Ruddell, R. (2006). Trouble in Mayberry: A national analysis of suicides and attempts in small jails. *American Journal of Criminal Justice*, *31*(1), 81–101. https://doi.org/10.1007/bf02885686

Tham, S.-G., Ibrahim, S., Hunt, I. M., Kapur, N., & Gooding, P. (2019). Examining the mechanisms by which adverse life events affect having a history of self-harm, and the protective effect of social support. *Journal of Affective Disorders*, *263*. https://doi.org/10.1016/j.jad.2019.11.037

Tsiachristas, A., Geulayov, G., Casey, D., Ness, J., Waters, K., Clements, C., Kapur, N., McDaid, D., Brand, F., & Hawton, K. (2020). Incidence and general hospital costs of self-harm across England: estimates based on the multicentre study of self-

harm. *Epidemiology and Psychiatric Sciences*, *29*. https://doi.org/10.1017/s2045796020000189

Tsirigotis, K., Gruszczynski, W., & Tsirigotis-Woloszczak, M. (2011). Gender differentiation in methods of suicide attempts. *Medical Science Monitor*, *17*(8), PH65–PH70. https://doi.org/10.12659/msm.881887

Vinokur, D., & Levine, S. Z. (2019). Non-suicidal self-harm in prison: A national population-based study. *Psychiatry Research*, *272*, 216–221. https://doi.org/10.1016/j.psychres.2018.12.103

Völlm, B. A., & Dolan, M. C. (2009). Self-harm among UK female prisoners: a cross-sectional study. *The Journal of Forensic Psychiatry & Psychology*, *20*(5), 741–751.

Way, B. B., Miraglia, R., Sawyer, D. A., Beer, R., & Eddy, J. (2005). Factors related to suicide in New York state prisons. *International Journal of Law and Psychiatry*, *28*(3), 207–221. https://doi.org/10.1016/j.ijlp.2004.09.003

Whitlock, J., & Knox, K. L. (2007). The Relationship Between Self-injurious Behavior and Suicide in a Young Adult Population. *Archives of Pediatrics & Adolescent Medicine*, *161*(7), 634–640. https://doi.org/10.1001/archpedi.161.7.634

Williams, J. M. G., & Pollock's, L. R. (2001). Psychological aspects of the suicidal process. *Understanding Suicidal Behaviour*, 76–93.