



Coexisting violence and self-harm: Dual harm in an early-stage male prison population

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Purpose. This study examined the characteristics of men in prison who have a history of both self-harm and violence (known as *dual harm*) and the extent to which demographic and criminogenic factors, in-prison incidents, and self-harm method could differentiate men who dual harm.

Methods. Official prison sample data were examined for the period April 2010 to November 2017 ($n = 965$). Regression analysis of all custodial incidents, demographic and offending information, and imprisonment experience, was undertaken.

Results. Self-harm was associated with violence in prison, representing a 3.5-fold risk of violence compared with men who did not self-harm, after controlling for time in prison, age, and index offence. 60% of men who harmed themselves also engaged in custodial violence, while 32% who were violent also had a self-harm event. After controlling for age at first incident, 11% of the sample had custodial history of dual harm and they accounted for 56% of all recorded custodial incidents. They had a high probability of property damage and fire setting in prison and spent 40% longer in custody. Men who dual harmed used a greater variety of self-harm methods, with increased use of lethal methods.

Conclusion. Dual harm is prevalent, particularly among those who harm themselves in prison. Men who dual harm contribute excessively to the overall incident burden in prison and demonstrate behavioural variability and risk regarding both violence and self-harm. The findings challenge the usual distinctive management responses or that self-harm or violence is solely the responsibility of health or justice, with greater integration required.

Rates of self-harm, suicidal behaviours, and violence have generally been rising in prisons within most jurisdictions (Ministry of Justice (MoJ), 2019a, 2019b; Correctional Services Canada (CSC), 2017). In England and Wales, 13.6% of the prison population are thought to engage in acts of self-harm each year, with an overall population self-harm incident rate of 667 per 1,000 prisoners (MoJ, 2019a). At the same time, there are also high rates of custodial violence, which has a comparative population incident rate of 411 per 1,000 prisoners (MoJ, 2019b). However, despite high levels of both self-harm and violence, no jurisdictions currently report on the coexistence of these behaviours as a matter of

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routine. This phenomenon – *the coexistence of a history of violence and self-harming behaviour within the same individual* – has come to be known in the small but developing literature as *dual harm* (Slade, 2019). Some early studies of this phenomenon have suggested a prevalence of *dual harm* of between 11% and 16% in male prisoners (Slade, 2018) and 2.6% among female prisoners (Kottler, Smith, & Bartlett, 2018). In both studies, 40–60% of people with a history of prison self-harm also had a history of institutional violence. Although these rates are higher than those reported among the general population, they are similar to international forensic and psychiatric samples that have been described elsewhere (Nijman & Campo, 2002; Plutchik, van Praag, & Conte, 1989).

It has been established in the literature that a relationship exists between harmful behaviours, with self-harm acting as a precursor to violent behaviour, and vice versa (O'Donnell, Smith, & Waterman, 2015). Both male and female prisoners who harm themselves, or exhibit suicidal behaviour, can be differentiated from prisoners who do not harm themselves through institutional records of violence and other general disciplinary problems (Lanes, 2009; Salive, Smith, & Brewer, 1989; Wichmann, Serin, & Abracen, 2002; Wichmann, Serin, & Motiuk, 2000; Young, Justice, & Erdberg, 2006). The lifetime risk posed by a history of either self-harm or violence is known to be important. Self-harm in the community can double the lifetime risk of subsequent violent offending in both genders, even when substance use and comorbid psychiatric diagnoses are controlled for (Sahlin *et al.*, 2017). This also is reflected in the widely accepted raised risk of suicide for those who have a history of either self-harm or violence (Hawton *et al.*, 2015; Jordan & Samuelson, 2016). However, the relationship between having a history of both behaviours and these outcomes (i.e., suicide, homicide) but also for other high-risk outcomes; for example, firesetting has not yet been explored in detail.

Although the existing literature demonstrates a clear relationship between self-harm and violent behaviour, little is known of the factors underpinning dual-harm behaviour, although knowledge is emerging from within-prison environments (a setting presenting high risk of both behaviours). Within the wider theoretical literature, the substantial overlap between self-harming and violent behaviour has largely been neglected. Although those who self-harm account for significant rates of violence, only a small number of studies have explored this subgroup (O'Donnell *et al.*, 2015). There have been suggestions that suicidal behaviour may be 'aggression turned inwards' (Plutchik *et al.*, 1989) – a proposition with limited ability to explain the wider phenomenon of dual harm or its development since dual-harm individuals appear qualitatively (e.g., methods used) and quantitatively (e.g., severity) different from individuals that engage in sole harmful behaviours (O'Donnell *et al.*, 2015). Consequently, it is not yet clear which primary theoretical framework – self-harm or violence – offers the best method for understanding dual harm, or whether a new theoretical model is required. Until recently, few attempts were made to identify factors that could distinguish those who will develop a pattern of dual harm. However, evidence is now emerging that indicates a discrete model, based on distinct features, should be considered for dual harm and we provide a theoretical account of dual harm to provide tentative insights into this phenomenon.

There is substantial overlap between risk factors for both self-harm and violence, with factors such as hopelessness and impulsivity, being causally implicated in both suicide and violence (O'Donnell *et al.*, 2015; Plutchik *et al.*, 1989; Plutchik & Van Praag, 1994). Nevertheless, epidemiological studies suggest potentially distinctive factors in this group, including a higher presence of antisocial personality disorder traits, lower childhood self-control, greater emotional and interpersonal lability, early substance dependence or

psychosis (pre-18), being a young victim of violence (pre-12), childhood polyvictimization and early contact with the criminal justice system (Richmond-Rakerd *et al.*, 2019; Steeg *et al.*, 2019; Harford, Chen, Kerridge, & Grant, 2018; Harford, Yi, & Freeman, 2012).

Prison and psychiatric hospital studies have additionally provided early evidence of a distinct pattern of reactive behaviours in those who dual harm (Young *et al.*, 2006). Lanes (2011) reported that those in a US prison who exhibited extensive self-harm were more involved in property destruction, engaged in greater violence during their time in prison, and were more versatile in their use of methods of self-injury. This is in keeping with findings from both male and female UK prisoners with dual harm, who displayed more lethal methods of self-harm, far higher rates of property destruction and firesetting (Kottler *et al.*, 2018; Slade, 2018), yet similar rates of self-harm and violence to those with sole harmful behaviours. Firesetting was also identified among psychiatric patients who displayed both suicidal and violent behaviour (Plutchik *et al.*, 1989), suggesting a pattern across populations.

The range of harmful behaviours, combined with their early contact with the CJS and higher level of imprisonments (Kottler *et al.*, 2018), may underlie the greater overall experience of imprisonment found in female dual-harm prisoners (Kottler *et al.*, 2018). However, contradictory results within male prison studies, where no difference was observed (Slade, 2018), require further clarification. Furthermore, there are conflicting findings regarding the relevance of current convictions in distinguishing those who dual harm in prison. Early evidence suggests that those convicted for violence may be more likely to dual harm than violent-only offenders within some subgroups (e.g., females, men serving long sentences; Kottler *et al.*, 2018; Slade, 2018) but not others (men in early-stage prisons (Slade, 2018). However, all previous prison studies have used small, selected samples, with non-specific timelines. In contrast, the present study uses the complete population of a prison over an extended time period to provide more robust comparison.

In developing a theoretical account of dual harm, it is plausible that the significant early life experiences in this group and ongoing family problems may disproportionately affect the development of emotional and behavioural regulation (Richmond-Rakerd *et al.*, 2019; Sahlin *et al.*, 2017), with both violence and self-harm emerging at a young age to manage emotional and trauma-based distress within a complex early childhood environment (Pickering & Slade, in prep.). The early experiences of this group have also been linked with other reactive behaviours. For example, parental violence increases the risk of damaging property in adolescence (Margolin & Baucom, 2014) with poor emotional and behavioural regulation and ASPD traits theoretically linked with pathways to firesetting (Gannon, Ó Ciardha, Doley, & Alleyne, 2012). This development of underlying risk in tandem, rather than one as a causal factor for the other, is supported in the prison environment where equal rates of first behaviour occur as self-harm or violence by those who dual harm (Slade, 2018). However, even if risk develops in tandem, the likelihood of a particular behaviour is heavily influenced by the combination of behavioural function (e.g., those who dual harm often seek relief from distress through inflicting pain; Pickering & Slade, in prep.) and, importantly, circumstance (e.g., availability) or consequence; for example, men report they would self-harm due to a wish to avoid violence (Power, Smith & Beaudette, 2016). This theoretical account suggests that there is a relationship between the behaviours which is not coincidental and suggests some distinctiveness in its development worthy of further research. The present study does not aim to empirically explore the temporal or theoretical relationship between the behaviours, due to the complex experiential relationship underpinning the behaviours. Rather, it aims to

consider in greater depth previous indications that dual harm should in fact be considered a distinct group who require a unique theoretical understanding.

Although there are limitations to each of the existing studies on dual harm, the apparent consistency across countries and gender does suggest that this subgroup has distinct behavioural features which need examination in a more robust study. Furthermore, those who engage in dual harm are emerging as at greater risk of self-inflicted and accidental death in the community (Stegg *et al.*, 2019), with those who engage in near-lethal self-harm more likely to display anger, aggression, and hostility than those with less lethality (Marzano, Hawton, Rivlin, & Fazel, 2011). An important concern, therefore, is whether people with dual harm are more likely to use more lethal methods when they harm themselves.

Further developing our understanding of dual-harm behaviour in prison settings is likely to have wider community implications. Existing studies have shown highly mixed results regarding the links between violent conviction and custodial violence (Arbach-Lucioni, Martínez-García, & Andrés-Pueyo, 2012; Berg & DeLisi, 2006; Cunningham, Sorensen, & Reidy, 2005; Drury & DeLisi, 2010; Reidy, Sorensen, & Cunningham, 2012; Slade, 2018; Sorensen & Pilgrim, 2000). Nevertheless, custodial violence has a somewhat more consistent relationship to subsequent imprisonments (Cunningham & Sorensen, 2007; Drury & DeLisi, 2010). This suggests that introducing improvements within custodial environments, and addressing underlying risk factors for institutional violence, may have a role in the prevention of future violent crime.

This study therefore aims to identify distinct characteristics of men who display a history of dual harm over a 7.5-year period within a complete single prison sample. Based on the literature, we hypothesize that men who have a history of dual harm in prison will, in comparison with other groups:

1. Be younger at first self-harm or assault and more likely to have a violent index offence;
2. Have experienced a greater time in prison;
3. Have a higher rate of non-harm incidents within prison (particularly in relation to property damage and firesetting);
4. Use a greater range of self-harming methods (particularly highly lethal methods).

Method

Definitions

This study used the official definitions of assault and self-harm adopted by HM Prison and Probation Service (HMPPS: MoJ, 2013). Both definitions include direct bodily contact and therefore threats of harm and other non-physical harm behaviours were not included.

Assault

Assaults in prison custody cover a wide range of contact violent behaviours, including fights between prisoners. Assaults are not sub-categorized and are not comparable with violent conviction categories.

Self-harm

This is defined as any act where a prisoner deliberately harms themselves, irrespective of the method, intent or severity of any injury.

Institutional incident

Reportable incidents which are required to be entered onto the NOMIS system by Prison Service Order 23/2014 (NOMS, 2014) and can include damage to property, fire, drug use, mobile phone possession, barricading, and miscellaneous others (e.g., cell floods, prisoners in wrong location).

Study establishment

The prison used in this study was a local medium secure prison, operating at category B, located in the Midlands. In England and Wales, such prisons serve the local courts and are mainly focused on providing a service for prisoners who are on remand (pre-trial), convicted but un-sentenced, in the early stages of serving a custodial sentence, or awaiting release to the local community.

Sample

A total of 965 male prisoners were included. The full sample ranged in age between 18 and 83 years ($M = 35.0$, $SD = 12.1$) and 7.4% were under the age of 21 ($n = 71$). The median time in prison was 167 days ($M = 1.8$ years, $SD = 2.5$ years). One of the dual-harm sample died by suspected suicide shortly after the sample selection.

Table 1 summarizes the group prevalence and ethnic origin of the sample.

Ethical considerations

Ethical approval was obtained from University Research Ethics Committee and the National Offender Management Service. The Governor at the study prison also granted permission for the research to be undertaken.

Procedure

A retrospective analysis of routinely collected data was performed, in keeping with methods used in earlier studies (Kottler *et al.*, 2018; Slade, 2018). Data were assembled from the NOMS national computerized case work system (CNOMIS) for the date range 01 April 2010 (initiation of CNOMIS)–01 November 2017 (sample selection date) for every prisoner resident on 01 November 2017. This system includes a record of every known act of self-harm or violence in prisons in England and Wales, irrespective of method, intent or severity, and recordings must be made using a dedicated set of questions so that every act is specified. Institutional incidents may have occurred during any period of imprisonment.

Table 1. Percentage and number of white and BAME individuals by group

	None % (n) [95% CI]	No harm % (n) [95% CI]	Assault % (n) [95% CI]	Self-harm % (n) [95% CI]	Dual % (n) [95% CI]
White	77.8 (325) [73.9, 81.3]	75.6 (62) [65.8, 83.8]	68.6 (147) [62.3, 74.5]	91.4 (63) [83.3, 96.5]	81.9 (79) [73.8, 88.5]
BAME	22.2 (156) [18.7, 26.1]	24.4 (24) [16.1, 34.1]	31.4 (76) [25.6, 37.7]	8.6 (7) [3.5, 16.7]	18.1 (26) [11.5, 26.2]
Total	49.8 (481)	8.9 (86)	23.1 (223)	7.3 (70)	10.9 (105)

Details and dates of all institutional incidents were obtained for each individual, including at previous institutions, throughout any period of detention. From this, the following mutually exclusive groups were differentiated:

- *Assault* (history of physical assault with no self-harm)
- *Self-harm* (history of physical harm to self but not others)
- *Dual harm* (history of both assault and self-harm)
- *No harm* (incidents had been recorded but none involved physical harm to self or others)
- *No incidents (no recorded incidents)*

For all assault events, a further records check took place to ensure that included individuals had perpetrated the relevant violent event, with researchers reading the full incident report to confirm their role. All victim and bystander events were removed from their count. Any ambiguity was resolved through checking whether the individual was placed on report for the behaviour and if not, the incident was removed from their count. Dates of imprisonment were collected to enable calculation of the total time spent in prison, and time spent in the community was subtracted from the overall total. Every incident of self-harm is recorded on CNOMIS within set categories. The sample was coded into one of the following categories for analysis: ligature or self-strangulation; cutting; punching; overdose; head-banging; swallowing an item; other (all other recorded types, e.g., insertion, wound interference).

Data analysis

The data were used to establish the overall prevalence and incidence rates for self-harm and violence within the sample, then men who exhibited either self-harm and violence, or who exhibited both (i.e., dual harm), were compared with those who exhibited neither behaviour while they were in prison. As this study focuses on identifying the distinct characteristics of individuals with a history of dual harm relative to groups, we predominately use logistic regression and generalized linear models and related models for count data rather than time series.¹ The risk of an individual being violent in prison according to their self-harm status, and of them harming themselves according to their history of violence, and differences between the groups on socio-demographic variables, index offence characteristics, and institutional misconduct was modelled using R version 3.4.4 (R Core Team, 2018).² For the main prevalence and incident rate analyses, we included covariates to control for age, index offence, and (only for analyses without the 'no incident' group) age of first recorded prison incident. In addition, years in prison were also included as an offset or covariate when comparing groups on within-prison incidents.³ The use of administrative data means that there are no missing outcome data for recorded incidents.

¹ Time series models require more fine-grained data than available for the present analysis and also present challenges when handling multiple events and multiple periods of incarceration. Further work by our research team to model the trajectory of self-harm and violence with more fine-grained is planned.

² R code for all analyses is included with the submission. We have requested permission to publish simulated data with similar patterns of results to facilitate statistical review and maintain security of the raw data.

³ For count models, it is possible to include the exposure (years in prison) as an offset in the model, but not for binomial models (as the required offset varies as a function of the predicted probability). Hence, we use years in prison as a covariate if an offset cannot be included.

Results

Of the 965 individuals in the sample, 49.8% ($n = 481$) had no recorded incidents, 8.9% ($n = 86$) were in the no harm group, 23.1% ($n = 223$) were classified with only a history of assault, 7.3% ($n = 70$) had a history only of self-harm, and 10.9% ($n = 105$) were classified within the dual-harm group.

There was a clear association between self-harm and violence in the data set as a whole, when considering all prisoners who had at least one incident of self-harm or violence. The simple correlation between having an assault and a self-harm incident was .258, 95% CI [0.20, 0.32]. As the data are dichotomous (and these data include those with no recorded incidents), we looked at the change in odds of an assault incident for those with a self-harm incident. Logistic regression was used to predict assault incidents from self-harm, indicating nearly a fourfold change in odds compared with men who did not harm themselves, OR = 3.81, 95% CI [2.72, 5.37], $p < .001$. This relationship weakens only slightly when including age and index offence as covariates (age at first incident not being included as not all prisoners in the full sample have recorded incidents), OR = 3.51, 95% CI [2.47, 5.00], $p < .001$. Risk of an assault incident is substantially increased if there is an incident of self-harm and vice versa.⁴ When considering all prisoners, there was considerable overlap between self-harm and assault with 60% ($n = 105$) of men who had self-harmed also having an assault on record. Conversely, 32% ($n = 105$) of assaultive men also had a recorded self-harm (the difference reflecting the base rates for assaultive and self-harm incidents).

Demographics and offending history

Table 2 summarizes the years in prison, current age, age at first self-harm and first assault, by group (the latter two excluding the non-harm group). Confidence intervals were obtained separately for each variable using one-way ANOVA with group as the factor.

Differences between groups were tested using Welch–Satterthwaite-corrected t -tests with a Hochberg correction for multiple testing (Hochberg, 1988). For years in prison, there is a clear pattern, with the no recorded incidents group having spent less time in prison than all other groups (all adjusted $p < .0001$). The no harm, assault, and self-harm groups were not significantly different in terms of prison experience (all adjusted $p > .10$) and the dual-harm group with significantly greater length in prison than no harm, assault, and self-harm groups (all adjusted $p > .001$). In terms of current age, the no recorded incidents and no harm groups were not significantly different from each other (adjusted $p = .79$) but were on average older (by 4–5 years) than the three harm groups (all adjusted $p < .05$). Assault, self-harm and dual-harm groups did not differ significantly in terms of age (all adjusted $p > .37$).

Age at first self-harm differs between the self-harm and dual-harm groups, with dual-harm 3.61 years younger on average than the self-harm individuals, $t(108.0) = 2.69$, $p < .01$, 95% CI [0.95, 6.28]. The dual-harm group were also on average 2.96 years younger than the assault for the age at first assault, $t(277.2) = 3.14$, $p < .005$, 95% CI [1.11, 4.81].

⁴ The odds ratio is symmetric as it strips out the incident base rates and thus the OR for predicting assault from self-harm is the same as that of predicting self-harm from assault (Baguley, 2012).

Table 2. Mean and standard deviation for years in prison, age, age at first self-harm, and age at first assault by group

Group	Years in prison M (SD) [95% CI]	Age M (SD) [95% CI]	Age at first self-harm M (SD) [95% CI]	Age at first assault M (SD) [95% CI]
All	1.92 (2.54)	35.0 (12.1)	28.3 (8.49.3)	28.3 (9.38.4)
None	0.4645 (1.43) [0.28, 0.64]	37.5 (13.4) [36.4, 38.5]	–	–
No harm	3.01 (2.63) [2.59, 3.44]	36.8 (12.1) [34.3, 39.3]	–	–
Assault	3.24 (2.55) [2.98, 3.51]	31.8 (9.8) [30.3, 33.4]	–	29.1 (9.8) [28.0, 30.3]
Self-harm	2.56 (2.33) [2.08, 3.04]	32.2 (9.7) [29.5, 34.9]	30.3 (9.7) [28.4, 32.3]	–
Dual	4.50 (2.30) [4.11, 4.89]	30.3 (6.9) [28.0, 35.5]	26.7 (6.7) [25.2, 28.3]	26.2 (6.8) [24.5, 27.9]

Index offence

Index offences by group are summarized in Table 3. Differences in the pattern of offences were analysed using a chi-square test of independence, with the Egon Pearson ‘ $N - 1$ ’ correction for small cells.⁵ The pattern of differences was statistically significant, χ^2 ($N = 965$, $df = 16$) = 41.94, $p < .0005$. Analysis of the adjusted standardized residuals with a Hochberg correction revealed only two cells with statistically significant residuals. For sexual offences, the no recorded incidents group had a higher-than-expected proportion of sexual offences ($z = 4.37$, $p = .003$) while the assault group had a lower than expected proportion of sexual offences ($z = -3.21$, adjusted $p = .032$) with all other cells residuals not statistically significant after applying the Hochberg correction (all adjusted $p > .49$).

Institutional events

The full sample had a recorded history of 4083 institutional events ($M = 4.2$ events per person). Differences in the incident rate between groups were analysed using Poisson regression with the number of incidents as an outcome and group as a predictor. The no incident group have zero incidents data and were excluded from the analysis. As is common for count data, the number of incidents was overdispersed and a dispersion parameter was included to adjust the standard errors of the model. The model also included an offset – years in prison – to account for the differential opportunity for incidents to occur (see Baguley, 2012). This changes the interpretation of the outcome as to an incident rate rather than a count. The resulting model compares the incident rate per year between the no harm, assault, self-harm, and dual-harm groups.

As including assault and self-harm incidents would necessarily tend to produce higher overall rates for dual harm and lower rates for no harm groups, the analyses below exclude assault or self-harm incidents. Figure 1 shows the mean incident rate by group for both total incident rate per year (left panel) and incident rate excluding harmful incidents (right panel).

⁵ This correction is recommended when some expected values are below 5 but greater than 1 (Campbell, 2007).

Table 3. Percentage and number of individuals by group and index offence type

Index offence	None % (n)	No harm % (n)	Assault % (n)	Self-harm % (n)	Dual % (n)
Violent	24.7 (119)	32.6 (28)	27.8 (62)	35.7 (25)	29.5 (31)
Sexual	19.1 (92)	7.0 (6)	7.6 (17)	18.6 (13)	8.6 (9)
Drug	8.5 (41)	12.8 (11)	12.1 (27)	1.4 (1)	6.7 (7)
Breach	4.6 (22)	7.0 (6)	2.7 (6)	5.7 (4)	2.9 (3)
Misc.	43.0 (207)	40.7 (35)	49.8 (111)	38.6 (27)	52.4 (55)

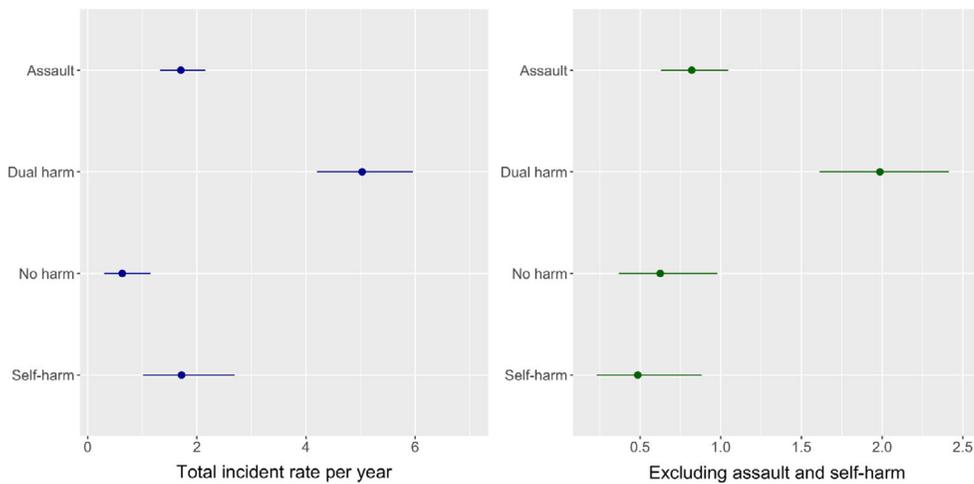


Figure 1. Mean and 95% confidence intervals for total incident rate per year (left panel) and total incident rate per year excluding assault and self-harm incidents (right panel).

The dual-harm group has a markedly higher rate of both total incidents and non-harm incidents than all other groups. The mean rate of incidents per year is 0.62, 95% CI [0.37, 0.98] for the no harm group, 0.82, 95% CI [0.63, 1.05] for the assault group, 0.49, 95% CI [0.28, 1.05] for the self-harm group, and 1.99, 95% CI [1.61, 2.41] for the dual-harm group. After including age, age at first incident and index offence as covariates the pattern is broadly similar with rates of 0.74, 95% CI [0.47, 1.19] for the no harm group, 0.85, 95% CI [0.63, 1.13] for the assault group, 0.55, 95% CI [0.30, 1.02] for the self-harm group, and 1.97, 95% CI [1.47, 2.64] for the dual-harm group. The likelihood ratio test comparing overall differences in covariate-adjusted rates between groups is statistically significant, $G^2(3) = 39.72, p < .001$. Pairwise comparisons, using the emmeans package in R (Lenth, 2018) and a Hochberg correction for multiple testing revealed significant differences only between dual harm and no harm ($z = 3.67, \text{adjusted } p < .001$), dual harm and assault ($z = 5.41, \text{adjusted } p < .001$), and dual harm and self-harm ($z = 3.87, \text{adjusted } p < .001$). Differences in rates between no harm, assault, and self-harm groups were all non-significant (all adjusted $p > .57$). The dual-harm group have substantially elevated rates of non-harm incidents – more than double that of all other groups.

As hypothesized, we investigated two specific incident types: property damage and firesetting. Most individuals have zero such incidents, but the distribution is heavily

skewed with a maximum of 13 for firesetting ($M = 0.105$, $SD = 0.620$) and 10 for property damage ($M = 0.284$, $SD = 1.195$). As such 'excess' zeroes are potentially problematic for Poisson or negative binomial regression models (e.g., see Baguley, 2012), we employed a hurdle model using the R *pscl* package (Zeileis, Kleiber, & Jackman, 2008) using a negative binomial regression model for the count part of the model to handle overdispersion arising from clustering of incidents over time. This approach allows us to model simultaneously the tendency of a type of incident to occur and the rate at which it occurs (including variables that predict the occurrence and rate of incidents, or both). Thus, it could be the case that firesetting occurs at different rates between two groups but is equally likely to occur at all (or vice versa). Age and age at first incident were included as covariates while years in prison was included as offset for the count component and as a covariate for the binomial component. Index offence was included as a covariate for the binomial component, but it was not possible to include it in the count model because the data were too sparse to obtain stable estimates for different offence types. As with the overall incident analyses the 'no incident' group who, by definition, have no incidents are not included in this analysis. Thus, the two components of the model are estimated for an individual with an average prison term (3.45 years; higher than for the full sample because the 'no incident' group are absent). A group factor coding for no harm, assault, self-harm, and dual harm was included as a predictor in both the binomial and the count part of the model.

For firesetting, the binomial part of the hurdle model detected no effect of years in prison, $G^2(1) = 0.01$, $p = .92$, but there was evidence of group differences for both the binomial part of the model, $G^2(3) = 19.4$, $p < .001$, and the count part, $G^2(3) = 19.2$, $p < .001$.

The probability of firesetting is outlined in Table 4. After Hochberg correction, the differences between groups are statistically significant only for the dual-harm group who are more likely to have set fires than the assault group, $z = 3.99$, adjusted $p < .001$, or the self-harm group, $z = 2.89$, adjusted $p < .005$ but not (after correcting for multiple testing) the no harm group, $z = 2.35$, adjusted $p = .076$. For the annual rate, although the dual and self-harm groups have higher rates than the assault or no harm group, none of the pairwise comparisons were statistically significant after adjustment for multiple comparisons.

For property damage, the binomial part of the hurdle model did not reveal a statistically significant effect of years in prison, $G^2(1) = 2.48$, $p = .12$, but detect differences between the groups, $G^2(3) = 10.48$, $p < .05$. In addition, the difference in property damage rates per year between groups in the count part of the model was statistically significant, $G^2(3) = 26.11$, $p = .001$.

The effect of group in the binomial part of the model suggest rates of property damage vary between groups, while the effect of group in the count component suggests that it occurs at higher rates in some groups. The probability of property damage, corresponding to the binomial part of the model, is outlined in Table 4. Hochberg-corrected pairwise comparisons were conducted for both parts of the model. For the binomial part of the model, the differences between groups are statistically significant only for the dual-harm group relative to other groups; they are more likely to damage property than the assault group, $z = 4.01$, adjusted $p < .001$, self-harm group, $z = 3.55$, adjusted $p < .001$, or no harm group, $z = 3.47$, adjusted $p < .001$. The adjusted rates from the count part of the model (the rate of property damage incidents per year for individuals with at least one property damage incident) are 0.19 for the dual-harm group, 0.14 for the no harm group, 0.044 for the assault group, and 0.038 for the self-harm group. However, only the difference between the assault and dual-harm groups (the two largest groups) is

Table 4. Estimated firesetting and property damage incidents after covariate adjustment

Adjusted probability and rate of incident	No harm	Assault	Self-harm	Dual harm
Firesetting				
Probability	0.087 [0.04, 0.18]	0.071 [0.04, 0.12]	0.053 [0.02, 0.014]	0.240 [0.15, 0.37]
Damage to property				
Probability	0.068 [0.03, 0.15]	0.118 [0.07, 0.19]	0.060 [0.02, 0.15]	0.294 [0.19, 0.42]
Incidents/year	0.14 [0.01, 2.42]	0.04 [0.003, 0.61]	0.04 [0.001, 1.23]	0.19 [0.02, 2.05]

Note. Predicted probability and (for individuals with incidents) estimated annual rate of incidents estimated for individuals at mean values of included covariates with 95% CIs from the hurdle model for property damage. Data are too sparse to obtain useful annual incident rates for firesetting.

statistically significant, $z = 3.22$, adjusted $p < .01$. There is evidence that the dual-harm group are more likely to have firesetting and property damage incidents than all other groups. There is also some indication that the frequency of such incidents, should they occur, is higher for the dual-harm group than certain groups, but this finding is somewhat tentative given the sparseness of the data when looking at individual incident types rather than the combined rates.

Method of self-harm

Methods of self-harm were classified into seven categories for purpose of analysis. For each person, their use of a method was coded 1 or 0, plus total number of methods used. As multiple methods could be present for each individual, the data were analysed using a multilevel logistic regression to allow for the dependencies between methods using a random intercept model in the lme4 package within R (Bates, Maechler, Bolker, & Walker, 2015). Figure 2 shows the proportion of participants using each method for the self-harm

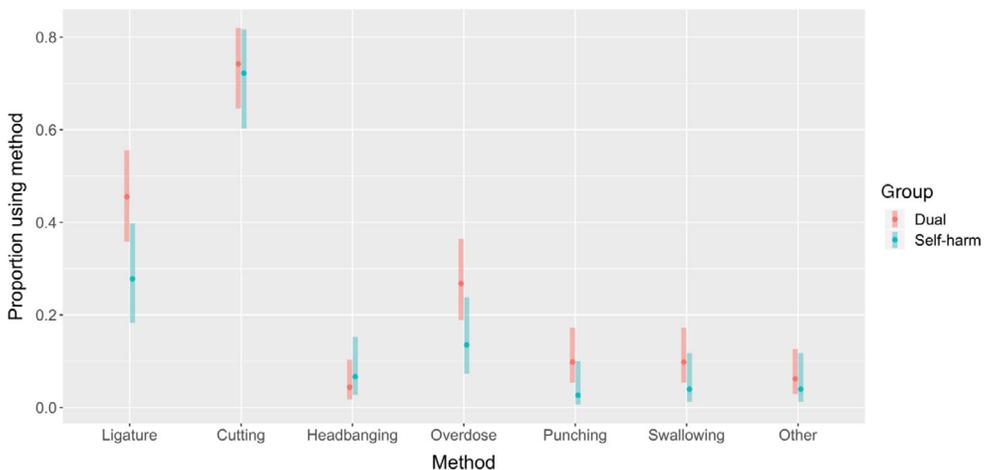


Figure 2. Proportion of individuals in the self-harm and dual groups using each type of method of self-harming with 95% confidence intervals for the proportion.

and dual-harm groups. This pattern indicates typically higher use of most methods for the dual-harm group relative to the self-harm group.

To test the prediction that the dual-harm group are more likely to use lethal methods (ligature or overdose) than the self-harm group, we compared the groups using a joint test of the difference between groups for these methods. This was statistically significant for lethal methods, $G^2(2) = 9.28$, $p = .010$, but not for non-lethal methods, $G^2(5) = 6.10$, $p = .30$. In addition, each of these methods separately was statistically significant: ligature or self-strangulation (45.7% vs. 26.7%; $z = 2.26$, one-sided $p = .012$) and overdose (27.6% vs. 14.3%; $z = 2.04$, one-sided $p = .021$) and remained so after including years in prison as a covariate both for the joint test, $G^2(2) = 6.43$, $p = .04$, for the methods separately, $z = 1.86$, one-sided $p = .031$ and $z = 1.72$, one-sided $p = .042$, respectively.

Men in the dual-harm group ($M = 1.79$, $SD = 1.12$) also used a wider range of methods than those in the self-harm group ($M = 1.33$, $SD = 0.76$). Ordinal logistic regression (Christensen, 2018) was used to compare the number of methods used by each group. The odds of the dual-harm group using an additional method were three times higher than the self-harm group, $OR = 3.01$, 95% CI [1.56, 6.10], $G^2(1) = 11.02$, $p < .001$. This difference remained statistically significant after including years in prison as a covariate: $OR = 2.39$, 95% CI [1.18, 5.01], $G^2(1) = 5.95$, $p < .001$.

Discussion

This study aimed to examine the prevalence of a history of dual-harm behaviour and identify the distinct characteristics of men who dual harm in prison, using a complete prison sample for the first time. The results confirm that dual harm is prevalent within an early-stage prison setting, with 11% of prisoners having engaged in both self-harm and violence within custody. Consistent with the hypothesis, and with earlier work (Slade, 2018), 60% of men who harm themselves in prison also engaged in custodial violence. This represents over a threefold risk of violence compared with men who did not self-harm, even accounting for time in prison, age, and index offence, and exceeds the doubled risk identified in community samples (Sahlin *et al.*, 2017). In addition, men who engage in dual harm use a greater variety of self-harm methods, including greater use of highly lethal methods of self-harm (ligatures and overdoses) than men who only harm themselves. This is a new finding among male prisoners, although it reflects an earlier finding among women (Kottler *et al.*, 2018) and men in the US correctional system (Lanes, 2011; Young *et al.*, 2006).

There were no differences between the groups on current age or having an index offence related to violent, or most other offending types, although men with dual harm had spent, on average, 40% longer in prison than all other groups. However, men with dual harm had their first incident of self-harm or assault, on average, three years prior to men with sole harm behaviour, suggesting that behavioural initiation takes place earlier among those who later progress to dual harm. This may reflect the earlier adverse life experiences identified for dual harm in the community (Harford *et al.*, 2018; Harford *et al.*, 2012; Richmond-Rakerd *et al.*, 2019; Steeg *et al.*, 2019).

Even accounting for time in prison, age at first incident and index offence, significant differences were identified in other institutional misconduct events, with an exceptionally high misconduct rate for men who dual harm than all other groups. Furthermore, the 11% of men who dual harm accounted for the majority (56%) of events within the sample, contributing greatly to the instability of the custodial setting. In keeping with previous

prison research, this rate is accounted in part by a higher probability of firesetting and property damage in this group (Kottler *et al.*, 2018; Lanes, 2011; Slade, 2018) with these events suggesting underlying distress with reactive, impulsive responses that may reflect limitations in self-regulation (Richmond-Rakerd *et al.*, 2019; Sahlin *et al.*, 2017). However, there is little evidence that self-harm, in and of itself, leads to violence, or that dual harm leads to other institutional misconduct behaviours. Therefore, it remains most likely that dual harm is a manifestation of a common set of vulnerabilities underlying the behaviours (Sahlin *et al.*, 2017). This study confirms a distinctive profile for those with a history of dual-harm behaviour in prison, which is not simply an artefact of shared risk factors. Their disproportionate risk and distinct needs emphasize the importance of developing our theoretical understanding, including the impact of recent events (e.g., segregation) and current intervention approaches on their behaviour.

A striking characteristic of dual harm is behavioural variability. Those with a history of dual harm in prison engaged in a range of reactive behaviours and were more variable in self-harm method, thereby presenting serious clinical and operational challenges. At present, violence and misconduct are met with punishment and containment to protect others. Self-harm, however, is more likely to elicit a caring and compassionate response to protect the person (Slade, 2018). However, the relationship between these behaviours challenges this distinction. The small proportion of men with a history of dual harm over-account for institutional disruption during their time in prison while also remaining vulnerable to serious self-harm behaviour. The complexity of the presentation challenges the usual distinctive responses to harmful behaviours, or that self-harm or violence are solely main responsibility of health or justice services, respectively.

The growing evidence across custodial and community settings suggests that the distinct needs and relevance of dual harm requires a stronger move towards single case management, with coordination across multiple sectors including the criminal justice system, mental health, and substance misuse services (Kinner & Borshmann, 2019). This could help provide a holistic, or unitary, treatment, and management response to the issue of dual harm, while also recognizing that common aetiologies may be at work. Given the link between dual harm and wider misconduct, a recommendation for the routine assessment for risk to others for those presenting with a risk to self, especially when other antecedents and behaviour patterns are present, is recommended.

A major challenge to confirming risk factors for dual harm has been the separation of violent and self-harm behaviours, both on the ground and within the theoretical and academic literature. This schism is further compounded by its distinction into government departments and policy areas encompassing *justice* and *health* (Richmond-Rakerd *et al.*, 2019; Slade, 2018). This separation based upon outcome, rather than cause, accentuates divergence between these common areas and can lead to conflicts within practice. Although some risk indicators are suggested from epidemiological and prison studies, it is still necessary to confirm causal and explanatory mechanisms in order to develop effective intervention strategies. Although we present a theoretical account of dual harm, supported by the current study, we do not know how, or why, these behaviours develop in tandem, or co-occur, nor fully understand their typical trajectory. As a minimum next step, studies on self-harm would benefit from more routine inclusion of history of violence within their analyses. Furthermore, the need for the testing of dual harm against current theories of both self-harm and violence may assist in enhancing their explanatory value and we require further development of a hybrid theoretical understanding of dual harm. These developments would allow the literature to underpin a more considered identification, assessment, and intervention approach in practice.

The present analysis has several strengths. It captures, for the first time, all resident prisoners within a single setting: an early-stage prison (including remand) covering adults over age 18, and all custodial behaviour for an extended 7.5-year period – including all periods of custody prior to the present one. This sample allows greater confidence in prevalence and the patterns of misconduct, self-harm harm method within a male prison population.

However, it also has limitations. It only includes behaviours recorded while within the prison system in England & Wales over the period, so lifetime estimates of dual harm, including community violence or self-harm, are not possible. Although the study data are from official records, not all incidents may be reported and some perpetrators of assault cannot be named. Therefore, the prevalence and strength of relationship may be somewhat under-reported. However, given the repeated patterns within multiple prisons, across genders and countries for some factors, it is likely that the patterns of characteristics are robust.

This study included data from one prison of a single type (category B). Although time in prison was accounted, and multiple prior episodes of imprisonment represented in the histories of individuals, it cannot be assumed to reflect the behaviour and risks across all prisons and does not take account of the number of imprisonments in their history. Owing to the nature of the data, previous offending information was unavailable and only the current index offence was included in the analysis. Future studies should therefore broaden their scope to include all behaviours and convictions. Furthermore, the classifications do not take account of the pattern of the behaviours (e.g., time to emergence of both behaviours, or where there is a prominence of one behaviour over the other). Future research should aim therefore to explore the relevance of the temporal relationships and prominence of harmful behaviours. Finally, this study aimed to consider the distinct characteristics of the dual-harm group and provides further understanding of the profile of this group. Together these findings suggest important directions for further research on dual harm – notably in relation to causation and the time course over which vulnerabilities develop and risk factors play out. Here, we believe that more fine-grained analysis and longer-term analysis of the trajectory of individual offenders, ideally in both community and prison samples, would be invaluable. In addition, it will be important to establish the stability of the profile identified across different criminal justice systems, where institutional responses to violence and self-harm differ substantially. A particularly important consideration is to establish whether dual-harm individuals respond differentially to current clinical or offending behaviour interventions.

Men who dual harm in prison are a prevalent, distinct but complex group and to meet the challenge they present, future initiatives within both research and practice should seek to understand and integrate their characteristics and needs. A conceptual move towards the integration of dual harm into everyday practice (e.g., routine assessments considering dual harm; unitary case management) could have an impact upon the overall safety and stability of some prisons and may have a role in helping to reduce deaths (Slade & Forrester, 2015). The effective management of dual harm is very likely to require a more integrated approach to the case management of individuals, particularly in cases where there is clinical and behavioural complexity, with cross-disciplinary decision-making. In order to do this, health and justice services should work together more closely at all levels within criminal justice settings.

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None.

Conflicts of interest

All authors declare no conflict of interest.

Author contributions

CASRAI CRediT Taxonomy: authors' contribution(s) to the submitted manuscript are attributed as follows: Karen Slade, Psych.D. (Conceptualization; Data curation; Formal analysis; Methodology; Project administration; Writing – original draft; Writing – review & editing) Andrew Forrester (Writing – review & editing) T Baguley (Formal analysis; Writing – original draft; Writing – review & editing).

Data availability statement

Research data are not shared.

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