Titel: Understanding Use of Force in Prison Settings: Development of a Conceptual Framework for Restraint

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Abstract: Use of Force in prison settings is an important but under-researched topic, both in the UK and internationally. Research across comparable settings focusses on situational, organisational, officer- and person-specific factors influencing Use of Force. To date this empirical evidence is lacking in prison Use of Force. The aim of this study is to present a conceptual model to better understand the factors involved in the Use of Force. Utilising data from 2,867 force incidents and survey responses from 281 prison officers within the Scottish Prison Service, this study employed exploratory Bayesian mixed-effect modelling. Results identify factors covering situational, organisational, officer and prisoner factors in the Use of Force, which are integrated into a conceptual model.

Introduction:

Prison officers are tasked with ensuring good order, safety, and stability within a prison environment, with the Use of Force (UoF) one tool at their disposal to achieve this. The UoF in Scottish Prisons is regulated through the Prison and Young Offenders Institution (Scotland) Rules 2011 (Rule 91), which states officers are allowed to use physical force to gain control of a prisoner if they can evidence that it is necessary and proportionate to the threat posed. The main type of force used is Control and Restraint (C&R), defined as physically securing the person to restrict their movement and prevent them from engaging in certain behaviours (Wolf et al., 2020). The C&R used within the Scottish Prison Service (SPS) are guiding holds, arm holds and floor restraints.

The UoF in prison settings can have a negative impact on both officers and prisoners due to physical harm from the application of C&R and associated psychological trauma (Stubbs et al., 2008). Critically, there have been several high-profile UoF cases in the UK and internationally resulting in the death of a prisoner (County Durham and Darlington Coroner's Office, 2022; Smallridge & Williams, 2008) and the undermining of public trust (Armstrong et al., 2020; Jardine, 2018). Health, social care and education settings have also experienced similar issues (Barnett et al., 2012; Deveau & McDonnell, 2009; Knowles et al., 2015; Paterson et al., 2003; Sequeira & Halstead, 2002). In May 2011, an abuse scandal in Winterbourne House, a private care home for adults with learning disabilities, led the UK Government to implement proactive guidance encouraging interventions that reduce UoF across health and social care settings (Department of Health, 2014). This resulted in new initiatives, including: Safewards (Bowers et al, 2015); the 'No Force First' approach, developed in the US (Haines-Delmont et al., 2022); and 'Six Core Strategies' (Huckshorn, 2004). At the centre of these initiatives is an evidence-base of how and why force is used (Paterson & Leadbetter, 1999). Based on work by Nijman et al. (2002), researchers have traditionally divided contributing factors into: person-specific, situational, environmental/organisational, and staff-specific (Duxbury, 2002). While this work has considerably advanced understanding and practice in health and social care settings, no conceptual model for the UoF in prison has been developed. Consequently, the aim of this article is to propose the first empirically grounded model to enhance understanding of the UoF in prison settings.

Prison UoF research

Research into prison UoF is limited, focussing on officer-specific (Griffin, 2002; Hemmens & Stohr, 2001; Mesko & Hacin, 2020), situational or prisoner-specific factors (McNeeley and Donley, 2021). Organisational factors have been almost entirely neglected, despite their importance in policing and health care UoF research (Alpert & Dunham, 2004; Duxbury, 2002; Klahm et al., 2013; Nijman et al., 2002).

Officer factors

Research on officer factors (e.g, age, gender, and length of service) has assessed their influence via the six-question 'readiness to use force' scale (Griffin, 1999; Griffin, 2002). Hemmens and Stohr (2001) identified that as officers get older and their experience increases, overall willingness to use force decreases. This aligns with Mesko and Hacin (2020), who identified younger officers as having higher readiness to use force, especially male officers. Hogan et al. (2004), in an earlier study, found no difference between male or female officers' responses to prisoner aggression using case studies. Instead, Individual staff characteristics predicting the UoF are explained throughout the research as linked to prison culture, particularly the dominance of a toxic masculinity subculture, leading to normalisation of violence and the UoF (Hemmens & Stohr, 2001; Mesko & Hacin, 2020).

Griffin (1999; 2002) investigated the relationship between prison officers' professional orientation, the organizational culture of their workplace and their readiness to use force. Officers experiencing role ambiguity, fear of victimization, a high sense of authority and a strong custodial orientation more readily used force to gain compliance (Griffin, 1999; Griffin 2002). The range of influencing factors, covering officers' attitudes and organizational culture, indicates a complex underlying conceptual framework, related closely to the support an officer receives, how they view relationships within the prison and the subcultures that develop from these. Across the secure youth estate in England and Wales, Gooch (2015) and Shenton and Smith (2022) highlight the relational nature of conflict and the importance of officers fostering positive relationships with prisoners to reduce usage of physically coercive means to assert their authority.

Prisoner factors

Risk of prisoners engaging in violence is related to key factors including: an individual having previously shown violence towards staff or prisoners (Butler et al, 2022; Cunningham & Sorensen, 2007; Lahm, 2009; McGuire, 2018), being convicted for an assault-related offence (Cunningham & Sorensen, 2007; McGuire, 2018; Steiner & Wooldredge, 2009), being a young prisoner, generally identified as under the age of 21 years (Cunningham & Sorensen, 2007; Ditchfield & Harris, 1996; Gadon et al., 2006; Lahm, 2009; McGuire, 2018), being on remand or on a shorter sentence (Cuningham & Sorensen, 2007; Ditchfield & Harris, 1996; Steiner & Wooldredge, 2009); and having difficulties with substance use (Butler et al., 2022; McGuire, 2018).

Situational & Organisational factors

There is a small evidence base for the role of situational or organisational factors. In terms of situational factors, only the type of facility and the level of resistance offered by the prisoner appear to be relevant (Gadon et al., 2006; Hemme & Stohr, 2001). Indeed, policing research has identified level of resistance as the biggest predictor of level of force used by officers. Experiencing a mental health crisis, having a weapon, or suspected to be under the influence of a substance are also predictive of non-lethal force used by police officers (Hine et al., 2018; Hine et al., 2019). Organisational factors identified include the relationship between officers and their managers, support offered, and quality of supervision received (Griffin, 2002; Mesko & Hacin, 2020). The institutional culture of each establishment, defined by how officers interpret their role, identification with a punitive versus caring orientation and the way training is delivered, are also identified as contributing to an increased likelihood of UoF (Hogan et al., 2004; Mesko and Hacin, 2020).

The importance of factors across these four broad categories suggests UoF in prison settings is based on the complex interplay of multiple factors. However, no robust frameworks exist for the explanation of force within a prison setting (Bosworth & Ashcroft). While His Majesty's Prison and Probation Service (HMPPS) is developing the evidence base for training and improved UoF recording, there remains a fundamental lack of understanding why force happens and how in turn this may be prevented through organisational and training initiatives (Bosworth & Ashcroft, 2021).

Theoretical concepts relevant to the UoF in prisons

In policing, Alpert and Dunham (2004) explain UoF from a social interaction perspective, investigating how interaction between the participants is shaped. In their Authority Maintenance Theory, they identify the goals of the police officer as maintaining control and order of the situation, while exerting their authority status. When someone challenges the officer's authority by not following their orders, a conflict situation is perceived, with the officer justified to use force to maintain their authority and restore order (Alpert & Dunham, 2004). Holmes et al (1998) identified that both police officers and those restrained assess the level of perceived threat when deciding how to respond. Their model suggests assessment is multidimensional, drawing on situational, personal and environmental cues. Consequently, previous experiences and biases may influence decision-making around level of force and level of resistance. This is particularly the case during high stress situations, such as a violent encounter (Holmes et al., 1998).

Focussing on mental health settings, Bowers (2014) identified six interactive domains influencing restrictive practice: the patient community and individual characteristics, the regulatory framework within which the placement operates, the staff team, the physical environment and external factors outside of the placement. Emphasising the conflict behaviours a person may show, and the containment strategies staff utilise to manage these, they also introduced the concept of flashpoints or triggers occurring imminently before conflict. Organisational factors, such as specific ward rules, staff factors and patient factors can all influence whether flashpoints result in conflict (Bowers, 2014). Nijman et al. (2002), using a similar linear approach, identified three predictive variables, including ward, staff and patient variables as interacting with each other to cause aggression and the need for restrictive interventions. In addition, they highlight the reinforcing impact different types of interventions may have in increasing the aggression of the individual. The UoF in prison settings is likely to have a similar underlying model, explaining why some conflict situations escalate while others de-escalate.

Present Study

Utilising data from four Scottish prisons, the present study aims to develop a conceptual framework, based on exploratory statistical analysis, that identifies factors which may influence escalation from lower level to higher level force and resistance in prison settings. By analysing 2,876 UoF incidents alongside survey responses from 281 prison officers, the study provides new insights into the variables that may either amplify or mitigate the likelihood of force being used, offering a crucial step towards a more nuanced understanding of force within prison settings.

Method:

Ethical approval was received for the research through Abertay University's Ethics Committee (EMS4024 and EMS4755) and from the Scottish Prison Service's Research Access and Ethics Committee (RAEC).

Study sites

The study took place within four prisons run by the Scottish Prison Service (SPS), an executive agency of the Scottish Government responsible for running 14 of the 15 Scottish prisons. The four prisons were selected to cover all types of prisoner populations and a mix of smaller and larger establishments. Access was granted to the lead researcher by the SPS, via the RAEC. Table 1 provides an overview of each prison selected for this study.

Table 1: Overview of study sites

Type	Population	Capacity
Adult male	Remand, short-term and long-term, life sentence, sexual offenders, and those on an Order of Lifelong Restrictions (OLR).	630
Adult mixed (changed to male only)	Remand, short-term, long-term, life sentence prisoners and those on an OLR.	870
Young Offenders Institute (mixed)	Males aged 16-21 years, females aged 21 years and older; on remand, short-term, long-term and life sentence.	760
Female facility	All ages, including remand, short-term, long-term and life sentence prisoners.	119

(closed in 2023)

Participants

UoF incident analysis

Between 1st of January 2018 and 31st of December 2020, a total of 2876 UoF incidents were recorded, involving N=1427 individuals (n=152 females [11%]; n=1274 males [89%]). Of these, n=859 (60%) had experienced a single UoF incident during the sampling period and n=568 (40%) had experienced multiple UoF incidents (40%), ranging from a minimum of two to a maximum of 29 incidents (mean = 3.55, SD = 2.78). The age of prisoners experiencing restraint ranged from 16 years to 64 years, with a mean of 27.36 years (SD = 9.25).

Readiness to use force survey

The 'Readiness to Use Force' survey was administered online via the SPS digital learning platform, with officers invited to participate when enrolling onto their physical intervention's refresher training. The survey was live for six months, with N=1134 officers being invited to participate, of which n=309 officers accessed the survey, and n=281 officers completed it (representing a 25% completion rate). Of the 281 participants, n=220 were male (78%) and n=61 female (22%). The mean age of participants was 46 years (SD=11.43; range 20-68 years). The mean length of service was 17.7 years (SD=11.16; range 1-39 years). Most staff were from the residential officer staffing group (n=149; 53%), followed by the operations officer group (n=72; 26%) and the enhanced residential officer group (n=34; 12%) who hold specialised roles (e.g., programmes officer). The smallest group of participants was from the First Line Manager group (n=26; 9%).

Measures

UoF incident analysis

In line with Rule 91(3) of the Prison and Young Offenders Institution (Scotland) Rules 2011, all UoF incidents must be recorded using a UoF incident form, consisting of a mixture of pre-selected categories and open-text officer narratives. Pre-selected categories include the specific techniques used, situational features of the incident and prisoner details. For the narrative, every officer involved must complete a personal account of the incident, with the Supervising Officer completing a summary that draws on all narratives. Each form is reviewed by the establishment's Head of Operations, ensuring all sections are completed. UoF forms are completed in a hardcopy paper form and archived within the prison for a minimum of five years. Data was collected by the lead researcher by accessing the original forms within each prison.

Relevant factors, identified from the literature, were recorded from each form for further analysis. Three dependent variables were identified: 'officer force' and 'prisoner resistance' concerned the level of force present during the incident, and 'multiple restraints' whether prisoners experienced multiple episodes of force. 'Officer force' and 'prisoner resistance' were coded as binary variables of low vs. high force/resistance based on the criteria outlined in Table

2. The binary coding was used because the recording of incidents is limited to the specific techniques used, meaning only guiding technique, application of arm locks and floor holds are recorded consistently. The binary coding was developed in conjunction with SPS Physical Restraint instructors ensuring alignment with operational practice and information on incident forms. Draft codes were shared with instructors, and consensus achieved following two rounds of comment and feedback. The final draft was tested with instructors against a set of incident forms to ensure full applicability and no further changes were needed.

Table 2: Definition of officer force and prisoner resistance levels

Level	Officer force	Prisoner resistance
High	Use of pain-compliance or resulting in the person being restrained on the floor	Active resistance, such as pushing, punching, or threatening officers with a weapon.
Low	Using only verbal commands or guiding techniques without escalation	Passive resistance, such as refusing to follow a demand.

Predictor variables included reflect considerations about what may predict the UoF as documented in the prison (Griffin, 1999; Griffin, 2002; Hemmens and Stohr, 2001; Hogan et al, 2004; McNeeley and Donley, 2021; Mesko and Hacin, 2020) and policing literature (Bolger, 2015; Cojean et al, 2020; Garner et al, 2002; Hine et al., 2018; Willits and Makin, 2018). We included eleven prisoner variables and three variables that capture situational and environmental factors. The first prisoner predictor, 'Age', was for reasons of confidentiality grouped into 10 age bands of five years each. The other prisoner factors were: 'Gender', having committed an 'Assault Offence', whether there was a record of 'Previous Violence' in prisons, having a diagnosed learning difficulty or disability ('Learning Difficulty'), being deemed to be a 'Suicide Risk' or 'Self Harm Risk', being categorised as a care leaver under The Children and Young People [Scotland] Act of 2014 ('Care Leaver'), 'Sentence Category' (on remand/untried, short-term, long-term) and 'Nationality'. The three situational/environmental predictors included whether a weapon was present ('Weapon Present'), the prisoner appearing under the influence of substances ('Substance Use Present'), and appearing to have a mental health crisis ('Mental Health Crisis Present'). Variables recorded were contained on the UoF form as pre-selected categories. They were coded as present where they were indicated on the form.

'Readiness to Use Force' survey

The 'Readiness to Use Force' survey was developed to comprise five subscales and eight officer questions. The dependent variable was the 'Readiness to Use Force' score, adapted from Griffin (1999 & 2002), with an acceptable Cronbach's α = .78. Changes were made to the language of the original survey to make it relevant to a Scottish prison setting. Predictive subscales included a measure of officer self-legitimacy ('Self-Legitimacy'), Cronbach's α = .74, developed for a prison setting by Akoensi and Tankebe (2019), satisfaction with line management support ('Management Support'), Cronbach's α = .88, identify / relationship with the prison service ('Identification'), Cronbach's α = .93, a measure of workplace stress, ('Work Stress') Cronbach's

α = .81, and a scale measuring the officer's sense of safety at work ('Sense of Safety'), Cronbach's α = .79. The last four subscales were taken from the 'Staff Quality of Life' questionnaire, used widely across HMPPS in England and Wales (Liebling et al., 2011; Liebling et al., 2015). Additional officer variables included: 'Officer Age', 'Officer Gender', 'Years of Service', prison worked at ('Prison') and 'Current Role'. In addition, officers were asked to indicate if they had previously used force ('Previous Force'), the number of times used in the past 12 months ('Frequency of Force'), and if they had previously been assaulted while in the prison service ('Previous Assault'). The survey's aim was to identify potential officer and organisational factors that contribute towards the UoF.

Results

UoF in restraining incidents

Of the total 2867 incidents, the majority (54.9%) were incidents with high prisoner resistance and high officer force. Of the 1224 incidents in which prisoners did not engage in high resistance, 235 incidents (19.2%) involved high officer force (see Table 3). In contrast, of the 1652 incidents in which prisoners engaged in high resistance, only 72 (4.4%) were not met with high officer force. To assess the strength of association between officer force and prisoner resistance we computed a tetrachoric correlation, under the assumption that officer force and prisoner resistance reflect continuous underlying latent variables even if the nature of the incident reports only allowed for binary coding. The results indicated a strong positive correlation between the two variables, r_tet(N = 2873) = .95. This suggests higher levels of prisoner resistance were highly associated with increased UoF by officers. The thresholds for the latent traits were estimated to be -0.33 for officer force and -0.19 for prisoner resistance, indicating that coding had resulted in relatively low thresholds for occurrence of high force and high resistance.

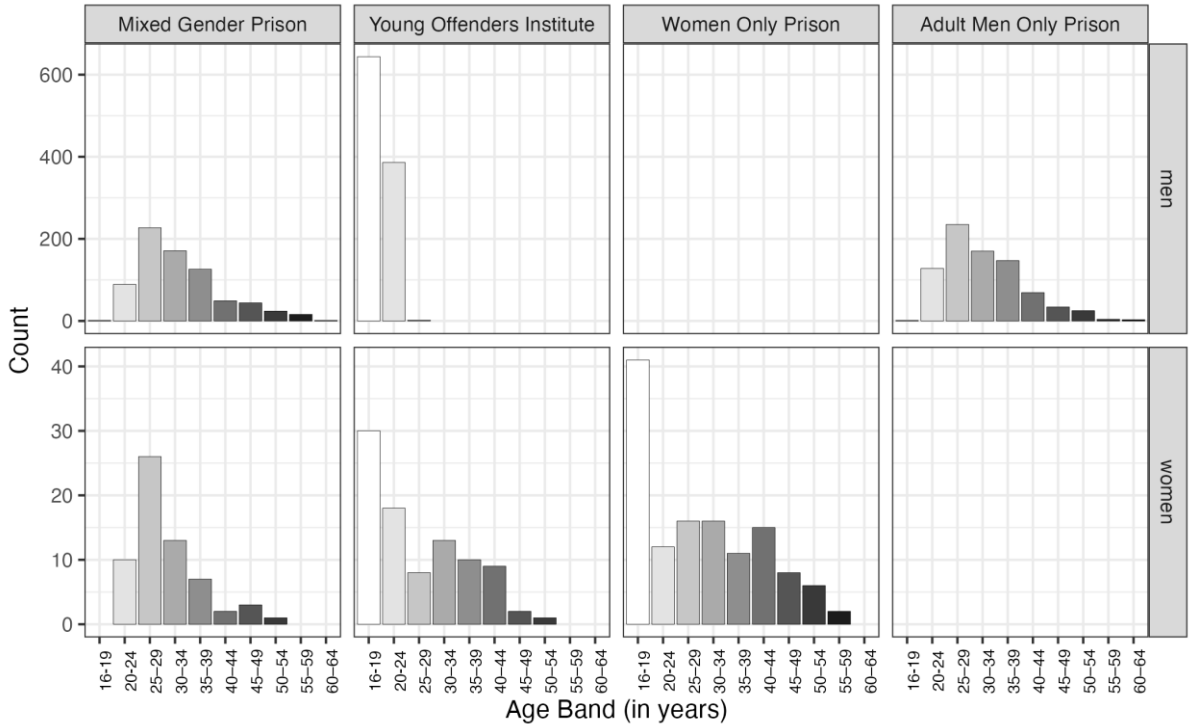
Table 3: Counts and percentages of the total of all incidents (in parentheses) for the different outcome categories.

		Prisoner force		
Officer force		low	high	Total
	low	989 (34.4)	72 (2.5)	1061
	high	235 (8.2)	1580 (54.9)	1815
Total		1224	1652	2876

Because of the strong association between officer force and prisoner resistance we created a combined multinomial dependent variable, 'Force', that allowed us to capture the close relationship and non-independence between 'Officer Force' and 'Prisoner Resistance'. The four categories of this dependent variable were: (a) Officer and Prisoner Force; (b) Officer Force Only; (c) Prisoner Force Only; and (d) No Force. To model the effect of the selected predictors we employed a Bayesian mixed-effect model with fixed effects of 'Age', 'Gender', 'Assault Offence', 'Previous Violence', 'Learning Difficulty', 'Suicide Risk', 'Self-Harm Risk', 'Care Leaver', 'Sentence Category' and 'Nationality', and the random effect of Prisoner. To capture individual differences in the effects of incident-level variables, we also included random slopes of 'Weapon Present', 'Substance Use Present' and 'Mental Health Crisis Present' by Prisoner. Although 'Age' was coded in 5-year age bands, we included it as a continuous centred variable to reduce the complexity

that would have arisen from adding it as an ordered factor. The predictor 'Prisoner Violence' included the centred sum of the presence (1) or absence (0) of violence towards other prisoners, staff or property and ranged from zero to three, thereby capturing a continuum of propensity towards violence. As there were no prisoners with sentences of over four years in the Women-Only prison, we combined all custodial sentences so that 'Sentence Category' was entered as a binary predictor (non-custodial vs. custodial). Because of the different distributions of age and gender across the four prison sites (see Figure 2), the model also included 'Prison' and the interaction between 'Age' and 'Prison' as fixed effects because this diversity of prison populations precluded entering it as a random effect from which to generalise to the population of all prisons.

Figure 2: Distribution of age and gender across the four prison sites. Note that scale has been adjusted to accommodate the smaller population of women.



Bayesian modelling of the outcome variable 'Force' was chosen for its greater flexibility in handling complex categorical dependent variables and the possibility of making direct probabilistic inferences about the effects of different predictors, as well as greater robustness of estimation when sample sizes in certain predictor categories are small. The model was implemented using the *brms*-package (Bürkner, 2017) in R version 4. 4. 1. We used weakly informative normal priors for the regression coefficients. Specifically, the coefficients for 'Age' and its interactions with 'Prison' were assigned a normal prior distribution with a mean of 0 and a standard deviation of 5, allowing for a broad range of possible effects while centring the expectation around zero. All other predictors, including binary predictors such as 'Gender', 'Care Leaver' or 'Weapon Present' were given normal priors with a mean of 0 and a standard deviation of 2.5, which reflects a more conservative range of plausible effect sizes. The predictor 'Previous Violence', given its numerical range and centring, was assigned a tighter prior of normal (0, 1) to align with its specific scale. Table 4 lists the coefficient estimates for the effects whose 95% credible intervals did not include 0, indicating that these effects are likely associated with

changes in the log-odds of the outcome categories. The 95% credible intervals provide a direct probabilistic interpretation of the uncertainty of each estimate, representing the range within which we are 95% confident the true value lies. The complete list of coefficient estimates, and credible intervals can be found in table S1 of the Supplementary Materials (https://osf.io/n5kfq/?view_only=c23db7424d7c4185a6179694bf2d7b3a).

Compared to incidents with no force, incidents involving high officer force combined with high prisoner resistance (i.e., "Officer Force and Prisoner Resistance") were more likely if a weapon was present at the scene (β = 3.51, CI = 1.83 to 5.95) and when the incident record indicated management of restricted substances (β = 1.09, CI = 0.30 to 2.36). This outcome was less likely when the prisoner had previously engaged in violence (β = -0.12, CI = -0.23 to -0.01) and for prisoners with a custodial rather than a non-custodial sentence (β = -0.45, CI = -0.71 to -0.15). Additionally, compared to the Adult Mixed-Gender Prison, the likelihood of high officer force and prisoner resistance was lower in the Adult Men-Only Prison (β = -0.63, CI = -0.94 to -0.32). The 95% credible intervals suggested that in both the Young Offenders Institute (β = -0.54, CI = -1.03 to -0.06) and the Women-Only Prison (β = -0.54, CI = -1.06 to -0.03), the likelihood of incidents involving high officer force and prisoner resistance declined with prisoner age (see Figure 3 for interaction plots).

Compared to incidents with no force, high officer force only was more likely for women prisoners (β = 0.89, CI = 0.13 to 1.65) but less likely if the prisoner had previously engaged in violence (β = -0.22, CI = -0.40 to -0.05), had received a custodial rather than a non-custodial sentence (β = -0.45, CI = -0.71 to -0.15) or the incident involved a mental health crisis (β = -1.35, CI = -3.69 to -0.04). Incidents with high officer force only were also less likely in the Adult Men-Only Prison compared to the Adult Mixed-Gender Prison (β = -0.73, CI = -1.23 to -0.22).

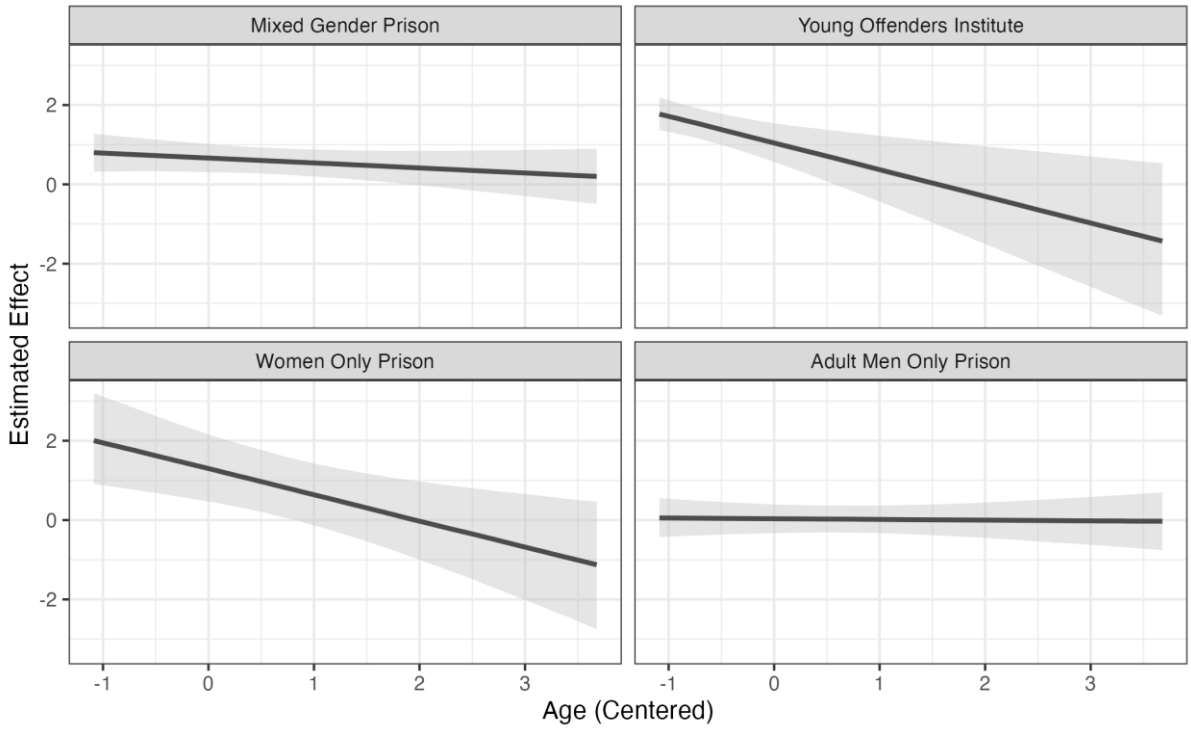
Finally, compared to incidents with no force, incidents involving high prisoner resistance only were more likely for women prisoners (β = 1.85, CI = 0.68 to 2.99) but less likely with increasing prisoner age (β = -0.92, CI = -1.84 to -0.09), for prisoners with a custodial sentence (β = -0.89, CI = -1.56 to -0.17), and during incidents involving a mental health crisis (β = -2.91, CI = -5.69 to -0.92).

Table 4: Model coefficients with 95% credible intervals (in parentheses) for the different categories of Force in comparison to the No Force outcome category

effect	Officer Force and Prisoner Resistance	Officer Force Only	Prisoner Resistance Only
Intercept	0.67 (0.31, 1.02)	-1.27 (-1.93, -0.68)	-2.67 (-3.84, -1.72)
Age			-0.92 (-1.84, -0.09)
Gender: Women		0.89 (0.13, 1.65)	1.85 (0.68, 2.99)
Sentence: Custodial	-0.45 (-0.71, -0.15)		-0.89 (-1.56, -0.17)
Previous Violence	-0.12 (-0.23, -0.01)	-0.22 (-0.40, -0.05)	
Weapon Present	3.51		

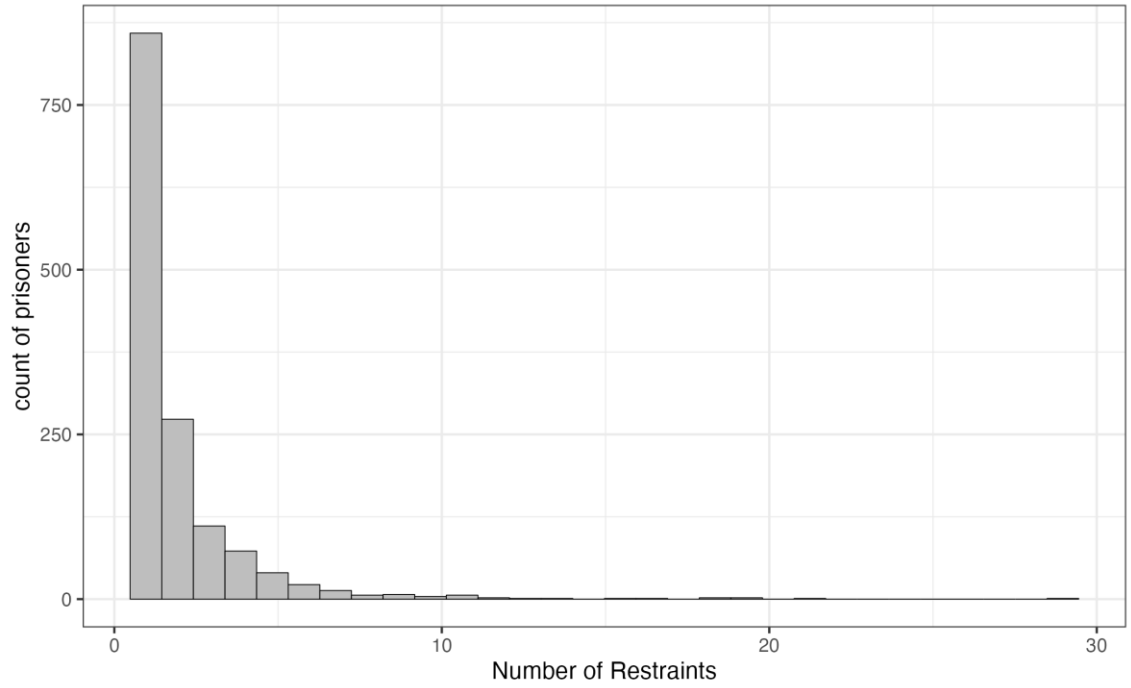
	(1.83, 5.95)		
Substance Use	1.09		
	(0.30, 2.36)		
Mental Health Crisis		-1.35	-2.91
		(-3.69, -0.04)	(-5.69, -0.92)
Adult Men-Only Prison	-0.63	-0.73	
	(-0.94, -0.32)	(-1.23, -0.22)	
Age x Young Offenders Institute	-0.54		
	(-1.03, -0.06)		
Age x Women Only Prison	-0.54		
	(-1.06, -0.03)		

Figure 3: Interaction between Age and Prison for incidents with high officer force and high prisoner resistance.



Number of restraints: The numbers of restraints per prisoner ranged from one to 29. Of the 1427 prisoners, 859 (60.2%) were involved in only one incident. The frequency distribution of number of restraining incidents per prisoner is depicted in Figure 4.

Figure 4: Distribution of number of restraints by prisoners.



We employed a hurdle negative binomial model within a Bayesian framework to analyse the 'Number of Restraints', which exhibited many instances equal to one and considerable overdispersion in the remaining counts. The hurdle component of the model allowed us to distinguish between the process generating the value of one and the process governing higher counts. The negative binomial distribution was used to account for overdispersion in the values greater than one. Weakly informative priors were specified for all model parameters as detailed in the Supplementary Materials. All prisoner-level descriptors that had no missing values were entered into the model. Because data were aggregated over multiple incidents to obtain the count of restraining incidents per prisoner, situational variables had to be excluded from the model. The model included fixed effects of 'Age' (centered and in bands of 5 years), 'Gender', 'Assault Offence', 'Previous Violence', 'Mental Health Risk', 'Learning Disability', 'Suicide Risk', 'Self-Harm Risk', 'Legal Status' (on remand vs convicted), 'Care Leaver', 'Mobility Difficulty', 'Sentencing Category', 'Nationality' and 'Days in Prison'. The latter predictor was coded in five bands of three months each (0-3 months, 3 months and 1 day–6 months; 6 months and 1 day–9 months; 9 months and 1 day–12 months; more than 12 months and 1 day) and was entered as a centred continuous variable. As with the analysis of 'Force', the model also included the fixed effect of 'Prison'.

All model coefficients and credible intervals for the predictors are provided in Table S2 of the Supplemental Materials. The results show that the number of restraining incidents per

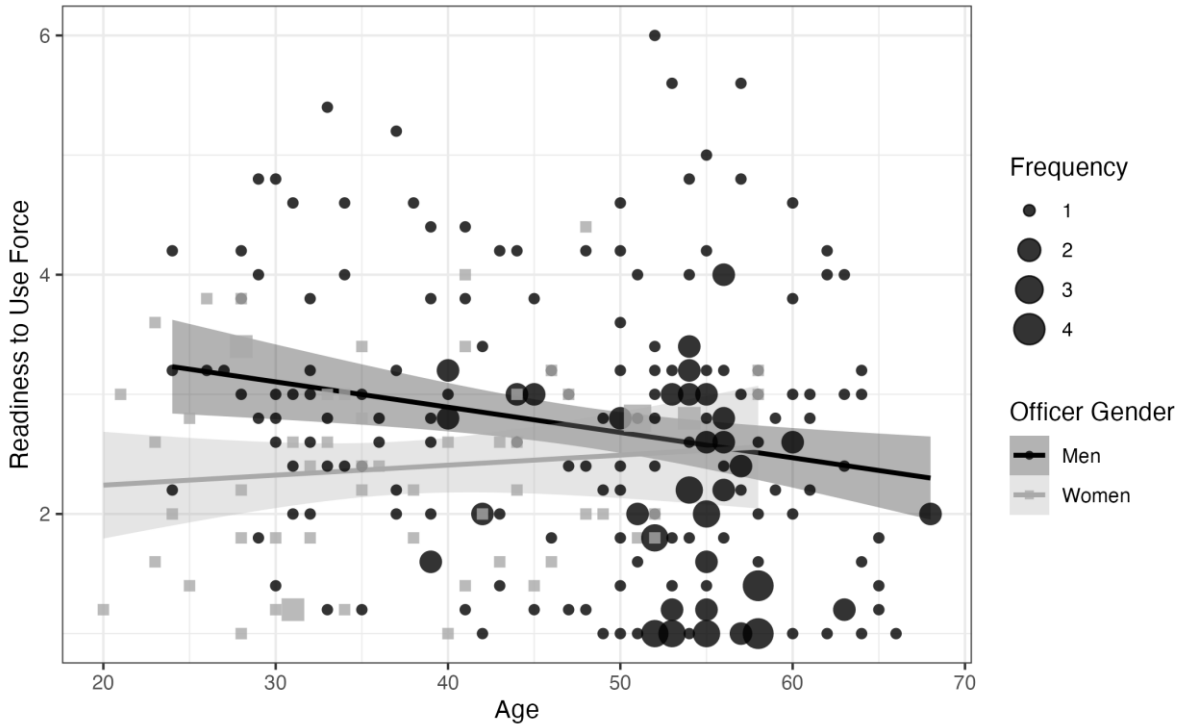
prisoner increased if an assault offence had been committed (β = 1.09, CI = 0.87 to 1.31), if there was a record of previous violence (β = 0.43, CI = 0.34 to 0.52), if the prisoner had been convicted as opposed to being on remand or untried (β = 0.33, CI = 0.07 to 0.61), if the prisoner was a care leaver (β = 0.37, CI = 0.08 to 0.65), had a custodial sentence (β = 0.37, CI = 0.03 to 0.72), or had spent more days in prison (β = 0.33, CI = 0.22 to 0.43). The number of restraining incidents was lower for women (β = -0.99, CI = -1.51 to -0.50). Overall, compared to the Adult Mixed-Gender Prison, the number of restraining incidents per prisoner was higher in the other three prisons (Young Offenders Institute: β = 0.69, CI = 0.26 to 1.11; Women-Only Prison: β = 2.09, CI = 1.46 to 2.75; Adult Male-Only Prison, β = 0.44, CI = 0.18 to 0.69). Note that having received a conviction or a custodial sentence and having spent more time in prison are all variables that are linked to the amount of time spent in prison, which makes it more likely to be involved in restraining incidents. This means that the effects of being a care leaver, having committed an assault or having a record of previous violence as well as the effect of gender and prison all hold when the amount of time spent in prison is controlled. Inspection of the posterior indicated that the model showed a good fit (see Figure S4 in the Supplementary Materials)

Readiness to Use Force

To analyse officers' self-reported readiness to use force, we employed a Bayesian linear model that included the predictor variables of 'Officer Age', 'Officer Gender', 'Years of Service', the 'Frequency of Force', 'Previous Assault', 'Current Role', 'Prison', 'Self-Legitimacy', 'Management Support', 'Identification', 'Work Stress' and 'Sense of Safety'. Because the binary coding of 'Previous Restraints' was subsumed under the count of 'Frequency of Force' the former variable was not included in the model. A model with simple fixed effects demonstrated, among other effects, a negative effect of 'Officer Age' on readiness to use force (β = -0.20, CI = -0.36 to –0.04) and a lower readiness to use force in women officers (β = -0.34, CI = -0.645 to –0.02). To examine whether there was a moderating effect of 'Officer Gender' on 'Officer Age' we included the interaction between these two factors as a fixed effect. The model with this interaction showed superior fit as indicated by a higher expected log pointwise predictive density (elpd) compared to the simpler model without interactions. However, the difference in elpd (-2.4 with a standard error of 2.2) suggests that the improvement is relatively small, and there is considerable overlap in the uncertainty of the two models' predictive performance. Model coefficients and credible intervals for both models are provided in tables S5 and S6 and model fit is illustrated in Figure S7 of the Supplementary Materials. Below we report the results of the model that included the interaction between 'Officer Age' and 'Officer Gender'.

Fitting this Bayesian linear model provided evidence that readiness to use force declined with 'Officer Age' (β = -0.28, CI = -0.44 to –0.11). The credible intervals for the interaction between the effects of 'Officer Age' and 'Officer Gender' (β = 0.43, CI = 0.10 to 0.77) suggest that this decline was mainly evident in male officers (see Figure 5). Readiness to use force declined also with greater perceived management support (β = -0.20, CI = -0.36 to –0.03) and greater perceived sense of safety (β = -0.18, CI = -0.32 to –0.03) and increased with greater identification with the prison service (β = 0.28, CI = 0.09 to 0.47). All other credible intervals included 0.

Figure 5: Readiness to Use Force as a function of Officer Age and Officer Gender



Discussion and Conclusion

The aim of this article was to present a conceptual model for the UoF in prison settings, based on data collected within the Scottish Prison Service. Informed by existing models in police and health settings, it was anticipated that there would be an impact on the UoF from specific officer, prisoner, situational and organisational factors. The results indicate that both officer force and prisoner resistance are impacted by these factors, which may contribute to a higher risk of force or resistance, while also highlighting factors that indicate a reduced risk of escalation. Overall, results indicate a complex, multi-factor model, in which various factors interact to influence the possible outcome of conflict situations in a prison setting.

We identified a total of three situational factors that affect the UoF: presence of a weapon and being deemed to be under the influence of unauthorised substances increased the risk of escalation, while experiencing a mental health crisis reduced the risk. The effect of substance use supports research by Alpert and Dunham (2004) who found that substance use increased the risk of a person in police custody showing elevated levels of resistance and increased the risk of officer UoF. Until now, there has been little evidence of substance use increasing the risk of force in prison, though studies into the impact of Novel Psychoactive Substances in the prison population have indicated a link to increased risk of violence and aggression (Corazza et al., 2020;

Mason et al., 2022). Kinman and Clements (2021) suggest that prison officers perceive the use of psychoactive substances as increasing the risk of aggression and reducing officers' overall sense of safety.

Officer responses to the presence of a weapon is somewhat in line with research in policing. Both Garner et al., (2002) and Hine et al. (2018) identified that the presence or the suspected carrying of a weapon impacted police officer's decision-making, so they approached the individual in a more cautious manner, using strategies such as Tasers rather than physical interventions. This is due to the high level of perceived risk to the officer and the need to gain rapid control of the individual (Hine et al., 2018). While Tasers are not an option available to prison officers, higher-level restraints may similarly be used as a tactic to rapidly gain control in a situation assessed as high risk.

While suspected substance use and weapon presence increased the risk of higher-level restraints and resistance during the conflict, a suspected mental health crisis appears to have a de-escalatory influence. This contrasts with research in mental health settings which has generally found an increased risk of restraint during a mental health crisis (Haines-Delmont, et al., 2022; Knowles et al., 2015). This difference is most likely due to procedural processes within the SPS, where individuals at risk due to their mental health are taken to a safer cell location which may include the use of lower-level restraints and a level of compliance on the prisoner's part (SPS, 2015).

Prisoner factors had the biggest impact on both the UoF and the level of resistance. In particular, an individual's length of stay in prison increased the risk of multiple restraints occurring. Logically, longer stays in prison provide more opportunities for conflict situations to arise. Other prisoner-specific factors are broadly in line with research from prison and policing settings, such as a record of previous assault, either as an index offence or during time in prison. This is in line with McNeely and Donley (2021), who identified prisoners with an index offence involving assault as being more likely to be restrained in prison, while Butler et al (2022) found that a previous assault while in prison increased the risk of engaging in future assaults. Current guidelines by the National Institute for Health and Care Excellence (NICE, 2015) indicate that one predictor for future aggressive behaviour is past violent or aggressive behaviour. Taking this into account, an assault offence or previous violence may mean prisoners are more likely to show resistance or aggression, while staff may be more likely to use restraints as a proactive risk management tool under special security measures. This may also explain why the presence of a violence risk marker is associated with a decreased risk of high-level force being used, as the marker leads to proactive special security measures to manage the behaviour with lower-level restraints.

Three other prisoner risk factors include age, gender and their status as a care leaver. In line with existing research, younger prisoners were at increased risk of force being used on them (Cunningham and Sorensen, 2007; Gadon et al, 2006). Work on maturation and brain development by the Scottish Sentencing Council (O'Rourke et al., 2020) indicates that younger people in the criminal justice system (CJS) are more likely to struggle with emotions and impulse control. Consequently, young people in custody may be more likely to present in a way that is interpreted as a threat by prison officers, leading to UoF in line with the Authority Maintenance Theory (Alpert and Dunham, 2004). A similar effect of age was identified for prison officers, with younger male officers showing a higher readiness to use force (Figure 5).

Care leavers are identified as having an increased risk of experiencing repeat restraints. Holt, Buckley and Whelan (2008) identify increased exposure to domestic violence and other traumatic experience among young people identified as care leavers. This exposure at an early age increases the risk of contact with the CJS, due to difficulties in emotional regulation and impulse control, while also increasing the risk of presenting with distressed behaviours related to trauma, which may be interpreted as dangerous and in need of controlling aversively by officers (Bray et al, 2015; Gooch, 2015; Shenton and Smith, 2021; Steckley, 2015).

The impact of gender contrasts with previous research, with the current study indicating that being female increases the risk of high-level force and resistance. At the same time, being in the female only prison reduced the risk of experiencing multiple restraints. Previous research consistently indicates that being male increases the risk of violence or being restrained (Emerson and Einfeld, 2011), which contrasts with the results of this study. One interpretation may relate to females entering prison having experienced domestic abuse, resulting in a higher level of trauma-related behaviours at an early stage. Due to unfamiliarity with the offender and appropriate de-escalatory approaches, staff may initially employ higher-level restraints which reduce as they become more attuned to the individuals' needs (Criminal Justice Inspectorate, 2022). Alternatively, specific cultural differences within establishments may be relevant, with the female prison being more focussed on avoiding restraint. Within the SPS, the women's strategy advocates a trauma-informed approach, which may impact officers' decision making in relation to restraint (SPS, 2021). Hemmens and Stohr (2001) identified differences in attitude towards restraint and differences in assault rates when comparing different types of establishments. Similarly, Liebling, Price and Shefer (2010) identified differences in the way prisons utilise their power to establish good order, pointing to differences in prison officer culture as a driving force.

When considering officer specific factors, only one was identified as increasing readiness to use force, while a further three reduced the readiness. In line with work by Griffin (1999 & 2002), having a strong identification with the prison service's aims, or a custodial orientation, was predictive of a higher readiness to use force. A strong identification with the prison service is linked to the predominant view of maintaining good order and safety as the priority for prison officers, with the predominant method of gaining control being the UoF (Schoenfield and Everly, 2022). This further aligns with the view that officers are preoccupied with maintaining their level of authority as a way of gaining control when challenged by a prisoner.

Acting as protective factors in the UoF, the officer being older, female and having a greater sense of safety at work were associated with a reduced readiness to use force. This is broadly in line with previous research, particularly in relation to age and sex (Hemmens and Stohr, 2001; Mesko and Hacin, 2020). Of interest is the change in older male and female officers' readiness to use force identified in this study, particularly after 50 years of age. Where female officers start with a lower readiness to use force, which increases with age, male officers start from a higher readiness which declines with age. Having a high sense of safety within the workplace was also indicative of a reduced readiness to use force, in line with the predominant aim of officers being to maintain safety (Schoenfeld and Everly, 2022) and the maintenance of control and authority (Alpert and Dunham, 2004; Holmes et al., 1998). Feeling safe within the work environment may indicate a prison officer confident in their own authority and ability to manage prisoners by use of relationships and verbal de-escalation, relying less on the UoF to maintain their authority.

Two protective organisational factors were identified. First, variability between establishments points to differences in culture across prisons. This is in line with work by Hemmens and Stohr (2001), who identified establishment type, population mix and officer mix as influencing the culture, which in turn influenced a more control- vs. care-orientated regime. Second, management support was identified as reducing an officers' readiness to use force, with officers receiving good support showing lower readiness to use force. This is in line with results of previous research showing increased management support and supervision led to a lower readiness to use force in prison officers (Griffin, 1999; Griffin, 2002; Mesko and Hacin, 2020). Gadon et al., (2006) found that positive management support fostered better relationship building between officers and prisoners, contributing towards a reduction in violence and the UoF.

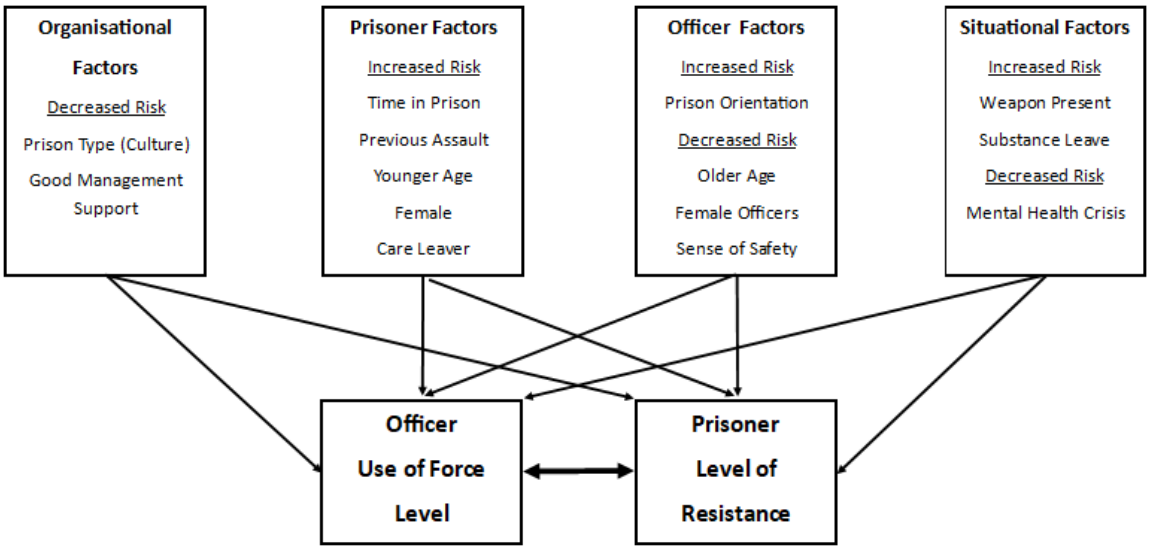
Integrating these results into an exploratory conceptual model (Figure 6) suggests that UoF is influenced by organisational, situational, prisoner and officer factors, which can act to increase or decrease the risk of force escalating into higher level restraints. One of the main influences on officer's level of force is prisoner's level of resistance, highlighting the interactional nature of conflict situations. Both force level and resistance appear to be impacted by the situational factors of a weapon being present, the person being under the influence, or experiencing a mental health crisis. Holmes et al., (1998) describe the perception of threat as the main driver in UoF decision making, with officers utilising situational cues such as the person's behaviour to assess threat levels. The presence of a weapon and the behavioural presentation of a person under the influence may be seen as increasing the threat level for the officer(s), leading to a response intended to gain rapid control. Equally, substance use cause prisoners to perceive officers as a threat, leading to increased resistance when a perceived confrontation occurs.

In addition, officer's decision making appears to be influenced by both officer factors and prisoner factors. Officer factors such as age, gender and a strong identification with the prison service may point to officer personalities with a tendency towards more control vs. care orientation. A younger male officer that has a strong custodial orientation would appear to rely more on the UoF to maintain control and good order, while older officers, female officers, and those with a low custodial orientation may rely more on relational security aspects, such as developing good relationships and using verbal de-escalation. Prisoner factors around age, being a care leaver and gender may be related to the presentation of behaviours consistent with trauma or a lack of maturity in younger prisoners. These behaviours may be interpreted as high risk or as challenging the authority of the prison officer, leading to a response including the UoF, especially high-level force. Equally, the knowledge that a prisoner has previously assaulted a staff member, another prisoner or has an assault conviction may impact on an officer's perception of threat, leading to proactive violence management with UoF. These same influences may be implicated in the level of resistance shown by the person. Young prisoners, female prisoners or prisoners who are care leavers may be more likely to have a traumatic background, meaning their perception of threat, impulse control and coping strategies during conflict lead to a higher level of resistance being offered.

Within this proposed framework, influences on officers' perception of threat and the prisoner's level of resistance sit within the wider organisational factors, such as the individual cultures fostered within each prison. Differences in emphasis on care or control within the prison regimes may directly impact officers threat perception and their confidence in how to manage distressed behaviour. The positive impact of management support should be seen within the context of staff support. Managers that provide good feedback, support and mentoring to

officers, supporting their decision-making and fostering positive relationships, are likely to generate staff who are more confident in their approach towards prisoners, reducing incidents of confrontation and unnecessary reliance on force to ensure good order.

Figure 6: A conceptual framework for understanding the UoF.



This study proposes the first conceptual framework for the UoF in prison settings, advancing our understanding of the complexities in the management of aggression. It can serve as a basis for future research into the topic, with an emphasis on further investigating how different factors influence prison culture and the UoF. This increased understanding allows researchers to conduct targeted research to test the framework across populations and settings. The framework also allows further work to be undertaken to identify interventions which could be evaluated for effectiveness, allowing progress in the identification of how restraint reduction may be adapted in a prison setting. Most importantly, the presented framework should be a starting point for the development of an evidence-based approach towards the critical topic of restraint within the prison system, both in the UK and internationally.

While this research provides suggestions regarding how a conceptual framework for the UoF in prison settings may look, there are several limitations that need to be considered. Specifically, the use of incident forms and staff surveys offer some limitations. Incident forms are completed retrospectively by each officer involved in the UoF. While these are audited by more senior staff members and triangulated with other information, there remains a risk of bias and

critical situational information being missed due to the delay in recording. Alpert and Dunham (2004) highlight difficulties with the use of physical forms in policing research, which often lack completeness and tend to be seen as a defence for officers rather than a research tool. These same issues are to some degree present within a prison context. Similarly, staff surveys may be influenced by participants answering in a way they expect they should, rather than in a way that is representative of their views on the subject. Prison officer culture is defined as based on solidarity and a shared values base, subscribed to by all in the profession (Arnold, Liebling and Tait, 2012). This shared culture of togetherness may influence officers' willingness to honestly answer a survey relating to the management of aggressive individuals using force. To combat this, the current study utilised a combination of both a survey and information contained on UoF forms, supported by a robust analysis of themes emerging in previous research. Due to the information that could be taken from the UoF forms and the focus on physical interventions only, the UoF scale was kept as a binary low-level vs. high-level dichotomy. This contrasts with traditional UoF continuums, which tend to distinguish between verbal de-escalation, lower-level force options, higher level force options and deadly force (Hine et al, 2018). While deadly force is not an option available to prison officers, use of verbal de-escalation is not routinely recorded. The lack of a more comprehensive continuum may limit a detailed understanding of how factors influence the UoF. While all factors included in this study were selected through a review of the existing literature, the knowledge base is limited meaning other underlying factors may not be captured within this research.

Future research should explore alternative measures that can be applied to UoF incidents to further assess the proposed framework, including the capture of data related to the use of verbal de-escalation. This could include the use of body-worn camera footage of incidents to better explore the interactional processes during the conflict, particularly in relation to situational factors. Prison officer surveys, exploring different parts of the framework in detail, may allow for a deeper understanding of the identified factors such as what management support elements are particularly relevant, or how a sense of safety is achieved among prison officers. Similarly, a focus on different prisoner groups to explore the framework's application and an international comparison would support the development of a more comprehensive framework to inform future identification of restraint reduction approaches and training content across prison settings. The use of more qualitative research into the UoF, exploring in-depth the views of both prison officers and prisoners who have experience of restraint should complement the quantitative methods utilised in this study.

To conclude, this study proposes the first conceptual framework for understanding the UoF in prison settings, based on an exploratory statistical model investigating UoF incidents and staff survey responses. Results from the statistical model identify influencing factors from officer, prisoner, situational and organisational domains, which are combined into a multi-factor model for the explanation of UoF incidents. It provides a starting point for future researchers to further develop the empirical evidence base of the UoF, with the aim of developing a robust restraint reduction approach that can be applied into an operational prison setting. This research has the potential to impact future understanding of the management of force in prisons, both from an applied and a policy perspective.

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