Single Crewing in English and Welsh Policing: Frequency and Associations with Violence Towards and Injuries in Officers

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Abstract

There is limited contemporary evidence concerning whether single crewing - the deployment of unaccompanied police officers – presents a risk to officer safety. This exploratory self-report study examined the frequency of single crewing in England and Wales and associations with violence-related variables. Officers represented by the Police Federation of England and Wales contributed survey data on four forms of violent victimisation and injuries requiring medical attention arising from work-related violence experienced over the 12 months to February 2016. Respondents for whom crewing was applicable to their role indicated the frequency with which they had been single crewed during the same period. Pearson's χ^2 tests were used to characterise socio- and occupational-demographic factors associated with single crewing, violence, and injuries. Associations between single crewing frequency and the target variables were assessed using adjusted binary logistic regression to generate odds ratios and 95% confidence intervals. Among the 11,397 respondents who indicated that crewing was applicable to their role, 53% were *often* and 21% *always* single crewed. Relative to those who were *never* single crewed, the odds of being subjected to verbal insults and verbal threats were significantly elevated in officers who were *often* or *always* single crewed. The odds of physical attacks and injuries requiring medical attention were significantly elevated in officers who were *always* single crewed. There was no association between single crewing frequency and physical attacks with a weapon. These initial cross-sectional findings suggest that tailored crewing options might represent a means by which to reduce violence towards police officers. Keywords: crewing, injury, police, violence.

Introduction

Crime Survey for England and Wales data indicate that those in protective service occupations (including police officers) are at greatest risk for violence at work, with 9.6% having been victimised within the previous year compared to an average of 1.2% for the wider workforce (Health and Safety Executive 2016). When surveyed in 2015, police officers across England and Wales reported physical assault (without a weapon) as the second most common occupational cause of injury (Fielding *et al.* 2016). Alongside such statistics, serving police officers have expressed concern that single crewing (solo deployment) might represent a risk factor for violence targeted at police officers (Elliott-Davies *et al.* 2016). In this study we examine whether single crewing - often referred to in North American literature as single person cars or patrols - might contribute to explaining the high risk of violent victimisation in policing in England and Wales relative other occupational groups (Health and Safety Executive 2016) and consider whether crewing arrangements might offer a risk reduction mechanism for the violent victimisation of police officers.

Single Crewing Rationale

Single crewing is used by police forces to facilitate the fulfilment of a host of operational objectives. A series of mostly experimental studies conducted in the United States in the 1970s and 1980s indicated that single crewed patrols typically travelled more quickly to incidents (Chelst 1981, Green and Kolesar 1984) and emergencies (Boydstun *et al.* 1977, Kessler 1985), detected more potential crimes (Elliott 1971), and were more visible (Kaplan 1979). More recently, patrol modelling in the United Kingdom suggested that switching all double crewed units to single officer units would result in an estimated increase in on-scene captures at in-progress burglaries from 10% to 21% by reducing the number of incidents and area covered

per patrol (Coupe and Blake 2005). Officers patrolling alone have also been shown to be approached more frequently than when paired, potentially fostering police-community relations (McKenzie and Whitehouse 2010). Notably, however, evidence concerning operational outcomes associated with single crewing is not universally supportive (e.g., Bentley and Bardswell 1972, Blake and Coupe 2001, Wilson and Brewer 2001, Lindsay *et al.* 2009, Elliott-Davies *et al.* 2016).

In addition to operational benefits, single crewed patrols may also be more cost effective than double crewed units (Boydstun *et al.* 1977). Accordingly, in England and Wales single crewing represents one possible response to unprecedented 18% real term budget cuts between 2010 and 2015 (National Audit Office 2015) that resulted in a 14% fall in police officer numbers from a high of 143,734 in 2009 (Home Office 2010) to 124,066 in 2016 (Home Office 2016).

Single Crewing and Officer Safety

A key argument against single crewing concerns the safety of officers, with the notion advanced that double crewing may represent a defence against the violent victimization of police officers (Elliott-Davies *et al.* 2016). This view finds widespread support in research examining the views of serving officers. For instance, a study of US police officers found widespread disagreement with the suggestion that officers are more likely to be injured in two-officer cars than one-officer cars (Del Carmen and Guevara 2003), a view echoed in recent officer focus group research in England and Wales (Elliott-Davies *et al.* 2016). A further early US study found that 45% of surveyed officers felt that double crewed patrols were safer than single crewed patrols, though 40% expressed a neutral opinion (Boydstun *et al.* 1977). In an English study Shapland and Hobbs (1988) found a widespread view among officers that the introduction of single crewing would not work effectively owing to safety

risk. This view was consistent with earlier research involving a small scale survey of 94 officers in an English police force which showed that officers were overwhelmingly in favour of 24-hour double crewing at all times, with almost all (96%) expressing the view that senior managers would not be able to appreciate their position on double crewing (as cited in Bailey 2008).

However, the view that single crewing is associated with elevated risk to the safety and health of officers finds little support in the quantitative scientific literature. For instance, Australian research has shown increased resistance from the public – and by implication likelihood of assault or injury – associated with the two as opposed to one officer patrol mode (Wilson and Brewer 2001), particularly in high and medium anxiety situations (Wilson and Brewer 1993). Consistent with this, Dart's (1989) analysis of US officer injury data suggested that officers patrolling in double crewed cars were three times more likely to be injured than single crewed officers.

Other research has suggested little or no difference between single and double crews in terms of risk to officer safety. Kaplan's (1979) analysis of data from an earlier US experimental study (Boydstun *et al.* 1977) concluded that an officer serving in a single crewed capacity for a year had an almost identical probability of being injured relative to double crewed officers, though Wilson and Brewer (1992) point out that possible differences in the nature and severity of injury were not considered. Indeed, further analysis of US data from the 1970s indicated that single crewed police officers were no more likely to be assaulted than double crewed officers, but when assaulted were more likely to sustain an injury (Wilson *et al.* 1990). Finally, analyses of two years of citizen complaint data from a medium-sized US city concluded that after controlling for shift and dangerousness of precinct there

was no significant difference between single and double crewed patrols in terms of the probability of officer injuries (Decker and Wagner 1982).

It is possible that absence of a notable increased risk of injury for single crewed officers may reflect greater prudence and restraint on the part of the lone officer (Decker and Wagner 1982). Indeed, this view was expressed by many participants in a qualitative focus group study of serving police officers in England and Wales in which one participant succinctly summed up the dilemma facing the single crewed officer: 'You can be sitting in the car single crewed, outside of a violent domestic incident knowing that you won't get backup for another forty minutes. So you have to choose whether to go in there alone and risk getting a battering yourself or wait and listen to someone else getting a battering' (Elliott-Davies *et al.* 2016 p.107).

Implications of Police Officer Violent Victimisation

Police officers are at elevated risk for violent victimisation, with one in ten UK officers having been on the receiving end of violence at work in the preceding 12 months relative to one in 100 in the wider workforce (Health and Safety Executive 2016). Large-scale survey research showed that in 2015 police officers across England and Wales reported physical assault (without a weapon) as the second most common occupational cause of injury (Fielding *et al.* 2016). Moreover, officers that experienced an injury on duty rated their overall level of general health as lower than those who had not experienced an injury, even after having made a recovery sufficient to return to work. These findings are consistent with earlier British police research that identified violence and injury among the key operational stressors experienced by officers (Brown *et al.* 1999).

Violence towards officers has been shown to be associated with various undesirable health outcomes (for a review see Leino 2013). Notable among recent research is that of Finnish researchers who observed increased odds of psychological distress among officers who had been the target of physical violence in the form of unarmed physical attack or threatened with attack involving a weapon though, interestingly, not among those who had been the victim of psychological violence in the form of verbal insults or verbal threats of physical attack (Leino 2013). The Finnish study also found that officers who experienced more than one injury arising out of work-related violence were significantly more likely to report increased alcohol consumption, psychological distress symptoms, and fear of future violence. Further, among officers who had suffered injuries, the need for medical attention when injured was associated with increased odds of each of the aforementioned outcomes (Leino *et al.* 2012). Findings such as these highlight the imperative to identify and manage ways of working that might be associated with elevated risk of violent victimisation. In England and Wales single crewing has been identified by police officers as one such possible working arrangement (Elliott-Davies *et al.* 2016; The Argus 2013; The Star 2015), with several publicised episodes of violent victimisation reported in which crewing issues were perceived to be instrumental to the outcome (e.g., The Northern Echo 2015, The Star 2015).

Aims of the Current Study

An imperative exists to identify and manage aspects of the design, management, and organisation of police officers' work that may be associated with negative health and safety outcomes. In the four decades since Bentley and Bardswell (1972) initiated research on single crewing in English policing and called for further studies to examine the implications for officer safety, little progress has been made on

scientific knowledge developments in this regard. Considering the research as a whole, in their 1992 review of the literature Wilson and Brewer concluded that the evidence was not sufficient to determine that single and double crewing differ in terms of safety. However, given contemporary concerns about the safety of single crewed officers alongside data on the prevalence and stressfulness of violent victimisation in policing in England and Wales, there is a need for a fresh examination of the use of single crewing and its association with violent victimisation. As such, the current study aims to contribute to the knowledge base through an examination of the extent to which single crewing is used in English and Welsh policing and associations between single crewing frequency, violence towards police officers, and officer injuries. Findings are considered in terms of their bearing on the question of whether crewing arrangements might offer a risk reduction mechanism for the violent victimisation of police officers.

Method

Procedure and Participants

The analyses reported herein are drawn from the Police Federation of England and Wales' 2016 Officer Demand, Capacity, and Welfare Survey. The self-report measurement instrument collected information on a range of issues relating to police officers' psychosocial working conditions, safety, health, and wellbeing, of which crewing and violent victimization formed one part. The Faculty of Medicine and Health Sciences Research Ethics Committee at the University of Nottingham granted ethical approval for the study (ref: LT08122015 SoM PAP).

Police officers of the federated ranks (constable, sergeant, inspector, chief inspector) in the 43 territorial forces across England and Wales were eligible to complete the online survey that was hosted in Survey Monkey. Officers were made

aware of the survey through Police Federation national and local social media activity, magazine/newsletter communications, and its website. The survey was available for a four-week period in February 2016.

A total of 17,434 questionnaires containing responses were submitted. Removal of ineligible cases reduced the overall sample to 16,841 usable responses, representing a 14% response rate based on officer numbers at 31 March 2016 (Home Office 2016). For purposes of the current study, analyses were restricted to respondents who indicated that crewing was applicable to their role, resulting in the exclusion of 5,444 cases. Analyses were therefore conducted on a final sample of 11,397 cases.

The response rate was relatively low, though comparable to that achieved in recent research concerning working conditions in policing (Houdmont *et al.* 2012, Allisey *et al.* 2014, Fielding *et al.* 2016, Boag-Munroe *et al.* 2017). Chi-square analyses indicated that the socio-demographic profile of the full sample and population (Home Office 2016) were broadly comparable, with no significant difference for gender ($p>.05$). There were significant though numerically small differences for age ($p<.001$) and ethnicity ($p<.001$). In terms of occupational characteristics, there was a significant difference between the sample and the population for rank ($p<.001$), with a slightly higher proportion of the population than the sample reporting constable rank (79% vs. 74%), and a slightly higher proportion of the sample than the population reporting sergeant rank (19% vs. 15%).

Measurement Instruments

Frequency of single crewing was examined using the item "In the last 12 months how frequently have you been single crewed?" Responses were given on a 6-

point scale of (i) *never*, (ii) *rarely*, (iii) *sometimes*, (iv) *often*, (v) *always*, and (vi) *not applicable to me*.

In accordance with the UK Health and Safety Executive's (1996) definition of work-related violence that encapsulates "any incident in which a person is abused, threatened, or assaulted in circumstances relating to their work", we assessed both verbal and physical violence towards officers using four items developed for a nationwide study of Finnish police officers (Leino 2013). This instrument was selected because (i) it assesses multiple forms of violent victimisation, (ii) is police-specific, (iii) responses are receptive to dichotomisation, which was important in order to demonstrate risk magnitude, and (iv) contemporary data gathered using this instrument are available against which to compare findings from the current study. The items assessed the frequency over the previous 12-month period of being the target of verbal insults, verbal threats, unarmed physical attacks, and attacks with a weapon. Each item was scored on a 6-point response scale of (i) *never*, (ii) *once or twice*, (iii) *more than twice*, (iv) *once a month*, (v) *once a week*, and (vi) *daily*. The wording of the first three items – those concerning verbal insults, verbal threats, and unarmed physical attacks – was identical to that used in Leino's (2013) study. The wording of the fourth item was adapted slightly; whereas the original item examined frequency of violence involving a *threat* to use a deadly weapon, our study examined frequency of violence involving *actual* use of a deadly weapon. To enable comparison with the Finnish study, findings are presented on the frequency and proportion of respondents experiencing the first three forms of violence at least once per month. For the fourth item frequencies and proportions are presented for having experienced this at least once in the previous 12 months. Leino (2013) reported findings on frequency

of threat of attack with a deadly weapon in this manner owing to its relatively rare occurrence and potentially serious consequences.

Injury incidence was examined via the item "How many times have you suffered an injury that required medical attention as a result of work-related violence in the last year?" Responses were given on a 7-point scale of (i) *zero*, (ii) *once*, (iii) *twice*, (iv) *three times*, (v) *four times*, (vi) *five times*, and (vii) *more than five times*. Responses were dichotomized into (i) *zero* and (ii) *once or more*. The focus on more serious injuries that required medical attention was informed by Finnish police research demonstrating that officers who required medical attention due to injuries arising from work-related violence were 2.33 times more likely to display psychological distress symptoms, 2.08 times more likely to report increased risk for increased alcohol consumption, and 2.09 times more likely to report fear of future violence relative to those who had no need for medical attention after suffering such an injury (Leino *et al.* 2012).

Data were also collected from participants on a range of background socio- and occupational-demographic characteristics.

Analytical Approach

We performed analyses in IBM SPSS Statistics V.22. Descriptive statistics were generated for each study variable to characterise socio- and occupational-demographic factors associated with crewing, violence, and injuries arising from violence, using Pearson's χ^2 tests to compare categorical variables. Statistical significance was defined as $p<0.05$ throughout. Cramer's V was applied to establish effect size, with a coefficient of >.10 representing a small effect, >.30 a medium effect, and >.50 a large effect (Morgan *et al.* 2013). In Tables 1 and 2 statistically significant relationships that have an effect size of >.10 are presented in bold text. To

examine the relationship between crewing and violence and injuries we used binary logistic regression to generate odds ratios [ORs] with 95% confidence intervals [CIs]. For each odds ratio the reference category was the presumed least hazardous crewing arrangement, i.e., the group that reported having *never* been single crewed in the preceding year. Crude odds ratios were calculated in addition to models that adjusted for some potential confounding variables that were shown to be significantly related to the outcome variables in univariate χ^2 analyses (age, gender, rank, role, years of service).

Results

Descriptive Statistics

The descriptive epidemiology of the study variables is shown in Tables 1 and 2. Among officers that indicated crewing was applicable to their role, 73% reported having been single crewed *often* or *always* in the preceding 12-month period. The incidence of single crewing differed significantly by all socio- and occupational-demographic characteristics, though the size of the effect was notable only for job role (.26).

Seventy one per cent of respondents reported having been verbally insulted (e.g., swearing, shouting, abuse), 55% verbally threatened (e.g., threat of hitting, threat of kicking), and 44% the victim of an unarmed physical attack (e.g., struggling to get free, wrestling, hitting, kicking) at least once per month over the preceding 12-month period. Significant differences were found by all socio- and occupational-demographic characteristics: age, gender, rank, and years of service produced a small effect (.10-.22), with younger officers, male officers, officers of lower ranks, and and officers with fewer years of service reporting more frequent victimisation; while role produced a medium strength effect (.41-.42), with response and neighbourhood

policing officers reporting the most frequent victimisation. Ethnicity did not produce a notable effect.

Forty seven per cent of respondents reported having been attacked with a weapon (e.g., stick, bottle, axe, firearm) at least once within the last year. Significant differences were found by all socio- and occupational-demographic characteristics, with age, gender, and years of service producing a small effect (.12-.15), while role produced a medium strength effect (.38). Ethnicity and rank failed to produce a notable effect.

Finally, 26% of respondents reported having suffered one or more injuries that required medical attention as a result of work-related violence in the preceding 12-month period. Significant differences were found by all socio- and occupational-demographic characteristics with the exception of ethnicity, though only gender and role produced a notable effect size (.11 and .26 respectively).

[Table 1 near here]

[Table 2 near here]

Inferential Statistics

In binary logistic regression analyses, single crewing was associated with significantly increased odds of all four forms of violent victimization and injuries arising out of work-related violence (Table 3). Relative to those who reporting *never* having been single crewed in the last year, the odds of having been verbally insulted at least once per month in the preceding 12-month period were elevated after full adjustment for socio- and occupational-demographic characteristics for those who were single crewed *rarely* (OR 1.40, 95% CI 1.04-1.88), *often* (OR 1.65, 95% CI 1.28-2.13) and *always* (OR 1.82, 95% CI 1.40-2.37), while the odds were not significantly elevated for those *sometimes* single crewed.

The OR for having been verbally threatened at least once per month in the preceding 12-month period was raised after full adjustment for officers who were *often* (OR 1.34, 95% CI 1.05-1.71) and *always* (OR 1.58, 95% CI 1.22-2.04) single crewed. The OR for having been physically attacked at least one per month in the preceding 12-month period was raised after full adjustment for officers who were *always* single crewed (OR 1.41, 95% CI 1.09-1.83). After adjustment there was no significant association between single crewing frequency and having been physically attacked with a weapon. Finally, the OR for having suffered one or more injuries arising out of work-related violence was elevated after adjustment for officers that were *always* single crewed (OR 1.56, 95% CI 1.05-2.30).

[Table 3 near here]

Discussion

Summary of Findings

The aim of this study was to investigate the extent of single crewing in policing in England and Wales and the relationship between single crewing frequency and the violent victimisation of officers. Specifically, the study set out to explore the frequency with which officers reported being single crewed over a 12-month period to February 2016 and the association between frequency of single crewing and the incidence of four forms of violence towards officers and injuries to officers arising from work-related violence. Among a large sample of more than eleven thousand officers for whom crewing was relevant to their role, approximately three quarters reported having been single crewed *often* or *always* in the 12-month period under consideration. Compared to those who were *never* single crewed, officers who were *often* and *always* single crewed were, respectively, 65% and 82% more likely to be verbally insulted and 34% and 58% more likely to be verbally threatened at least once

per month. Officers who reported that they were *always* single crewed were 41% more likely to report having been physically attacked at least once per month. The odds of being physically attacked with a weapon were unrelated to crewing arrangements. Finally, officers who were *always* single crewed were 56% more likely to have suffered one or more injuries arising out of work-related violence in the preceding year.

Practical Implications

The qualitative literature concerning police officers' views on single crewing consistently reports disquiet about risks to safety (Boydstun *et al.* 1977; Del Carmen and Guevara 2003; Elliott-Davies *et al.* 2016; Shapland and Hobbs, 1988). Our findings lend quantitative empirical support to this body of research and advance the largely aged, experimental, and US-orientated quantitative knowledge base that hitherto failed to show support for the notion that single crewing represents a risk to officer safety (Boydstun *et al.* 1977; Dart, 1989; Decker and Wagner 1982; Kaplan, 1979; Wilson and Brewer 2001, 2003; Wilson *et al.* 1990). The insights gained from this study help to deepen our understanding of crewing as a risk factor for the violent victimisation of police officers and add to the limited literature on this important issue. Knowledge in this regard can be used by police forces to manage violent victimisation in English and Welsh policing.

There is a particular imperative for such actions given the high prevalence of violent victimisation found in the current study relative to that in the overall working population in England and Wales (Health and Safety Executive 2016) and evidenced in policing research in other national contexts involving the same measures. At present such data are available for Finland only, with a nationwide policing study (Leino 2013) generating a considerably lower rate of violent victimisation than the

current study. Whereas 71% of our respondents (for whom crewing was applicable to their role) reported having been verbally insulted at least monthly within the last year the equivalent figure in the Finnish study was 63%. The difference between the two studies in terms of the frequency of verbal threats was particularly marked, with 55% of respondents in our study and 25% of Finnish officers reporting this. For physical violent victimisation, the rate of unarmed physical attacks across the two studies was identical, with 44% experiencing such an attack at least once per month over the preceding year. For attacks with a deadly weapon sharply contrasting findings emerged; whereas 47% of respondents in our study reported having been attacked in this way at least once within the last year, 22% of Finnish officers reported having been threatened with such an attack (as opposed to actually attacked) within the same timeframe.

Our findings and those of Leino (2013) should be compared with caution given that our analyses were restricted to officers for whom crewing was applicable to their role; the incidence rate for the four forms of violent victimisation was 9-12% lower in our overall respondent sample than among this sub-sample. Furthermore, findings from the two studies concerning attacks with a deadly weapon are not directly comparable owing to differences in item wording – we assessed actual attacks whereas the Finnish study considered threat of attack. In addition, differences in crime pattern between the two countries need to be taken into account when drawing comparisons. For instance, the United Nations Survey on Crime Trends and Operations of Criminal Justice Systems reported that in 2014 the domestic burglary rate in England and Wales was 343 per 100,000 people, relative to 116 in Finland. Crime rates were also considerably higher in England and Wales than Finland for sexual violence (137 vs. 55), and assaults (649 vs. 30) (United Nations Office on

Drugs and Crime, n.d.), all which may have implications for the violent victimisation of police officers. Despite these caveats, the comparisons between our findings and those of Leino (2013) nevertheless highlight the imperative for further research on the violent victimisation of police officers across national contexts using a consistent set of measures; such research could valuably facilitate forces in their benchmarking and risk management activities.

These findings highlight the high rate of psychological and physical violent victimisation of police officers in England and Wales (for whom crewing is relevant to their role) relative to another Western policing context and, by extension, the imperative for ameliorative action. Our findings on associations between single crewing and violent victimisation suggest that crewing arrangements that take into account contextual factors might offer an effective means by which to reduce the violent victimisation of police officers. However, before policing organisations design and implement crewing policies that limit the use of single crewing, further research is required to confirm whether the linkages observed in the current study are reflective of causal relationships and, if so, whether and the extent to which they are moderated by time of day, job type, and other operational factors that may influence these relationships. Although conclusions on relations between single crewing and officer safety drawn on the basis of the current findings should be drawn with caution, these initial findings suggest that operational gains achieved by single crewing should perhaps be considered against negative implications for officer safety and, by extension, reduced productivity and lost working days.

Limitations

There are several limitations within this study that must be borne in mind when interpreting its findings. We cannot be certain that all episodes of violent

victimisation and injuries arising from work-related violence occurred while single crewed. Even among the group of officers that reported being always single crewed the possibility exists that they were the target of violence or suffered an injury as a result of work-related violence while on other duties such as, for example, dealing with a violent prisoner while booking into a custody suite.

We did not collect data on organisational factors that may influence the relationship between single crewing and violent victimisation. Among such factors might be included organisational policies on double crewing at high risk times and locations, the differing nature of incidents to which single and double crews might be dispatched in terms of their potential for danger, and the relative risk associated with foot versus car patrols.

The item we used to assess injuries arising from work-related violence focused on those that required medical attention. We set the injury threshold at this point in order to encourage only the reporting of injuries that were likely to have resulted in lost work time. However, it is possible that this approach might have encouraged respondents to consider only physical injuries while neglecting those of a psychological nature, generating an under-estimation of the incidence rate. Indeed, strength is lent to this possibility by the findings of a contemporaneous survey of police officers across England and Wales which found that 34% of work-related injuries (all cause) were psychological, with a further 19% being a combination of physical and psychological (Fielding *et al.* 2016).

Although our survey attracted a large number of responses the overall response rate was relatively low. As noted above, the response rate was comparable to that achieved by other force-level and nationwide UK policing studies concerned with working conditions, and the socio- and occupational-demographic composition of the

sample did not differ markedly from that of the population of officers of the federated ranks in England and Wales. However, given that six out of seven eligible officers did not complete the survey the low response rate may nevertheless raise concerns about the representativeness of these findings, and in particular whether relations between single crewing and violent victimisation among non-respondents differ from survey respondents. In light of this, caution must be exercised in generalising these findings to the English and Welsh police population as a whole.

Future Research

The current study was by design exploratory and the findings highlight the imperative for further research involving a methodological design that is capable of drawing conclusions on the nature and direction of causal relations between crewing arrangements and officer safety. Such research should consider the contribution of a wide array of organisational and individual factors that might moderate or mediate these relations. For instance, personal characteristics could play an influential role. Of particular note are findings from German research showing that high levels of burnout, primarily on the emotional exhaustion dimension and to a lesser extent the depersonalisation dimension, were associated with increased risk of physical assaults on officers (Ellrich 2016). Ellrich suggests that emotional exhaustion might reduce officers' self-protecting behaviours, which in turn increases their risk of victimisation. The prevalence of emotional exhaustion and depersonalization among English police officers has been shown to be exceptionally high (Houdmont and Randall 2016), raising the possibility that burnout might moderate the relationship between single crewing and the violent victimisation of police officers.

To further refine our understanding of the relationship between single crewing and violent victimisation future research should also take into account a range of

operational characteristics. In addition to information of the number of individuals within the unit at the point of violent victimisation, this might include the nature of duties undertaken, time of day, and transportation mode (foot versus car patrol). Real-time recording of incidents of violent victimisation might also help to allay any potential concerns about the reliability of retrospective subjective accounts. Future research could also utilise organisational records, where available, to allay possible concerns about the accuracy of self-reports of crewing arrangements.

Finally, a strength of this study was its use of a measure of four forms of violent victimisation developed for a Finnish nationwide policing study (Leino 2013) that facilitated between-country comparisons. Data generated via the consistent application of a measurement instrument across studies are useful because they empower police forces to benchmark and priority set. With this in mind, further research is warranted concerning the application of Leino's (2013) measure of violent victimisation in policing studies within and across national contexts in order to enable policing organisations to benchmark their data against that of 'most similar' comparator organisations and countries and priority set accordingly.

Conclusions

In a time of austerity characterised by unprecedented cuts to policing budgets single crewing might represent an efficient use of limited resources. However, this exploratory study has highlighted a possible undesirable correlate of single crewing concerning the safety of police officers in England and Wales. Though further research is required to confirm whether the associations identified in the current study are reflective of causal relationships and refine our understanding of the factors that influence these relationships, our initial findings suggest that the gains achieved by

single crewing should be considered against possible negative implications for officer safety, health, and, by extension, operational effectiveness.

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Table 1

Incidence of single crewing, violence towards officers, and injuries arising from violence by socio-demographic group

	Single crewed often or always in preceding 12 months	Verbal insults (e.g., swearing, shouting, abuse) ≥ once per month	Verbal threats (e.g., threat of hitting, threat of kicking) ≥ once per month	Unarmed physical attacks (e.g., struggling to get free, wrestling, hitting, kicking) ≥ once per month	Attack with a deadly weapon (e.g., stick, bottle, axe, firearm) ≥ once per year	≥1 injuries arising from work-related violence in preceding 12 months
	% (*N*)					
All	73 (8,351/11,397)	71 (7,118 /10,027)	55 (5,460/10,010)	44 (4,355/9,986)	47 (4,649/9,998)	26 (1,605/6,147)
Age						
≤25	59 (238/404)	**87 (293/336)**	**73 (244/335)**	**62 (208/335)**	**52 (172/333)**	35 (64/184)
26-40	72 (4,130/5,701)	**77 (3,885/5,020)**	**62 (3,086/5,008)**	**50 (2,481/4,994)**	**52 (2,603/5,010)**	28 (848/3,034)
41-55	76 (3,800/5,028)	**63 (2,796/4,458)**	**46 (2,028/4,455)**	**36 (1,583/4,445)**	**40 (1,777/4,443)**	24 (660/2,799)
>55	69 (66/96)	**60 (48/80)**	**39 (31/79)**	**35 (28/80)**	**44 (35/80)**	17 (9/54)
X^2, df, p value	59.25, 3, p<.001	**295.42, 3, p<.001**	**300.12, 3, p<.001**	**239.30, 3, p<.001**	**139.31, 3, p<.001**	24.31, 3, p<.001
Effect size	.07	**.17**	**.17**	**.16**	**.12**	.06
Gender						
Female	76 (2,248/2,978)	**62 (1,586/2,578)**	**44 (1,130/2,572)**	**35 (908/2,567)**	**34 (878/2,567)**	**19 (302/1,636)**
Male	73 (6,072/8,376)	**74 (5,507/7,415)**	**58 (4,314/7,404)**	**47 (3,436/7,386)**	**51 (3,755/7,397)**	**29 (1,299/4,487)**
X^2, df, p value	10.06, 1, p=.002	**150.92, 1, p<.001**	**158.14, 1, p<.001**	**96.26, 1, p<.001**	**210.08, 1, p<.001**	**68.33, 1, p<.001**
Effect size	.03	**.12**	**.13**	**.10**	**.15**	**.11**
Ethnicity						
White	74 (7,945/10,770)	71 (6,737/9,501)	54 (5,158/9,484)	44 (4,114/9,462)	46 (4,391/9,472)	26 (1,535/5,859)
Mixed	63 (130/206)	78 (145/187)	63 (118/187)	46 (86/187)	53 (99/187)	31 (33/108)
Asian/Asian British	59 (82/139)	78 (79/102)	56 (57/102)	49 (49/100)	47 (48/102)	21 (11/52)
Black/African/Caribbean/Black British	72 (41/57)	55 (26/47)	42 (20/48)	35 (17/48)	42 (20/48)	13 (3/24)
Other	66 (95/144)	70 (85/121)	60 (72/120)	49 (59/120)	51 (61/120)	25 (16/65)
X^2, df, p value	30.68, 4, p<.001	11.63, 4, p=.020	10.34, 4, p=.035	4.50, 4, p=.343	4.56, 4, p=.335	4.16, 4, p=.385
Effect size	.05	.03	.03	.02	.02	.03

Table 2

Incidence of single crewing, violence towards officers, and injuries arising from violence by occupational-demographic group

	Single crewed often or always in preceding 12 months	Verbal insults (e.g., swearing, shouting, abuse) ≥ once per month	Verbal threats (e.g., threat of hitting, threat of kicking) ≥ once per month	Unarmed physical attacks (e.g., struggling to get free, wrestling, hitting, kicking) ≥ once per month	Attack with a deadly weapon (e.g., stick, bottle, axe, firearm) ≥ once per year	≥1 injuries arising from work-related violence in preceding 12 months
	% (*N*)					
All	73 (8,351/11,397)	71 (7,118 (10,027)	55 (5,460/10,010)	44 (4,355/9,986)	47 (4,649/9,998)	26 (1,605/6,147)
Rank						
Constable	73 (6,781/9,308)	**73 (5,967/8,143)**	**57 (4,617/8,133)**	**46 (3,743/8,111)**	48 (3,898/8,123)	28 (1,357/4,935)
Sergeant	75 (1,260/1,679)	**65 (986/1,517)**	**48 (728/1,512)**	**35 (533/1,510)**	42 (632/1,508)	22 (222/994)
Inspector	79 (274/348)	**46 (149/323)**	**32 (103/321)**	**22 (71/322)**	33 (107/323)	12 (23/195)
Chief Inspector	53 (16/30)	**18 (4/22)**	**18 (4/22)**	**14 (3/21)**	18 (4/22)	20 (2/10)
X^2, df, p value	14.94, 3, p=.002	**173.99, 3, p<.001**	**118.22, 3, p<.001**	**131.82, 3, p<.001**	50.30, 3, p<.001	33.14, 3, p<.001
Effect size	.04	**.13**	**.11**	**.12**	.07	.07
Role						
Other	**59 (210/358)**	**52 (159/305)**	**35 (106/305)**	**21 (65/305)**	**27 (81/305)**	**8 (16/200)**
Neighbourhood	**77 (1,501/1,942)**	**71 (1,208/1,713)**	**49 (828/1,708)**	**36 (609/1,704)**	**38 (649/1,705)**	**23 (239/1,045)**
Response	**81 (4,061/5,012)**	**88 (3,922/4,463)**	**75 (3,357/4,459)**	**65 (2,883/4,441)**	**64 (2,837/4,453)**	**37 (1,024/2,742)**
Central Communications	**100 (3/3)**	**100 (2/2)**	**0 (0/2)**	**0 (0/2)**	**0 (0/2)**	**0 (0/2)**
Custody	**0 (0/1)**	**0 (0/1)**	**0 (0/1)**	**100 (1/1)**	**100 (1/1)**	**100 (1/1)**
Criminal justice	**62 (75/121)**	**49 (52/106)**	**22 (23/106)**	**9 (9/106)**	**17 (18/106)**	**3 (2/70)**
Road policing	**69 (509/739)**	**67 (434/649)**	**39 (255/648)**	**27 (177/647)**	**38 (246/647)**	**25 (103/413)**
Operational support	**41/382/924)**	**68 (509/746)**	**54 (402/743)**	**43 (317/742)**	**60 (445/743)**	**21 (96/453)**
Intelligence	**0 (0/2)**	**0 (0/2)**	**0 (0/2)**	**0 (0/2)**	**0 (0/2)**	**0 (0/2)**
Investigations	**71 (1,559/2,200)**	**40 (788/1,958)**	**24 (460/1,954)**	**14 (265/1,954)**	**18 (345/1,952)**	**9 (109/1,164)**
National	**31 (10/32)**	**32 (8/25)**	**12 (3/25)**	**8 (2/25)**	**16 (4/25)**	**12 (2/17)**

policing						
Training	**25 (1/4)**	**75 (3/4)**	**75 (3/4)**	**75 (3/4)**	**25 (1/4)**	**25 (1/4)**
Administrative support	**50 (4/8)**	**29 (2/7)**	**14 (1/7)**	**14 (1/7)**	**14 (1/7)**	**25 (1.4)**
PFEW rep.	**67 (6/9)**	**29 (2/7)**	**14 (1/7)**	**29 (2/7)**	**0 (0/7)**	**0 (0/4)**
Mixed role	**71 (30/42)**	**74 (29/39)**	**54 (21/39)**	**54 (21/39)**	**54 (21/39)**	**42 (11/26)**
X^2, df, p value	**757.06, 14, p<.001**	**1641.53, 14, p<.001**	**1745.37, 14, p<.001**	**1788.45, 14, p<.001**	**1413.62, 14, p<.001**	**424.87, 14, p<.001**
Effect size	**.26**	**.41**	**.42**	**.42**	**.38**	**.26**
Years service						
0-9	71 (2,427/3,415)	**83 (2,436/2,943)**	**68 (1,999/2,934)**	**56 (1,649/2,929)**	**54 (1,571/2,935)**	30 (520/1,753)
10-19	74 (3,956/5,316)	**71 (3,378/4,741)**	**54 (2,577/4,737)**	**43 (2,043/4,721)**	**48 (2,290/4,732)**	28 (794/2,892)
≥20	74 (1,871/2,540)	**55 (1,235/2,242)**	**37 (831/2,238)**	**28 (619/2,236)**	**33 (741/2,230)**	19 (279/1,448)
X^2, df, p value	12.20, 2, p=.001	**474.20, 2, p<.001**	**492.26, 2, p<.001**	**422.64, 2, p<.001**	**222.95, 2, p<.001**	49.28, 2, p<.001
Effect size	.03	**.22**	**.22**	**.21**	**.15**	.09

Table 3

Binary logistic regression of single crewing in relation to violence towards police officers and injuries arising from violence

Single crewed [last 12 months]	Violent victimisation [last 12 months]		OR (95% CI)	AOR[a] (95% CI)	AOR[b] (95% CI)	AOR[c] (95% CI)
	Verbally insulted < once per month *N* (%)	Verbal insulted ≥ once per month *N* (%)				
Never	162 (40.2)	241 (59.8)	-	-	-	-
Rarely	221 (31.0)	491 (69.0)	**1.49 (1.16-1.93)**	**1.48 (1.14-1.94)**	**1.35 (1.01-1.81)**	**1.40 (1.04-1.88)**
Sometimes	519 (35.8)	930 (64.2)	1.21 (0.96-1.51)	**1.36 (1.07-1.72)**	1.17 (0.90-1.53)	1.28 (0.97-1.67)
Often	1,413 (26.5)	3,915 (73.5)	**1.86 (1.51-2.29)**	**2.24 (1.78-2.75)**	**1.47 (1.14-1.89)**	**1.65 (1.28-2.13)**
Always	594 (27.8)	1,541 (72.2)	**1.74 (1.40-2.17)**	**2.18 (1.73-2.75)**	**1.66 (1.28-2.15)**	**1.82 (1.40-2.37)**
	Verbally threatened < once per month *N* (%)	Verbally threatened ≥ once per month *N* (%)				
Never	211 (52.4)	192 (47.6)	-	-	-	-
Rarely	351 (49.4)	359 (50.6)	1.12 (0.88-1.44)	1.11 (0.86-1.43)	1.05 (0.79-1.38)	1.08 (0.81-1.44)
Sometimes	757 (52.4)	687 (47.6)	1.00 (0.80-1.24)	1.10 (0.88-1.39)	1.01 (0.78-1.30)	1.10 (0.84-1.43)
Often	2,288 (43.0)	3,033 (57.0)	**1.46 (1.19-1.78)**	**1.69 (1.37-2.09)**	1.19 (0.94-1.52)	**1.34 (1.05-1.71)**
Always	943 (44.2)	1,189 (55.8)	**1.39 (1.12-1.72)**	**1.71 (1.37-2.13)**	**1.42 (1.11-1.82)**	**1.58 (1.22-2.04)**
	Physically attacked < once per month *N* (%)	Physically attacked ≥ once per month *N* (%)				
Never	249 (62.3)	151 (37.8)	-	-	-	-
Rarely	423 (59.9)	283 (40.1)	1.10 (0.86-1.42)	1.08 (0.83-1.40)	1.02 (0.77-1.36)	1.05 (0.79-1.40)
Sometimes	902 (62.4)	544 (37.6)	1.00 (0.79-1.25)	1.08 (0.85-1.37)	1.00 (0.77-1.31)	1.07 (0.81-1.39)
Often	2,863 (53.9)	2,445 (46.1)	**1.41 (1.14-1.74)**	**1.58 (1.27-1.96)**	1.12 (0.88-1.44)	1.22 (0.95-1.57)
Always	1,194 (56.2)	932 (43.8)	**1.29 (1.03-**	**1.53 (1.22-**	**1.32 (1.02-**	**1.41 (1.09-**

			1.60)	**1.92)**	**1.71)**	**1.83)**
	Physically attacked with a weapon < once per year *N* (%)	Physically attacked with a deadly weapon ≥ once per year *N* (%)				
Never	201 (50.2)	199 (49.8)	-	-	-	-
Rarely	386 (54.4)	323 (45.6)	0.85 (0.66-1.08)	0.83 (0.65-1.07)	0.88 (0.67-1.16)	0.89 (0.67-1.18)
Sometimes	850 (58.7)	597 (41.3)	0.71 (0.57-0.89)	**0.77 (0.61-0.97)**	0.85 (0.66-1.10)	0.90 (0.69-1.16)
Often	2,829 (53.3)	2,481 (46.7)	0.89 (0.72-1.09)	0.98 (0.80-1.21)	0.88 (0.69-1.12)	0.95 (0.74-1.21)
Always	1,083 (50.8)	1,049 (49.2)	0.98 (0.79-1.21)	1.14 (0.91-1.41)	1.14 (0.89-1.46)	1.23 (0.96-1.58)
	Zero injuries arising from work-related violence	≥1 injuries arising from work-related violence				
Never	177 (80.5)	43 (19.5)	-	-	-	-
Rarely	302 (76.3)	94 (23.7)	1.28 (0.85-1.92)	1.30 (0.86-1.98)	1.24 (0.81-1.91)	1.24 (0.80-1.92)
Sometimes	675 (79.3)	176 (20.7)	1.07 (0.74-1.56)	1.21 (0.83-1.78)	0.98 (0.66-1.47)	1.06 (0.71-1.60)
Often	2,404 (72.8)	898 (27.2)	**1.54 (1.09-2.16)**	1.74 (1.22-2.47)	1.14 (0.78-1.66)	1.24 (0.84-1.81)
Always	984 (71.4)	394 (28.6)	**1.65 (1.16-2.35)**	**1.90 (1.33-2.74)**	1.45 (0.98-2.12)	**1.56 (1.05-2.30)**

[a]Adjusted for socio-demographic factors (age, gender).

[b]Adjusted for occupational-demographic factors (rank, role, years of police service).

[c]Adjusted for all.

OR, odds ratio; AOR, adjusted odds ratio; CI, confidence interval.