



# Intimate partner violence and abuse experience and perpetration in UK military personnel compared to a general population cohort: A cross-sectional study

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## Summary

**Background** Research exploring prevalence of, and factors associated with, increased risk of experiencing or perpetrating Intimate Partner Violence and Abuse (IPVA) in military communities is limited. This study aimed to describe IPVA prevalence in a military sample, explore the role of military-specific risk factors, and draw comparisons with a general population cohort.

**Methods** We utilised data from a sample of military personnel participating in a cohort study of the health and well-being of UK military personnel who reported having an intimate relationship in the previous 12 months ( $n = 5557$ ). To allow for comparison with civilian populations, participants from a general population cohort study in England ( $n = 6075$ ) were matched on age and sex to the military cohort ( $n = 8093$ ).

**Findings** The 12-month prevalences of IPVA experience and perpetration in the military sample were 12.80% (95% CI 11.72–13.96%) and 9.40% (8.45–10.45%), respectively. Factors associated with both increased IPVA experience and perpetration included childhood adversity, relationship dissatisfaction, military trauma, and recent mental health and alcohol misuse problems. Compared to the civilian cohort, adjusted odds (95% CI) of IPVA experience and perpetration were higher in the military: 2.94 (2.15–4.01) and 3.41 (1.79–6.50), respectively.

**Interpretation** This study found higher prevalences of IPVA experience and perpetration in the military compared to the general population cohort and highlighted both non-military and military factors associated with increased risk of both. Relationship dissatisfaction, military trauma and mental health difficulties mark key areas for IPVA prevention and management efforts to target.

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**Keywords:** Intimate partner violence and abuse; UK military; Risk factors; Prevalence; Trauma; Mental health

## Introduction

Intimate Partner Violence and Abuse (IPVA) represents a major health, social and economic cost to society<sup>1</sup> and has been of heightened concern in the UK in light of evidence of increased incidence during the Covid-19 pandemic.<sup>2</sup> International research indicates that both perpetration and experience of IPVA are prevalent among military personnel and may be more prevalent

than in civilian populations.<sup>3,4</sup> However, crude comparisons of prevalence among military and civilian populations have been limited by lack of adjustment for population differences, such as in socio-demographic characteristics or early life factors, that may be associated with IPVA.<sup>5–8</sup>

Research into drivers of IPVA in civilian populations has argued that risk factors operate at multiple levels: structural risk factors in society, such as those relating to poverty, gender inequality and the normalisation of violence in relationships, as well as relationship and

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## Research in context

*Evidence before this study*

Four electronic searches were conducted using six bibliographic databases (EMBASE, MEDLINE, PsycINFO, Science Direct and Web of Science (including SCI, SSCI)) to identify studies which (i) estimated the prevalence of IPVA perpetration among military populations (serving and ex-serving); (ii) reported the risk of IPVA perpetration among those with and without mental disorder or vice versa, and/or a measure of association between IPVA perpetration and mental disorder; (iii) estimated the prevalence of IPVA experience among military populations (serving and ex-serving); and (iv) reported the risk of IPVA experience among those with and without mental disorder or vice versa, and/or a measure of association between IPVA experience and mental disorder. Medical Subject Headings (MeSH) and keywords were used for electronic searches. There were no language restrictions and databases were searched from inception until March 17, 2021. Studies were eligible if they: (i) included male and/or female serving, Reserve or ex-serving military personnel and/or their intimate partners; (ii) used a validated measure of IPVA perpetration or experience, adapted questions or objective measures such as military records; (iii) measured mental health outcomes using a validated diagnostic or screening tool; (iv) were published in a peer-reviewed journal; (v) used an eligible study design (e.g. randomised control trial, cohort study, cross-sectional study, etc.); and (vi) reported prevalence of IPVA perpetration or experience or presented data from which these statistics could be calculated. Quality appraisal of the included studies was conducted using a checklist adapted from validated tools giving each study a final appraisal score. Studies were categorised as high quality if they scored  $\geq 50\%$  on questions pertaining to selection bias.

48 studies of IPVA perpetration and 39 studies of IPVA experience were eligible for inclusion. There were no UK studies included. Among studies that measured the prevalence rates of IPVA perpetration, emotional and psychological IPVA was the most prevalent type of abuse, in keeping with findings from civilian populations. In most studies which disaggregated the data by gender, past-year physical IPV perpetration was higher among males than females. There were consistently higher prevalence estimates of IPVA perpetration among Veterans compared to Active Duty samples. Among studies that measured IPVA experience, psychological IPVA was again the most prevalent type of abuse, as also seen in civilian populations. In studies which disaggregated the data by gender, similar or higher prevalence rates of physical IPV victimisation were found among males compared to females. There were no studies on sexual IPV victimisation among male personnel. Evidence for the impact of military factors, such as deployment or rank, on IPVA perpetration or victimisation was conflicting. A range of mental health problems were strongly associated with both IPVA perpetration (PTSD and depression) and experience (depression and PTSD), as was alcohol misuse. A small

number of studies compared prevalence of perpetration and experience in a military population to the corresponding civilian population. While the prevalence in the military was mostly found to be significantly higher than in civilian populations, such comparisons were often crude or only adjusted for minimal potential group differences, such as age and gender.

*Added value of this study*

This study adds to the existing evidence base for the prevalence of and risk factors for IPVA in the UK, especially enhancing understanding of IPVA in population subgroups, such as the UK military as a whole and in particular military men. We were able to estimate the past year prevalence of different types of IPVA, as per the WHO definition, compare prevalence in males and females (providing novel evidence of higher rates of experience of IPVA than perpetration among military personnel, even males), as well as identify high rates of bidirectionality. We were also able to examine the association of a range of non-military, military and mental health related factors with IPVA and in doing so we have identified key at risk groups, identified military specific risk factors for and the importance of mental health problems and alcohol misuse in both IPVA perpetration and experience. Importantly, we were also able to undertake a comparison of IPVA prevalence among males and females in the UK military with those in the civilian population, adjust for key population differences such as age, relationship status, educational achievement, socioeconomic status, and childhood abuse to achieve a more robust military vs civilian comparison than has been achieved to date.

*Implications of all the available evidence*

The available evidence sheds light on the scale of the problem of IPVA in military communities (of serving and ex-serving personnel) and the need for a Domestic Abuse Strategy for the UK military which is separate to the national government strategy. Mounting evidence of specific at-risk groups, such as those serving in the Army, who report early adversity, have been exposed to deployment trauma and report relationship dissatisfaction, must inform the further development of more targeted approaches to the prevention, identification and management of IPVA. Importantly, there is strong evidence for the role of mental health problems and alcohol misuse in both IPVA perpetration and experience, understanding of which needs to be incorporated into broader prevention strategies as well as specific perpetrator and victim support programmes. Mental health services must form a core element of any IPVA reduction and management strategy.

individual risk factors, such as mental health, substance misuse and experience of childhood trauma.<sup>9–11</sup> In addition to generic risk factors, Gibbs and colleagues<sup>9</sup> view armed conflict as a significant additional driver of IPVA in some communities due in part to increased risk factors at an individual level through exposure to

traumatic events and the chronic stress of living under constant threat of attack resulting in worsened mental health and substance misuse. Research among military groups specifically has highlighted demographic and early life factors associated with IPVA perpetration and/or experience of IPVA, including age, gender, marital status, level of educational attainment.<sup>6–8</sup> As in civilian research, mental health and lifestyle factors are also likely to play a role in IPVA perpetration and experience among military personnel, in particular depression, anxiety, PTSD and alcohol misuse.<sup>6,8,12,13</sup> In addition, couples in the military community can be exposed to unique stressors related to military experiences, such as frequent relocations, deployments and separations, which can negatively impact relationships and increase likelihood of IPVA perpetration and/or experience of IPVA.<sup>3,7,14</sup> However, research to date has largely focussed on deployed US military personnel and IPVA perpetration. There remains a dearth of research examining IPVA experience and perpetration by a range of military characteristics (e.g. Service branch, rank, status), which would support the military and the veteran community in the identification and targeted management of IPVA.

The UK Government launched the Domestic Abuse Act in 2021.<sup>15</sup> In recognition of potential differences in IPVA experiences and presentations among military personnel, the Ministry of Defence have published their own Domestic Abuse strategy.<sup>16</sup> Exploration of IPVA in the UK military community is much needed, along with a robust comparison with the civilian population, to inform how to improve identification of victim-survivors and perpetrators of IPVA in military samples. To address these gaps, this study aimed to utilise data from an existing UK military cohort study to describe IPVA prevalence; to explore military-specific factors associated with IPVA perpetration and/or experience of IPVA; and to draw comparisons with a general population cohort.

## Methods

### Study design and data

We conducted a cross-sectional analysis of two surveys: the King's Centre for Military Health Research (KCMHR) cohort study,<sup>17</sup> an ongoing study exploring the health and wellbeing of UK military personnel; and the 2014 Adult Psychiatric Morbidity Survey (APMS), which examined the prevalence of psychiatric disorders in a large cohort living in private households in England.<sup>18</sup> From these, we constructed two separate samples: first, a military sample using data from Phase 3 of the KCMHR cohort study; and second, a matched civilian and military sample using data from both surveys.<sup>1</sup>

<sup>1</sup> Brief details of the KCMHR and APMS cohorts are provided in the Supplementary Materials.

### Military sample

Phase 3 KCMHR data were collected by questionnaire between October 2014 and December 2016. Full details of previous waves, as well as details of the randomised stratified sampling strategy, response weighting, and data collection procedures are reported by Stevelink and colleagues.<sup>17</sup>

In Phase 3, serving and ex-serving UK military personnel ( $n = 8093$ ) completed the self-administered questionnaire, with a 44% response rate. The questionnaire required participants to only answer questions on IPVA if they reported having an intimate partner in the previous 12 months. Thus, we excluded individuals who did not report having an intimate partner in the previous 12 months from the sample. This left a final sample for analysis of  $N = 5557$  (68.7% of Phase 3 respondents).

### Military and civilian comparison sample

We constructed the military and civilian comparison sample using the full KCMHR Phase 3 cohort ( $N = 8093$ ) – i.e. not just those who reported having had a partner in the previous 12 months. This was to allow comparison with the APMS survey, which asked whether the IPVA occurred in the previous 12 months (irrespective of whether the respondent had a partner or not). From the full Phase one APMS cohort ( $N = 7546$ , 57% response rate), we excluded participants outside the age range of the military cohort (aged 18 or younger, or aged over 74,  $n = 1210$ ) or who reported ever serving in the armed forces ( $n = 518$ ). The remaining APMS sample ( $n = 6075$ ) were matched on age and sex to KCMHR data using entropy balancing, a multivariate reweighting method to ensure comparability<sup>19</sup> (see Supplementary Table S1 for sample characteristics). Full details relating to the APMS Phase one sampling is reported by McManus and colleagues.<sup>18</sup>

## Measures<sup>11</sup>

### Socio-demographic and background characteristics.

We examined data on sex, age (20–34, 35–44, 45–54, 55 and over), relationship status/satisfaction (military sample: single/divorced/separated/widowed, satisfied relationship, or dissatisfied relationship; comparison sample: married/in a relationship, or single/divorced/separated/widowed), level of education (no qualification/O level equivalent, or A-level/degree level), and SES (high/low; based on National Statistics Socio-economic Classification [NS-SEC-5] for civilians and ex-military personnel, and based on rank for serving military personnel).

<sup>11</sup> See also Supplementary Table S2.

**Childhood adversity.** Military participants were asked 16 true/false questions about their experiences (both adverse and protective) during childhood.<sup>20</sup> Endorsed items were summed to create a vulnerability count: 0–2 (low); 3–5 (moderate); and 6 or more (high). Only one item, capturing childhood physical abuse, was comparable across KCMHR and APMS surveys, though there were some minor differences: “Not including smacking, before you were 18, did an adult in your life hit, beat, kick, or physically hurt you in any way?” (APMS); “I used to be hit/hurt by a parent or caregiver regularly.” (KCMHR). Therefore, in our comparison of military and civilian IPVA prevalence we adjusted for childhood physical abuse only.

**Military characteristics.** These included: currently serving (yes/no); service type (regular, reserve); service (Navy, Army, Royal Air Force (RAF)); rank (Officer, non-commissioned officer (NCO), Other); deployment to Iraq and/or Afghanistan (not deployed, deployed in a combat role, or deployed in a non-combat role); and military trauma during deployment – a cumulative score derived from endorsing an experience (13 in total) and the number of times they had experienced. Scores ranged from 0 to 52 [median = 5, IQR 2–12], and were categorised into: 0, none; 1–5, mild; 6–12, moderate; and 13 or over, severe.

**Mental health factors (military sample).** The following measures and scorings were utilised: Caseness of common mental disorder (CMD) using a cut-off score of 4 or more on the General Health Questionnaire (GHQ-12)<sup>21</sup>; Probable posttraumatic stress disorder (PTSD) using a cut-off of 50 or more on the PTSD Checklist (PCL-5)<sup>22</sup>; Harmful drinking using a cut-off of 16 or more on the Alcohol Use Disorders Identification Test (AUDIT)<sup>23</sup>; Difficulties with anger using a score of 12 or above on the Dimensions of Anger Reactions (DAR-7).<sup>24</sup>

**IPVA outcomes.** Both KCMHR and APMS used measures of IPVA experience and perpetration, adapted from the British Crime Survey, considered compatible despite minor differences between the questions asked in the surveys (Supplementary Table S3). All respondents were asked a series of questions that targeted four types of IPVA as defined by the World Health Organisation<sup>25</sup>: emotional abuse (e.g. belittling, humiliating), psychological abuse (e.g. threatening behaviour, verbal aggression), physical violence or sexual violence. All IPVA outcomes were analysed in the military sample, but only the IPVA questions that were common to both KCMHR and APMS questionnaires were compared in the military and civilian comparison sample. Military participants who reported both IPVA experience and

perpetration were assumed to be reporting bidirectional abuse within the same relationship. IPVA outcomes for the military sample were grouped into non-physical (emotional abuse, psychological abuse and controlling behaviours; “EPC abuse”) and physical forms of abuse (physical and sexual abuse; “P/S abuse”).

### Statistical analysis

**Military sample:** prevalence estimates are reported as weighted proportions with their 95% confidence intervals (CI), and stratified by sex. Due to the low number of IPVA outcomes among females, we restricted the regression analyses to males only. Univariable and multivariable logistic regression analyses were used to examine crude and independent associations between each IPVA outcome and the socio-demographic, military, and mental health factors in the military sample. Any socio-demographic, military, or pre-enlistment variable that was independently associated with each IPVA outcome was retained as a covariate in subsequent adjusted models examining the independent associations between each IPVA outcome and deployment and mental health factors. To account for sampling and response rates,<sup>17</sup> all analysis estimates were weighted using Stata’s SVY functions. Further elaboration of the survey weights is provided in the Supplementary Materials.

**Military and civilian comparison sample:** adjusted logistic regression analyses were used to compare IPVA prevalences in the military and civilian comparison samples after accounting for socio-demographic characteristics, stratified by sex. In order to account for the socio-demographic differences between the military and civilian samples, separate models were calculated and adjusted for: age only; age and relationship status; age and education level; age and SES; age and childhood physical abuse; and all covariates. As a supplementary analysis, the associations between socio-demographic characteristics and IPVA were assessed in KCMHR and APMS samples separately, adjusting for age and sex, using logistic regression models.

Throughout, frequencies are crude, and percentages are reported as weighted. Results from the crude analyses are reported as odds ratios (OR) with 95% CI; and the results from the adjusted analyses are reported as adjusted ORs (aOR) with 95% CI. We used a complete-case analysis approach to missing data. All analyses were conducted in Stata 16.

### Role of the funding source

The UK MoD funded this cohort study. However, the funder had no role in the design, analysis, interpretation or decision to submit this paper. The paper was disclosed to the MoD prior to submission for publication.

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## Results

### Sample characteristics

The military sample comprised 5557 respondents who reported having a partner in the previous 12 months (Table 1). The majority of the sample were males ( $n = 4865$ , 90%), with a median (IQR) age of 38 (30–47). 69% reported educational achievement of A-level (college-level equivalent) or above. 44% were serving members, and most were in regular service (91%), served in the Army (65%), and in the rank of a non-commissioned officer (65%). 64% had deployed to Iraq or Afghanistan, of whom 29% were deployed in a combat/combat support role.

### Prevalence of self-reported intimate partner violence and abuse

The prevalence of total reported IPVA experience was higher than perpetration (12.80% [95% CI 11.72–13.96%] vs 9.40% [8.45–10.45%];  $F = 32.84$ ,  $p < 0.001$ ; Figure 1 and Supplementary Table S4). This pattern was observed for P/S abuse, as well as for EPC abuse. The prevalence of IPVA perpetration was higher among males than females (9.71% [8.68–10.85%] vs 6.57% [4.75–8.99%];  $F = 6.89$ ,  $p = 0.009$ ), driven by the sex difference in EPC abuse. Rates of experience were similar among males and females (12.98% [11.83–14.23%] vs 11.13% [8.62–14.25%];  $F = 1.43$ ,  $p = 0.23$ ).

Males were more likely to report EPC abuse perpetration than females (8.01% [95% CI 7.07–9.07%] vs 3.96% [2.69–5.80%];  $F = 19.08$ ,  $p < 0.001$ ), driven predominantly by the higher prevalence of humiliating and frightening/threatening types of abuse. Indeed, only males reported frightening/threatening their partners. Rates of experience of EPC abuse were similar in males and females (11.06% [9.99–12.22%] vs 9.80% [7.44–12.80%];  $F = 0.74$ ,  $p = 0.39$ ), but only women reported experiencing fear/threats. Less severe physical abuse perpetration (pushed, held, slapped etc) was more common than more severe abuse (kicked, bit, hit) among both sexes. Males and females were just as likely to report severe physical abuse perpetration, (0.86% [0.58–1.27%] vs 1.71% [0.86–3.37%];  $F = 1.91$ ,  $p = 0.17$ ), and males were more likely to report experience of severe physical abuse than females (3.0% [2.43–3.75%] vs 1.33% [0.64–2.76%];  $F = 7.84$ ,  $p = 0.005$ ). Perpetration of forced acts of sex was only reported by males. The prevalence of experience of sexual abuse was low, but of note it was reported by both sexes.

Bidirectional abuse was also common: 4.94% of military personnel reported both perpetration and experience of either EPC or P/S abuse; 52.74% (95% CI 47.09

	N	%* (95% CI)
Sex		
Female	692	9.71 (8.87–10.63)
Male	4865	90.29 (89.37–91.13)
Age		
20–34	2114	32.69 (31.20–34.20)
35–44	1697	33.91 (32.35–35.51)
45 & over	1746	33.40 (31.88–34.96)
Relationship		
Relationship satisfied	4670	86.27 (85.12–87.35)
Relationship dissatisfied	236	4.32 (3.69–5.06)
Single/divorced/widowed	603	9.41 (8.53–10.37)
(Missing)	(48)	
Education		
No qual/O-level	1652	31.22 (29.71–32.78)
A-level/degree	3877	68.78 (67.22–70.29)
(Missing)	(28)	
Currently serving		
No	2258	55.75 (54.17–57.32)
Yes	3299	44.25 (42.68–45.83)
Status		
Regular	4622	90.94 (90.19–91.64)
Reserve	935	9.06 (8.36–9.81)
Service		
Army	3609	64.53 (62.95–66.07)
RAF	1097	19.08 (17.85–20.37)
Naval Services	851	16.39 (15.20–17.66)
Rank		
Officer	1391	18.42 (17.35–19.54)
NCO	3168	64.84 (63.32–66.33)
Other rank	998	16.74 (15.55–18.01)
Deployment		
Not deployed	1780	36.12 (34.53–37.75)
Combat/Combat support	1580	28.46 (27.01–29.96)
Combat service support	2190	35.41 (33.90–36.96)
(Missing)	(7)	

**Table 1: Characteristics of the military subsample (N = 5557).**

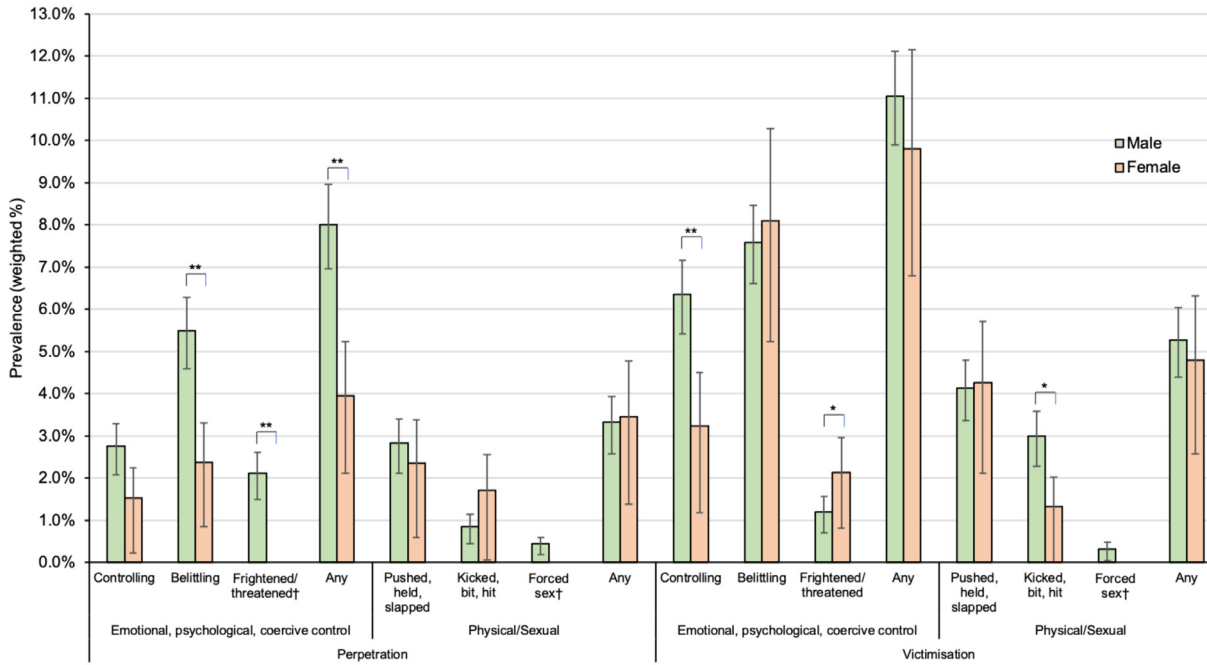
Note:

\* Weighted.

–58.31%) of those who reported IPVA perpetration reported a form of IPVA experience and 38.61% (34.10–43.32%) of those reporting IPVA experience reported a form of perpetration. No significant sex differences were observed.

### Non-military and military factors associated with IPVA among males within the military sample

Relationship dissatisfaction or not being in a relationship at the time of questionnaire completion (having been in one during the previous 12 months) and increased childhood adversity were the non-military and non-mental health factors which were most strongly independently associated with both IPVA perpetration



**Figure 1.** Prevalence of IPVA perpetration and victimisation in military subsample.  
 Note: \* $p < 0.05$ ; \*\* $p < 0.01$ ; †cell counts of less than 10 have been omitted from this figure to preserve anonymity.



and experience. In addition, male sex was independently associated with EPC perpetration, lower educational attainment was independently associated with P/S perpetration. Further, being aged 45 and older (compared to being aged under 35) was associated with reduced odds of P/S and EPC abuse experience. Few military factors were associated with IPVA. Service Branch (i.e. being in the RAF compared to the Army) was independently associated with reduced odds of EPC abuse perpetration. Service branch (being in the Naval Services, compared to the Army) was independently associated with reduced odds of P/S abuse experience. No other military characteristic was independently associated with any IPVA outcome, but military deployment experiences were found to be important. Being deployed in a combat role was independently associated with EPC abuse experience, though not any type of perpetration, while exposure to military trauma was independently associated with EPC and P/S abuse perpetration (severe trauma vs none), and experience of EPC abuse (moderate trauma vs none). Measures of current mental health were the variables most strongly associated with IPVA (Tables 2 and 3). Probable PTSD, anger management difficulties and alcohol misuse were strongly and independently associated with all types of IPVA perpetration and experience. Probable CMD was associated with EPC perpetration, and all types of IPVA experience. All crude odds ratios are presented in Supplementary Table S5.

### Military and civilian comparison

Within the matched military and civilian sample, using weighted comparisons, the odds of IPVA perpetration was significantly higher among military personnel compared to civilians: aOR 3.41 (95%CI 1.79–6.50) (Table 4). This was found for both males and females, 3.69 (1.73–7.88) and 1.85 (1.02–3.35) respectively. Similarly, the odds of any type of IPVA experience was significantly higher among military personnel compared to civilians: aOR 2.94 (95%CI 2.15–4.01). This was again found for both males and females: 3.12 (2.18–4.47) and 1.87 (1.29–2.70) respectively. See Supplementary Table S6 for the association of socio-demographic characteristics with perpetration and experience of IPVA among the military and civilian samples.

### Discussion

This study describes IPVA prevalence in a large UK military sample, draws comparisons with a general population cohort and examines the non-military and military factors associated with IPVA in military males. Our findings suggest that both IPVA experience and perpetration are prevalent among UK military personnel, although rates were lower than in studies of military samples internationally.<sup>3,4,7</sup> Patterns of IPVA in our

sample were however similar to those found in international military populations.

Experience of IPVA was more commonly reported than perpetration, although both were prevalent, and less physically injurious forms of abuse predominated, replicating IPVA patterns observed in military populations internationally.<sup>3,4</sup> Overall, IPVA perpetration was more commonly reported by males than females, driven by increased reporting of EPC abuse perpetration by males, in particular humiliating and frightening/threatening types of abuse, supporting earlier research.<sup>6</sup> Qualitative research has described how aspects of military socialisation, such as aggressive/threatening styles of communication and controlling behaviours, can extend beyond the military environment and into relationships.<sup>2,6</sup> The results of the current study suggest that this phenomenon might be more prominent among male personnel. It is of note that only females reported feeling frightened or threatened by their partners. This may support literature suggesting that experiences of men and women are different, with one key difference being that violence by men against women is experienced by women within a context of real fear.<sup>2,7</sup> However, there is research evidence that some males may underreport feeling fearful or threatened as it undermines their sense of masculinity<sup>2,8</sup> or may minimise or trivialise such experiences as a result of gender socialisation which may be more pronounced in military communities.<sup>29,30</sup> In keeping with some civilian studies,<sup>5</sup> sex differences were not observed in the perpetration of physical IPVA. The prevalence of IPVA experience was more evenly distributed between sexes, contrasting with international military studies which found higher rates of male IPVA experience.<sup>4</sup> However, this is still in contrast to civilian studies which generally find higher rates of IPVA experience among females.<sup>31</sup> Bidirectional abuse was common within military relationships, consistent with research exploring IPVA among military couples in the US and Canada.<sup>7,32</sup>

IPVA perpetration and experience of IPVA were not as clearly associated with socio-demographic factors within the military sample as has been found in civilian research.<sup>5</sup> The association with sex was nuanced and mostly apparent when looking at EPC perpetration, and lower educational attainment was only found to be independently associated with perpetration of P/S abuse. Our finding that individuals who are recently single are more at risk of harm accords with previous findings<sup>5</sup> and highlights this group as particularly vulnerable. No further socio-demographic factors were found to be key correlates. Increased childhood adversity was strongly independently associated with all types of IPVA perpetration and experience, replicating previous findings from military studies<sup>6,7</sup> and highlighting the role of early life vulnerability in both IPVA perpetration and experience. Relationship dissatisfaction was another key

	Physical or sexual perpetration			EPC perpetration		
	Males (N = 4865)		Females (N = 692)	Males (N = 4865)		Females (N = 692)
	n/N (%)	aOR	n/N (%)	n/N (%)	aOR	n/N (%)
Age						
20–34	66/1786 (4.23)	1	13/322 (3.60)	121/1786 (7.83)	1	17/322 (4.80)
35–44	35/1446 (2.99)	0.83 (0.41–1.65)	.. (4.01)	118/1446 (9.34)	1.25 (0.82–1.90)	17/243 (4.64)
45+	38/1616 (2.81)	1.05 (0.52–2.13)	.. (1.95)	99/1616 (6.93)	1.05 (0.67–1.65)	.. (0.81)
Relationship						
Relationship satisfied	102/4117 (2.67)	1	16/541 (2.79)	235/4117 (6.27)	1	20/541 (2.65)
Relationship dissatisfied	15/203 (11.08)	3.86 (1.93–7.71)	.. (1.77)	54/203 (35.16)	7.25 (4.67–11.26)	10/33 (21.55)
Single/divorced/widowed	22/490 (6.22)	2.07 (1.08–3.97)	.. (8.12)	46/490 (12.10)	2.05 (1.33–3.14)	.. (5.89)
Education level						
No qual or O level	67/1479 (5.04)	1.66 (1.05–2.61)	.. (5.47)	108/1479 (8.58)	0.96 (0.70–1.33)	11/168 (3.55)
A level or degree	71/3345 (2.53)	1	15/519 (2.70)	229/3345 (7.78)	1	25/519 (4.13)
Serving						
No	60/1980 (3.58)	1.35 (0.85–2.13)	.. (2.78)	154/1980 (8.31)	1.13 (0.84–1.52)	14/272 (3.14)
Yes	79/2868 (3.00)	1	16/418 (4.28)	184/2868 (7.63)	1	22/418 (4.96)
Regular/reserve status at sampling						
Regular	124/4083 (3.44)	1	16/527 (3.00)	292/4083 (8.15)	1	24/527 (3.55)
Reserve	15/765 (2.11)	0.60 (0.29–1.21)	.. (6.18)	46/765 (6.59)	0.72 (0.44–1.16)	12/163 (6.39)
Service						
Naval Services	19/734 (2.94)	0.68 (0.35–1.30)	.. (2.38)	44/734 (7.15)	0.80 (0.50–1.27)	.. (2.88)
Army	106/3187 (3.77)	1	18/410 (4.34)	244/3187 (8.97)	1	24/410 (4.24)
RAF	14/927 (2.08)	0.49 (0.22–1.11)	.. (2.16)	50/927 (5.40)	0.57 (0.38–0.84)	.. (4.09)
Rank						
Officer	12/1180 (0.93)	0.36 (0.17–0.80)	.. (2.70)	61/1180 (5.87)	0.83 (0.57–1.22)	12/209 (5.00)
NCO	93/2794 (3.62)	1	18/359 (4.19)	223/2794 (8.42)	1	20/359 (4.12)
Other rank	34/874 (4.74)	1.33 (0.66–2.68)	.. (1.69)	54/874 (8.72)	1.12 (0.69–1.80)	.. (1.87)
Childhood adversity						
0–2	15/1221 (1.58)	1	6/289 (1.77)	51/1221 (4.89)	1	11/289 (2.92)
3–5	57/2164 (2.95)	1.58 (0.80–3.12)	.. (2.21)	146/2164 (7.13)	1.33 (0.90–1.97)	14/264 (3.88)
>=6	58/1213 (5.24)	2.41 (1.21–4.83)	11/97 (12.04)	119/1213 (11.53)	1.98 (1.30–3.00)	10/97 (7.93)
Deployment						
Not deployed	41/1476 (2.88)	1	.. (1.83)	77/1476 (6.69)	1	13/298 (2.44)
Combat/Combat support	53/1506 (4.40)	1.52 (0.87–2.65)	.. (10.91)	136/1506 (10.00)	1.28 (0.89–1.84)	.. (6.11)
Combat service support	45/1859 (2.84)	1.21 (0.71–2.07)	10/322 (3.39)	124/1859 (7.62)	1.11 (0.77–1.59)	19/322 (5.07)
Military trauma						
None	53/1910 (2.78)	1	10/358 (1.78)	98/1910 (6.45)	1	14/358 (2.18)
Mild	21/1049 (2.25)	0.93 (0.49–1.75)	.. (5.43)	60/1049 (6.18)	0.92 (0.60–1.39)	10/143 (7.39)
Moderate	28/740 (5.27)	1.97 (1.10–3.51)	.. (8.32)	59/740 (9.48)	1.27 (0.83–1.93)	.. (4.76)
Severe	33/788 (4.77)	1.66 (0.92–3.00)	.. (3.58)	97/788 (13.20)	1.93 (1.33–2.81)	.. (2.14)
Probable PTSD						
No	109/4550 (2.69)	1	22/645 (3.24)	265/4550 (6.63)	1	30/645 (3.49)
Yes	29/254 (12.81)	3.03 (1.66–5.54)	.. (7.55)	70/254 (27.98)	3.73 (2.46–5.65)	.. (12.05)
Alcohol misuse						
No	102/4340 (2.62)	1	17/644 (2.59)	242/4340 (6.23)	1	29/644 (3.51)
Yes	36/474 (9.37)	2.78 (1.63–4.75)	.. (21.92)	93/474 (23.04)	3.45 (2.40–4.97)	.. (12.93)
Common mental disorders						
No	80/3769 (2.52)	1	16/503 (3.10)	167/3769 (5.35)	1	17/503 (2.80)
Yes	57/1045 (6.18)	1.97 (1.24–3.14)	.. (4.75)	168/1045 (17.62)	2.93 (2.15–4.00)	19/181 (7.73)
Anger score						
0–11	74/4084 (2.00)	1	18/621 (2.53)	189/4084 (5.25)	1	30/621 (3.76)
12+	56/636 (10.32)	4.06 (2.47–6.68)	.. (16.94)	141/636 (24.45)	4.34 (3.14–5.98)	.. (7.57)

**Table 2: Socio-demographic, military, pre-enlistment, deployment and mental health risk factors for any physical or sexual, and any emotional/psychological/coercive control (EPC) IPVA perpetration.**

Note: \*Weighted; .. cell counts less than 10 have been omitted to preserve anonymity.

<sup>a</sup>Sociodemographic, military and pre-enlistment factors adjusted for socio-demographic, military and pre-enlistment factors; Deployment and mental health factors adjusted for relationship, education, rank, and childhood adversity.

<sup>b</sup>Sociodemographic, military and pre-enlistment factors adjusted for socio-demographic, military and pre-enlistment factors; Deployment and mental health factors adjusted for relationship, service, and childhood adversity.

aOR=adjusted Odds Ratio; NCO=non-commissioned officer; PTSD=posttraumatic stress disorder.

factor associated with both IPVA perpetration and experience, supporting previous findings.<sup>6,7</sup>

Limited existing research has not shown the prevalence of IPVA to consistently vary by specific military characteristics, except being higher among Army personnel,<sup>3,4</sup> in keeping with research into general violence perpetration.<sup>33</sup> Resonating with these findings,

the only military characteristic independently associated with IPVA was Service branch. Being in the Army was independently associated with higher risk of all types of IPVA perpetration compared to RAF and the prevalence of P/S abuse experience was significantly higher in the Army compared to RAF and Navy. In-depth qualitative research has shed some light on possible mechanisms



	Physical or sexual victimisation			EPC victimisation		
	Males (N = 4865)		Females (N = 692)	Males (N = 4865)		Females (N = 692)
	n/N (%)	aOR <sup>a</sup>	n/N (%)	n/N (%)	aOR <sup>b</sup>	n/N (%)
Age						
20–34	133/1781 (8.01)	1	17/322 (5.14)	204/1782 (12.48)	1	35/322 (8.84)
35–44	67/1446 (5.37)	0.75 (0.47–1.21)	15/242 (4.96)	186/1446 (13.34)	1.22 (0.87–1.71)	30/243 (12.19)
45+	45/1616 (2.68)	0.43 (0.25–0.75)	.. (3.71)	128/1616 (7.61)	0.64 (0.43–0.94)	10/125 (6.43)
Relationship						
Relationship satisfied	151/4113 (3.87)	1	15/541 (1.92)	302/4114 (7.53)	1	31/541 (5.22)
Relationship dissatisfied	40/203 (20.98)	6.15 (3.63–10.44)	.. (18.77)	97/203 (49.92)	10.85 (7.28–16.16)	12/33 (42.45)
Single/divorced/widowed	54/489 (11.83)	2.59 (1.64–4.09)	17/111 (17.29)	113/489 (26.26)	3.91 (2.83–5.42)	32/112 (26.18)
Education level						
No qual or O level	106/1475 (7.53)	1.46 (1.00–2.13)	12/168 (5.70)	172/1476 (12.35)	1.10 (0.83–1.44)	21/168 (10.45)
A level or degree	136/3344 (4.22)	1	24/518 (4.38)	341/3344 (10.46)	1	53/519 (9.51)
Serving						
No	89/1979 (5.20)	1.36 (0.93–2.00)	14/272 (3.93)	208/1979 (10.80)	1.21 (0.93–1.58)	26/272 (8.22)
Yes	156/2864 (5.38)	1	23/417 (5.83)	310/2865 (11.39)	1	49/418 (11.73)
Regular/reserve status at sampling						
Regular	206/4078 (5.36)	1	27/526 (4.47)	427/4079 (11.02)	1	51/527 (8.98)
Reserve	39/765 (4.38)	0.78 (0.48–1.27)	10/163 (6.70)	91/765 (11.47)	1.12 (0.78–1.61)	24/163 (14.65)
Service						
Naval Services	29/734 (3.32)	0.46 (0.27–0.80)	.. (3.24)	71/734 (9.39)	0.86 (0.60–1.24)	.. (4.71)
Army	185/3182 (6.26)	1	24/409 (5.75)	359/3183 (11.66)	1	52/410 (11.90)
RAF	31/927 (3.56)	0.58 (0.33–1.01)	.. (3.63)	88/927 (10.39)	0.93 (0.66–1.30)	15/169 (8.54)
Rank						
Officer	28/1180 (2.44)	0.71 (0.41–1.22)	.. (3.49)	93/1180 (8.85)	1.06 (0.76–1.48)	18/209 (8.27)
NCO	142/2792 (5.12)	1	22/359 (5.66)	306/2792 (10.78)	1	44/359 (10.76)
Other rank	75/871 (8.95)	1.37 (0.85–2.21)	.. (3.27)	119/872 (14.51)	1.20 (0.83–1.74)	13/122 (8.27)
Childhood adversity						
0–2	33/1220 (3.25)	1	.. (2.34)	79/1220 (6.49)	1	21/289 (7.75)
3–5	104/2162 (4.78)	1.24 (0.76–2.03)	16/264 (4.32)	224/2162 (10.66)	1.57 (1.10–2.24)	31/264 (9.52)
>=6	89/1211 (7.43)	1.62 (0.97–2.72)	15/97 (13.87)	184/1212 (15.07)	2.09 (1.44–3.05)	21/97 (17.20)
Deployment						
Not deployed	78/1474 (4.86)	1	14/298 (3.37)	132/1475 (8.74)	1	25/298 (6.70)
Combat/Combat support	89/1504 (6.69)	1.08 (0.70–1.67)	.. (10.41)	198/1504 (13.61)	1.42 (1.03–1.97)	11/70 (17.67)
Combat service support	78/1858 (4.48)	0.86 (0.55–1.33)	16/321 (4.94)	187/1858 (11.18)	1.25 (0.90–1.73)	39/322 (11.21)
Military trauma						
None	97/1907 (4.64)	1	18/358 (3.85)	166/1908 (8.72)	1	31/358 (6.42)
Mild	37/1049 (4.15)	0.82 (0.49–1.36)	.. (4.45)	96/1049 (11.11)	1.27 (0.89–1.81)	15/143 (11.43)
Moderate	42/739 (6.79)	1.33 (0.79–2.24)	.. (8.00)	89/739 (12.49)	1.27 (0.86–1.86)	13/99 (17.60)
Severe	52/787 (6.88)	1.09 (0.67–1.75)	.. (7.87)	129/787 (15.69)	1.63 (1.16–2.29)	.. (12.06)
Probable PTSD						
No	200/4545 (4.39)	1	31/644 (4.23)	410/4546 (9.34)	1	66/645 (9.32)
Yes	44/254 (18.74)	3.42 (2.10–5.59)	.. (14.31)	107/254 (37.06)	3.76 (2.56–5.54)	.. (19.14)
Alcohol misuse						
No	193/4335 (4.43)	1	32/643 (4.57)	410/4336 (9.62)	1	66/644 (9.32)
Yes	49/474 (12.08)	2.30 (1.47–3.61)	.. (8.74)	104/474 (23.09)	1.97 (1.39–2.79)	.. (20.46)
Common mental disorders						
No	143/3766 (3.86)	1	20/503 (3.85)	255/3766 (7.06)	1	41/503 (7.80)
Yes	101/1043 (10.54)	2.21 (1.53–3.19)	17/180 (7.93)	262/1044 (25.78)	3.56 (2.74–4.63)	34/181 (16.47)
Anger score						
0–11	157/4079 (3.71)	1	35/620 (5.06)	334/4080 (8.35)	1	66/621 (9.12)
12+	80/636 (14.39)	2.99 (2.02–4.43)	.. (3.19)	175/636 (27.61)	2.90 (2.15–3.92)	.. (21.41)

**Table 3: Socio-demographic, military, pre-enlistment, deployment and mental health risk factors for any physical or sexual, and any emotional/psychological/coercive control (EPC) IPVA victimisation.**

Note: \*Weighted; .. cell counts less than 10 have been omitted to preserve anonymity.

<sup>a</sup> Socio-demographic, military and pre-enlistment factors adjusted for socio-demographic, military and pre-enlistment factors; Deployment and mental health factors adjusted for age, relationship, education, and service.

<sup>b</sup> Socio-demographic, military and pre-enlistment factors adjusted for socio-demographic, military and pre-enlistment factors; Deployment and mental health factors adjusted for age, relationship, and childhood adversity.

aOR=adjusted Odds Ratio; NCO=non-commissioned officer; PTSD=posttraumatic stress disorder.

for these associations, including military training and hierarchy, styles of communication, and experiences of deployment and military traumas.<sup>26</sup> While all these issues are relevant across the Service Branches, they may be more pronounced among Army personnel.

Contrary to international studies of veteran populations reporting higher prevalence of IPVA perpetration

compared to studies of active duty personnel,<sup>3</sup> no differences in perpetration or experience rates were found by serving status. Some studies have found higher prevalence of IPVA among lower ranks (enlisted personnel) when compared to higher ranks (officers).<sup>3</sup> This study also found higher prevalence of all types of IPVA perpetration and experience of P/S abuse experience in lower

	Civilian (APMS; N = 6132) N (%)*	Military (KCMHR; N = 8093) N (%)*	Unadjusted OR (95%CI)	Adjusted for age aOR (95% CI)	Adjusted for marital status aOR (95% CI)	Adjusted for education <sup>†</sup> aOR (95% CI)	Adjusted for SES <sup>†</sup> aOR (95% CI)	Adjusted for childhood physical abuse <sup>†</sup> aOR (95% CI)	Multivariable aOR (95% CI)
<b>Perpetration</b>									
Overall	47 (1.0)	210 (3.3)	3.30 (1.93–5.64)	3.35 (1.96–5.72)	3.28 (1.84–5.84)	3.39 (1.97–5.83)	3.03 (1.71–5.35)	3.96 (2.33–6.73)	3.41 (1.79–6.50)
Males (APMS=2469, KCMHR=7051)	13 (1.0)	184 (3.4)	3.60 (1.92–6.78)	3.68 (1.96–6.90)	3.51 (1.78–6.94)	3.70 (1.96–7.00)	3.35 (1.71–6.55)	4.36 (2.33–8.15)	3.69 (1.73–7.88)
Females (APMS=3663, KCMHR=1042)	34 (1.5)	26 (2.6)	1.72 (0.97–3.05)	1.70 (0.97–3.00)	1.87 (1.08–3.25)	1.79 (1.00–3.18)	1.46 (0.82–2.60)	1.95 (1.11–3.43)	1.85 (1.02–3.35)
<b>Victimisation</b>									
Overall	203 (3.9)	687 (9.7)	2.65 (2.01–3.50)	2.69 (2.04–3.55)	2.97 (2.22–3.98)	2.71 (2.05–3.57)	2.41 (1.79–3.23)	2.98 (2.26–3.93)	2.94 (2.15–4.01)
Males (APMS=2469, KCMHR=7051)	60 (3.6)	606 (9.8)	2.88 (2.08–3.99)	2.94 (2.12–4.06)	3.17 (2.25–4.46)	2.94 (2.13–4.07)	2.59 (1.84–3.63)	3.28 (2.37–4.54)	3.12 (2.18–4.47)
Females (APMS=3663, KCMHR=1042)	143 (5.8)	81 (8.5)	1.50 (1.08–2.07)	1.46 (1.06–2.02)	1.76 (1.27–2.45)	1.51 (1.09–2.09)	1.39 (0.98–1.97)	1.54 (1.11–2.13)	1.87 (1.29–2.70)

**Table 4: Military and general population comparison of perpetration and victimisation of IPV among males and females.**

Note:

\* weighted.

† also adjusted for age.

ranks compared to officers, but the association was not maintained after adjustment for socio-demographic and military confounders. No significant difference in prevalence rates between regulars and reserves was found, adding to existing limited research.<sup>4</sup>

Deployment-related factors and mental health and alcohol misuse problems were found to be key factors associated with abusive behaviours within relationships. A small number of previous studies have explored the impact of deployment and combat on the risk of IPV, with mixed findings.<sup>3,4</sup> Our findings suggest that previous deployment experience or role while on deployment were not independently associated with any type of IPV perpetration, but that being deployed in a combat role was associated with an increased risk of EPC abuse experience. Of note, however, intensity of exposure to trauma while on deployment was associated with increased risk of perpetration of all types of IPV, adding to the mounting evidence for the link between deployment-related trauma and IPV perpetration.<sup>8,34</sup> Intensity of trauma exposure was also found to be associated with EPC abuse experience among military personnel, which is a new finding, and highlights a broader vulnerability associated with traumatic experiences beyond the risk of perpetration. Supporting existing literature, probable mental health difficulties and alcohol misuse were strongly and independently associated with IPV perpetration and experience (probable CMD associated with EPC abuse perpetration only).<sup>6,8,12,13</sup> This adds to recent research finding an association between IPV and post-deployment mental health difficulties.<sup>34</sup> Qualitative work has facilitated better understanding of the complexity and nuances of the association between deployment, mental health difficulties and both IPV perpetration and experience, the different potential underlying pathways and mechanisms, and different contexts in which it can arise.<sup>26</sup> For example, in studies of the impact of military service in relationships, many participants described mutually conflictual relationships.<sup>26</sup> In the context of such relationships, some participants described how the experience of being deployed in a combat role and experiencing trauma could result in them returning with problems with emotional hyperarousal, perhaps in the context of PTSD, which resulted in them engaging in increased aggressive behaviour within their relationship. Whereas others reported the return from combat to be associated with mental health difficulties which resulted in their withdrawal from their partner, increased arguments and shifts in the power dynamics within their relationships resulting in them experiencing more controlling behaviours by their partners.

Using the best available UK general population comparison sample,<sup>18</sup> our findings suggest that self-reported IPV experience and perpetration was significantly higher in the military compared to the general population cohort for both males and females even after

adjustment for population differences in socio-demographics and early life abuse, which were found to be associated with IPVA in both populations (Supplementary Table S4). This is consistent with crude findings from preliminary systematic reviews undertaken by our group.<sup>3,4</sup> Both military and non-military factors which were shown to be associated with increased risk of IPVA in the military sample may provide possible explanations for the increased IPVA compared to the general population cohort. Recent research studies have described how military life and experiences can negatively affect relationship satisfaction and occurrence of abusive behaviours in relationships<sup>26</sup> and found higher prevalence of mental health and alcohol difficulties in military compared to civilian samples.<sup>35</sup> In particular, the current study suggests that the psychological and behavioural consequences of deployment trauma, as well as increased mental health and alcohol problems, may in part explain the increased prevalence of IPVA in the military compared to the UK general population cohort.

This study provides the first estimates for IPVA prevalence in the UK military and a robust comparison with a large general population cohort. Extrapolation of these findings to countries outside of the UK is potentially limited by differences in the experiences of military personnel, as well as differences in prevalence of civilian IPVA. Given the paucity of studies researching male experience of IPVA,<sup>4</sup> this study represents a major contribution to the literature. However, lack of data from partners'/spouses' and on the context of the IPVA was a limitation which restricted interpretation. For example, it was not possible to categorise acts of perpetration as occurring in the context of a mutually conflictual relationship or in self-defence/retaliation. The use of the term 'perpetration' is therefore problematic in light of this lack of contextual or partner data. Despite the large sample size, low numbers of female personnel precluded our ability to explore risk factors in females only. Our findings may underestimate prevalence of IPVA in the military sample, as our measure excluded those who may have experienced IPVA by or perpetrated it against an ex-partner within the last year. As in other population studies of IPVA,<sup>36</sup> we suspect a tendency to under-report more severe IPVA in this study too. It is likely that a proportion of what is reported is 'situational couples' violence', especially given the level of bidirectional abuse reported, though further information on the bidirectional nature of abuse within military relationships (e.g. symmetry) was limited. The risk factors may be more reflective of those associated with this type of IPVA rather than more severe unidirectional abuse. Furthermore, low reporting of sexual IPVA did not allow for further analysis. Importantly, this study did not measure frequency or impact of IPVA or the nature of relationships, e.g. heterosexual/homosexual. Such measures are critical to understanding sex differences

in IPVA experiences beyond just incidence of perpetration and victimisation.<sup>37</sup> Although not the focus of the study, ethnicity is not adjusted for in the present analysis. This study made direct comparison between IPVA in the military sample and IPVA in a civilian dataset. The IPVA questions asked of the general population cohort were very similar to those asked of the military sample, but not exactly the same, which may have explained some of the discrepancy in prevalences between the two populations. Although adjustments were made for a number of differences between the populations, we could not adjust for variables for which we did not collect data. The number of questions asked for each IPVA outcome had to be restricted to two due to the size of the overall questionnaire. It is best practice to have more questions on each type of violence. Further research should examine lifetime prevalence of IPVA among personnel and include measures of frequency and impact of IPVA, explore sexual IPVA and bidirectional abuse in more depth, and the role of ethnicity, which may differentially impact risk of IPVA.<sup>6,8</sup>

The present research provides robust evidence of high prevalence of both IPVA perpetration and victimisation among military personnel. It further confirms that, similar to international military populations, male experience of IPVA and bidirectional IPVA is prevalent. These findings warrant further exploration of what male experience of IPVA looks like in terms of frequency and impact, and consideration of the effect of bidirectional abuse within relationships both on the partners involved and others in the household who may be exposed, particularly children. These findings add to the growing literature on drivers of IPVA in wider society<sup>9</sup> with critical information on drivers of IPVA in military populations. Exposure to military trauma and elevated prevalence of probable mental disorders and alcohol misuse, all of which are associated with IPVA perpetration and victimisation, mark key potential differences between the military and civilian samples in this study. The higher prevalence of both perpetration and victimisation in the Army requires further attention and qualitative research is key to understanding the underlying reasons.<sup>26</sup> These findings will support the development of effective IPVA prevention interventions for this population in the UK. They underline the role that mental health services can and should play in the prevention, identification and management of IPVA in military communities and, in particular, highlight the need for trauma informed IPVA interventions as have been developed in the US, such as the Strength at Home, Veteran's Program, which incorporates components of interventions for IPVA and trauma, targets mechanisms implicated in the relationship between trauma and IPVA, and has shown promise in randomised controlled trials.<sup>38</sup> Together, the findings from this study will support the further refinement of the UK Government military specific Domestic Abuse

Strategy<sup>16</sup> to ensure tailored support for military communities in the UK.

### Contributors

DM was responsible for the conception and design of the project, the analyses, and the writing and revision of the manuscript. RS was responsible for the data management, analyses and contributed to the writing and revision of the manuscript. RL was involved in the writing, submission and revision of the manuscript. MJ contributed to the design and data management and writing and revision of the manuscript. LH was responsible for project management of the KCMHR cohort study and hence collection of the data used for this manuscript and the writing of the manuscript. LMH was an advisor on the research project and contributed to the writing of the manuscript. NF was responsible for the design and data collection for the KCMHR cohort study and contributed to the design of the project, analyses and writing of the manuscript.

### Data sharing statement

Data are available on reasonable request. Given the sensitive nature of the data, data have not been made widely available. Requests for data will be considered on a case-by-case basis and will be subject to appropriate ethical and any other required approvals.

### Ethical approval

Ethical approval for the study was granted by the UK Ministry of Defence Research Ethics Committee (reference: 448/MODREC/13) and the King's College London Psychiatry Nursing and Midwifery Research Ethics Subcommittee (Reference: PNM/12/13-169).

### Declaration of interests

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analysis, interpretation or decision to submit this paper. We disclosed the paper to the Ministry of Defence at the point we submitted it for publication.

### Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:[10.1016/j.lanepe.2022.100448](https://doi.org/10.1016/j.lanepe.2022.100448).

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