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Title: Service use following violence: insights from the linked administrative data in South Wales

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Abstract

Background: To better support victim-survivors of violence and inform violence prevention initiatives, it is important to understand potential barriers and facilitators for using services such as healthcare and police. Administrative data are often limited to the users of a particular service, while linked data provides an opportunity to examine factors associated with the use of multiple services or one over the other. The present research used linked emergency department (ED) and police data from South Wales to understand the individual and contextual factors associated with the use of healthcare and police support.

Methods: Analyses of the sociodemographic characteristics of victims and characteristics of violent incidents were conducted for the incidents that appeared in the police data only, ED data only, and both services. Adjusted logistic regressions were used to examine factors associated with contacting both services and police first.

Results: Victims of violent incidents that happened at the victim's home rather than on the street were more likely to approach the police in addition to the ED. Those who experienced violence from a current or former partner were also more likely to approach the police first than those who experienced violence from a stranger. If a violence incident happened at a workplace, victims who used the ED were less likely to approach the police. Older age and alcohol consumption were associated with the use of both services.

Conclusions: More measures are required to encourage young people to use services. Identifying and addressing barriers for disclosing workplace violence is recommended.

Key words: violence, abuse, healthcare use, police use, injuries, emergency department

37 Introduction

38 Following experience of violence and abuse, many victim-survivors have multiple needs, for
39 example, health-related, psychological, emotional, and social wellbeing, financial, physical
40 protection, and/or justice, and as a result require support from different services. These services
41 might include police, healthcare, and specialised services (e.g., specialist domestic and family
42 violence services, sexual assault referral centres). However, despite the range of needs, some
43 people do not receive the types of support required (1), might only access one service, or
44 approach and receive one type of support initially. The factors that affect the use of services
45 might include individual characteristics (e.g., age, gender (2), ethnicity, migration status (3)),
46 contextual and violence incident related factors (e.g., health harms, type of violence, victim-
47 perpetrator relationship (4), use of weapon, location and time of the incident (5)), as well as
48 organisational factors (e.g., lack of access to the service (3), community norms (6), lack of
49 trust, institutional racism (7), and fear of discrimination).

50 Understanding the barriers and facilitators influencing service use among people who
51 experience violence is essential for improving support for victim-survivors, identifying and
52 addressing service gaps, informing service planning and delivery, and strengthening violence
53 prevention initiatives (8). Mainly qualitative research has looked at the barriers to using
54 healthcare (1). A limited number of quantitative studies used survey data (4, 9), and some
55 studies used administrative data to measure characteristics of the health service users (10, 11).
56 However, administrative data from one service is limited to people who use the service and
57 does not provide an opportunity to understand why some people did not use it. Survey-based
58 research has more frequently examined the use of criminal justice services, yet such studies did
59 not provide any insight on health service use (12, 13). Therefore, linked data from multiple
60 services can be a more suitable alternative for learning about the factors associated with the
61 use of various services (14).

The Cardiff model of violence prevention, an evidence-based, public health approach that uses data from emergency departments (EDs) and police (15, 16) to identify and prevent violence, has been widely adopted (17). While the Cardiff Model does not include linked data, many studies have moved beyond the model and applied linked data to compare the prevalence in different data sources and by subgroups (18). South Wales has implemented a routine sharing and linking of data on violence from multiple sources: recorded by the police, emergency department (ED) assaults from local health boards, and violence-related call-outs from the ambulance services (19). The linked data allowed identifying the violent incidents and victims less likely to be reported to the police and improving the understanding of violence distribution within the region (5).

There is currently limited evidence on the factors associated with the use of specific services, patterns of multiple service use, and the sequencing of service utilisation. These insights can be valuable for informing the design and implementation of violence prevention initiatives. The current research used linked ED and police data from South Wales to observe any seasonal and annual changes in the use of both services over the study period and understand the individual and contextual factors associated with the use of healthcare and police. Specifically, the study aimed to identify factors associated with the use of ED services only or police services only; to examine factors associated with approaching the police or ED first; and, among individuals who accessed both services, to identify factors associated with reporting to the police. We expected that the sociodemographic characteristics such as older age and greater level of socioeconomic deprivation, as well violent incident characteristics such as presence of injury, use of weapon, and a greater number of perpetrators were associated with the greater odds of appearing in the ED and police records. We also expected that there would be less recorded incidents of violence in both ED and police records during the national Covid lockdowns.

87 Methods

88 *Data sources*

89 This study used data on violent incidents recorded in the linked South Wales Police and
90 Emergency Department (ED) assault attendance data. The data were collected over the period
91 from the 1st of January 2018 until the 31st of July 2021.

92 *Emergency Department data*

93 Data from ED included incidents where an individual attended an ED following a violent
94 assault (ED assault attendances). Data on ED assault attendances were collected in three South
95 Wales local health boards including Cardiff and Vale, Cwm Taf Morgannwg¹, and Swansea
96 Bay² University Health Boards (UHB) in addition to a local inner-city alcohol treatment centre.
97 ED reception staff documented records of assaults upon the patient's arrival.

98 *Police data*

99 Police data included incidents of violence that included a list of instances of physical and sexual
100 assaults and robbery of personal and business property recorded in the South Wales Police
101 Force Region. The sample was convenience sample, as it included data from the police stations
102 and health boards that contributed to the dataset. However, this included data from all three
103 health boards in South Wales and the largest police force of the country, which serves 42 per
104 cent of the Welsh population (20). The three South Wales health Boards included in this study
105 cover the same geographical footprint as South Wales Police force area.

106 *Linked data*

¹ Cwm Tat Morgannwg UHB changed their name from Cwm Taf UHB in April 2019

² Swansea Bay UHB changed their name from Abertawe Bro Morgannwg UHB in April 2019

The data from ED and police were linked by patient name, age, and either date of arrival at ED or police ‘crime date’. Crime date refers to the date when police formally record the incident as a crime, which in most cases matches the day of the incident occurrence but can take place within 72 hours of the occurrence.

The most appropriate method of matching criteria for cross-referencing ED and police data was tested using 2015 data. First, the audit was conducted for the matching criteria to check the missingness of the data, and first name, surname initial, age and reported/visit date showed nearly 100% completion. After that, four different methods of matching were tested using combinations of full first name, first name initial, and first two letters of first name, exact matching date of ED visit and reported crime date and extending the data searched by +/- 1 day for reported/visit day. A matching algorithm that used first two letters of the first name + first letter of the surname + age (± 1 year) + date of ED attendance/reported crime date (± 1 day) yielded a greatest number of matches. Following that, the 10% of the new matches were manually checked against the matching method and resulted in 100% true matches (positive predictive value). The algorithm accounted for late-night assaults, for example when an individual reported the incident to the police and then accessed the ED in the early hours of the following day or vice versa (5, 19).

Measures

ED data included the patient’s age at time of assault (grouped as “Under 16”, “16-19”, “20-29”, “30-39”, “40-49”, “50-59”, “60-69”, “70-79”, “80 and over”) and the patient’s sex (recorded as “female”, “male”, or “unknown”). Information on the deprivation quintile of the patient’s residence postcode (1 to 5, “unknown”) was also recorded. Deprivation quintiles were determined from victim and patient postcodes using the 2019 version of the Welsh Index of Multiple Deprivation (WIMD), which is made up of eight separate domains of deprivation,

including income, employment, health, education, access to services, housing, community safety, and physical environment (21).

ED data also had information related to violent incidents including the assailant relationship to patient (grouped as “intimate partner/ex-partner”, “family member”, “acquaintance/friend”, “stranger”, “unknown/missing”), number of assailants (1, 2, 3+, “unknown/missing”), and assault weapon (grouped as “blunt object”, “body part”, “pushed”, “sharp object”, and “unknown/missing”), and assault site description (“street”, “licensed premise”, “own home”, “someone else’s home”, “workplace”, “other”, “unknown/missing”). Additionally, assault date (in “day/month/year” format), assault time (“hour/minute/second”), date of arrival (“day/month/year”), and time of arrival (“hour/minute/second”) were recorded.

Variables recorded in the police data included victim’s age group (grouped as Under 16”, “16-19”, “20-29”, “30-39”, “40-49”, “50-59”, “60-69”, “70-79”, “80 and over”) and sex (recorded as “female”, “male”, “unknown”). Police records also held information on type of crime (“violence against person”, “robbery”, “sexual violence”). Presence of injury was derived from Administrative Data Research (ADR) textual data item and coded as “with injury”, “without injury”, or “not mentioned”. Information whether the incidence was alcohol related (“yes”, “no”) was recorded. Also, police records had data on reported date (“day/month/year”), reported time (“hour/minute/second”), and crime recorded date (“day/month/year”).

Additionally, a Covid lockdown variable was generated using the Welsh national Covid lockdown timelines: “lockdown 1” for the incidents recorded between the 23rd of March 2020 and 31st of May 2020, “lockdown 2” for the 23rd of October 2020 to 8th of November 2020, and “lockdown 3” for the 20th of December 2020 to the 12th of March 2021 (19).

Statistical analysis

Analyses were undertaken using R studio (version 4.2.2).

Initial descriptive statistical analyses were conducted for sociodemographic characteristics of victims and characteristics of the incident of violence separately for those who only approached police (age category, sex, type of crime, association with alcohol, injury, Covid lockdown) and those who only accessed ED support (age group, sex, quintile, assault site description, relationship with the assailant, number of assailants, assault weapon, Covid lockdown). Additionally, separate descriptive analyses were conducted for victims who accessed both services but approached police first and ED first (age category, sex, type of crime, association with alcohol, injury, quintile, assault site description, relationship with the assailant, number of assailants, assault weapon, Covid lockdown). We used the ED date and time of arrival, and the police reported date and time to estimate whether the individuals who accessed both services approached ED or police first.

To observe any seasonal and lockdown related trends in police and ED attendance due to assaults during the study period, the counts of visits per week for both ED and police were produced between the 1st of January 2018 and the 31st of January 2021. The police data missed reported date for the dates between 30-03-2019 and 29-12-2019 and between 25-04-2020 and 03-03-2021, and for these observations the reported dates were replaced with crime report date. The ED and police victim datasets were merged using the linked data file that had identifiers from the police files (police occurrence number) and ED (A&E record number). Before merging, the police victim file was reshaped from long to wide format, to distinguish multiple incidents of assault against the same individual. The data curation workflow is presented in Figure 1.

We examined the patterns in temporal trends on the number of visits to the police and ED separately (Figure 2).

Adjusted logistic regression models were used to examine the sociodemographic factors and violence related characteristics associated with approaching police (binary outcome - yes/no) among all the victims who used ED (independent variables were sex, age group, deprivation quintile, relationship with the assailant, assault weapon, number of assailants) and factors associated with seeking ED support (binary - yes/no) among all violence victims who approached police (independent variables were sex, age group, type of crime, injury, alcohol related). We also examined the order of services sought among those who went both to ED and police produced different insights, using an adjusted logistic regression model to analyse factors associated with approaching police first (independent variables: sex, age group, quintile, relationship with the assailant, assault weapon, number of assailants, type of crime, injury, alcohol related).

Results

A total of 199,401 observations were present in the linked ED and police dataset between 2018 and 2021 and used for the analysis (Figure 1). Among these incidents, 185,760 were recorded in the police records only, 7,946 were recorded in ED only, and 5,440 appeared in both services records. Figure 2 shows the temporal trend in the number of visits to the police or ED between the 1st of January 2018 and 24th of January 2021. During that period, there were drops in the police visits around the wintertime in 2018, 2019, and 2020 as well as in the spring 2020 in both police and ED records. There were also drops observed in the police records in December 2020. Spikes were observed in the summer of 2018, February 2019, and summer 2020 in both records; and summer 2019, February-March 2020, August 2020, November 2020, and January 2021 in the police records.

Characteristics of the victims and factors associated with violent incidents for those who only sought police, ED, or both are presented in Tables 1 and 2. Those aged 20 to 29 and 30 to 39

were the most frequent groups in accessing both police only and ED; and more than a half of victims who appeared in ED records only were 20 to 39. There were more females than males who only sought support from the police and approached the police first police if the support from both services was sought, but more males than females accessed the ED only or approached ED first. Majority of cases recorded in the police data were not related to alcohol (93.6%, 95% CI 93.5-93.8), did not have information about an injury (62.2%, 95% CI 62.0-62.4).

More patients from the most deprived quintile (37.5%, 95% CI 36.5-38.6) were recorded in the ED data, and a downward gradient was observed moving to less deprived quintiles. The most common location for the assault of the ED patients and those who sought help from both ED and police was on the street (26.2%, 95% CI 25.2-27.1), and a stranger was the most common assailant (52.0%, 95% CI 50.9-53.1). However more assaults happened at victims' own homes among the individuals who approached the police first (28.6%, 95% CI 27.1-30.1). Also, there was a higher proportion of victims who experienced violence from an intimate partner/ex-partner (16.4%, 95% CI 15.2-17.6) and a family member (6.0%, 95% CI 5.2-6.8) in the cases when the police support was sought first. In more than half of the records in ED data (58.3%, 95% CI 57.2-59.4), there was one assailant, and a body part (65.4%, 95% CI 64.4-66.5) was the most common assault weapon.

Regression results at presented in Tables 3 and 4.

Approaching police among the ED recorded incidents

Older victim age was associated with approaching police among those who accessed the ED: compared with victims aged 20–29, the odds were higher for those aged 50–59 (AOR 1.22, 95% CI 1.06–1.42), 60–69 (AOR 1.73, 95% CI 1.36–2.21), and 70–79 (AOR 2.13, 95% CI 1.38–3.30). Other factors included experiencing violence from an intimate partner/ex-partner

(AOR 1.54, 95% CI 1.32-1.81) and an acquaintance/friend (AOR 1.36, 95% CI 1.23-1.50) compared with a stranger, the use of a sharp object in the assault (AOR 1.31, 95% CI 1.07-1.60), being assaulted in victim's own home (AOR 1.17, 95% CI 1.02-1.33), and accessing ED during the third national Covid lockdown (AOR 1.98, 95% CI 1.58-2.50). Odds of accessing the police among the ED patients were lower for the cases when a body part was used as an assault weapon (AOR 0.80, 95% CI 0.69-0.92) or the victim was pushed (AOR 0.57, 95% CI 0.43-0.75), when there were 3 or more assailants (AOR 0.87, 95% CI 0.78-0.98) and when the number of assailants was unknown (AOR 0.71, 95% CI 0.61-0.83), if assault happened at a victim's workplace (AOR 0.52, 95% CI 0.44-0.61), and if the victim accessed ED during the first Covid lockdown (AOR 0.32, 95% CI 0.24-0.42) or second lockdown (AOR 0.44, 95% CI 0.27-0.69) (Table 3).

Approaching ED among the police recorded incidents

Odds of approaching the ED among the police help seekers gradually decreased with age when compared to 20–29-year-olds: aged 30-39 (AOR 0.82, 95% CI 0.76-0.88), 40-49 (AOR 0.71, 95% CI 0.65-0.78), 50-59 (AOR 0.69, 95% CI 0.62-0.77), 60-69 (AOR 0.61, 95% CI 0.52-0.72), 70-79 (AOR 0.42, 95% CI 0.32-0.55), and 80 and over (AOR 0.22, 95% CI 0.13-0.33). Also, those under 16 were less likely to approach ED (AOR 0.73, 95% CI 0.65-0.81) than people aged 20-29. However, those aged 16 to 19 had higher odds of accessing ED (AOR 1.18, 95% CI 1.07-1.30).

The violent incidents characteristics associated with approaching the ED among all incidents recorded in the police included experience of robbery (AOR 6.82, 95% CI 5.74-8.07) compared to experiencing violence against a person and incidents related to alcohol consumption (AOR 1.40, 95% CI 1.28-1.52). Compared to the police recorded incidents when it was specifically stated that no injury was present, incidents with injury had higher odds of appearing in the ED

data (AOR 7.60, 95% CI 6.94-8.33), while those without any information about injury had lower odds of being in the ED records (AOR 0.84, 95% CI 0.76-0.94). If the incidents were recorded by the police during the first (AOR 0.46, 95% CI 0.35-0.59), second lockdown (AOR 0.52, 95% CI 0.37-0.70), or third lockdown (AOR 0.85, 95% CI 0.74-0.98) they were less likely to appear in ED records, in comparison with incidents recorded outside of the lockdowns (Table 3).

Approaching police first

Among the incidents that appeared in both services data, those where victims were under the age of 16 were less likely to be recorded by the police first compared with incidents with victims aged 20 to 29 (AOR 0.66, 95% CI 0.49-0.88). Victims of incidents perpetrated by a current or former intimate partner were more likely to approach police first than those perpetrated by a stranger (AOR 1.69, 95% CI 1.23-2.33). Victims of robbery were more likely to approach police first (AOR 2.03, 95% CI 1.30-3.26) and victims in alcohol related incidences (AOR 1.34, 95% CI 1.07-1.71). Also, individuals were less likely to go to the police first when the assault weapon was unknown (AOR 0.71, 95% CI 0.51-0.99), when victims had an injury (AOR 0.71, 95% CI 0.53-0.92) or information about an injury was not mentioned (AOR 0.36, 95% CI 0.26-0.49) in the ED records. Incidents were less likely to be recorded in the police first, if the assault happened at a workplace (AOR 0.50, 95% CI 0.36-0.70), or other than provided options (AOR 0.70, 95% CI 0.57-0.86), compare to assaults that happened on the street. Additionally, if the incident was recorded during the third national lockdown, it was less likely to be recorded by the police first (AOR 0.30, 95% CI 0.19-0.45) (Table 4).

Discussion

The present study used linked ED and police data from South Wales to examine factors associated with the use of these services and the order in which the services were approached when a violence incident had occurred.

More violent incidents were recorded in the police data. Violence continues to be primarily addressed within the remit of the criminal justice system (23), despite being acknowledged a public health problem (24). Health services play a crucial role in violence prevention by identifying and supporting victims, providing data on risk factors and trends, and implementing preventive interventions (8, 25). Evidence-based interventions in ED settings have been established, such as the NHS Violence Prevention Teams (VPT) introduced in hospitals in South Wales, offering advice, support and guidance to ED patients with an assault related injury. However, violence is still poorly recorded in health administrative data (10), because health professionals might not see it as their main priority (1).

In the present study, more than half of the incidents that mentioned injury in the police records also appeared in ED records, although most incidents that appeared in the police records did not mention any information about injury. The substantial missing information about injuries in the police records might be because health harms are not perceived as the main focus for the criminal justice system (5). Also, only more significant or visible injuries may be likely to be recorded. Not all incidents that mentioned injury appeared in the ED data. It could be because the victims used other health services. Also, victims of violence might not use health services if they perceive the health harms as minor, not warranting medical attention. Also, some people might not use health services despite having health harms, for example they are prevented from accessing it due to financial situation or insecure migration status (26) or if it is perceived too risky for them to access it or disclose their experiences (such as in DA situations (1) (4)).

295 *Sociodemographic characteristics of the victims*

296 The incidents of violence recorded in ED data only and by both the ED and police were more
297 likely to happen to male and young people, in more deprived areas, on a street, and with the
298 assailant being a stranger. Despite some official sources suggesting higher male victimisation
299 (27), there is an acknowledgement that many cases of female victimisation are not being
300 reported and recorded, as victim-survivors may not access services (28, 29). In the present
301 study, the number of violent incidents against females was greater than against males in the
302 police records, while incidents with male victims were higher in the ED records. The observed
303 difference may be because the health source only included ED data. Due to the types of
304 violence more often experienced by females, such as domestic or sexual violence, the first point
305 of healthcare support for them might be primary care (30), sexual assault referral centres (31),
306 sexual health clinics (32), or mental health facilities (33). Also, even if female victims are in
307 contact with ED due to the urgent nature of injuries, they might choose not to disclose their
308 experiences, for example, because of shame or fear of retaliation (1). Spontaneous disclosure
309 of domestic violence in emergency care is less likely unless screening protocols are in place.

310 The observed sex difference might also be due to factors related to males. Specifically, males
311 might be less likely to report violence experiences to the police because of gender norms and
312 stereotypes (i.e., masculinity norms) and associated stigma (34), blurred distinction between
313 victim and assailant roles and associated fear of legal consequences, for example, in case of
314 street fights, and fear of reprisal (35). Additionally, there might be biases in the criminal and/or
315 health systems related to identifying, supporting, and recording violence incidents. For
316 example, cases with male victims of DV might not be taken seriously by the police (34). Female
317 patients might not report their experiences of violence in healthcare settings unless prompted
318 (36). It is also worth noticing that females and males are not homogeneous groups, and
319 experiences of violence and access to support services are shaped by intersecting social

positions. Sociodemographic factors can interact in complex ways and intensify barriers to accessing support, and for example, females from ethnic minority or migrant backgrounds (37) may face compounded challenges in seeking and receiving appropriate care. A recent evaluation of the NHS Violence Prevention Teams found that patients who were male, younger, those residing in deprived neighbourhoods, and black or mixed ethnicity patients were more likely to be missed under usual care (38).

Older age was more likely to be associated with the use of both services. It might be because older people are likely to suffer more severe health consequences as a result of violence, for example due to pre-existing vulnerabilities, or they perceive violence and associated harms as more serious. Also, older adults might be more likely to be referred if they use one of these services (39). In contrast, younger people can be dismissive of their experiences and injuries (40). Additionally, there might be less trust in the police or healthcare among young people (41).

Characteristics of the violent incidents

If violence occurred at home and the assailant was known to the victim (intimate partner, friend or acquaintance), both services were more likely to be used. Existing evidence suggests that victims of domestic violence (DV) are less likely to disclose their experiences (1). However, the present study only included incidents that were recorded by either police, ED, or both services. Violent incidents that were not reported at all or in these specific services are out of scope. Furthermore, violence experienced at home by an intimate partner, family member or friend is a more complex and multifaceted problem, which can include not just physical injury but emotional, psychological, sexual and economic abuse that would likely require support from multiple services. Also, it may indicate that once DV victims made the decision to disclose their experiences to professionals, they seek different types of support. If recorded by

both services, the incidents of intimate partner violence (IPV) were more likely to appear in the police records first followed by ED, which may suggest that victims of IPV might prioritise the support from the police, for example for safety, or might see their experience as a crime against them.

Incidents of workplace violence were less likely to be reported to the police among ED users, also less likely to be reported to the police first if used both services. The reluctance to disclose the incidents of violence happening at a workplace to the police even if the severity of injuries was great enough to use ED might be due to fear of retaliation, job loss, or other negative professional consequences; also, organisational cultures that discourage victims of workplace violence to report their experiences externally, and normalisation of violence (42, 43).

Incidents of robbery were more likely to appear in both services records. The existing hierarchy of offences used in the Crime Survey for England and Wales (CSEW) applies a principal offence rule whereby only one offence is recorded per incident and prioritises some property offences over physical assaults in the coding of incidents (44). Although robbery involves the use or threat of force, it is treated as a separate category rather than being included within “violence against the person”. Given that some forms of robbery (e.g., armed robbery and/or incidents that cause severe health harms) can attract severe penalties, including life imprisonment, it is possible that in practice incidents involving both robbery and assault are recorded under robbery in police systems that do not permit multiple offences to be recorded, potentially contributing to an underrepresentation of co-occurring violence. Alcohol related incidents were also more likely be reported to both services, which suggests that violence can be more harmful and requires multiple types of support.

Temporal changes

367 The temporal changes in count of visits suggest seasonal trends, specifically drops in the police
368 and ED visits during the winter and spikes in the summer months. Furthermore, drops in both
369 ED and police visits were seen during the Covid lockdowns in Wales. However, around the
370 time of the third lockdown there were greater odds of using ED, while during the first and
371 second lockdowns the odds were lower. This could be due to the differences in restrictions and
372 public messages regarding accessing healthcare during different lockdown waves and, to a
373 lesser extent in subsequent lockdowns, the night-time economy was effectively shut down,
374 restricting socialising and alcohol-related violence (45). As a result, street- and stranger-based
375 assault injuries declined significantly due to reduced opportunity. Also, in the first lockdown,
376 Welsh government instructed suspension of non-urgent outpatient appointments and surgical
377 admissions, while by late 2020 many services had been restarted or continued with adaptation
378 rather than the wholesale suspension (45). During the first wave, there was a steeper drop in
379 attending the UK National Health System (NHS) ED services than in the consequent waves
380 overall, although the demand for telephone triage rose (46). Additionally, Covid vaccination
381 started around January 2021, which might have increased people's confidence in accessing
382 medical services for help.

383 Overall, despite majority of the incidents were recorded in the police data, the use of health
384 data has provided more detail about the characteristics of the victims and violent incidents than
385 the use of police data alone and allowed the comparison between the use of both services by
386 violent victims. There have been sex differences in recorded incidents of violence between ED
387 and police data, as violent incidents recorded in ED were more likely to be against people who
388 were male and young, occur in more deprived areas, on a street, and with an assailant being a
389 stranger, while the incidents with female victims was greater in the police data. If both services
390 were accessed, the incidence of violence against females was higher among those who
391 approached the police first. When incidents happened at the victim's home and with the

assailant known to the victim, both services were more likely to be used. The incidents that happened at a workplace were less likely to be reported to the police. The results suggest that policies and interventions need to focus on identifying and addressing barriers for reporting violent incidents to the police by workplace victims and males. Given that when incidents involved the consumption of alcohol, the health services were more likely to be used, measures need to focus on reducing excessive alcohol consumption, to reduce health harms from violent incidents. Also, as IPV incidents were more often reported to the police first when both services were used, potentially more efforts need to encourage victims of IPV to approach health services to address immediate health harms.

Strengths and limitations

As always, there are strengths and limitations to our study. We used linked data to examine the characteristics of violent incidents that appeared in medical and/or criminal records, which added to a more complete picture of violence distribution. Data from two services allowed examining differences between violent incidents that appeared in one or both types of records. Also, the study benefited from using a large sample from police and medical services. However, only those who sought support from ED and/or police were included, missing individuals who experienced violence but did not use any of those services. The use of administrative data risks missing cases due to individuals not reporting their experiences, healthcare professionals not asking about or recording the information about incidents of violence. Also, some fields in administrative notes can be recorded better than others (5) leading to incomplete picture and potentially biased results. To mitigate that, we reported the missingness for each variable and conducted analyses on both administrative datasets. However, the sample's characteristics cannot be generalisable to all victims.

Future research needs survey data that include all victims to fully understand the true extent of service use and the factors associated with it. For example, the Crime Survey for England and Wales, which is a nationally representative, household victimisation survey and collects data from adults (16+) in England and Wales each year using a stratified probability sample, can be used to examine health and police services use following violent victimisation (47). Linking police data with other health services, such as primary care (7), and data from other support services, can expand opportunities learning about other types of violent incidents and victims not presented in the emergency care data. Additionally, future research should also focus on learning more about the characteristics of the perpetrators to inform prevention measure.

Conclusions

Using linked ED-police data from South Wales allowed identification of incidents of violence recorded in ED data only and in both ED and police data. Violent incidents recorded in ED were more likely to be against people who were male and young, occur in more deprived areas, on a street, and with an assailant being a stranger, while the incidents with female victims was greater in the police data. If both services were accessed, the incidence of violence against females was higher among those who approached the police first. When incidents happened at the victim's home and with the assailant known to the victim, both services were more likely to be used. The incidents that happened at a workplace were less likely to be reported to the police. Research and policies need to focus on identifying and addressing barriers for reporting violent incidents to the police by workplace victims and males. Relying on a single data source provides a partial and potentially biased picture of violence. Combining and linking different data sources offers a more comprehensive understanding but requires careful interpretation.

437 Declarations

438 *Ethics approval and consent to participate*

439 The secondary analysis study got ethical approval (ETH21220-299) from the International
440 Politics, Music, Journalism, Economics, and English (IPMJEE) Ethical Review Committee at
441 City St George's University of London that considers medium risk applications. The authors
442 assert that all procedures contributing to this work comply with the ethical standards of the
443 relevant national and institutional committees on human experimentation and with the Helsinki
444 Declaration of 1975, as revised in 2008.

445 The data presented in this manuscript are part of a routine surveillance dataset; the relevant
446 permissions to use this data were sought through data disclosure agreements. In accordance
447 with Health Research Authority guidance, ethical approval is not mandatory for the use of these
448 data, and explicit consent to participate is not legally required under the Data Protection Act
449 and the UK General Data Protection Regulation (UK GDPR). Additionally, permission for all
450 data held has been obtained from the relevant Caldicott Guardian or Data Protection Officer.

451 *Consent for publication*

452 Not applicable.

453 *Availability of data and materials*

454 The datasets generated and/or analysed during the current study are not publicly available due
455 to the data disclosure agreements in place with the data providers and the confidential nature
456 of the data provided but are available from the corresponding author on reasonable request.

457 *Competing interests*

458 The authors declare that they have no competing interests.

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470 *Authors' contributions*

471 AF, ECB, ERB, and LS contributed to conceptualisation. AF and ECB contributed to data
472 curation and analysis. AF wrote the original draft of the manuscript. AF, ECB, ERB, and LS
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611

612 Tables

613 Table 1 Individual and violent incidents related characteristics among who only approached
 614 police or Emergency Departments (ED)

		Police only		ED only	
Category	Value	Count	%, (95% CI)	Count	%, (95% CI)
Age category	Under 16	14417	7.8 (7.6-7.9)	575	7.2 (6.7-7.8)
	16-19	12576	6.8 (6.7-6.9)	787	9.9 (9.2-10.6)
	20-29	43731	23.5 (23.4-23.7)	2701	34.0 (33.0-35.0)
	30-39	41852	22.5 (22.3-22.7)	1805	22.7 (21.8-23.6)
	40-49	27881	15.0 (14.8-15.2)	1167	14.8 (14.0-15.5)
	50-59	18031	9.7 (9.6-9.8)	639	8.1 (7.5-8.7)
	60-69	7485	4.0 (3.9-4.1)	159	2.0 (1.7-2.3)
	70-79	3657	2.0 (1.9-2.0)	43	0.5 (0.4-0.7)
	80 and over	1872	1.0 (1.0-1.1)	19	0.2 (0.1-0.3)
	Unknown	14240	7.7 (7.5-7.8)	15	0.2 (0.1-0.3)
	Missing	18	0.0 (0.0-0.0)	2590	32.6 (31.6-33.6)
Sex	Female	104141	56.1 (55.8-56.3)	5312	66.9 (65.8-67.9)
	Male	71462	38.5 (38.3-38.7)	8	0.1 (0.0-0.2)
	Indeterminate	68	0.0 (0.0-0.0)	36	0.5 (0.3-0.6)
	Unknown	10071	5.4 (5.3-5.5)	575	7.2 (6.7-7.8)
	Missing	18	0.0 (0.0-0.0)	36	0.5 (0.3-0.6)
Covid lockdown	No lockdown	172894	93.1 (93.0-93.2)		93.6 (93.1-94.2)
	Lockdown 1	5496	3.0 (2.9-3.0)	7463	3.2 (2.8-3.6)
	Lockdown 2	2303	1.2 (1.2-1.3)	254	1.3 (1.0-1.5)
	Lockdown 3	5067	2.7 (2.7-2.8)	80	1.9 (1.6-2.2)
Type of crime	Robbery	1667	0.9 (0.9-0.9)		
	Sexual assault	11797	6.4 (6.2-6.5)		
	Violence against person	172278	92.8 (92.6-92.9)		
	Missing	18	0.0 (0.0-0.0)		
Alcohol related	No	173937	93.6 (93.5-93.8)		
	Yes	11805	6.4 (6.2-6.5)		
	Missing	18	0.0 (0.0-0.0)		
Injury	No injury	39042	21.0 (20.8-21.2)		
	With injury	31167	16.8 (16.6-16.9)		
	Not mentioned	115551	62.2 (62.0-62.4)		
Quintile	1			2983	37.5 (36.5-38.6)
	2			1662	20.9 (20.0-21.8)
	3			1043	13.1 (12.4-13.9)
	4			734	9.2 (8.6-9.9)
	5			789	9.9 (9.3-10.6)
	Unknown			699	8.8 (8.2-9.4)
	Missing			36	0.5 (0.3-0.6)
Assault site description	Street			2080	26.2 (25.2-27.1)
	Licensed premise			803	10.1 (9.4-10.8)

	Own home			1084	13.6 (12.9-14.4)
	Someone else's home			477	6.0 (5.5-6.5)
	Workplace			799	10.1 (9.4-10.7)
	Other			1739	21.9 (21.0-22.8)
	Unknown			488	6.1 (5.6-6.7)
	Missing			476	6.0 (5.5-6.5)
Relationship with the perpetrator	Stranger			4132	52.0 (50.9-53.1)
	Intimate partner/ex partner			696	8.8 (8.1-9.4)
	Family Member			401	5.0 (4.6-5.5)
	Acquaintance/Friend			1765	22.2 (21.3-23.1)
	Unknown			916	11.5 (10.8-12.2)
	Missing			36	0.5 (0.3-0.6)
Number of perpetrators	1			4630	58.3 (57.2-59.4)
	2			734	9.2 (8.6-9.9)
	3+			1216	15.3 (14.5-16.1)
	Unknown			1321	16.6 (15.8-17.4)
	Missing			1321	16.6 (15.8-17.4)
Assault weapon	Blunt Object			581	7.3 (6.7-7.9)
	Body Part			5198	65.4 (64.4-66.5)
	Pushed			195	2.5 (2.1-2.8)
	Sharp Object			430	5.4 (4.9-5.9)
	Unknown			1506	19.0 (18.1-19.8)
	Missing			36	0.5 (0.3-0.6)
Total		185760		7946	

616 Table 2 Individual and violent incidents related characteristics among those who approached
617 police and Emergency Departments (ED) first

Category	Value	Police first		ED first	
		Count	%, (95% CI)	Count	%, (95% CI)
Age category	Under 16	232	6.7 (5.8-7.5)	136	11.4 (9.6-13.2)
	16-19	357	10.2 (9.2-11.3)	139	11.6 (9.8-13.4)
	20-29	1093	31.4 (29.8-32.9)	346	28.9 (26.3-31.5)
	30-39	828	23.8 (22.4-25.2)	248	20.7 (18.4-23.0)
	40-49	500	14.4 (13.2-15.5)	147	12.3 (10.4-14.1)
	50-59	298	8.6 (7.6-9.5)	104	8.7 (7.1-10.3)
	60-69	114	3.3 (2.7-3.9)	34	2.8 (1.9-3.8)
	70-79	32	0.9 (0.6-1.2)	16	1.3 (0.7-2.0)
	80 and over	7	0.2 (0.1-0.3)	4	0.3 (0.0-0.7)
	Missing	23	0.7 (0.4-0.9)	23	1.9 (1.1-2.7)
Sex	Female	1346	38.6 (37.0-40.3)	303	31.4 (28.5-34.4)
	Male	2115	60.7 (59.1-62.3)	661	68.6 (65.6-71.5)
	Missing	23	0.7 (0.4-0.9)	23	1.9 (1.1-2.7)
Quintile	1	1378	39.6 (37.9-41.2)	435	36.3 (33.6-39.1)
	2	725	20.8 (19.5-22.2)	252	21.1 (18.7-23.4)
	3	413	11.9 (10.8-12.9)	156	13.0 (11.1-14.9)
	4	290	8.3 (7.4-9.2)	115	9.6 (7.9-11.3)
	5	358	10.3 (9.3-11.3)	121	10.1 (8.4-11.8)
Assault site description	Street	997	28.6 (27.1-30.1)	95	7.9 (6.4-9.5)
	Licensed premise	319	9.2 (8.2-10.1)	23	1.9 (1.1-2.7)
	Own home	761	21.8 (20.5-23.2)	315	26.3 (23.8-28.8)
	Someone else's home	263	7.5 (6.7-8.4)	119	9.9 (8.2-11.6)
	Workplace	157	4.5 (3.8-5.2)	166	13.9 (11.9-15.8)
	Other	695	19.9 (18.6-21.3)	75	6.3 (4.9-7.6)
	Unknown	130	3.7 (3.1-4.4)	76	6.3 (5.0-7.7)
	Missing	162	4.6 (4.0-5.3)	313	26.1 (23.7-28.6)
Relationship with the perpetrator	Stranger	1478	42.4 (40.8-44.1)	46	3.8 (2.8-4.9)
	Intimate partner/ex partner	571	16.4 (15.2-17.6)	87	7.3 (5.8-8.7)
	Family Member	208	6.0 (5.2-6.8)	579	48.4 (45.5-51.2)
	Acquaintance/Friend	943	27.1 (25.6-28.5)	97	8.1 (6.6-9.6)
	Unknown	261	7.5 (6.6-8.4)	57	4.8 (3.6-6.0)
	Missing	23	0.7 (0.4-0.9)	350	29.2 (26.7-31.8)
Number of perpetrators	0	1	0.0 (0.0-0.1)	91	7.6 (6.1-9.1)
	1	2268	65.1 (63.5-66.7)	23	1.9 (1.1-2.7)
	2	350	10.0 (9.0-11.0)	708	59.1 (56.4-61.9)
	3+	432	12.4 (11.3-13.5)	123	10.3 (8.6-12.0)
	Unknown	410	11.8 (10.7-12.8)	195	16.3 (14.2-18.4)
	Missing	23	0.7 (0.4-0.9)	147	12.3 (10.4-14.1)
Assault weapon	Blunt Object	300	8.6 (7.7-9.5)	23	1.9 (1.1-2.7)
	Body Part	2320	66.6 (65.0-68.2)	97	8.1 (6.6-9.6)
	Pushed	67	1.9 (1.5-2.4)	718	60.0 (57.2-62.8)

	Sharp Object	255	7.3 (6.5-8.2)	27	2.3 (1.4-3.1)
	Unknown	519	14.9 (13.7-16.1)	126	10.5 (8.8-12.3)
	Missing	23	0.7 (0.4-0.9)	206	17.2 (15.1-19.3)
				23	1.9 (1.1-2.7)
Type of crime	Robbery	110	3.2 (2.6-3.7)	42	3.5 (2.5-4.6)
	Sexual assault	52	1.5 (1.1-1.9)	33	2.8 (1.8-3.7)
	Violence against person	3299	94.7 (93.9-95.4)	1099	91.8 (90.3-93.4)
	Missing	23	0.7 (0.4-0.9)	23	1.9 (1.1-2.7)
Alcohol related	No	2975	85.4 (84.2-86.6)	1049	87.6 (85.8-89.5)
	Yes	486	13.9 (12.8-15.1)	125	10.4 (8.7-12.2)
	Missing	23	0.7 (0.4-0.9)	23	1.9 (1.1-2.7)
Injury	No injury	377	10.8 (9.8-11.9)	89	7.4 (5.9-8.9)
	With injury	2342	67.2 (65.7-68.8)	693	57.9 (55.1-60.7)
	Not mentioned	742	21.3 (19.9-22.7)	392	32.7 (30.1-35.4)
	Missing	23	0.7 (0.4-0.9)	23	1.9 (1.1-2.7)
Covid lockdown	No lockdown	3329	95.6 (94.9-96.2)	1101	92.0 (90.4-93.5)
	Lockdown 1	52	1.5 (1.1-1.9)	10	0.8 (0.3-1.4)
	Lockdown 2	23	0.7 (0.4-0.9)	7	0.6 (0.2-1.0)
	Lockdown 3	57	1.6 (1.2-2.1)	56	4.7 (3.5-5.9)
	Missing	23	0.7 (0.4-0.9)	23	1.9 (1.1-2.7)
Total		3484		1197	

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620 Table 3 Factors associated with approaching police among Emergency Department (ED)
621 recorded incidents and approaching ED among police recorded incidents: adjusted odd ratios

		Associated with approaching police in ED incidents	Associated with approaching ED in police incidents
	Categories	AOR (95% CI)	AOR (95% CI)
Sex	Female (ref)	1.00	1.00
	Male	0.90 (0.83-0.99)	2.06 (1.95-2.19)
Age group	20-29	1.00	1.00
	Under 16	1.06 (0.90-1.24)	0.73 (0.65-0.81)
	16-19	1.09 (0.95-1.25)	1.18 (1.07-1.30)
	30-39	1.10 (0.99-1.22)	0.82 (0.76-0.88)
	40-49	1.01 (0.90-1.15)	0.71 (0.65-0.78)
	50-59	1.22 (1.06-1.42)	0.69 (0.62-0.77)
	60-69	1.73 (1.36-2.21)	0.61 (0.52-0.72)
	70-79	2.13 (1.38-3.30)	0.42 (0.32-0.55)
	80 and over	0.87 (0.39-1.84)	0.22 (0.13-0.33)
Covid lockdown	No lockdown	1.00	1.00
	Lockdown 1	0.32 (0.24-0.42)	0.45 (0.35-0.59)
	Lockdown 2	0.44 (0.27-0.69)	0.47 (0.33-0.69)
	Lockdown 3	1.98 (1.58-2.50)	0.85 (0.74-0.98)
Quintile	1 (ref)	1.00	
	2	0.98 (0.88-1.08)	
	3	0.95 (0.84-1.07)	
	4	1.05 (0.91-1.20)	
	5	1.08 (0.95-1.23)	
Relationship with the perpetrator	Stranger (ref)	1.00	
	Intimate partner/ex partner	1.54 (1.32-1.81)	
	Family Member	1.10 (0.91-1.32)	
	Acquaintance/Friend	1.36 (1.23-1.50)	
	Unknown/missing	0.80 (0.62-1.03)	
Assault weapon	Blunt Object (ref)	1.00	
	Body Part	0.80 (0.69-0.92)	
	Pushed	0.57 (0.43-0.75)	
	Sharp Object	1.31 (1.07-1.60)	
	Unknown/missing	0.84 (0.71-1.00)	
Number of perpetrators	1 (ref)	1.00	
	2	1.07 (0.94-1.23)	
	3+	0.87 (0.78-0.98)	
	Unknown	0.71 (0.61-0.83)	
Assault site description	Street	1.00	
	Licensed premise	0.87 (0.76-1.00)	
	Own Home	1.17 (1.02-1.33)	
	Someone else's home	0.95 (0.81-1.13)	
	Workplace	0.52 (0.44-0.61)	
	Other	0.98 (0.88-1.09)	
	Unknown	1.07 (0.77-1.49)	
Type of crime	Violence against person (ref)		1.00
	Robbery		6.82 (5.74-8.07)
	Sexual assault		0.87 (0.70-1.07)
Injury	No injury (ref)		1.00
	Not mentioned		0.84 (0.76-0.94)
	With injury		7.60 (6.94-8.33)
Alcohol related	No (ref)		1.00
	Yes		1.40 (1.28-1.52)

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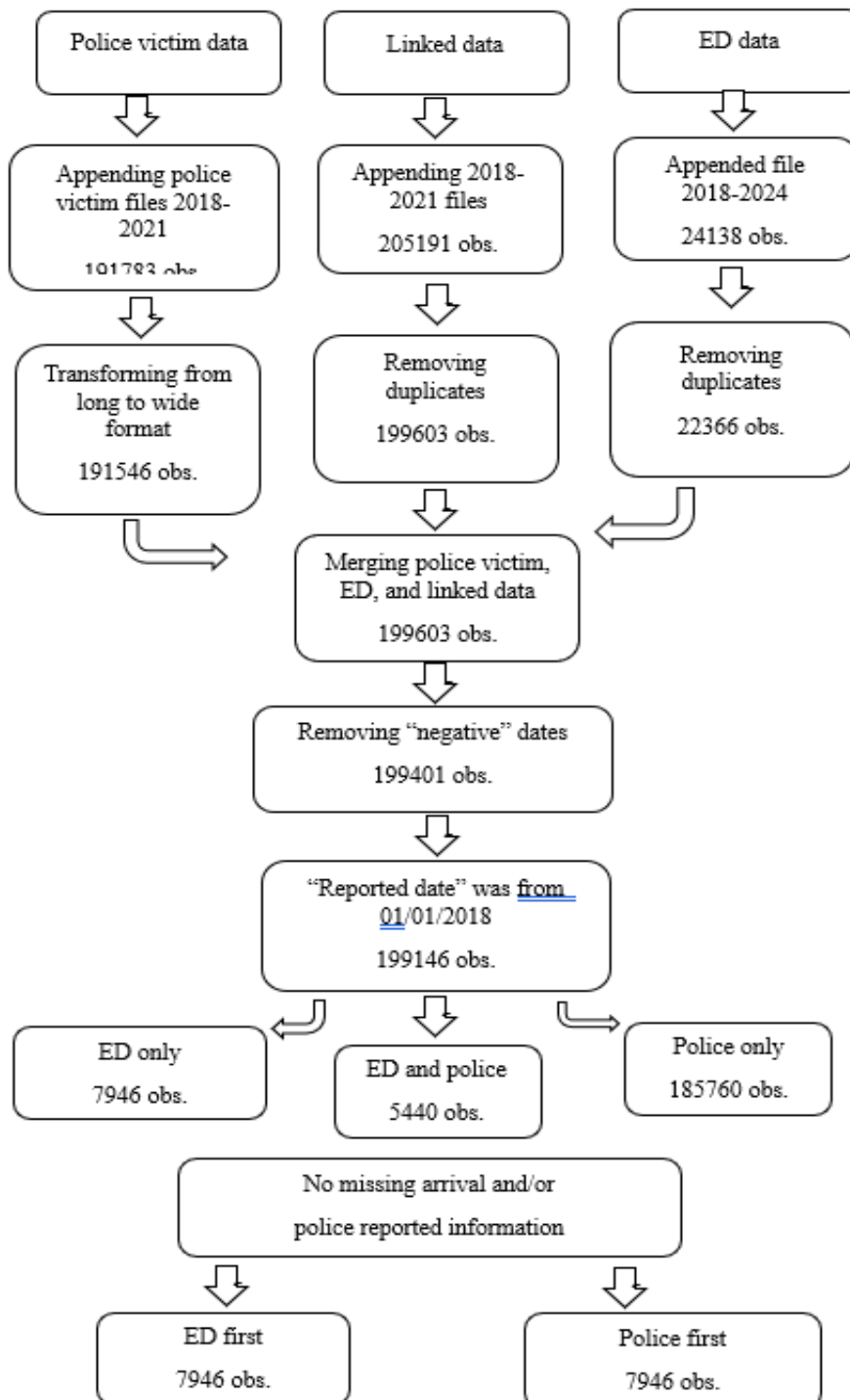
624 Table 4 Factors associated with approaching police first among violence victims who sought
 625 both Emergency Department (ED) and police support: adjusted odd ratios

	Categories	Adjusted odds ratio (AOR) (95% CI)
Sex	Female	1.00 (ref)
	Male	0.93 (0.78-1.11)
Age group	20-29	1.00 (ref)
	Under 16	0.66 (0.49-0.88)
	16-19	0.82 (0.63-1.06)
	30-39	1.05 (0.85-1.30)
	40-49	1.08 (0.85-1.39)
	50-59	0.84 (0.64-1.11)
	60-69	0.94 (0.61-1.48)
	70-79	0.51 (0.28-0.98)
	80 and over	0.65 (0.24-1.96)
Quintile	1	1.00 (ref)
	2	0.90 (0.74-1.09)
	3	0.83 (0.66-1.05)
	4	0.80 (0.62-1.03)
	5	0.93 (0.73-1.19)
Relationship with the perpetrator	Stranger	1.00 (ref)
	Intimate partner/ex partner	1.69 (1.23-2.33)
	Family Member	1.05 (0.73-1.51)
	Acquaintance/Friend	1.03 (0.86-1.24)
	Unknown	1.21 (0.73-2.08)
Assault weapon	Blunt Object	1.00 (ref)
	Body Part	0.86 (0.65-1.12)
	Pushed	0.70 (0.41-1.24)
	Sharp Object	0.71 (0.50-1.00)
	Unknown	0.71 (0.51-0.99)
Number of perpetrators	1 (ref)	1.00 (ref)
	2	0.97 (0.76-1.25)
	3+	0.80 (0.64-1.01)
	Unknown	1.10 (0.82-1.49)
Type of crime	Violence against person	1.00 (ref)
	Robbery	2.03 (1.30-3.26)
	Sexual assault	0.76 (0.44-1.32)
Injury	No injury	1.00 (ref)
	Not mentioned	0.36 (0.26-0.49)
	With injury	0.71 (0.53-0.92)
Alcohol related	No	1.00 (ref)
	Yes	1.34 (1.07-1.71)
Assault site description	Street	1.00 (ref)
	Licensed premise	0.76 (0.58-1.00)
	Own Home	1.14 (0.88-1.48)
	Someone else's home	0.90 (0.65-1.25)
	Workplace	0.50 (0.36-0.70)
	Other	0.70 (0.57-0.86)
	Unknown	0.80 (0.40-1.57)
Covid lockdown	No lockdown	1.00 (ref)
	Lockdown 1	1.55 (0.78-3.43)
	Lockdown 2	1.03 (0.41-2.93)
	Lockdown 3	0.30 (0.19-0.45)

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627 Figures

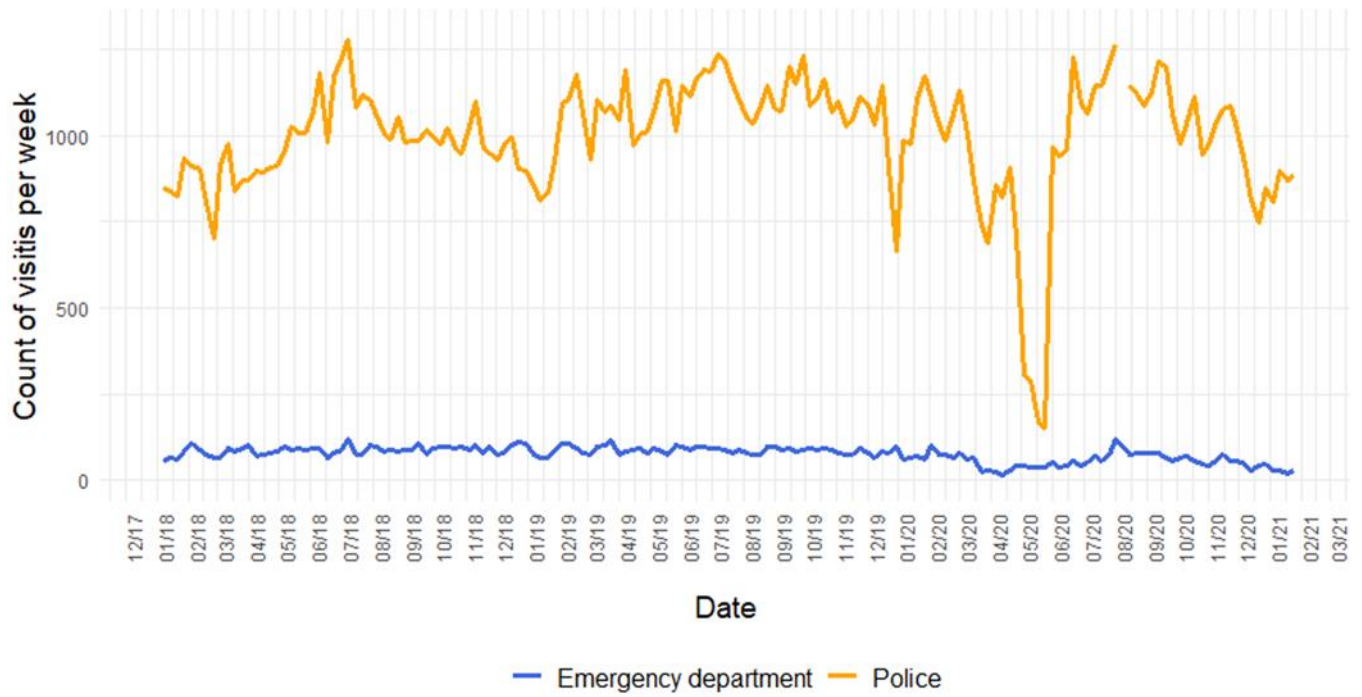
628 Figure 1 Number of observations recorded in the South Wales police, Emergency Department
629 (ED), and linked data and used in the analyses



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632 Figure 2 Number of visits to the police and emergency department by week



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