

Health outcomes in those who have been victims of knife crime: a protocol for a systematic review and meta-analysis

Gani, Illin; Chandan, Joht Singh; Bandyopadhyay, Siddhartha; Pathmanathan, Anna; Martin, James

DOI:

[10.1136/bmjopen-2023-078020](https://doi.org/10.1136/bmjopen-2023-078020)

License:

Creative Commons: Attribution-NonCommercial (CC BY-NC)

Document Version

Publisher's PDF, also known as Version of record

Citation for published version (Harvard):

Gani, I, Chandan, JS, Bandyopadhyay, S, Pathmanathan, A & Martin, J 2023, 'Health outcomes in those who have been victims of knife crime: a protocol for a systematic review and meta-analysis', *BMJ open*, vol. 13, no. 12, e078020. <https://doi.org/10.1136/bmjopen-2023-078020>

[Link to publication on Research at Birmingham portal](#)

General rights

Unless a licence is specified above, all rights (including copyright and moral rights) in this document are retained by the authors and/or the copyright holders. The express permission of the copyright holder must be obtained for any use of this material other than for purposes permitted by law.

- Users may freely distribute the URL that is used to identify this publication.
- Users may download and/or print one copy of the publication from the University of Birmingham research portal for the purpose of private study or non-commercial research.
- User may use extracts from the document in line with the concept of 'fair dealing' under the Copyright, Designs and Patents Act 1988 (?)
- Users may not further distribute the material nor use it for the purposes of commercial gain.

Where a licence is displayed above, please note the terms and conditions of the licence govern your use of this document.

When citing, please reference the published version.

Take down policy

While the University of Birmingham exercises care and attention in making items available there are rare occasions when an item has been uploaded in error or has been deemed to be commercially or otherwise sensitive.

If you believe that this is the case for this document, please contact UBIRA@lists.bham.ac.uk providing details and we will remove access to the work immediately and investigate.

BMJ Open Health outcomes in those who have been victims of knife crime: a protocol for a systematic review and meta-analysis

Illin Gani ¹, Joht Singh Chandan,² Siddhartha Bandyopadhyay,³ Anna Pathmanathan,⁴ James Martin¹

To cite: Gani I, Chandan JS, Bandyopadhyay S, *et al.* Health outcomes in those who have been victims of knife crime: a protocol for a systematic review and meta-analysis. *BMJ Open* 2023;**13**:e078020. doi:10.1136/bmjopen-2023-078020

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2023-078020>).

Received 21 July 2023

Accepted 30 November 2023



© Author(s) (or their employer(s)) 2023. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

¹Institute of Applied Health Research, University of Birmingham College of Medical and Dental Sciences, Birmingham, UK

²University of Birmingham College of Medical and Dental Sciences, Birmingham, UK

³The Department of Economics, University of Birmingham, Birmingham, UK

⁴Population Health Science, University of Bristol, Bristol, UK

Correspondence to

Dr Joht Singh Chandan;
J.S.Chandan.1@bham.ac.uk

ABSTRACT

Introduction Knife-enabled crime is a UK public health issue leading to substantial impacts on society, victims and their families, as well as additional strain on the healthcare system. Despite the increase in knife-enabled crime and the overwhelming consequences, there is a lack of comprehensive studies exploring the long-term health outcomes of knife crime victims in the UK. The research gap hinders the development of more targeted secondary preventative interventions, resource allocation and public awareness campaigns. This systematic review aims to identify the long-term health outcomes of knife crime victims, therefore providing valuable knowledge for stakeholders, health practitioners and policymakers for a more effective public health response.

Methods and analysis A comprehensive search strategy was developed, focusing on four key concepts: study design, knife-related offences, outcomes and risk. Databases being searched include MEDLINE, EMBASE, PsycINFO, ProQuest Criminology Collection, Web of Science Core Collection, Google Scholar and OpenGrey. Reference lists and forward citations will be inspected for further suitable literature. The study selection will involve two independent reviewers screening the studies from the search, with disagreements resolved by a third reviewer. All UK quantitative research on long-term health outcomes of knife crime victims will be included in the review. Covidence will be used to efficiently manage data. A data extraction form has been developed which will summarise key aspects of each study that will be included in the review. Methodological Index for Non-Randomised Studies quality assessment checklist will be used to assess the studies and the Newcastle-Ottawa Scale will assess the risk of bias in each study. Findings will be narratively synthesised, and if heterogeneity is sufficient, a meta-analysis will be conducted.

Ethics and dissemination Ethics approval is not required for this study as no original data will be collected. The results will be disseminated through a peer-reviewed publication and conference presentation.

INTRODUCTION

Rationale

In the UK, knife crime is defined as a crime involving a knife or a sharp instrument to

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The systematic review following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines ensures a reproducible, transparent and rigorous process for identifying and synthesising the available quantitative data on long-term health outcomes for knife crime victims.
- ⇒ A comprehensive search strategy will be used to identify and retrieve articles relevant to our research questions.
- ⇒ The review is restricted to the UK population, limiting the generalisability of the findings to other countries.

harm, threaten or hurt others.¹ Knife-enabled crime is defined as any incident where a knife or a bladed weapon is used in the commission of a criminal offence.² In the UK, knife-enabled crime recorded by police saw a 10% increase in knife crime offences from March 2021 to March 2022.³ However, the changes between selected offences involving a knife or sharp instrument knife offences are more substantive; as threats to kill increased by 290%, sexual assault increased by 241% and rape increased by 184% between 2020/21 and 2021/22.⁴ Since 2014, the UK has seen a clear and consistent rise in violent crimes and offences caused by sharp instruments.⁵ According to Professor Chris Moran, the national clinical director for NHS England trauma, these ‘violent crimes destroy lives, devastate families and divert doctors’ time away from other essential patient care’.⁶ Hence, knife crime is a pressing issue as it impacts a broad array of individuals. This includes the victims, who bear the brunt of the physical and psychological damage, and their friends, who grapple with emotional distress. It also significantly affects the families of those who have been harmed, regardless of the severity of the crime. Furthermore, the healthcare professionals, such as doctors



and nurses, who handle the repercussions of knife crime in hospitals, are deeply impacted. The ripple effect of these issues extends into wider society, reflecting the deep-seated nature of this problem.

The burden of knife crime in the UK has many impacts on society including the economic costs. It is estimated that violence costs the National Health Service around £2.9 billion annually, an average cost of £7196 per patient involved in knife crime^{7,8} with the cost to society being much higher and estimated to cost £29.9 billion annually.⁹

Knife crime is a complex social problem that predominantly affects young male adults.¹⁰ A qualitative systematic review by Haylock *et al*⁵ highlighted risk factors associated with knife crime in the UK among young people aged 10–24 years. The study identified adverse childhood experiences, poor mental health, discrimination and economic inequality to be associated with youth violence and knife crime. Other UK studies also highlight education, family, previous involvement with the criminal justice system, gang involvement, drug abuse and ethnicity as potential risk factors for knife crime.^{11–14} As a result of the higher rates of knife crime, policing strategies have been implemented such as stronger police numbers, wide scale of stop and search powers and more resources.¹⁵ However, such approaches are yet to be determined as successful. Such policing approaches encouraged discrimination of targeted individuals based on stereotypes and caused a lack of trust in the police.^{5,16} A paper by Shaw *et al*¹⁷ highlighted the lack of trust between young people and the police, which led to an unwillingness to collaborate with the police, causing feelings of unsafety and resorting to carrying weapons for self-protection. Hence, many policy-makers are seeking a public health approach and treating knife crime as a public health issue, balancing prevention and effective law enforcement strategies.¹⁸

Traditional models of a ‘public health approach’ consider knife crime as an infectious disease. However, more recent thoughts in this space, and rightly so, consider knife crime as a complex consequence of social issues (and wider determinants of health), which require a holistic approach to appropriately manage. The holistic approach suggests using scientific evidence to establish the root causes of knife crime and find preventative interventions. Despite this, knife crime can ‘spread’ like an infection (in line with the traditional model) due to the many risk factors that are exposed among a population such as association with violent peers, low self-esteem and fear of being attacked,¹⁹ which contributes to widespread stress, inequality and disaffection among young people.²⁰ Hence, a complex approach (derived from traditional models of communicable disease control and more recent thinking around complex systems-wide change) is required to overcome this challenge. Thus, early preventative interventions for knife crime involve a multi-agency approach aligned with a general public health approach,²¹ with violence reductions units in Glasgow being a successful example.^{15,22,23} The public health approach involves defining and monitoring knife

crime, identifying risk and protective factors developing and testing prevention strategies and assuring widespread adaptation to support evidence-based interventions.²⁴ Preventative approaches in the UK include primary prevention^{25,26} (education, awareness, support, community interventions and policing), secondary prevention²⁷ (gang interventions, victim support and diversion programmes) and tertiary prevention^{28–30} (rehabilitation, community healing and trauma-informed care).

Physical health outcomes of knife crime victims include wounds, pain, infection, organ damage and mobility issues.³¹ A quantitative observational study portrayed by Malik *et al*¹³ explored violence-related knife injuries in Birmingham, UK. The researchers observed patients aged over 16 years who were admitted to a major trauma centre for knife-related injuries due to interpersonal violence. The findings indicated that the median injury severity score, a measure used to assess the severity of traumatic injuries with higher scores indicating greater severity, was 9. Furthermore, 65% of knife-related injury victims underwent surgery, 25% required intensive care and 17.9% received a blood transfusion. A limitation of this study is that the true extent of knife crime may be underestimated as only 42% of patients in their cohort were captured by the Trauma Audit Research Network (TARN), which is a database that holds information on trauma patients. Furthermore, in a study by Christensen *et al*,³² the researchers observe the outcomes and costs of penetrating trauma injury in England and Wales. The study also analyses data from TARN and highlights there was an overall mortality rate of 7.2% among stabbing-related penetrative trauma patients and a mean time to death of 1 day.

Previously described mental health outcomes include post-traumatic stress disorder (PTSD), anxiety and stress. PTSD was seen as prevalent in assault victims as 11% of assault victims developed PTSD and much higher in people who were threatened (19%) and witnessed an assault (36%).^{33,34} Other wider mental health implications include depression, alcohol and suicidal behaviour.^{5,35} Beyond the long-term effects of knife crime, according to Duncan Bew, the clinical director for trauma and acute surgery at King’s College Hospital, there is still a ‘lack of mental health support for acute services’.³⁶ However, in 2022, programmes such as In-Hospital Violence Reduction Programme provided mental support for those affected by violence.²⁸

In the UK, the research on long-term health outcomes of knife crime victims is limited and there is no comprehensive study or systematic review that covers all the health outcome possibilities. However, some studies highlight the physical and mental health outcomes of knife crime victims.

To undertake a public health approach, it is imperative to have a clear description of the burden of the morbidity and mortality associated with knife crime. Following a scoping search undertaken in MEDLINE, EMBASE, PsycINFO and Google Scholar, we identified

no systematic reviews describing the long-term health outcomes of knife crime victims. By understanding the long-term health outcomes of knife crime victims, we can identify health issues, tailor interventions and treatments, prevent the impact of adverse health outcomes, effective resource allocation and raise awareness.^{37 38} However, the current literature does not comprehensively address the effects of knife crime, leaving several essential questions unanswered. For instance, how does being a victim of knife crime influence health across the life course? What is the strength of the evidence on the correlation between knife crime victimisation and varying health impacts? What are the long-term health outcomes of knife crime victims in the UK? Answering these questions can provide further insights, enabling a more comprehensive and effective public health approach to knife crime.

Objectives

This systematic review aims to identify, summarise and synthesise the available quantitative research, from a wide range of literature, on all long-term health outcomes of knife crime victims in the UK. Specific review questions include:

1. How does being a victim of knife crime impact health across the life course?
2. What is the strength of evidence on the association between victims of knife crime and different health impacts?
3. What are the long-term health outcomes of knife crime victims in the UK?

METHODS

A systematic review of the quantitative literature will be conducted, following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.³⁹ Moreover, this protocol is going to be aligned with PRISMA-Protocols.⁴⁰ The review will use a systematic

methodology in line with the Cochrane Handbook to synthesise quantitative research evidence.^{40 41}

Eligibility criteria

The review will include any quantitative research regarding the long-term health outcomes of knife crime victims in the UK. The studies will include but not be limited to quantitative study designs such as cohort studies, cross-sectional studies, case-control studies, non-randomised control studies and ecological studies. However, all qualitative research and mixed methods will be excluded due to resource constraints.

Inclusion criteria will be studies with the UK population and exclusion criteria will be non-UK population. This is because the review will solely focus on the UK population and hence will be generalisable to the UK. In addition, all health outcomes, defined by WHO⁴¹ will be considered in the review, this includes physical, mental and social health outcomes. The full exclusion and inclusion criteria are outlined in [table 1](#). A study selection form will be used to highlight how the study meets or does not meet the criteria ([table 2](#)).

Information sources

Databases including MEDLINE, EMBASE, PsycINFO, ProQuest Criminology Collection, Web of Science Core Collection, Google Scholar and OpenGrey for grey literature will be searched. Although the use of Google Scholar can be beneficial for forward-citation searching, it does hinder the reproducibility of search results as Google Scholar fails to deliver replicable results during certain periods.⁴² Nonetheless, Google Scholar is considered to be a suitable supplementary source of evidence.⁴²

Search strategy

A comprehensive search strategy ([table 3](#)) has been developed with the support of an experienced information specialist on Ovid, which will be used to search on

	Inclusion criteria	Exclusion criteria
Population	<ul style="list-style-type: none"> ▶ All ages ▶ UK population 	<ul style="list-style-type: none"> ▶ Non-UK population
Exposure	<ul style="list-style-type: none"> ▶ Victims involved in knife crime or knife-related violence 	<ul style="list-style-type: none"> ▶ Victims not involved in knife crime or knife-related violence.
Comparator	<ul style="list-style-type: none"> ▶ Population that is not subject to knife crime or knife-related violence 	
Outcomes	<ul style="list-style-type: none"> ▶ All health outcome (physical, mental health and social⁴⁴) 	<ul style="list-style-type: none"> ▶ Excluding outcomes that are not health related
Research type	Quantitative studies including: <ul style="list-style-type: none"> ▶ Cohort studies ▶ Cross-sectional studies ▶ Case-control studies ▶ Non-randomised control studies ▶ Ecological studies 	<ul style="list-style-type: none"> ▶ Qualitative studies ▶ Systematic reviews ▶ Mixed methods

**Table 2** Study selection form

Study information	Study ID	-	-	-
	Author			
	Year			
	Title			
Inclusion criteria (Y/N)	Is the study quantitative?			
	Is the study sample from the UK?			
	Is the exposure, victims involved in knife crime or knife-related violence?			
	If there is a comparator, are they not subject to knife crime or knife-related incidences?			
Exclusion criteria (Y/N)	Are outcomes related to health including physical, social and mental?			
	Is the study anything other than a quantitative study (eg, qualitative)?			
	Are the study sample not from the UK?			
	Is the exposure, anything other than victims involved in knife crime or knife-related violence?			
Include or exclude	Are outcomes not health (social, physical and mental) related ?			
	Reason for exclusion			

MEDLINE, EMBASE and PsycINFO and adapted to other databases (online supplemental file 1). Four concepts such as ‘knife’, ‘study design’, ‘outcome’ and ‘risk’ were used to generate the search terms (table 3). Data limits will be set from 1977 onwards due to the UK knife crime statistic reporting. No location or language limits will be implemented to include every relevant study. Medical Subject Headings terms and free-text words will be used against the four concepts outlined in table 3, to identify the relevant studies for long-term health outcomes of knife crime victims. The search strategy will combine relevant keywords and subject headings using Boolean operators. In addition, reference lists and forward citations will also be inspected for further suitable literature.

Study records

A reference manager software (COVIDENCE)⁴² will be used to organise all retrieved studies and remove any duplicates. The number of identified studies will be outlined in the PRISMA flow diagram.

Data management

The search results will be inputted into Covidence to organise, remove duplicates and make tracking information on individual studies easier.

Selection process

Two independent reviewers will carry out the study selection process. This will involve the two reviewers (IG and AP) independently screening titles and abstracts against the inclusion and exclusion criteria. When a disagreement between reviewers occurs, a third reviewer will be consulted (JSC, SB or JM). The full-text screening will be conducted by two reviewers for the first 20% of the studies. If an agreement is high, defined as reaching a consensus of 80% or more, a single reviewer will then continue with the full-text screening of the remaining

studies. This threshold ensures that the reviewers are consistent in their understanding and application of the study’s inclusion and exclusion criteria.

Data collection process

Once titles and abstracts are screened. The identified studies that met the eligibility criteria will be inputted into the data extraction form (table 4). The form is used to summarise, study characteristics, population characteristics, exposure and outcome measurement, effect size and uncertainty and risk of bias using the Newcastle-Ottawa Scale (NOS).⁴³

Data items

The data extraction form is structured in four sections as portrayed in table 5.

As part of our methodology, we plan to initially test the effectiveness and efficiency of these data extraction form on a subset of five papers. The feedback and data generated from this trial will be used to refine the form as necessary, ensuring it is well-suited to accurately and effectively extract the relevant information from the remaining studies.

Outcomes and prioritisation

In regard to the search, we will not restrict it to predefined health outcomes as we aim to accept all available literature reporting on knife crime victims and health outcomes. The definitions of health outcomes will be guided by the WHO definition⁴⁴ of health, therefore, including physical, mental and social well-being outcomes. Studies that are not relevant to these health outcomes such as association with biomarkers will not be included in this review. Furthermore, studies that identify the existence of a number of disease symptoms without the accommodating health outcome will also not be included. For eligible health outcomes (which will largely be in line with

Table 3 Example search terms developed on Ovid

Search term	Concept
1. statistic.ti,ab.	Risk
2. exp risk/	
3. exp odds ratio/	
4. risk.ti,ab.	
5. dds.ti,ab.	
6. "cross-product ratio*".ti,ab.	
7. hazard ratio*.ti,ab.	
8. hazards ratio*.ti,ab.	
9. HR.ti,ab.	
10. RR.ti,ab.	
11. aOR.ti,ab.	
12. relation*.ti,ab.	
13. correlat*.ti,ab.	
14. likel*.ti,ab.	
15. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14	
16. stabbing*.ti,ab,kf.	Knife
17. "knife attack*".ti,ab,kf.	
18. "knife violence".ti,ab,kf.	
19. "knife injurie*".ti,ab,kf.	
20. "knife wound*".ti,ab,kf.	
21. "knife crime".ti,ab.	
22. homicide.ti,ab.	
23. blade.ti,ab.	
24. gang.ti,ab.	
25. "knife assault".ti,ab.	
26. (knife adj3 assault).ti,ab.	
27. penetrative trauma.ti,ab.	
28. (penetrative adj3 trauma).ti,ab.	
29. blunt trauma.ti,ab.	
30. (blunt adj3 trauma).ti,ab.	
31. (knife adj3 violence).ti,ab.	
32. (knife adj3 injury).ti,ab.	
33. (stab adj3 violence).ti,ab.	
34. (violence not abuse not domestic not sexual not maltreatment not intimate).ti,ab.	
35. (knife* not gamma).ti,ab.	
36. (knife adj3 trauma).ti,ab.	
37. 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36	Study design
38. exp Case-Control Studies/	
39. exp Cross-Over Studies/	
40. exp Cohort Studies/	
41. Systematic Review.pt.	
42. Meta-Analysis.pt.	
43. Twin Study.pt.	
44. systematic review.ti,ab.	

Continued

**Table 3** Continued

Search term	Concept
45. meta-analysis.ti,ab.	
46. cohort.ti,ab.	
47. cross-over.ti,ab.	
48. case-control.ti,ab.	
49. prospective.ti,ab.	
50. retrospective.ti,ab.	
51. longitudinal.ti,ab.	
52. follow-up.ti,ab.	
53. followup.ti,ab.	
54. exp cross sectional study/	
55. 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54	
56. mortality.ti,ab.	Health outcomes
57. mental disorder*.ti,ab.	
58. physical health.ti,ab.	
59. quality of life.ti,ab.	
60. physical condition*.ti,ab.	
61. death.ti,ab.	
62. pain.ti,ab.	
63. anxiety.ti,ab.	
64. exp depression/	
65. exp anxiety/	
66. PTSD.ti,ab.	
67. exp social determinants/	
68. infection.ti,ab.	
69. physical disabilit*.ti,ab.	
70. employment.ti,ab.	
71. 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 or 69 or 70	
72. 15 and 37 and 55 and 71	
73. limit 72 to yr="1977-Current"	Date restriction—all available literature since 1977

the Global Burdens of Disease outcome list⁴³), reviewers will engage in regular discussions, which we define as meetings set every 2 weeks, to ensure consensus and alignment in the review process. Key long-term health outcomes include but are not limited to revictimisation, disability and substance use disorder, PTSD, depression, chronic pain, anxiety, depression and more. This will be documented in detailed guidelines to share. Moreover, the case definition or method of measurement of the eligible health outcomes will be included in the quality assessment.

Risk of bias in individual studies

During the data extraction, bias will be assessed. Following NOS, each identified study will be categorised into three ratings: good, fair and poor. NOS assesses the quality of non-randomised studies by evaluating their selection,

comparability and outcome/exposure characteristics, awarding stars in each domain and then converting these stars to standardised ratings (good, fair or poor), based on a set threshold, to provide an overall risk-of-bias assessment of the study.⁴⁵

Data synthesis

The identified studies will be synthesised through several steps. In the results section, study characteristics, study selections, quality assessment, risk of bias, review outcomes and results will be discussed. The process of data extraction refers to the method used to obtain relevant information from the selected studies, such as study ID, author(s), citation, year of publication, geographical location, study year(s), study design, study name and various statistical data. The data extraction table, on the other hand, is a tool where the extracted information is

Table 4 Data extraction form for identified studies

Study characteristics	Study ID	-	-	-
	Author(s)			
	Citation			
	Year of publication			
	Geographical location			
	Study year(s)			
	Study design			
	Study name			
Population characteristics	Selection criteria			
	Age summary statistic (range/median and SD)			
	Sex or gender summary statistics (per cent women/female)			
	Ethnicity			
Exposure and outcome measurement	Follow-up duration			
	Exposure definition			
	Exposure assessment frequency			
	Exposure recall period			
	Exposure type included in relative risk estimation			
	Exposure categories			
	Outcome definition			
Effect size and uncertainty	Perpetrator type (relationship between perpetrator and victim if known)			
	Effect size measure (eg, relative risk, OR, incidence rate ratio, HR)			
	Effect size			
	CI and level			
	Non-confidence			
	Interval uncertainty type and value			
	Sample size (total, exposed, unexposed)			
	Person-time (total, exposed, unexposed)			
	No. of events (total, among exposed, among unexposed)			
	Whether main or subgroup analysis			
Risk of bias	Description of subgroup analysis			
	NOS rating (good, fair and poor)			
NOS, Newcastle-Ottawa Scale.				

organised and recorded. This facilitates easy reference and comparison across different studies. The creation and content of this table, as well as the PRISMA study inclusion, will be discussed in the sections on study selection and study characteristics. The risk of bias will be portrayed through NOS and the quality of evidence will be assessed through the Methodological Index for Non-Randomised Studies (MINORS) checklist. The next step will involve all the evidence being analysed and outcomes will be reported in the study results table. All different health outcomes will be considered and analysed including social, physical and mental.

A narrative synthesis will be conducted on the findings from the review, which would be presented under broad headings with detailed summary of each health outcome including physical, mental and social. The narrative

synthesis will explore the range and magnitude of the available evidence around health outcomes of knife crime victims, as well as highlight the strength of the evidence present using the MINORS quality assessment checklist. The detailed summary will provide future recommendations for research as well as identify the extent of health outcomes of knife crime victimisation.

If there are at least three studies identified with a comparable form of knife crime exposure, reported health outcomes and sufficient heterogeneity, meta-analysis will be used to synthesise data quantitatively, thus, producing an effect size. We will use Review Manager software V.5.3 to pool the data for analysis and produce a pooled OR, using either a random or fixed-effects model.

To assess the heterogeneity, overlapping CIs will be identified and presented in a forest plot. With the application

**Table 5** MINORS checklist

Methodological item for non-randomised studies	Scores			
Study citation	-	-	-	-
A clearly stated aim				
Inclusion of consecutive patients				
Prospective collection of data				
End points appropriate to the aim of study				
Unbiased assessment of the study end point				
Follow-up period appropriate to the aim of the study				
Loss to follow-up <5%				
Prospective calculation of the study size				
Additional criteria in the case of comparative studies				
An adequate control group				
Contemporary group				
Baseline equivalence of group				
Adequate statistical analyses				
MINORS, Methodological Index for Non-Randomised Studies.				

of the I^2 statistic, we will delineate the degree of disparity across various studies for each targeted outcome. It should be noted that the I^2 statistic is used to measure the percentage of total variability that arises from heterogeneity between studies.

If there is missing data, the corresponding author of the original paper will be contacted to extract the data. However, if the data are not available, we will conduct a respective analysis instead of an imputation approach.

Additional analysis will also include subgroup analysis if sufficient data are presented. The subgroup analysis will be based on knife crime victims' characteristics such as gender, age, socioeconomic status, age at which knife crime incidence occurred and geographical variation. Depending on the level of detail available in the papers, the analysis of outcomes will potentially be stratified by type of victimisation such as physical injury (stab or puncture wound), threatened violence, the severity of victimisation, circumstances of victimisation and repeated victimisation.

Meta-bias(es)

If a sufficient amount of data is collected, we plan to conduct a sensitivity analysis. The sensitivity analysis is a method used to analyse how different values of an independent variable impact a particular dependent variable under a given set of assumptions. In this context, the sensitivity analysis will assess the robustness of the findings of the meta-analysis. Specifically, it will evaluate how the conclusions might change when varying factors such as the sample size, quality of the included studies and levels of bias. This provides a measure of the reliability and validity of the results, helping to understand the impact of any uncertainties in the overall conclusions drawn from the meta-analysis. Moreover, if there are at least 10 studies

in the meta-analysis that have no significant evidence of heterogeneity, we will explore the possibility of publication bias by visually inspecting on a funnel plot.

Confidence in cumulative evidence

The strength of the identified evidence will be assessed using the MINORS quality assessment checklist (table 5),⁴⁶ similarly used for the knife crime characteristics and intervention review by Browne *et al.*⁴⁷ This tool was chosen for its comprehensiveness, applicability of knife outcomes research and ease of use. The 12-item tool evaluates study design aspects such as appropriate statistical analysis, data collection, coherent research objectives and suitable study design, allowing for a thorough evaluation of potential limitations and biases.⁴⁶ Although the tool was originally developed for surgical research,⁴⁶ the MINOR checklist is appropriate for this quantitative review as it is specifically designed for non-randomised studies like cross-sectional, cohort and case-control studies often associated with knife crime health outcomes research.⁴⁸ Despite its strengths, the checklist has its weaknesses, including a lack of validation, subjectivity in the scoring systems and limited guidance. However, these issues can be negated by having multiple reviewers calculating inter-rater reliability and referring to multiple guidelines available for more detailed instructions.^{46 48}

The cohort and cross-sectional studies are scored on eight items including; clearly stated aim, the inclusion of patients, collection of data, appropriate end points, unbiased assessment of end points, appropriate follow-up period, if the loss to follow-up is <5% and calculation of study size. A poor-quality cohort or cross-sectional study is defined if a sum of points is <11, whereas a good-quality study is 11 or more points. Additionally, the case-control is scored on 12 items including the previous 8 mentioned

and 4 additional items; adequate control group, contemporary group, baseline equivalence of groups and adequate statistical analysis. Poor-quality case-control studies are defined if the sum of points is <16, whereas a good-quality study is 16 or more points.

Overall, the MINORS checklist is appropriate for this systematic review due to the types of study design, usability and adaptability. The checklist covers key aspects of the related studies of knife crime health outcomes. In addition, according to Browne *et al*,⁴⁷ researchers considered the checklist appropriate for knife crime studies.

Patient and public involvement

Patients were not involved in this piece of research's reporting, dissemination or design plans. However, we plan to engage with key stakeholders through our network such as the School of Public Health Research in the West Midlands (PHRESH) and the Youth Justice Board, which is an advisory body to the UK Home Office.

Limitations

The research question may have some key limitations that could hinder its breadth and impact. First, there is an inherent challenge in the variability of definitions of knife crime and health outcomes. The lack of standardised definitions across various studies and contexts can lead to inconsistencies in data interpretation, complicating the synthesis of findings and potentially affecting the conclusiveness of the research outcomes. Second, we have chosen to include only UK studies to reduce heterogeneity and address a pressing concern in the UK in the current context, but this may limit the generalisability of the results on a global scale, since the nature and implications of knife crime may differ between countries.

ETHICS AND DISSEMINATION

Ethics approval is not required for this study as no original data will be collected. The results will be disseminated through a peer-reviewed publication and conference presentation. The review will synthesise a summary of all health outcomes including physical, mental and social of knife crime victims in the UK. The synthesis of health outcomes from the available literature will be the main output (peer-reviewed publication) and will provide a summary of the health impact of knife crime victims. This will provide a greater understanding of how knife crime impacts the population. As a result, recommendations for future research will be developed from the review.

Contributors The initial Ovid search strategy was developed by IG. The writing and methodological plan for this protocol was developed by IG, JSC and JM. Further revisions to the protocol were made by SB and AP, and the final copy of the manuscript was approved by all authors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

Illin Gani <http://orcid.org/0009-0008-3644-278X>

REFERENCES

- Allen G, Burton M. Knife crime statistics, Available: <https://commonslibrary.parliament.uk/research-briefings/sn04304/>
- Home Affairs Committee. House of Commons - Knife Crime, Available: <https://publications.parliament.uk/pa/cm200809/cmselect/cmhaff/112/11204.htm>
- Office for National Statistics. Crime in England and Wales, Available: <https://www.ons.gov.uk/peoplepopulationandcommunity/crimeandjustice/bulletins/crimeinenglandandwales/yearendingmarch2022>
- Knife crime in England and Wales: statistics. n.d. Available: <https://researchbriefings.files.parliament.uk/documents/SN04304/SN04304.pdf>
- Haylock S, Boshari T, Alexander EC, *et al*. Risk factors associated with knife-crime in United Kingdom among young people aged 10-24 years: A systematic review. *BMC Public Health* 2020;20:1451. 10.1186/s12889-020-09498-4 Available: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-09498-4>
- NHS England. Hospital admissions for youths assaulted with sharp objects up almost 60%, Available: <https://www.england.nhs.uk/2019/02/teens-admitted-to-hospital/>
- Bellis M, Karen H, Perkins C, *et al*. Protecting people promoting Health: A public health approach to violence prevention for England. 2012. Available: https://www.basw.co.uk/system/files/resources/basw_25016-5_0.pdf
- Lam C, Aylwin C, Khan M. Are Paediatric Stabbings in London related to socioeconomic status *Trauma* 2019;21:310-6.
- Olding J, Olding C, Bew D, *et al*. Penetrating head & neck trauma - epidemiology and injury characteristics in terror-related violence, interpersonal violence and deliberate self-harm at a level 1 trauma centre. *Surgeon* 2019;17:133-8.
- Bailey L, Harinam V, Ariel B, *et al*. Victims, offenders and victim-offender overlaps of knife crime: A social network analysis approach using police records. *PLoS ONE* 2020;15:e0242621. 10.1371/journal.pone.0242621 Available: <https://doi.org/10.1371/journal.pone.0242621>
- Reilly JJ, Naumann DN, Morris L, *et al*. Injury by knife crime amongst children is associated with socioeconomic deprivation: an observational study. *Pediatr Surg Int* 2023;39. 10.1007/s00383-022-05298-6 Available: <https://link.springer.com/article/10.1007/s00383-022-05298-6>
- Coid J, Zhang Y, Zhang Y, *et al*. Epidemiology of knife carrying among young British men. *Soc Psychiatry Psychiatr Epidemiol* 2021;56:1555-63. 10.1007/s00127-021-02031-x Available: <https://link.springer.com/article/10.1007/s00127-021-02031-x>
- Malik NS, Munoz B, de Courcey C, *et al*. Violence-related knife injuries in a UK city; epidemiology and impact on secondary care resources. *EClinicalMedicine* 2020;20:100296.
- Lau G, Ang JY, Kim N, *et al*. Prevalence of alcohol and other drug use in patients presenting to hospital for violence-related injuries: A systematic review. *Trauma Violence Abuse* 2024;25:306-26. 10.1177/15248380221150951 Available: <https://journals.sagepub.com/doi/full/10.1177/15248380221150951>
- Community Practitioner. Knife crime: where's the public health approach?, Available: <https://www.communitypractitioner.co.uk/news/2019/07/knife-crime-wheres-public-health-approach?&redirectcounter=1>

- 16 Skarlatidou A, Ludwig L, Solymosi R, *et al.* Understanding knife crime and trust in police with young people in East London. *Crime & Delinquency* 2023;69:943–70. 10.1177/00111287211029873 Available: <https://doi.org/10.1177/00111287211029873>
- 17 Shaw D, Pease K, Heberton B. Possession of a knife and private defence: dilemmas in the pursuit of personal security in England and Wales. *Int J Law Crime Justice* 2011;39:266–79.
- 18 Brown J. n.d. How is the government implementing a 'public health approach' to serious violence?
- 19 Sethi D, Hughes K, Bellis M, *et al.* European report on preventing violence and knife crime among young People. 2010;17:79. Available: <http://www.euro.who.int/pubrequest>
- 20 Harding S. Getting to the point? Reframing narratives on knife crime. *Youth Justice* 2020;20:31–49.
- 21 Bullock K, Agar I, Ashby M, *et al.* Police practitioner views on the challenges of analysing and responding to knife crime. *Crime Sci* 2023;12. 10.1186/s40163-022-00180-1 Available: <https://crimesciencejournal.biomedcentral.com/articles/10.1186/s40163-022-00180-1>
- 22 Torjesen I. Can public health strategies tackle London's rise in fatal violence *BMJ* 2018;361:k1578. 10.1136/bmj.k1578 Available: <https://pubmed.ncbi.nlm.nih.gov/29625963/>
- 23 Skott S, Mcvie S. Key points reduction in Homicide and violence in Scotland is largely explained by fewer gangs and less knife crime. 2019.
- 24 CDC. The Public Health Approach to Violence Prevention, Available: <https://www.cdc.gov/violenceprevention/about/publichealthapproach.html>
- 25 Early interventions to reduce violent crime. 2019. Available: www.parliament.uk/post
- 26 Whole-system' approach to tackling violent crime is working, Available: <https://www.gov.uk/government/news/whole-system-approach-to-tackling-violent-crime-is-working>
- 27 ClinicalKey Student. Introduction - Gordis Epidemiology, Available: <https://www.clinicalkey.com/student/content/book/3-s2.0-B9780323552295000012#highlight-1>
- 28 Violence reduction programme London in-hospital violence reduction services: A guide to effective implementation. 2022.
- 29 Golding B, Mcclory J. Getting to the point. 2008. Available: www.policyexchange.org.uk
- 30 Heath-Kelly C, Shanaah S. n.d. Rehabilitation within pre-crime interventions: the hybrid Criminology of social crime prevention and countering violent extremism. *CrimRxiv* 10.21428/cb6ab371.2e23f865 Available: <https://journals.sagepub.com/doi/full/10.1177/13624806221108866>
- 31 Vulliamy P, Hancorn K, Glasgow S, *et al.* Age-related injury patterns resulting from knife violence in an urban population. *Sci Rep* 2022;12:15250.
- 32 Christensen MC, Nielsen TG, Ridley S, *et al.* Outcomes and costs of penetrating trauma injury in England and Wales. *Injury* 2008;39:1013–25. 10.1016/j.injury.2008.01.012 Available: <https://linkinghub.elsevier.com/retrieve/pii/S0020138308000454>
- 33 Kessler RC, Sonnega A, Bromet E, *et al.* Posttraumatic stress disorder in the National Comorbidity survey. *Arch Gen Psychiatry* 1995;52:1048–60. 10.1001/archpsyc.1995.03950240066012 Available: <https://pubmed.ncbi.nlm.nih.gov/7492257/>
- 34 Sethi D, Hughes K, Bellis M, *et al.* European report on preventing violence and knife crime among young people. 2010. Available: <http://www.euro.who.int/pubrequest>
- 35 Flannery DJ, Vazsonyi AT, Waldman ID. The Cambridge handbook of violent behavior and Aggression. In: *Exposure to violence, mental health and violent behavior Mark Singer Case Western Reserve University.* 2007.
- 36 Wilkinson E. How medical teams are coping with rising knife crime. *BMJ* 2019;l104. 10.1136/bmj.l104 Available: <https://www.bmj.com/content/364/bmj.l104>
- 37 Pantaleon L. Why measuring outcomes is important in health care. *J Vet Intern Med* 2019;33:356–62.
- 38 Krousel-Wood MA. Practical considerations in the measurement of outcomes in Healthcare. *Ochsner J* 1999;1:187–94.
- 39 Page MJ, McKenzie JE, Bossuyt PM, *et al.* The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. 10.1136/bmj.n71 Available: <https://www.bmj.com/content/372/bmj.n71>
- 40 PRISMA-P Group, Moher D, Shamseer L, *et al.* Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev* 2015;4. 10.1186/2046-4053-4-1 Available: <https://systematicreviewsjournal.biomedcentral.com/articles/10.1186/2046-4053-4-1>
- 41 Edgerton JD, Roberts LW. Health outcomes. *Encyclopedia of Quality of Life and Well-Being Research* 2014:2730–5. 10.1007/978-94-007-0753-5 Available: https://link.springer.com/referenceworkentry/10.1007/978-94-007-0753-5_1251
- 42 Covidence. Better systematic review management, Available: <https://www.covidence.org/>
- 43 GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the global burden of disease study 2019. *Lancet* 2020;396:1204–22.
- 44 The Preamble of the Constitution of the world health organization. n.d. Available: <https://apps.who.int/iris/handle/10665/268691>
- 45 Wells G, Shea B, Robertson J, *et al.* n.d. The Newcastle-Ottawa scale (NOS) for assessing the quality of Nonrandomized studies in meta-analysis.
- 46 Slim K, Nini E, Forestier D, *et al.* Methodological index for non-randomized studies (minors): development and validation of a new instrument. *ANZ J Surg* 2003;73:712–6. 10.1046/j.1445-2197.2003.02748.x Available: <https://pubmed.ncbi.nlm.nih.gov/12956787/>
- 47 Browne KD, Green K, Jareno-Ripoll S, *et al.* Knife crime offender characteristics and interventions – A systematic review. *Aggression Violent Behav* 2022;67:101774.
- 48 Zeng X, Zhang Y, Kwong JSW, *et al.* The methodological quality assessment tools for Preclinical and clinical studies, systematic review and meta-analysis, and clinical practice guideline: a systematic review. *J Evid Based Med* 2015;8:2–10. 10.1111/jebm.12141 Available: <https://onlinelibrary.wiley.com/toc/17565391/8/1>

Supplementary Table 1. Example search terms for Web of Science Core Collection

	Concept			
	Knife crime	Study type	Health outcome	Risk
Topic (searches title, abstract, author keywords, Keywords Plus®)	Knife "Penetrating injur*" "penetrative trauma" "Knife crime" homicide gang Blade Stab Stabbing* "knife violence" "knife injur*"	"systematic review" "meta-analysis" cohort cross-over case- control prospective retrospective longitudinal follow-up followup	Mortality PTSD Pain death "Quality of life" "social determinant*" "employment" "Physical disability" Depression Anxiety "Physical condition" "Mental disorder*" infection	"risk*" "odds" "cross-product ratio*" "hazards ratio*" "hazard ratio*" "statistic*" "HR" "RR" "aOR" relation* correlat* associat* likel*

Supplementary Table 2. Example search terms for ProQuest Criminology Collections

	Concept			
	Knife crime	Study type	Health outcome	Risk
Anywhere except full text – NOFT	Knife Penetrating NEAR/3 injur* penetrative NEAR/3 trauma Knife crime homicide gang Blade Stab Stabbing* knife NEAR/3 violence knife injur*:	"systematic review" "meta- analysis" cohort cross-over case- control prospective retrospective longitudinal follow-up followup	Mortality PTSD Pain death "Quality of life" "social determinant*" "employment" "Physical disability" Depression Anxiety "Physical condition" "Mental disorder*" infection	"risk*" "odds" "cross-product ratio*" "hazards ratio*" "hazard ratio*" "statistic*" "HR" "RR" "aOR" relation* correlat* associat* likel*

Supplementary Table 3. Example search terms on Google Scholar (

<https://scholar.google.com>) - 100 first results per string have been considered; citations records and patents were excluded.

#	Search	# Results screened
1	"Knife violence" AND "Health outcome" AND "UK"	100
2	"Knife crime" AND "UK"	100
3	"Knife violence" AND "Epidemiology" AND "UK"	100

Supplementary Table 4. Example search terms on OpenGrey

(<https://easy.dans.knaw.nl/ui/advancedsearch?wicket:bookmarkablePage=:nl.knaw.dans.easy.web.search.pages.PublicSearchResultPage&q=knife+violence>)

#	Search
1	Knife AND violence
2	Penetrating AND injury
3	Sharp AND injury