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Health and social care gaps among people presenting to hospital following self-harm: population-based study

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Abstract

Objectives

To examine proportions of patients referred to mental health, social and VCSE services and general practice and to assess care gaps among people presenting to hospital following self-harm.

Design

Population-based study. Data were extracted from hospital records.

Setting

Three emergency departments (EDs) in Manchester, UK.

Participants

26,090 patients aged 15+ years who presented to participating EDs following self-harm and who received a psychosocial assessment by a mental health specialist.

Primary and secondary outcome measures

Primary outcome measures: care gaps, estimated from the proportion of patients with evidence of social and mental health needs with no new or active referral to mental health, social and VCSE services or general practice (GP). Secondary outcome measures: proportions of referrals by groups of patients and estimated mental health and social needs of patients. Indicators of mental health and social need were developed with academic clinicians (psychiatrist, GP and social worker) and expert lived experience contributors.

Results

96.2% (25,893/26,909) of individuals were estimated as having mental health needs. Among this group, 29.9% (6503/21719) had no new or active referral to mental health services (indicating a care gap). Men, those who were younger, from a Black, South Asian or Chinese ethnic group, living in the most deprived areas, with no mental health diagnosis, or with an alcohol, substance misuse, anxiety or trauma-related disorder, had greater mental health care gaps. 52.8% (14,219/26,909) had social needs, with care gaps greater for men,

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individuals aged 45-64 and those who were unemployed or had a diagnosed mental disorder.

Conclusions

Care gaps were higher among hospital-presenting groups known to have increased risks of suicide: men, those at middle age, unemployed individuals and those misusing substances. Improved access to mental health, social and VCSE services and general practice care is vital to reduce inequities in access to self-harm aftercare.

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Strengths and limitations of this study

- This is the first study of care gaps among people attending hospital following self-harm. The use of a self-harm cohort study allowed detailed assessment of patients' needs and referrals to mental health care, social and VCSE services and GPs.
- Measures of mental health and social needs were co-developed with lived experience contributors, researchers and clinicians.
- Our study does not could not include people not receiving a psychosocial assessment by a mental health specialist because information relating to mental health and social needs was not available in this group.
- The use of validated measures would have provided more accurate and nuanced estimates of mental health and social needs; for example, we were unable to estimate severity of needs or discern the level of impairment to daily activities.

INTRODUCTION

People who present to hospital following self-harm are a priority group for suicide prevention due to their increased risk of suicide [1]. Self-harm includes intentional self-poisoning or self-injury and can involve varying degrees of suicidal intent [2]. Appropriate aftercare for people who present to hospital following self-harm is central to suicide prevention. However, few studies have examined care gaps in this population. While studies to date have examined hospital management of self-harm in different groups, none have specifically linked referral rates to levels of need – thus enabling estimation of care gaps. The roles of social and voluntary, community and social enterprise (VCSE) services and general practitioner (GP) care are also under-researched.

There is widespread recognition that care for people who have self-harmed should be multi-agency and interdisciplinary; many people who have harmed themselves face social and economic adversities that exacerbate mental health problems [3, 4]. Guidance from the National Institute for Health and Care Excellence on management and prevention of self-harm therefore recommends joint approaches between social care agencies, healthcare professionals and voluntary, community and social enterprise (VCSE) services [2]. In addition, the latest suicide prevention strategy for England, launched in 2023, highlights the pivotal role of VCSE services in suicide prevention, calling for strong collaboration with health and local government services [1].

Much of the research into self-harm aftercare to date has focussed on psychosocial assessments and psychological therapies [5-8] [9]. Little attention has been given to the role of social services, VCSE organisations and primary care. For example, there has been very little research into social work-based or integrated interventions for preventing suicide [10, 11] or the role of voluntary-sector led support [12]. Similarly, while general GPs have a pivotal role in reviewing patients’ needs and linking with VCSE organisations following self-harm [13], most studies of hospital management have not considered referrals to GPs.

It is vital to recognise people’s wider psychosocial needs when considering care gaps in populations people experiencing poor mental health [14]. While care gaps have been

examined in general population samples and among people with specific mental disorders [15-18], there has been no assessment of care gaps for those seeking help after self-harm. Without comprehensive analysis of needs, the potential effectiveness of psychological treatments for self-harm may be compromised. For example, evidence for effectiveness of psychological interventions for self-harm is relatively weak despite a large body of research spanning decades [19].

Routine sources of health and social data are valuable in examining care gaps [14, 20]. Most national register studies used to examine suicidal behaviour do not contain key information such as specific life events preceding a self-harm episode [21]. However, dedicated, health condition-specific cohort studies contain more relevant information than national, service-wide health data. Using data from the Manchester Self-Harm Project, we examined likelihood of referrals to mental health and social care services and to VCSE organisations for people attending hospital following self-harm, and their mental health and social needs.

Our specific research objectives were:

- 1 To describe proportions of mental health, social and VCSE services and GP referrals among a cohort of people presenting to hospital following self-harm
- 2 To compare frequencies and probabilities of referrals between groups of patients, including age, gender, employment status, existing mental health diagnosis, ethnic and area-level deprivation groups
- 3 To estimate mental health and social needs among groups of patients including age, gender, employment status, existing mental health diagnosis, ethnic and area-level deprivation groups
- 4 To describe proportions referred to mental health, social and VCSE services and GP by prevalence of social and mental health need, thus estimating care gaps (primary outcome measure).

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METHODS

Study design and data sources

Data from the Manchester Self-Harm Project, a prospective cohort study of people presenting to emergency departments (EDs) in Manchester, UK, were used in this study. The Manchester Self-Harm Project includes approximately 65,000 episodes of self-harm by around 37,000 people presenting to three EDs between 1997 and 2017. The study includes episodes of intentional self-poisoning or self-injury, regardless of motivation. A range of demographic, clinical and area-based data were collected from ED and mental health service records, following each presentation involving self-harm. Research administrators used validated search terms to identify presentations potentially involving self-harm. Where self-harm was confirmed, data were extracted using a two-stage process. First, basic clinical and demographic data (including reason for attendance, method of self-harm, age, gender, ethnic group) were extracted from ED records for all episodes. Second, further information was extracted from psychosocial assessments for episodes that were assessed by a mental health specialist. In this stage, researchers coded the information in the written records of the assessments using a standard proforma and following a protocol. If uncertainty arose during coding, the researcher team discussed the anonymised case to reach a consensus. Accuracy and inter-rater reliability were assessed using a period of training for all researchers, including coding a random selection of assessments independently then comparing codes within the research team. This helped to identify areas of inconsistency and inaccuracy in applying coding rules. Validation exercises of the proformas against clinical records have showed high levels of agreement ($\kappa \geq 0.8$ for individual variables) [22]. Variables added during this stage included time of self-harm, suicidal intent (yes/no), suicide note, evidence of pre-planning, concealment of self-harm, history of drug or alcohol misuse, psychiatric diagnosis, history of self-harm, current and previous mental health service involvement, current symptoms of depression, factors identified by the patient as precipitating the self-harm (e.g. problems with relationships, family, housing, work, school, money, mental health, physical health, abuse, legal issues, being a victim of crime, drug or alcohol misuse, miscarriage) and clinical management (e.g. referral, admission, discharge).

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We analysed individuals rather than episodes due to many of the exposure characteristics (for example, gender, age, ethnic group, mental health diagnosis) being measured at an individual level. In addition, mental health care gaps are typically measured at the individual level [14]; including multiple episodes by the same individual would likely lead to an inaccurate estimation of care gaps. Where there were multiple episodes by the same individual, the individual's first assessed episode during the study period was included.

The study protocol was pre-registered (<https://osf.io/zq5et>). Following preliminary data analysis, it was apparent that the data relating to physical health problems was only available for people who had reported physical health as a direct precipitant to the self-harm. This was likely to be an underestimate of the prevalence of physical health problems in the cohort. Therefore, our study deviated from the planned protocol by focusing on mental health and social needs. The Manchester Self-Harm Project was granted Section 251 approval by the Confidential Advisory Group and the Health Research Authority for the use of patient data. This study followed the STROBE guidelines for reporting observational cohort studies [23].

Clinical management

We examined the following categories of hospital management: referral to mental health services (including referral to outpatient mental health follow-up, crisis or urgent care services, community mental health services and drug and alcohol services), referral to social services, referral to voluntary, community and social enterprise (VCSE) services and referral to general practice (including recommendations for the GP to refer for primary mental health care). We only included formal referrals, and did not include instances where the patient was advised to self-refer. Individuals could be referred to more than one service for the same episode of self-harm (Figure 1).

Figure 1: Venn diagram showing percentages of patients referred to their GP, to mental health services and to social or VCSE services following hospital presentation for self-harm.

Assessing clinical management and mental health and social needs of patients

Referral to mental health, social and VCSE services and GP following self-harm and characteristics pertaining to patients’ mental health and social needs were assessed using information recorded in hospital notes and specialist mental health assessments (Table 1). Data from psychosocial assessments were used to make inferences about mental health and social need. The indicators were devised in the context of a clinical population of people who had presented to ED with self-harm. For example, if a life event such as a financial problem was mentioned in the psychosocial assessment as a contributing factor to the self-harm, this was interpreted as a substantial social problem. Given the absence of validated measures of mental health and social needs in this population, indicators of mental health and social services/VCSE sector need were co-developed with researchers, clinicians (an academic clinical psychiatrist, an academic general practitioner and an academic social worker) and an expert lived experience panel comprising four people with personal experience of attending ED for self-harm as a patient or carer. The co-development process involved an initial meeting to discuss the factors available in the study that may indicate mental health or social needs, followed by an exercise where each expert was asked to specify which factors should be included as indicating mental health needs and which may indicate social needs. There was broad agreement between the experts. In instances where consensus was not reached in the initial selection of factors, the lead author facilitated further discussion. Two measures were derived:

- (i) Evidence of mental health treatment needs, derived from the presence of any of the following: any mental health diagnosis, current drug or alcohol misuse, self-harm that was reported as directly in response to mental symptoms or a mental disorder, the presence of a suicide note, patient reporting that they wanted to die at the time of the self-harm and symptoms of depression (Table 1)
- (ii) Evidence of significant social problems, derived from: homelessness or hostel dwelling, self-harm in response to problems with housing, money, work or study, or in response to legal problems or physical, sexual or emotional abuse (Table 1).

Table 1: Variables used to derive measures of mental health and social needs

Patient characteristics	(i) Mental health treatment needs	(ii) Significant social needs
Homeless or living in hostel accommodation		✓
Currently misusing alcohol	✓	
Currently misusing drugs	✓	
Has a mental health diagnosis	✓	
Precipitants of self-harm or cause(s) of current distress		
Housing problem		✓
Employment or study problems		✓
Legal problem e.g. criminal charges		✓
Victim of crime		✓
Financial problems		✓
Direct response to mental symptoms	✓	
Other mental health problems	✓	
Abuse (physical, mental, sexual)	✓	✓
Alcohol abuse	✓	
Substance abuse	✓	
Circumstances of the self-harm		
Suicide note	✓	
Intention to die during attempt	✓	
Symptoms of depression		
Suicidal thoughts	✓	
Suicidal plans	✓	
Hallucinations/delusions	✓	
Looks depressed	✓	
Feels depressed	✓	
Sleep disturbance	✓	
Appetite disturbance	✓	
Feels hopeless	✓	
Low energy	✓	
Evidence of hostility	✓	
Any mental health diagnosis	✓	

The measures of clinical management (new and existing referrals) and the co-developed measures of mental health/social needs were used to estimate care gaps, which were defined as ‘the percentage of individuals who require care but do not receive treatment’ as described by Kohn et al. [24].

Additional study measures

In addition to overall estimates, we examined estimates stratified by gender and age groups, presence of existing mental health diagnosis, ethnic groups and area-level deprivation quintile. The specific age groupings were determined based on the size of the outcome groups. Likewise, mental health diagnoses groupings were collapsed to enable analysis when there were too few patients in a single diagnostic category. Ethnic group categories were based on Office for National Statistics 2011 census broad groupings. In subgroup analyses where numbers were too low to report findings (<10), we suppressed cell counts and estimates for the specific ethnic group. This enabled us to retain broad groupings rather than collapsing ethnic minority groups into a single category. Mental health diagnosis categories used were mood disorders (including depression and bipolar disorder), anxiety and trauma-related disorders (including anxiety and post-traumatic stress disorder), psychotic disorders (including schizophrenia), eating disorders, personality disorders, alcohol dependence, substance abuse, multi-substance abuse and learning difficulties or autism). We also included separate groups for alcohol misuse and substance misuse. Diagnoses were based on ICD-10 codes.

Missing data

Factors used to estimate mental health and social needs (including demographic characteristics, precipitants to and circumstances of the self-harm, symptoms of depression) and categories of hospital management were coded as absent if there was no record of them in the psychosocial assessment. Missing data on age, sex and ethnic group were imputed using data from any additional episodes from the same individual recorded in the Manchester Self-Harm Project dataset. Data on exposure variables were missing for between 0% and 6% of individuals. No individuals had missing data for age, three individuals

were excluded due to missing data on gender and missing data for other variables were excluded pairwise to maximise the cohort size: 565 (2.1%) had missing ethnic group data, 1499 (5.6%) had missing employment status data and 1171 (4.4%) had missing area-level deprivation data. There were no substantial differences in outcome measures between patients with and without missing exposure data (Table S1).

Study sample

Our primary study sample for objectives 1 to 3 was 26,909 individuals: all patients aged 15 years or over presenting between 1997 and 2017, with data available on gender (n = 3 were missing) and who received a psychosocial assessment (n = 12174 received no assessment). Our primary study cohorts for objective 4 were patients assessed by the research team as having significant mental health (N = 25893) or social (N = 14219) needs. In adjusted analyses we restricted these cohorts to individuals with data available for confounding variables (N = 21719 and 11892 respectively).

Statistical analysis

Frequencies of health and social care referrals were estimated as a proportion of the broader study sample. Proportions and their 95% confidence intervals are presented. Log binomial regression models were used to estimate probability (risk) ratios of referrals to mental health and social care services among gender and age groups, presence of existing mental health diagnosis, ethnic groups and area-level deprivation quintiles. Risk ratios with confidence intervals above 1.0 indicated an exposure was associated with increased probability of referral in that group compared to the reference group. The following reference groups were used in the regression models: women, aged 65+, White ethnic group, in work or study, the least deprived IMD quintile and the group with no psychiatric diagnosis. Unadjusted and adjusted risk ratios were estimated, with models adjusted for factors known to be associated with referral likelihood: year of presentation, hour of presentation, hospital attended, role of assessor (doctor or nurse) and method of self-harm.

Patient and public involvement

An expert lived experience panel of four people with personal experience of attending an ED for self-harm were involved in designing the study, developing the measures of mental health and social needs (see ‘Assessing clinical management and mental health and social needs of patients’) and in interpreting the findings of the study.

RESULTS

Characteristics of the cohort

26,909 individuals presented with self-harm between 1997 and 2017 and received a psychosocial assessment. Three individuals were excluded due to missing data on gender. There were no individuals with missing data for age. Proportions of missing data for other exposure variables were between 2% and 6% (Table S1). 55.8% (15019/26909) of the cohort was female, 32.7% (8805) were aged under 25 years and 1.6% (419) were aged 65 years or over. 88.9% (23421) of the cohort were from a White ethnic group, 4.5 % (1193) were from an Indian/Pakistani/Bangladeshi background, 2.6% (695) were from a Black African/Caribbean ethnic group, 617 (1.6%) were from a mixed ethnic group, 0.3% (116) were Chinese and 1.4% (564) were from another ethnic group. The most deprived quintile (n = 5408) within the cohort lived in areas with a mean rank of 421 (out of 32482 Lower Super Output Areas), while the least deprived quintile (n = 4959) had a mean rank of 19613/32482. Therefore, the least deprived quintile within this cohort were broadly within the most deprived 60% of areas nationally.

52.5% (14163) of the cohort had a mental health diagnosis recorded; 16.5% (4445) mood disorder, 10.1% (2706) alcohol use disorder (defined as daily alcohol use of 7 units or more), 4.9% (1305) had alcohol dependence, 5.3% (1416) had anxiety or trauma-related disorder, 4.6% (1225) were misusing substances or had a substance use disorder (an additional 3.3%, 888, had multi-substance misuse disorder), 4.2% (1133) were diagnosed with a personality disorder, 2.3% (613) had a psychotic disorder and 0.7% (191) had an eating disorder. In addition, 0.9% (241) had learning difficulties or autism.

Clinical management

Overall, 36.9% (9916) of patients in the cohort were referred to mental health services: 13.2% (3542) to outpatient mental health services (Table 2), 9.8% (2623) crisis or urgent care, 4.0% (1072) to alcohol and drug services and 3.5% (948) to community mental health services (Table S2). 1.5% (393) were referred to social services and 11.3% (3047) were referred to VCSE services (Table 2). Referral to more than one service was common (Figure 1). Groups more likely to be referred to mental health services included men, older age groups, those who were unemployed, registered sick or retired, and those with a mental health diagnosis (Table 2). The youngest (15-19 years) and oldest (65+ years) age groups were most likely to be referred to social services, as were people living in more deprived areas. Younger age groups and those with a diagnosis of anxiety and trauma-related disorders were most likely to be referred to VCSE services (Table 2). Overall, 61.1% (16449) were referred to their GP. For a fifth of individuals (19.9%, 5357), a GP referral was only new or current referral in place. This proportion was higher for younger people (ages 15-19, 25.1%, CI 23.8% to 26.5%), Black (25.8% CI 22.6% to 29.1%) and South Asian (27.2%, CI 24.7% to 30.0%) people and those with no mental health diagnosis (26.2%, CI 25.4% to 27.0%).

Table 2: Proportions of patients referred to mental health, social and VCSE services and their GP (objectives 1 and 2) ^a

	% , 95% CI (n) referred to mental health services	% , 95% CI (n) referred to social services	% , 95% CI (n) referred to VCSE services	% , 95% CI (n) referred to GP	% , 95% CI (n) referred to GP with no other new referral or current mental health care
Total (26909)	36.9, 36.3 – 37.4 (9916)	1.5, 1.3-1.6 (393)	11.3, 11.0 – 11.7 (3047)	61.1, 60.5 - 61.7 (16449)	19.9, 19.4 - 20.4 (5357)
Women (15019)	35.5, 34.7 – 36.3 (5331)	1.7, 1.5 – 1.9 (257)	11.8, 11.3 – 12.3 (1771)	63.4, 62.6 – 64.2 (9521)	19.6, 18.9 – 20.2 (2936)
Men (11890)	38.6, 37.7 – 39.4 (4585)	1.1, 1.0 – 1.4 (136)	10.7, 10.2 – 11.3 (1276)	58.3, 57.4 – 59.2 (6928)	20.4, 19.6 – 21.1 (2421)
<i>Age group</i>					
15-19 (3931)	30.9, 29.4 – 32.3 (1213)	2.1, 1.7 – 2.6 (82)	16.5, 15.4 – 17.7 (648)	62.9, 61.4 – 64.4 (2473)	25.1, 23.8 – 26.5 (986)
20-24 (4874)	33.4, 32.1 – 34.7 (1626)	1.2, 0.9 – 1.5 (57)	13.8, 12.9 – 14.8 (673)	61.3 59.9 – 62.6 (2987)	21.2, 20.1 – 22.4 (1035)
25-34 (6982)	38.1, 37.0 – 39.2 (2660)	1.4, 1.1 – 1.7 (95)	10.5, 9.8 – 11.3 (734)	60.5, 59.3 – 61.6 (4223)	19.5, 18.5 – 20.4 (1358)
35-44 (5749)	38.2, 37.0 – 39.5 (2196)	1.3, 1.1 – 1.7 (77)	9.7, 9.0 – 10.5 (560)	63.2, 61.9 – 64.4 (3633)	19.4, 18.4 – 20.5 (1117)
45-64 (4954)	39.8, 38.4 – 41.1 (1969)	1.4, 1.1 - 1.8 (69)	8.2, 7.4 – 9.0 (404)	59.8, 58.5 – 61.2 (2964)	16.4, 15.3 – 17.4 (810)
65+ (419)	60.1, 55.4 – 64.7 (252)	3.1, 1.8 – 5.3 (13)	6.7, 4.7 – 9.5 (28)	40.3, 35.7 – 45.1 (169)	12.2, 9.4 – 15.7 (51)
<i>Ethnic group (26344)</i> ¹					
White (23421)	36.9, 36.3 – 37.5 (8648)	1.4, 1.3 – 1.6 (338)	11.3, 10.9 – 11.8 (2655)	61.6, 61.0 – 62.2 (14434)	19.6, 19.1 – 20.1 (4582)
Black (695)	39.1, 35.6 – 42.8 (272)	1.7, 1.0 – 3.0 (12)	13.4, 11.0 – 16.1 (93)	60.6, 56.9 – 64.1 (421)	25.8, 22.6 – 29.1 (179)
Indian/Pakistani/Bang ladeshi (1193)	34.0, 31.4 – 36.8 (406)	1.6, 1.0 – 2.5 (19)	10.0, 8.4 – 11.8 (119)	62.4, 59.6 – 65.1 (744)	27.2, 24.7 – 30.0 (324)
Mixed race (521)	41.1, 36.9 – 45.4 (214)	2.1, 1.2 – 3.8 (11)	9.8, 7.5 – 12.7 (51)	49.7, 45.4 – 54.0 (259)	14.6, 11.8 – 17.9 (76)
Chinese (73)	26.0, 17.3 – 37.2 (19)	--	--	50.7, 39.4 – 61.9 (37)	19.2, 11.7 – 29.8 (14)
Other (441)	36.1, 31.7 – 40.6 (159)	--	--	53.7, 49.1 – 58.3 (237)	19.3, 15.9 – 23.2 (85)
<i>Employment status</i> ² (25410)					
In work or study (9616)	31.3, 30.4 – 32.2 (3009)	0.8, 0.6 – 1.0 (76)	11.4, 10.8 – 12.1 (1097)	64.5, 63.7 – 65.6 (6221)	25.6, 24.8 – 26.5 (2464)
Unemployed (11585)	39.9, 39.0 – 40.8 (4623)	1.7, 1.5 – 1.9 (195)	11.0, 10.4 – 11.6 (1272)	57.1, 56.2 – 58.0 (6614)	16.3, 15.7 – 17.0 (1892)
Registered sick (2504)	40.7, 38.8 – 42.6 (1019)	2.6, 2.0 – 3.3 (64)	15.2, 13.8 – 16.6 (380)	75.0, 73.3 – 76.7 (1879)	16.0, 14.6 – 17.5 (401)
Retired (613)	53.8, 49.9 – 57.7 (330)	2.6, 1.6 – 4.2 (16)	6.4, 4.7 – 8.6 (39)	49.3, 45.3 – 53.2 (302)	15.8, 13.1 – 18.9 (97)
Looking after the home or family/other (1092)	31.8, 29.1 – 34.6 (347)	2.2, 1.5 – 3.3 (24)	13.1, 11.2 – 15.2 (143)	73.8, 71.1 – 76.3 (806)	26.8, 24.3 – 29.5 (293)
<i>Area-level deprivation (IMD) quintile (25738)</i> ^{± 3}					
1 (least deprived) (5065)	35.0, 33.7 – 36.3 (1773)	1.0, 0.8 – 1.3 (52)	9.4, 8.6 – 10.2 (474)	59.6, 58.8 – 61.0 (3020)	19.0, 18.9 – 20.1 (963)

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2 (5178)	38.8, 37.5 – 40.2 (2010)	1.2, 0.9 – 1.5 (62)	11.6, 10.8 – 12.5 (602)	61.1, 59.7 – 62.4 (3163)	19.2, 18.2 – 20.3 (996)
3 (5151)	38.2, 36.9 – 39.5 (1968)	1.8, 1.5 – 2.2 (93)	11.0, 10.2 – 11.9 (568)	61.8, 60.4 – 63.1 (3181)	19.6, 18.6 – 20.7 (1011)
4 (5034)	39.0, 37.7 – 40.4 (1965)	1.5, 1.2 – 1.8 (74)	10.9, 10.1 – 11.8 (549)	61.4, 60.0 – 62.7 (3089)	19.8, 18.7 – 20.9 (996)
5 (most deprived) (5310)	34.2, 32.9 – 35.5 (1815)	1.6, 1.3 – 1.9 (83)	13.1, 12.2 – 14.1 (697)	63.8, 62.5 – 65.1 (3390)	22.0, 20.9 – 23.2 (1170)
Primary psychiatric diagnosis (26909)					
None recorded (12746)	29.8, 29.0 – 30.6 (3799)	1.5, 1.3 – 1.7 (187)	12.8, 12.3 – 13.4 (1636)	63.7, 62.9 – 64.6 (8122)	26.2, 25.4 – 27.0 (3339)
Mood disorder (4445)	49.2, 47.8 – 50.7 (2188)	1.5, 1.1 – 1.9 (65)	10.6, 9.8 – 11.6 (473)	59.1, 57.7 – 60.6 (2628)	10.2, 9.3 – 11.1 (453)
Psychotic disorder (613)	68.0, 64.2 – 71.6 (417)	--	6.7, 5.0 – 9.0 (41)	33.0, 29.3 – 36.8 (202)	--
Anxiety or trauma-related disorder (1416)	32.6, 30.2 – 35.1 (462)	1.6, 1.0 – 2.3 (22)	18.4, 16.5 – 20.5 (261)	74.4, 72.0 – 76.6 (1053)	23.7, 21.5 – 25.9 (335)
Eating disorder (191)	38.7, 32.1 – 45.8 (74)	--	14.7, 10.3 – 20.4 (28)	57.6, 50.5 – 64.4 (110)	--
Alcohol misuse (2706)	36.1, 34.3 – 37.9 (976)	1.0, 0.7 – 1.5 (27)	8.8, 7.8 – 9.9 (238)	64.5, 62.6 – 66.2 (1744)	19.1, 17.7 – 20.6 (518)
Alcohol disorder (1305)	37.7, 35.1 – 40.4 (492)	2.1, 1.4 – 3.0 (27)	7.5, 6.2 – 9.1 (98)	66.4, 63.8 – 68.9 (866)	19.7, 17.6 – 21.9 (257)
Substance misuse/disorder (1225)	41.1, 38.3 – 43.8 (503)	1.1, 0.7 – 1.9 (14)	7.8, 6.5 – 9.5 (96)	53.1, 50.3 – 55.9 (651)	17.8, 15.8 – 20.0 (218)
Multi-substance use (888)	41.3, 38.1 – 44.6 (367)	1.5, 0.9 – 2.5 (13)	7.4, 5.9 – 9.4 (66)	50.0, 46.7 – 53.3 (444)	15.0, 12.8 – 17.5 (133)
Personality disorder (1133)	48.2, 45.3 – 51.1 (546)	1.8, 1.1 – 2.7 (20)	8.6, 7.1 – 10.3 (97)	44.7, 41.8 – 47.6 (506)	5.1, 4.0 – 6.6 (58)
Learning difficulties or autism (241)	38.2, 32.3 – 44.5 (92)	4.2, 2.2 – 7.5 (10)	5.4, 3.1 – 9.1 (13)	51.0, 44.7 – 57.3 (123)	10.0, 6.8 – 14.2 (24)

^a Individuals could be referred to more than one service, with the exception of the 'GP only' category where we excluded those with referrals to specialist mental health services, social services or VCSE organisation.

¹ Data on ethnic group were missing for n=565; ² data on IMD score were missing for n=1499; ³ data on IMD score were missing for n=1171; ⁴ The City of Manchester was ranked as the 4th most deprived Local Authority in England; -- denotes low cell count

Mental health and social needs, care gaps and patient characteristics

The majority (96.2%, 25,893/26,909) of individuals were rated as having mental health needs (Table 3). While proportions were high (90% or greater) in all groups, men, those aged 25 years or over and those who were unemployed were more likely to have mental health needs (Table 3).

Table 3: Estimated mental health and social needs by groups of individuals (objective 3) (N = 25893 unless stated)

	Significant mental health needs (n/N)	%, 95% CI	Significant social needs (n/N)	%, 95% CI
Total	25893/26909	96.2 (96.0 – 96.4)	14219/26909	52.8 (52.2 – 53.4)
Women	14347/15019	95.5 (95.2 – 95.8)	7727/15019	51.5 (50.6 – 52.2)
Men	11546/11890	97.1 (96.8 – 97.4)	6492/11890	54.6 (53.7 – 55.5)
<i>Age group</i>				
15-19	3618/3931	92.0 (91.1 – 92.8)	2176/3931	55.4 (53.8 – 56.9)
20-24	4641/4874	95.2 (94.6 – 95.8)	2723/4874	55.9 (54.5 – 57.3)
25-34	6772/6982	97.0 (96.6 – 97.4)	3751/6982	53.7 (52.6 – 54.9)
35-44	5601/5749	97.4 (97.0 – 97.8)	3020/5749	52.5 (51.2 – 53.8)
45-64	4854/4954	98.0 (97.6 – 98.3)	2410/4954	48.7 (47.3 – 50.0)
65+	407/419	97.1 (95.0 – 98.4)	139/419	33.2 (28.8 – 37.8)
<i>Ethnic group (N = 26344)</i>				
White	22643/23421	96.7 (96.4 – 96.9)	12322/23421	52.6 (52.0 – 53.2)
Black	659/695	94.8 (92.9 – 96.2)	407/695	58.6 (54.9 – 62.2)
Indian/Pakistani/Bangladesh i	1079/1193	90.4 (88.6 – 92.0)	582/1193	48.8 (46.0 – 51.6)
Mixed race	506/521	97.1 (95.3 – 98.3)	295/521	56.6 (52.3 – 60.8)
Chinese	--	--	39/73	53.4 (42.0 – 64.5)
Other	--	--	267/441	60.5 (55.9 – 65.0)
<i>Employment status (N = 25410)</i>				
In work or study	9101/9616	94.6 (94.2 – 95.1)	4990/9616	51.9 (50.9 – 52.9)
Unemployed	11308/11585	97.6 (97.3 – 97.9)	6607/11585	57.0.4 (56.1 – 57.9)
Registered sick	2463/2504	98.4 (97.8 – 98.8)	1195/2504	47.7.4 (45.8 – 50.0)
Retired	594/613	96.9 (95.2 – 98.0)	206/613	33.6 (30.0 – 37.4)
Looking after the home or family/other	1027/1092	94.1 (92.5 – 95.3)	484/1092	44.3 (41.4 – 47.3)
<i>Area level deprivation (IMD quintile) (N = 25738)</i>				
1 (least deprived)	4907/5065	96.9 (96.4 – 97.3)	2594/5065	51.2 (49.8 – 52.6)
2	4979/5178	96.2 (95.6 – 96.6)	2703/5178	52.2 (50.8 – 53.6)
3	4916/5151	95.4 (94.8 – 96.0)	2735/5151	53.1 (51.7 – 54.4)
4	4872/5034	96.8 (96.3 – 97.2)	2554/5034	50.7 (49.4 – 52.1)
5 (most deprived)	5092/5310	95.9 (95.3 – 96.4)	2796/5310	52.7 (51.3 – 54.0)
<i>Primary psychiatric diagnosis</i>				
None recorded	N/A	N/A	6588/12746	51.7 (50.8 – 52.6)
Mood disorder	N/A	N/A	2377/4445	53.5 (52.0 – 54.9)
Psychotic disorder	N/A	N/A	245/613	40.0 (36.2 – 43.9)
Anxiety or trauma-related disorder	N/A	N/A	761/1416	53.7 (51.1 – 56.3)
Eating disorder	N/A	N/A	102/191	53.4 (46.3 – 60.4)
Alcohol misuse	N/A	N/A	1436/2706	53.1 (51.2 – 54.9)
Alcohol disorder	N/A	N/A	661/1305	50.7 (47.9 – 53.4)
Substance misuse/disorder	N/A	N/A	754/1225	61.6 (58.8 – 64.2)
Multi-substance use	N/A	N/A	554/888	62.4 (59.2 – 65.5)
Personality disorder	N/A	N/A	598/1133	52.8 (49.9 – 55.7)
Learning difficulties or autism	N/A	N/A	143/241	59.3 (53.0 – 65.4)

-- denotes cell counts too low to present data
N/A due to all people with psychiatric diagnosis having mental health needs

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Among the group identified as having mental health needs, 29.9% (6503/21719) had no active or new referral to mental health services (Table 4i). Proportions of non-referral were higher among men (33.7% vs. 29.8% in women, adjusted Risk Ratio (aRR) 1.14, 95% CI 1.09 to 1.18), younger people (e.g. 42.5% among ages 15-19 years vs. 24.1% for ages 65+, aRR 1.81, CI 1.47 to 2.23), people from a Black ethnic group (42.3% vs. 30.8% among people from a White ethnic group, aRR 1.42, CI 1.29 to 1.57), Indian/Pakistani/Bangladeshi groups (39.5%, aRR 1.32, CI 1.21 to 1.43) and Chinese ethnic group (59.1%, aRR 2.09, CI 1.68 to 2.59) (Table 3 and Table 4i). Within the group identified as having mental health needs, we also observed higher rates of non-referral among people living in areas in the most deprived quintile (34.7% vs. 30.5% in the least deprived quintile, aRR 1.09, CI 1.03 to 1.17). People with a mental health diagnosis of any type had higher rates of referral than those without a recorded diagnosis (of which 40.6% had no active or new referral). Within the group who had a mental health diagnosis, people with alcohol and substance misuse disorders had higher non-referral rates than those with other diagnoses (e.g. alcohol misuse, 31.6% were not referred), as did people with an anxiety or trauma-related disorder (36.9%).

Table 4: Factors associated with non-referral among people with (i) mental health needs and (ii) social needs: risk ratios and 95% confidence intervals (objective 4)

(i) People with mental health needs

	% of those with mental health needs who had no new or active referral (n/n)	Unadjusted RR (95% CI)	Adjusted RR (95% CI)
Total	29.9 (6503/21719)		
<i>Gender (N = 21719)</i>			
Men	31.8 (3046/9578)	1.12 (1.07 – 1.16)	1.14 (1.09 – 1.18)
Women	28.5 (3457/12141)	1.00	1.00
<i>Age group (N = 21719) *</i>			
15-19	40.6 (1272/3137)	1.86 (1.51 – 2.28)	1.81 (1.47 – 2.23)
20-24	33.9 (1342/3954)	1.55 (1.26 – 1.91)	1.53 (1.25 – 1.89)
25-34	29.3 (1632/5579)	1.39 (1.09 – 1.65)	1.30 (1.06 – 1.60)
35-44	27.0 (1236/4686)	1.24 (1.00 – 1.52)	1.17 (0.95 – 1.44)
45-64	22.5 (948/4140)	1.05 (0.85 – 1.29)	0.98 (0.80 – 1.21)
65+	21.9 (73/334)	1.00	1.00
<i>Ethnic group (N = 21230) *</i>			
White	29.0 (5452/18816)	1.00	1.00
Black	41.3 (239/579)	1.42 (1.29 – 1.57)	1.42 (1.29 – 1.57)
Indian/Pakistani/Bangladeshi	38.7 (368/951)	1.34 (1.23 – 1.45)	1.32 (1.21 – 1.43)
Mixed race	28.0 (128/458)	0.96 (0.83 – 1.12)	0.98 (0.85 – 1.14)
Chinese	61.8 (34/55)	2.13 (1.73 – 2.63)	2.09 (1.68 – 2.59)
Other	33.4 (124/371)	1.15 (1.00 – 1.33)	1.18 (1.02 – 1.36)
<i>Employment status (N = 20419) *</i>			
In work or study	37.2 (2935/7897)	1.00	1.00
Unemployed	26.2 (2467/9421)	0.70 (0.67 – 0.74)	0.71 (0.68 – 0.74)
Registered sick	19.9 (355/1786)	0.53 (0.49 – 0.59)	0.51 (0.46 – 0.56)
Retired	23.2 (113/488)	0.62 (0.53 – 0.73)	0.62 (0.53 – 0.73)
Looking after the home or family/other	34.3 (284/827)	0.92 (0.84 – 1.02)	0.89 (0.81 – 0.99)
<i>Area level deprivation (IMD quintile) (N = 20783) *</i>			
1 (least deprived)	29.5 (1260/4270)	1.00	1.00
2	27.9 (1169/4189)	0.95 (0.88 – 1.01)	0.97 (0.91 – 1.04)
3	28.5 (1165/4088)	0.97 (0.90 – 1.03)	0.97 (0.91 – 1.04)
4	29.6 (1225/4137)	1.00 (0.94 – 1.07)	1.01 (0.95 – 1.08)
5 (most deprived)	32.5 (1334/4099)	1.10 (1.03 – 1.18)	1.09 (1.03 – 1.17)
<i>Primary psychiatric diagnosis (N = 21719)</i>			
None recorded	38.5 (3784/9819)	1.00	1.00
Mood disorder	15.6 (584/3737)	0.41 (0.37 – 0.44)	0.43 (0.40 – 0.47)
Psychotic disorder	3.8 (19/505)	0.10 (0.06 – 0.15)	0.11 (0.07 – 0.18)
Anxiety or trauma-related disorder	34.4 (348/1012)	0.89 (0.82 – 0.98)	0.87 (0.80 – 0.94)
Eating disorder	11.5 (19/165)	0.30 (0.20 – 0.46)	0.33 (0.21 – 0.50)
Alcohol misuse	30.8 (735/2390)	0.80 (0.75 – 0.85)	0.82 (0.77 – 0.87)
Alcohol disorder	27.2 (279/1026)	0.71 (0.64 – 0.78)	0.73 (0.66 – 0.80)
Substance misuse/disorder	32.1 (349/1086)	0.83 (0.76 – 0.91)	0.98 (0.89 – 1.07)
Multi-substance use	29.7 (240/809)	0.77 (0.69 – 0.85)	0.89 (0.79 – 0.99)
Personality disorder	11.4 (110/963)	0.30 (0.25 – 0.35)	0.34 (0.29 – 0.41)
Learning difficulties or autism	17.4 (36/207)	0.45 (0.34 – 0.61)	0.56 (0.41 – 0.75)

Adjusted RRs adjusted for year of presentation, hour of presentation, hospital attended, role of assessor (doctor or nurse) and method of harm.

* Not adjusted for hour or year of presentation due to model nonconvergence

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(ii) People with social needs

	% of those with social needs who had no referral to social or VCSE services (n/n)	Unadjusted RR (95% CI)	Adjusted RR (95% CI)
Total	79.6 (9469/11892)		
<i>Gender (N = 11892) *</i>			
Men	82.3 (4439/5397)	1.06 (1.04 – 1.08)	1.06 (1.04 – 1.08)
Women	77.4 (5030/6495)	1.00	1.00
<i>Age group (N = 11892) ¹</i>			
15-19	70.7 (1301/1841)	0.92 (0.83 – 1.02)	0.94 (0.85 – 1.05)
20-24	77.1 (1763/2287)	1.00 (0.90 – 1.11)	1.03 (0.93 – 1.14)
25-34	81.9 (2536/3095)	1.06 (0.96 – 1.17)	1.09 (0.99 – 1.21)
35-44	82.6 (2065/2500)	1.07 (0.97 – 1.18)	1.10 (0.99 – 1.21)
45-64	83.5 (1716/2055)	1.08 (0.98 – 1.20)	1.11 (1.00 – 1.21)
65+	77.2 (88/114)	1.00	1.00
<i>Ethnic group (N = 11608) *</i>			
White	79.7 (8140/10213)	1.00	1.00
Black	76.5 (273/357)	0.96 (0.91 – 1.02)	0.96 (0.91 – 1.02)
Indian/Pakistani/Bangladeshi	79.3 (399/503)	1.00 (0.95 – 1.04)	1.00 (0.96 – 1.05)
Mixed race	83.6 (224/268)	1.05 (0.99 – 1.11)	--
Chinese	78.1 (25/32)	0.98 (0.82 – 1.18)	--
Other	83.0 (195/235)	1.04 (0.98 – 1.10)	--
<i>Employment status (N = 11204) *</i>			
In work or study	79.2 (3409/4305)	1.00	1.00
Unemployed	82.0 (4515/5508)	1.04 (1.01 – 1.06)	1.03 (1.01 – 1.05)
Registered sick	68.1 (572/840)	0.86 (0.82 – 0.90)	0.87 (0.83 – 0.91)
Retired	79.5 (132/166)	1.00 (0.93 – 1.09)	0.99 (0.92 – 1.08)
Looking after the home or family/other	70.1 (270/385)	0.89 (0.83 – 0.95)	0.88 (0.83 – 0.95)
<i>Area level deprivation (IMD quintile) (N = 11205) *</i>			
1 (least deprived)	81.8 (1839/2249)	1.00	1.00
2	79.0 (1788/2264)	0.97 (0.94 – 0.99)	0.99 (0.96 – 1.02)
3	79.8 (1816/2277)	0.98 (0.95 – 1.00)	1.01 (0.98 – 1.03)
4	79.5 (1721/2166)	0.97 (0.94 – 1.00)	0.99 (0.97 – 1.02)
5 (most deprived)	77.5 (1742/2249)	0.95 (0.92 – 0.98)	0.98 (0.95 – 1.01)
<i>Primary psychiatric diagnosis (N = 11892) ²</i>			
None recorded	76.9 (4135/5375)	1.00	1.00
Mood disorder	79.8 (1617/2026)	1.04 (1.01 – 1.07)	1.03 (1.00 – 1.06)
Psychotic disorder	85.9 (165/192)	1.12 (1.05 – 1.19)	1.11 (1.04 – 1.17)
Anxiety or trauma-related disorder	66.6 (380/571)	0.87 (0.81 – 0.92)	0.86 (0.81 – 0.91)
Eating disorder	79.5 (66/83)	1.03 (0.93 – 1.15)	1.04 (1.06 – 1.12)
Alcohol misuse	83.9 (1077/1284)	1.09 (1.06 – 1.12)	1.09 (1.06 – 1.12)
Alcohol disorder	83.3 (454/545)	1.08 (1.04 – 1.13)	1.07 (1.03 – 1.12)
Substance misuse/disorder	87.6 (595/679)	1.14 (1.10 – 1.18)	1.13 (1.09 – 1.17)
Multi-substance use	87.9 (442/503)	1.14 (1.10 – 1.18)	1.14 (1.10 – 1.18)
Personality disorder	84.3 (428/508)	1.10 (1.05 – 1.14)	1.08 (1.04 – 1.13)
Learning difficulties or autism	87.3 (110/126)	1.13 (1.06 – 1.21)	1.12 (1.05 – 1.20)

Adjusted RRs adjusted for year of presentation, hour of presentation, hospital attended, role of assessor (doctor or nurse) and method of harm.

* Not adjusted for hour or year of presentation due to model nonconvergence

¹ Not adjusted for year of presentation or hospital attended due to model nonconvergence

² Not adjusted for hour of presentation, hospital attended or method of harm due to model nonconvergence

-- denotes cell counts too low to estimate adjusted RR

Just over half 52.8% (14,219/26,909) of individuals were estimated as having social needs. Men, those aged under 35, people from a Black ethnic group, those who were unemployed and people with a substance misuse disorder were more likely to have social needs (Table 3).

Among people with social needs, 79.6% (9469/11892) had no new referral to social and/or VCSE services (Table 4ii). 23.0% (3,269/14,219) also had no active or new referral to mental health services. Proportions of those with no new referral to social and/or VCSE services among those with identified social needs were higher for men (82.3% vs. 77.4% among women, aRR 1.06, CI 1.04 to 1.08), people aged 45-64 (83.5% vs. 77.2% among 65+ year olds, aRR 1.11, CI 1.00 to 1.21), and those who were unemployed 82.0% vs. 79.9% among those in work or study, aRR 1.03, CI 1.01 to 1.05). With the exception of anxiety and trauma-related disorders, individuals with a mental health diagnosis who had social needs had higher rates of non-referral than those with no recorded diagnosis (Table 4ii). People with substance misuse disorders who had social needs had especially high rates of non-referral: substance misuse disorder 87.6%, aRR 1.13, CI 1.09 to 1.17 and multi-substance misuse aRR 87.9%, 1.14, CI 1.10 to 1.18.

DISCUSSION

Main findings

The majority of individuals were estimated as having mental healthcare needs and just over half of individuals were estimated as having significant social needs. In terms of care gaps, almost a third of people presenting to the ED following self-harm who had mental health needs had no new or active referral to mental health services. For people with social needs, the care gap was substantially larger, with eight in ten having no new referral to social or VCSE services. The mental health care gap was higher for men, younger people, those from a Black, South Asian or Chinese ethnic group, those from the most deprived areas, those with no mental health diagnosis and those with an alcohol or substance misuse disorder, or an anxiety or trauma-related disorder. Among individuals with social needs, the care gap

(i.e. no new referral to social and/or VCSE services) was higher for men, individuals aged 45-64, those who were unemployed and those with a diagnosed mental disorder (particularly substance misuse).

Strengths and limitations

This is the first study of referrals to mental health, social and VCSE services and GP care and care gaps for people attending hospital following self-harm. The use of a self-harm cohort study allowed detailed assessment of patients' needs, beyond the basic patient measures which are commonly recorded in electronic health records. The main limitation is that we could not include people who did not receive a psychosocial assessment because the information relating to mental health and social needs was not available in this group. Non-assessment has been found to be associated with some indicators of need, including having engaged in substance or alcohol misuse at the time of self-harm [25]. As a consequence, our study is likely to underestimate the social needs of people presenting to hospital after self-harm (though mental health needs were consistently high at around 95%). We were able to include self-harm presentations up to 2017 only, due to the availability of data.

The use of established measurement scales would have provided more accurate and nuanced measures of mental health and social needs; for example, we were unable to estimate severity of needs or discern the level of impairment to daily activities. In addition, there is likely to be some overlap between mental health and social needs, with some mental health needs potentially met by social care and VCSE services and vice versa. Finally, people may have been receiving help from sources not recorded in the study, for example from private or workplace therapy, from family and friends or from other services.

While we were able to obtain information about existing mental health services and GP treatment, we were not able to ascertain if people were already receiving input from social services. We did not include people receiving current treatment for mental health as experiencing mental health needs as we concurred that this indicated their needs would be met, though we acknowledge that a current or new referral to services does not necessarily mean that an individual receives appropriate care or any care. Barriers such as long waiting

times and referrals being rejected by the service can contribute to people experiencing exclusion from follow-up services [9, 26]. Finally, we acknowledge that patients seeking help from an ED following self-harm represent the tip of the iceberg of all self-harm, due to a substantial proportion of people not seeking help [27].

Comparison with existing evidence

Care gaps for mental health in our study were greater in ethnic minority groups. We also found that Black and South Asian groups were more likely to be referred solely to their GP for mental health care. Previous research has found that people from ethnic minority groups who died by suicide were more likely to be unemployed, to live in unstable housing and to live in areas of higher deprivation [28]. Individuals from ethnic minority groups were also viewed as lower risk and were less likely to receive certain types of care such as crisis home treatment services. We have shown that, among ethnic minority groups presenting to hospital for self-harm, not only are levels of social adversity higher, but the care gap is greater. Approaches to reducing ethnic group inequalities in access to mental healthcare include reverse commissioning, training for care providers to deliver more culturally sensitive services and interactions and patient and public involvement of people from ethnic minority groups in designing service provision [29].

We also found elevated care gaps for individuals with social needs among middle aged men, a group previously been identified as at particular risk of experiencing socioeconomic adversity [30]. Socioeconomic difficulties are also strongly associated with suicide in midlife [31]. Our findings suggest that social problems in midlife are accompanied by comparatively low levels of follow-up support for people who have self-harmed. This is particularly important considering the relatively high suicide rates in this age group [1].

In an example of the inverse care law [32], previous research has identified that probability of mental health services referrals following self-harm is lower for people in more deprived neighbourhoods and that rates of self-harm are higher in those same neighbourhoods [33, 34]. While studies have attempted to explain the associations between area-level characteristics and self-harm rates [35, 36], our research provides insight at the individual

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level. While we did not find lower referral rates among people from areas of higher deprivation, we found that the gap between mental health needs and likelihood of referral was greater for people living in the most deprived areas. In other words, the mental health care gap was greater for people in more deprived neighbourhoods seeking help for self-harm.

We found evidence of mental healthcare needs in the majority of individuals. However, previous research has indicated that people who had no mental illness had especially low rates of psychosocial assessment and mental health services referral following self-harm [37]. In our study, the mental health care gap was greater among people with no diagnosed mental health condition. Individuals with no diagnosis were more likely to be referred solely to their GP for mental health support. Our findings imply that the absence of a diagnosed mental disorder among people seeking help following self-harm could act as a barrier to accessing aftercare for those with mental health care needs. This finding is consistent with qualitative research on patient and staff experiences of accessing self-harm aftercare [9, 26]. We also found lower levels of referrals to social and VCSE services alongside greater social needs among people with a mental health diagnosis, with greater treatment gaps for those with a substance misuse diagnosis. Substance misuse has previously been linked to lower likelihood of referral in episodes of self-poisoning [38] and exclusion from mental health services [39]. Research has suggested referrals alone are not sufficient for this group – active follow-up helping to link individuals to services following the referral is recommended [40].

Implications for practice and research

Two key recommendations for hospital presentations involving self-harm are psychosocial assessment by a mental health specialist and to consider referral for psychological therapy [2]. Our findings suggest that the provision of recommended care is not proportionate to need, with men, younger people, those from a Black, South Asian or Chinese ethnic group, those from the most deprived areas and those with an alcohol, substance misuse or anxiety or trauma-related disorder having lower levels of access to potentially effective treatments.

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Efforts to increase provision of mental health support should be targeted towards these groups in particular.

The considerable gaps in access to social and VCSE services identified in this study underline the importance of involving non-health sector professionals in developing aftercare plans and conducting psychosocial assessments. A recent review found evidence that non-clinical self-harm services were viewed more positively than clinical services [41]. However, people reported being unsure of which non-clinical services were available to them, in part due to poor integration between social/voluntary services and clinical services.

Future research should focus on integrated approaches to self-harm aftercare. Systems approaches to suicide prevention show promise, particularly multi-component models and those that are tailored to specific needs of communities [42]. Developing new models of integrated care between primary, secondary and VCSE services is a key objective of the Community Mental Health Framework in England [43]. This initiative has potential to reduce inequities in access to mental health and social support. For example, the forty two Integrated Care Systems across England are currently being supported to develop co-designed, evidence-based interventions and reduce fragmentation between services for people who have self-harmed [1, 44]. Investment in aftercare for individuals seeking help for self-harm is vital for addressing the high risks of suicide in this group [45].

Conclusions

We found substantial care gaps among people presenting to hospital following self-harm, with particularly large gaps for individuals with social needs. Care gaps were particularly high among groups known to be at increased risk of suicide: men, those at middle age, unemployed individuals and those with a substance misuse disorder. The greater mental health care gaps in ethnic minority groups suggests services are not adequately recognising and actioning appropriate aftercare following self-harm. Training and support for health and social care providers to engage with people from ethnic minority groups to help develop appropriate services is recommended. The role of social and VCSE services in self-harm aftercare is only recently being prioritised in suicide prevention policy. Our findings suggest

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3 this is a key area for closing the gaps and reducing inequalities in self-harm aftercare.
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5 Improving links between health, social and VCSE services is vital in achieving this.
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8 Author contributions

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12 All authors contributed to the conception and design of the study. HB prepared the dataset
13 and SS led the analysis. CR, EM, FM, FN, JS, NK, SB and SS co-developed the measures of
14 mental health and social needs. All authors contributed to the interpretation of the results.
15
16 SS wrote the original draft and all authors contributed to critically reviewing and editing the
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36 Transparency declaration

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39 The lead author* affirms that this manuscript is an honest, accurate, and transparent
40 account of the study being reported; that no important aspects of the study have been
41 omitted; and that any discrepancies from the study as planned (and, if relevant, registered)
42 have been explained. *The manuscript's guarantor.
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51 Data sharing statement: No data are available for sharing. The code used to analyse data are
52 available from the lead study author on request.
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55 Competing interests

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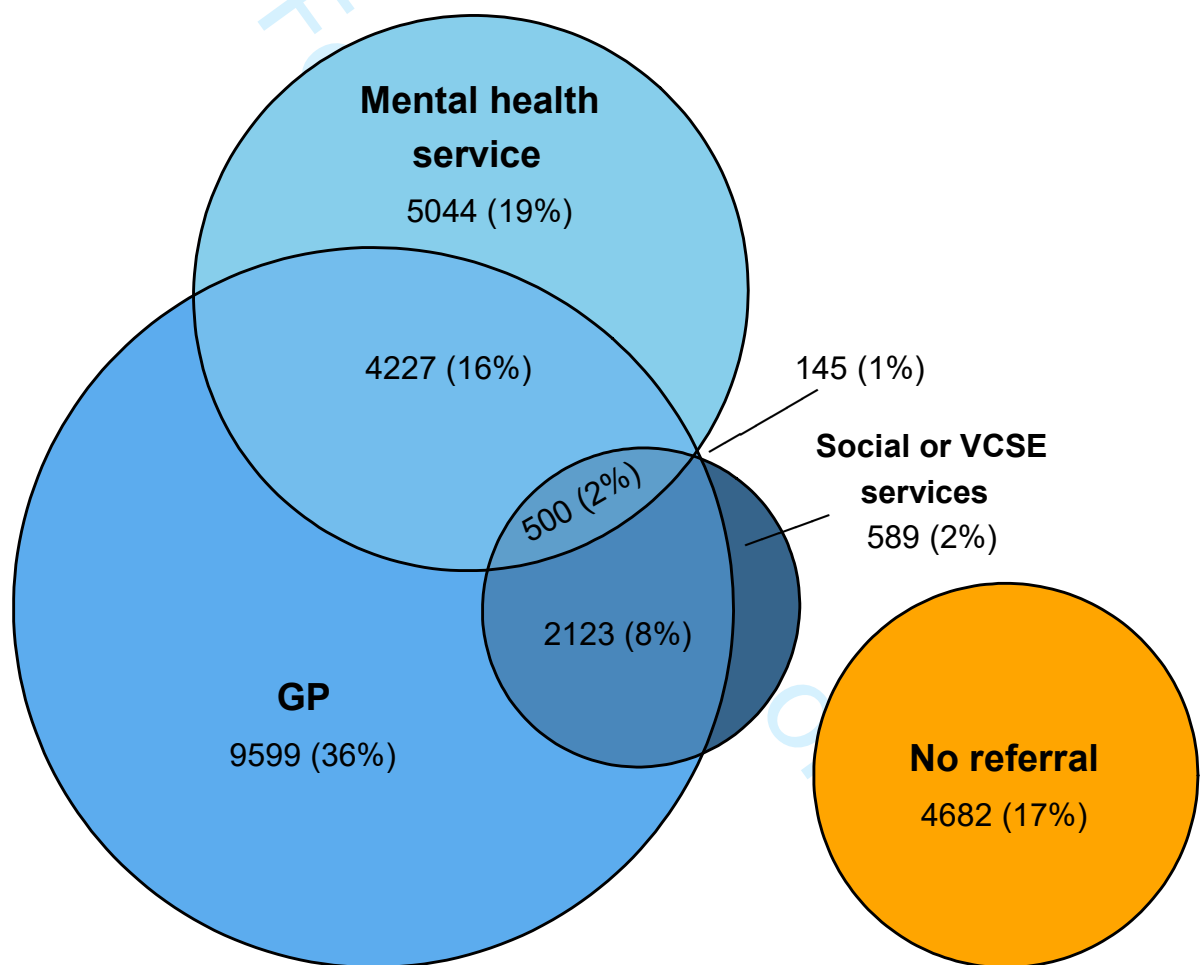


Table S1: Proportions of missing data among assessed self-harm episodes by study population characteristics and study outcomes

	n (%)	n (%) with mental health needs	n (%) referred to mental health services
Total (26909)			
Ethnic group missing	565 (2.1)	532 (94.2)	198 (35.0)
Ethnic group not missing	26344 (97.9)	25361 (96.3)	9718 (36.9)
Employment status missing	1499 (5.6)	1400 (93.4)	588 (39.2)
Employment status not missing	25410 (94.4)	24493 (96.4)	9328 (36.7)
Area level deprivation missing	1171 (4.4)	1127 (96.2)	385 (32.9)
Area level deprivation not missing	25738 (95.6)	24766 (96.2)	9531 (37.0)

Table S2: Proportions of patients referred to mental health services, by type of service ^a

	% , 95% CI (n) referred to mental health services	- %, 95% CI (n) referred to outpatient mental health follow-up	- %, 95% CI (n) referred to crisis or urgent care services	- %, 95% CI (n) referred to community mental health services	- %, 95% CI (n) referred to drug and alcohol services
Total (26909)	36.9, 36.3 – 37.4 (9916)	13.2, 12.8 – 13.6 (3542)	9.8, 9.4 – 10.1 (2623)	3.5, 3.3 – 3.8 (948)	4.0, 3.8 – 4.2 (1072)
Women (15019)	35.5, 34.7 – 36.3 (5331)	13.9, 13.4 – 14.5 (2089)	9.7, 9.3 – 10.3 (1460)	3.8, 3.5 – 4.1 (570)	3.0, 2.7 – 3.2 (445)
Men (11890)	38.6, 37.7 – 39.4 (4585)	12.2, 1.6 – 12.8 (1453)	9.8, 9.3 – 10.2 (1163)	3.2, 2.9 – 3.5 (378)	5.3, 4.9 – 5.7 (627)
<i>Age group</i>					
15-19 (3931)	30.9, 29.4 – 32.3 (1213)	15.0, 13.9 – 16.1 (588)	8.7, 7.8 – 9.6 (340)	2.2, 1.8 – 2.8 (88)	--
20-24 (4874)	33.4, 32.1 – 34.7 (1626)	12.4, 11.5 – 13.3 (604)	10.2, 9.4 – 11.1 (497)	3.5, 3.0 – 4.1 (172)	2.3, 1.9 – 2.7 (110)
25-34 (6982)	38.1, 37.0 – 39.2 (2660)	13.0, 12.2 – 13.8 (904)	10.2, 9.5 – 10.9 (712)	3.7, 3.3 – 4.1 (256)	4.6, 4.2 – 5.2 (324)
35-44 (5749)	38.2, 37.0 – 39.5 (2196)	12.9, 12.1 – 13.8 (743)	8.3, 7.6 – 9.0 (476)	4.1, 3.6 – 4.6 (234)	6.1, 5.5 – 6.7 (349)
45-64 (4954)	39.8, 38.4 – 41.1 (1969)	13.0, 12.1 – 13.9 (642)	11.4, 10.5 – 12.2 (563)	3.7, 3.2 – 4.3 (183)	4.9, 4.3 – 5.5 (241)
65+ (419)	60.1, 55.4 – 64.7 (252)	14.6, 11.5 – 18.3 (61)	8.4, 6.1 – 11.4 (35)	3.5, 2.2 – 5.9 (948)	--
<i>Ethnic group (26344) ¹</i>					
White (23421)	36.9, 36.3 – 37.5 (8648)	13.3, 12.8 – 13.7 (3103)	9.5, 9.1 – 9.8 (2213)	3.6, 3.4 – 3.9 (844)	4.3, 4.0 – 4.6 (1004)
Black (695)	39.1, 35.6 – 42.8 (272)	16.0, 13.4 – 18.9 (111)	10.9, 8.8 – 13.5 (76)	2.9, 1.9 – 4.4 (20)	2.0, 1.2 – 2.1 (14)
Indian/Pakistani/Bangladeshi (1193)	34.0, 31.4 – 36.8 (406)	11.9, 10.2 – 13.9 (142)	10.3, 8.7 – 12.2 (123)	3.8, 2.8 – 5.0 (45)	1.3, 0.8 – 2.1 (15)
Mixed race (521)	41.1, 36.9 – 45.4 (214)	12.7, 10.1 – 15.8 (66)	14.2, 11.5 – 17.5 (74)	--	--
Chinese (73)	26.0, 17.3 – 37.2 (19)	--	--	--	--
Other (441)	36.1, 31.7 – 40.6 (159)	14.1, 11.1 – 17.6 (62)	13.6, 10.7 – 17.1 (60)	--	--
<i>Employment status ² (25410)</i>					
In work or study (9616)	31.3, 30.4 – 32.2 (3009)	12.5, 11.9 – 13.2 (1203)	9.8, 9.2 – 10.4 (940)	2.3, 2.1 – 2.6 (222)	2.3, 2.0 – 2.6 (223)
Unemployed (11585)	39.9, 39.0 – 40.8 (4623)	12.1, 11.5 – 12.7 (1398)	10.9, 10.3 – 11.5 (1262)	3.6, 3.3 – 4.0 (418)	5.4, 5.0 – 5.8 (624)
Registered sick (2504)	40.7, 38.8 – 42.6 (1019)	22.4, 20.8 – 24.0 (560)	3.7, 3.0 – 4.5 (93)	7.7, 6.7 – 8.8 (193)	5.4, 4.6 – 6.3 (135)
Retired (613)	53.8, 49.9 – 57.7 (330)	13.4, 10.9 – 16.3 (82)	10.6, 8.4 – 13.3 (65)	3.0, 6.3 – 13.3 (27)	2.3, 1.4 – 3.8 (14)
Looking after the home or family/other (1092)	31.8, 29.1 – 34.6 (347)	13.0, 11.1 – 15.1 (142)	7.3, 5.9 – 9.0 (80)	4.1, 3.1 – 5.5 (45)	3.1, 2.2 – 4.3 (34)
<i>Area-level deprivation (IMD) quintile (25738) ³</i>					
1 (least deprived) (5065)	35.0, 33.7 – 36.3 (1773)	13.0, 12.1 – 13.9 (658)	9.8, 9.0 – 10.6 (495)	2.9, 2.5 – 3.4 (149)	2.6, 2.2 – 3.0 (130)
2 (5178)	38.8, 37.5 – 40.2 (2010)	13.7, 12.8 – 14.7 (709)	11.5, 10.7 – 12.4 (597)	4.0, 3.5 – 4.5 (205)	3.3, 2.9 – 3.9 (173)
3 (5151)	38.2, 36.9 – 39.5 (1968)	14.0, 13.1 – 15.0 (722)	9.8, 9.0 – 10.6 (505)	3.8, 3.4 – 4.4 (198)	4.5, 4.0 – 5.1 (231)
4 (5034)	39.0, 37.7 – 40.4 (1965)	14.1, 13.1 – 15.1 (708)	9.7, 8.9 – 10.5 (486)	3.6, 3.1 – 4.1 (181)	4.9, 4.4 – 5.6 (248)
5 (most deprived) (5310)	34.2, 32.9 – 35.5 (1815)	11.6, 10.8 – 12.5 (617)	9.1, 8.3 – 9.9 (482)	3.6, 3.1 – 4.2 (192)	4.4, 3.9 – 5.0 (235)
<i>Primary psychiatric diagnosis (26909)</i>					

None recorded (12746)	29.8, 29.0 – 30.6 (3799)	12.5, 11.9 – 13.1 (1587)	8.4, 7.9 – 8.9 (1067)	3.4, 3.1 – 3.7 (427)	1.1, 0.9 – 1.3 (142)
Mood disorder (4445)	49.2, 47.8 – 50.7 (2188)	17.4, 16.3 – 18.5 (773)	14.4, 13.4 – 15.5 (640)	4.2, 3.6 – 4.8 (185)	1.9, 1.5 – 2.3 (83)
Psychotic disorder (613)	68.0, 64.2 – 71.6 (417)	16.5, 13.7 – 19.6 (101)	14.4, 11.8 – 17.4 (88)	9.0, 7.0 – 11.5 (55)	--
Anxiety or trauma-related disorder (1416)	32.6, 30.2 – 35.1 (462)	13.9, 12.2 – 15.8 (197)	7.3, 6.1 – 8.8 (104)	6.1, 5.0 – 7.5 (87)	2.3, 1.6 – 3.2 (32)
Eating disorder (191)	38.7, 32.1 – 45.8 (74)	16.2, 11.7 – 22.2 (31)	13.1, 9.0 – 18.7 (25)	--	--
Alcohol misuse (2706)	36.1, 34.3 – 37.9 (976)	11.0, 9.9 – 12.2 (298)	7.7, 6.7 – 8.8 (208)	2.5, 2.0 – 3.2 (68)	13.5, 12.3 – 14.8 (365)
Alcohol disorder (1305)	37.7, 35.1 – 40.4 (492)	8.0, 6.6 – 9.6 (104)	3.9, 3.0 – 5.1 (51)	2.5, 1.7 – 3.4 (32)	19.2, 17.2 – 21.5 (251)
Substance misuse/disorder (1225)	41.1, 38.3 – 43.8 (503)	10.4, 8.8 – 12.2 (127)	14.4, 12.5 – 16.4 (176)	--	6.8, 5.5 – 8.3 (83)
Multi-substance use (888)	41.3, 38.1 – 44.6 (367)	11.5, 9.5 – 13.8 (102)	10.9, 9.0 – 13.2 (97)	1.9, 1.2 – 3.1 (17)	10.1, 8.3 – 12.3 (90)
Personality disorder (1133)	48.2, 45.3 – 51.1 (546)	16.3, 14.3 – 18.6 (185)	12.4, 10.6 – 14.4 (140)	4.2, 3.2 – 5.6 (48)	1.2, 0.7 – 2.1 (14)
Learning difficulties or autism (241)	38.2, 32.3 – 44.5 (92)	15.4, 11.3 – 20.5 (37)	11.2, 7.8 – 15.8 (27)	--	--

^a Individuals could be referred to more than one service.

¹ Data on ethnic group were missing for n=565; ² data on IMD score were missing for n=1499; ³ data on IMD score were missing for n=1171; ⁴ The City of Manchester was ranked as the 4th most deprived Local Authority in England; -- denotes low cell count

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.	Relevant text from manuscript
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found	10	Population-based study Abstract
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	10	Introduction, paragraphs 1 to 5
Objectives	3	State specific objectives, including any prespecified hypotheses	10	Introduction, paragraph 6
Methods				
Study design	4	Present key elements of study design early in the paper	10	Methods, 'Study design and data sources'
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	10	Methods, 'Study design and data sources', paragraph 1
Participants	6	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants (b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case	10	Methods, 'Study design and data sources', paragraph 1
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	10	Methods, 'Clinical management', 'Assessing clinical management and mental health and social needs of patient' and 'Additional study measures'

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Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6	Methods, 'Study design and data sources' and Table 1
Bias	9	Describe any efforts to address potential sources of bias	6 - 7 and 8 - 9	Methods, 'Clinical management', 'Assessing clinical management and mental health and social needs of patients' and 'Additional study measures.'
Study size	10	Explain how the study size was arrived at		Methods, 'Study sample'

Continued on next page

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7 0	Methods, ‘Clinical management’, ‘Assessing clinical management and mental health and social needs of patient’ and ‘Additional study measures’
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding		Methods, ‘Statistical analysis’
		(b) Describe any methods used to examine subgroups and interactions		Methods, ‘Statistical analysis’
		(c) Explain how missing data were addressed		Methods, ‘Statistical analysis’
		(d) Cohort study—If applicable, explain how loss to follow-up was addressed		
		Case-control study—If applicable, explain how matching of cases and controls was addressed		
		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy		
		(e) Describe any sensitivity analyses		
Results				
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10 12	Methods, ‘Study sample’ and Results, ‘Characteristics of cohort’
		(b) Give reasons for non-participation at each stage	12	Results, ‘Characteristics of cohort’
		(c) Consider use of a flow diagram		
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	12	Results, ‘Characteristics of cohort’
		(b) Indicate number of participants with missing data for each variable of interest	12	Results, ‘Characteristics of cohort’ and Table S1
		(c) Cohort study—Summarise follow-up time (eg, average and total amount)		
Outcome data	15*	Cohort study—Report numbers of outcome events or summary measures over time		
		Case-control study—Report numbers in each exposure category, or summary measures of exposure		
		Cross-sectional study—Report numbers of outcome events or summary measures	13 17	Results, ‘Clinical management’ and ‘Mental health and social needs, care gaps and patient characteristics’

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Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11 and 13-17	Methods, 'Statistical analysis' and Results, 'Clinical management' and 'Mental health and social needs, care gaps and patient characteristics'
		(b) Report category boundaries when continuous variables were categorized	16	Tables 2 and 3
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period		

Continued on next page

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	Discussion, ‘Main findings’
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Discussion, ‘Strengths and limitations’
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Discussion, ‘Comparison with existing evidence’ and ‘Implications for practice and research’
Generalisability	21	Discuss the generalisability (external validity) of the study results	Discussion, ‘Strengths and limitations’
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Role of the funding source

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Care gaps among people presenting to hospital following self-harm: observational study of three emergency departments in England

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Abstract

Objectives

To examine proportions of patients referred to mental health, social and VCSE services and general practice and to assess care gaps among people presenting to hospital following self-harm.

Design

Population-based observational study. Data were extracted from hospital records.

Setting

Three emergency departments (EDs) in Manchester, UK.

Participants

26,090 patients aged 15+ years who presented to participating EDs following self-harm and who received a psychosocial assessment by a mental health specialist.

Primary and secondary outcome measures

Primary outcome measures: care gaps, estimated from the proportion of patients with evidence of social and mental health needs with no new or active referral to mental health, social and VCSE services. Secondary outcome measures: proportions of referrals by groups of patients, estimated mental health and social needs of patients. Indicators of mental health and social need were developed with academic clinicians (psychiatrist, GP and social worker) and expert lived experience contributors.

Results

96.2% (25,893/26,909) of individuals were estimated as having mental health needs. Among this group, 29.9% (6503/21719) had no new or active referral to mental health services (indicating a care gap). Mental health care gaps were greater in men and those who were aged under 35 years, from a Black, South Asian or Chinese ethnic group, living in the most deprived areas, and had no mental health diagnosis, or an alcohol, substance misuse, anxiety or trauma-related disorder. 52.8% (14,219/26,909) had social needs, with care gaps

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greater for men, individuals aged 45-64 and those who were unemployed or had a diagnosed mental disorder.

Conclusions

Care gaps were higher among hospital-presenting groups known to have increased risks of suicide: men, those at middle age, unemployed individuals and those misusing substances. Improved access to mental health, social and VCSE services and general practice care is vital to reduce inequities in access to self-harm aftercare.

Strengths and limitations of this study

- The use of a self-harm cohort study allowed detailed assessment of patients' needs and referrals to mental health care, social and VCSE services and GPs.
- Measures of mental health and social needs were co-developed with lived experience contributors, researchers and clinicians.
- Our study could not include people not receiving a psychosocial assessment by a mental health specialist because information relating to mental health and social needs was not available in this group.
- The use of validated measures would have provided more accurate and nuanced estimates of mental health and social needs; for example, we were unable to estimate severity of needs or discern the level of impairment to daily activities.

INTRODUCTION

People who present to hospital following self-harm are a priority group for suicide prevention due to their increased risk of suicide [1]. Self-harm includes intentional self-poisoning or self-injury and can involve varying degrees of suicidal intent [2]. Appropriate aftercare for people who present to hospital following self-harm is central to suicide prevention. However, few studies have examined care gaps in this population. While studies to date have examined clinical management of self-harm in different groups, none have specifically linked referral rates to levels of need – thus enabling estimation of care gaps. The roles of social and voluntary, community and social enterprise (VCSE) services and general practitioner (GP) care are also under-researched.

There is widespread recognition that care for people who have self-harmed should be multi-agency and interdisciplinary; many people who have harmed themselves face social and economic adversities that exacerbate mental health problems [3, 4]. Guidance from the National Institute for Health and Care Excellence on management and prevention of self-harm therefore recommends joint approaches between social care agencies, healthcare professionals and voluntary, community and social enterprise (VCSE) services [2]. In addition, the latest suicide prevention strategy for England, launched in 2023, highlights the pivotal role of VCSE services in suicide prevention, calling for strong collaboration with health and local government services [1].

Much of the research into self-harm aftercare to date has focussed on psychosocial assessments and psychological therapies [5-8] [9]. Little attention has been given to the role of social services, VCSE organisations and primary care. For example, there has been very little research into social work-based or integrated interventions for preventing suicide [10, 11] or the role of voluntary-sector led support [12]. Similarly, while general GPs have a pivotal role in reviewing patients’ needs and linking with VCSE organisations following self-harm [13], most studies of clinical management have not considered referrals to GPs.

It is vital to recognise people’s wider psychosocial needs when considering care gaps in populations people experiencing poor mental health [14]. While care gaps have been

examined in general population samples and among people with specific mental disorders [15-18], there has been no assessment of care gaps for those seeking help after self-harm. The terms 'healthcare needs analysis', 'treatment gaps' and 'care gaps' all focus on incidence/prevalence rates of disease, provision of appropriate care and differences between groups. In the present study we use the term 'care gaps'; this concept has been recommended as more appropriate for mental health as it takes into account non-clinical interventions and psychosocial needs [14]. Without comprehensive analysis of needs, the potential effectiveness of psychological treatments for self-harm may be compromised. For example, evidence for effectiveness of psychological interventions for self-harm is relatively weak despite a large body of research spanning decades [19].

Routine sources of health and social data are valuable in examining care gaps [14, 20]. Most national register studies used to examine suicidal behaviour do not contain key information such as specific life events preceding a self-harm episode [21]. However, dedicated, health condition-specific cohort studies contain more relevant information than national, service-wide health data. Using data from the Manchester Self-Harm Project, we examined likelihood of referrals to mental health and social care services and to VCSE organisations for people attending hospital following self-harm, and their mental health and social needs.

Our specific research objectives were:

- 1 To describe proportions of mental health, social and VCSE services and GP referrals among a cohort of people presenting to hospital following self-harm
- 2 To compare frequencies and probabilities of referrals between groups of patients, including age, gender, employment status, existing mental health diagnosis, ethnic and area-level deprivation groups
- 3 To estimate mental health and social needs among groups of patients including age, gender, employment status, existing mental health diagnosis, ethnic and area-level deprivation groups

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- 4 To describe proportions referred to mental health, social and VCSE services and GP by prevalence of social and mental health need, thus estimating care gaps (primary outcome measure).

METHODS

Study design and data sources

Data from the Manchester Self-Harm Project, a prospective cohort study of people presenting to emergency departments (EDs) in Manchester, UK, were used in this study. The Manchester Self-Harm Project includes approximately 65,000 episodes of self-harm by around 37,000 people presenting to three EDs between 1997 and 2017. The study includes episodes of intentional self-poisoning or self-injury, regardless of motivation. A range of demographic, clinical and area-based data were collected from ED and mental health service records, following each presentation involving self-harm. Research administrators used validated search terms to identify presentations potentially involving self-harm. Where self-harm was confirmed, data were extracted using a two-stage process. First, basic clinical and demographic data (including reason for attendance, method of self-harm, age, gender, ethnic group) were extracted from ED records for all episodes. Second, further information was extracted from psychosocial assessments for episodes that were assessed by a mental health specialist. In this stage, researchers coded the information in the written records of the assessments using a standard proforma and following a protocol. If uncertainty arose during coding, the researcher team discussed the anonymised case to reach a consensus. Accuracy and inter-rater reliability were assessed using a period of training for all researchers, including coding a random selection of assessments independently then comparing codes within the research team. This helped to identify areas of inconsistency and inaccuracy in applying coding rules. Validation exercises of the proformas against clinical records have showed high levels of agreement ($\kappa \geq 0.8$ for individual variables) [6]. Variables added during this stage included time of self-harm, suicidal intent (yes/no), suicide note, evidence of pre-planning, concealment of self-harm, history of drug or alcohol misuse, psychiatric diagnosis, history of self-harm, current and previous mental health service involvement, current symptoms of depression, factors identified by the patient as

precipitating the self-harm (e.g. problems with relationships, family, housing, work, school, money, mental health, physical health, abuse, legal issues, being a victim of crime, drug or alcohol misuse, miscarriage) and clinical management (e.g. referral, admission, discharge).

We analysed individuals rather than episodes due to many of the exposure characteristics (for example, gender, age, ethnic group, mental health diagnosis) being measured at an individual level. In addition, mental health care gaps are typically measured at the individual level [14]; including multiple episodes by the same individual would likely lead to an inaccurate estimation of care gaps. Where there were multiple episodes by the same individual, the individual's first assessed episode during the study period was included.

The study protocol was pre-registered (<https://osf.io/zq5et>). Following preliminary data analysis, it was apparent that the data relating to physical health problems was only available for people who had reported physical health as a direct precipitant to the self-harm. This was likely to be an underestimate of the prevalence of physical health problems in the cohort. Therefore, our study deviated from the planned protocol by focusing on mental health and social needs. The Manchester Self-Harm Project was granted Section 251 approval by the Confidential Advisory Group and the Health Research Authority for the use of patient data. This study followed the STROBE guidelines for reporting observational cohort studies [22].

Clinical management (secondary outcome measures)

We examined the following categories of clinical management: referral to mental health services (including referral to outpatient mental health follow-up, crisis or urgent care services, community mental health services and drug and alcohol services), referral to social services, referral to voluntary, community and social enterprise (VCSE) services and referral to general practice (including recommendations for the GP to refer for primary mental health care). We only included formal referrals, and did not include instances where the patient was advised to self-refer. Individuals could be referred to more than one service for the same episode of self-harm (Figure 1).

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3 *Figure 1: Venn diagram showing percentages of patients referred to their GP, to mental*
4 *health services and to social or VCSE services following hospital presentation for self-harm.*
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9 Care gaps (primary outcome measures)

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12 Referral to mental health, social and VCSE services and GP following self-harm and
13 characteristics pertaining to patients’ mental health and social needs were assessed using
14 information recorded in hospital notes and specialist mental health assessments (Table 1).
15 Data from psychosocial assessments were used to make inferences about mental health and
16 social need. The indicators were devised in the context of a clinical population of people
17 who had presented to ED with self-harm. For example, if a life event such as a financial
18 problem was mentioned in the psychosocial assessment as a contributing factor to the self-
19 harm, this was interpreted as a substantial social problem. Given the absence of validated
20 measures of mental health and social needs in this population, indicators of mental health
21 and social services/VCSE sector need were co-developed with researchers, clinicians (an
22 academic clinical psychiatrist, an academic general practitioner and an academic social
23 worker) and an expert lived experience panel comprising four people with personal
24 experience of attending ED for self-harm as a patient or carer. The co-development process
25 involved an initial meeting to discuss the factors available in the study that may indicate
26 mental health or social needs, followed by an exercise where each expert was asked to
27 specify which factors should be included as indicating mental health needs and which may
28 indicate social needs. There was broad agreement between the experts. In instances where
29 consensus was not reached in the initial selection of factors, the lead author facilitated
30 further discussion. Two measures were derived:
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49 (i) Evidence of mental health care needs, derived from the presence of any of the
50 following: any mental health diagnosis, current drug or alcohol misuse, self-harm
51 that was reported as directly in response to mental symptoms or a mental disorder,
52 the presence of a suicide note, patient reporting that they wanted to die at the time
53 of the self-harm and symptoms of depression (Table 1)
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(ii) Evidence of significant social problems, derived from: homelessness or hostel dwelling, self-harm in response to problems with housing, money, work or study, or in response to legal problems or physical, sexual or emotional abuse (Table 1).

Table 1: Variables used to derive measures of mental health and social needs

Patient characteristics	(i) Mental health care needs	(ii) Significant social needs
Homeless or living in hostel accommodation		✓
Currently misusing alcohol	✓	
Currently misusing drugs	✓	
Has a mental health diagnosis	✓	
Precipitants of self-harm or cause(s) of current distress		
Housing problem		✓
Employment or study problems		✓
Legal problem e.g. criminal charges		✓
Victim of crime		✓
Financial problems		✓
Direct response to mental symptoms	✓	
Other mental health problems	✓	
Abuse (physical, mental, sexual)	✓	✓
Alcohol abuse	✓	
Substance abuse	✓	
Circumstances of the self-harm		
Suicide note	✓	
Intention to die during attempt	✓	
Symptoms of depression		
Suicidal thoughts	✓	
Suicidal plans	✓	
Hallucinations/delusions	✓	
Looks depressed	✓	
Feels depressed	✓	
Sleep disturbance	✓	
Appetite disturbance	✓	
Feels hopeless	✓	
Low energy	✓	
Evidence of hostility	✓	
Any mental health diagnosis	✓	

Individuals were defined as having mental health care needs met if they were currently receiving mental health care or were referred to mental health services following their hospital presentation for self-harm. Significant social needs were defined as being met if the individual was referred to social services or VCSE services. The measures of clinical management (new and existing referrals) and the co-developed measures of mental health/social needs were used to estimate care gaps, which were defined as ‘the percentage of individuals who require care but do not receive treatment’ as described by Kohn et al. [23], with the term ‘treatment’ encompassing existing care and new referrals to care made following the hospital presentation.

Study covariates

In addition to overall estimates, we examined estimates stratified by gender and age groups, presence of existing mental health diagnosis, ethnic groups and area-level deprivation quintile. The specific age groupings were determined based on the size of the outcome groups. Likewise, mental health diagnoses groupings were collapsed to enable analysis when there were too few patients in a single diagnostic category. Ethnic group categories were based on Office for National Statistics 2011 census broad groupings. In subgroup analyses where numbers were too low to report findings (<10), we suppressed cell counts and estimates for the specific ethnic group. This enabled us to retain broad groupings rather than collapsing ethnic minority groups into a single category. Mental health diagnosis categories used were mood disorders (including depression and bipolar disorder), anxiety and trauma-related disorders (including anxiety and post-traumatic stress disorder), psychotic disorders (including schizophrenia), eating disorders, personality disorders, alcohol dependence, substance abuse, multi-substance abuse and learning difficulties or autism). We also included separate groups for alcohol misuse and substance misuse. Diagnoses were based on ICD-10 codes.

Missing data

Factors used to estimate mental health and social needs (including demographic characteristics, precipitants to and circumstances of the self-harm, symptoms of depression) and categories of clinical management were coded as absent if there was no record of them in the psychosocial assessment. Missing data on age, sex and ethnic group were imputed using data from any additional episodes from the same individual recorded in the Manchester Self-Harm Project dataset. Data on exposure variables were missing for between 0% and 6% of individuals. No individuals had missing data for age, three individuals were excluded due to missing data on gender and missing data for other variables were excluded pairwise to maximise the cohort size: 565 (2.1%) had missing ethnic group data, 1499 (5.6%) had missing employment status data and 1171 (4.4%) had missing area-level deprivation data. There were no substantial differences in outcome measures between patients with and without missing exposure data (Table S1).

Study sample

Our primary study sample for objectives 1 to 3 was 26,909 individuals: all patients aged 15 years or over presenting between 1997 and 2017, with data available on gender (n = 3 were missing) and who received a psychosocial assessment (n = 12174 received no assessment). Our primary study cohorts for objective 4 were patients assessed by the research team as having significant mental health (N = 25893) or social (N = 14219) needs. In adjusted analyses we restricted these cohorts to individuals with data available for confounding variables (N = 21719 and 11892 respectively).

Statistical analysis

Frequencies of health and social care referrals were estimated as a proportion of the broader study sample. Proportions and their 95% confidence intervals are presented. Log binomial regression models were used to estimate probability (risk) ratios of referrals to mental health and social care services among gender and age groups, presence of existing mental health diagnosis, ethnic groups and area-level deprivation quintiles. Risk ratios with confidence intervals above 1.0 indicated an exposure was associated with increased probability of referral in that group compared to the reference group. The following

reference groups were used in the regression models: women, aged 65+, White ethnic group, in work or study, the least deprived IMD quintile and the group with no psychiatric diagnosis. Unadjusted and adjusted risk ratios were estimated, with models adjusted for factors known to be associated with referral likelihood: year of presentation, hour of presentation, hospital attended, role of assessor (doctor or nurse) and method of self-harm.

Patient and public involvement

An expert lived experience panel of four people with personal experience of attending an ED for self-harm were involved in designing the study, developing the measures of mental health and social needs (see ‘Assessing clinical management and mental health and social needs of patients’) and in interpreting the findings of the study.

RESULTS

Characteristics of the cohort

26,909 individuals presented with self-harm between 1997 and 2017 and received a psychosocial assessment. Three individuals were excluded due to missing data on gender. There were no individuals with missing data for age. Proportions of missing data for other exposure variables were between 2% and 6% (Table S1). 55.8% (15019/26909) of the cohort was female, 32.7% (8805) were aged under 25 years and 1.6% (419) were aged 65 years or over. 88.9% (23421) of the cohort were from a White ethnic group, 4.5 % (1193) were from an Indian/Pakistani/Bangladeshi background, 2.6% (695) were from a Black African/Caribbean ethnic group, 617 (1.6%) were from a mixed ethnic group, 0.3% (116) were Chinese and 1.4% (564) were from another ethnic group. The most deprived quintile (n = 5408) within the cohort lived in areas with a mean rank of 421 (out of 32482 Lower Super Output Areas), while the least deprived quintile (n = 4959) had a mean rank of 19613/32482. Therefore, the least deprived quintile within this cohort were broadly within the most deprived 60% of areas nationally.

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52.5% (14163) of the cohort had a mental health diagnosis recorded; 16.5% (4445) mood disorder, 10.1% (2706) alcohol use disorder (defined as daily alcohol use of 7 units or more), 4.9% (1305) had alcohol dependence, 5.3% (1416) had anxiety or trauma-related disorder, 4.6% (1225) were misusing substances or had a substance use disorder (an additional 3.3%, 888, had multi-substance misuse disorder), 4.2% (1133) were diagnosed with a personality disorder, 2.3% (613) had a psychotic disorder and 0.7% (191) had an eating disorder. In addition, 0.9% (241) had learning difficulties or autism.

Clinical management

Overall, 36.9% (9916) of patients in the cohort were referred to mental health services: 13.2% (3542) to outpatient mental health services (Table 2), 9.8% (2623) crisis or urgent care, 4.0% (1072) to alcohol and drug services and 3.5% (948) to community mental health services (Table S2). 1.5% (393) were referred to social services and 11.3% (3047) were referred to VCSE services (Table 2). Referral to more than one service was common (Figure 1). Groups more likely to be referred to mental health services included men, older age groups, those who were unemployed, registered sick or retired, and those with a mental health diagnosis (Table 2). The youngest (15-19 years) and oldest (65+ years) age groups were most likely to be referred to social services, as were people living in more deprived areas. Younger age groups and those with a diagnosis of anxiety and trauma-related disorders were most likely to be referred to VCSE services (Table 2). Overall, 61.1% (16449) were referred to their GP. For a fifth of individuals (19.9%, 5357), a GP referral was only new or current referral in place. This proportion was higher for younger people (ages 15-19, 25.1%, CI 23.8% to 26.5%), Black (25.8% CI 22.6% to 29.1%) and South Asian (27.2%, CI 24.7% to 30.0%) people and those with no mental health diagnosis (26.2%, CI 25.4% to 27.0%).

Table 2: Proportions of patients referred to mental health, social and VCSE services and their GP (objectives 1 and 2) ^a

	% , 95% CI (n) referred to mental health services	% , 95% CI (n) referred to social services	% , 95% CI (n) referred to VCSE services	% , 95% CI (n) referred to GP	% , 95% CI (n) referred to GP with no other new referral or current mental health care
Total (26909)	36.9, 36.3 – 37.4 (9916)	1.5, 1.3-1.6 (393)	11.3, 11.0 – 11.7 (3047)	61.1, 60.5 - 61.7 (16449)	19.9, 19.4 - 20.4 (5357)
Women (15019)	35.5, 34.7 – 36.3 (5331)	1.7, 1.5 – 1.9 (257)	11.8, 11.3 – 12.3 (1771)	63.4, 62.6 – 64.2 (9521)	19.6, 18.9 – 20.2 (2936)
Men (11890)	38.6, 37.7 – 39.4 (4585)	1.1, 1.0 – 1.4 (136)	10.7, 10.2 – 11.3 (1276)	58.3, 57.4 – 59.2 (6928)	20.4, 19.6 – 21.1 (2421)
<i>Age group</i>					
15-19 (3931)	30.9, 29.4 – 32.3 (1213)	2.1, 1.7 – 2.6 (82)	16.5, 15.4 – 17.7 (648)	62.9, 61.4 – 64.4 (2473)	25.1, 23.8 – 26.5 (986)
20-24 (4874)	33.4, 32.1 – 34.7 (1626)	1.2, 0.9 – 1.5 (57)	13.8, 12.9 – 14.8 (673)	61.3 59.9 – 62.6 (2987)	21.2, 20.1 – 22.4 (1035)
25-34 (6982)	38.1, 37.0 – 39.2 (2660)	1.4, 1.1 – 1.7 (95)	10.5, 9.8 – 11.3 (734)	60.5, 59.3 – 61.6 (4223)	19.5, 18.5 – 20.4 (1358)
35-44 (5749)	38.2, 37.0 – 39.5 (2196)	1.3, 1.1 – 1.7 (77)	9.7, 9.0 – 10.5 (560)	63.2, 61.9 – 64.4 (3633)	19.4, 18.4 – 20.5 (1117)
45-64 (4954)	39.8, 38.4 – 41.1 (1969)	1.4, 1.1 - 1.8 (69)	8.2, 7.4 – 9.0 (404)	59.8, 58.5 – 61.2 (2964)	16.4, 15.3 – 17.4 (810)
65+ (419)	60.1, 55.4 – 64.7 (252)	3.1, 1.8 – 5.3 (13)	6.7, 4.7 – 9.5 (28)	40.3, 35.7 – 45.1 (169)	12.2, 9.4 – 15.7 (51)
<i>Ethnic group (26344)</i> ¹					
White (23421)	36.9, 36.3 – 37.5 (8648)	1.4, 1.3 – 1.6 (338)	11.3, 10.9 – 11.8 (2655)	61.6, 61.0 – 62.2 (14434)	19.6, 19.1 – 20.1 (4582)
Black (695)	39.1, 35.6 – 42.8 (272)	1.7, 1.0 – 3.0 (12)	13.4, 11.0 – 16.1 (93)	60.6, 56.9 – 64.1 (421)	25.8, 22.6 – 29.1 (179)
Indian/Pakistani/Bang ladeshi (1193)	34.0, 31.4 – 36.8 (406)	1.6, 1.0 – 2.5 (19)	10.0, 8.4 – 11.8 (119)	62.4, 59.6 – 65.1 (744)	27.2, 24.7 – 30.0 (324)
Mixed race (521)	41.1, 36.9 – 45.4 (214)	2.1, 1.2 – 3.8 (11)	9.8, 7.5 – 12.7 (51)	49.7, 45.4 – 54.0 (259)	14.6, 11.8 – 17.9 (76)
Chinese (73)	26.0, 17.3 – 37.2 (19)	--	--	50.7, 39.4 – 61.9 (37)	19.2, 11.7 – 29.8 (14)
Other (441)	36.1, 31.7 – 40.6 (159)	--	--	53.7, 49.1 – 58.3 (237)	19.3, 15.9 – 23.2 (85)
<i>Employment status</i> ² (25410)					
In work or study (9616)	31.3, 30.4 – 32.2 (3009)	0.8, 0.6 – 1.0 (76)	11.4, 10.8 – 12.1 (1097)	64.5, 63.7 – 65.6 (6221)	25.6, 24.8 – 26.5 (2464)
Unemployed (11585)	39.9, 39.0 – 40.8 (4623)	1.7, 1.5 – 1.9 (195)	11.0, 10.4 – 11.6 (1272)	57.1, 56.2 – 58.0 (6614)	16.3, 15.7 – 17.0 (1892)
Registered sick (2504)	40.7, 38.8 – 42.6 (1019)	2.6, 2.0 – 3.3 (64)	15.2, 13.8 – 16.6 (380)	75.0, 73.3 – 76.7 (1879)	16.0, 14.6 – 17.5 (401)
Retired (613)	53.8, 49.9 – 57.7 (330)	2.6, 1.6 – 4.2 (16)	6.4, 4.7 – 8.6 (39)	49.3, 45.3 – 53.2 (302)	15.8, 13.1 – 18.9 (97)
Looking after the home or family/other (1092)	31.8, 29.1 – 34.6 (347)	2.2, 1.5 – 3.3 (24)	13.1, 11.2 – 15.2 (143)	73.8, 71.1 – 76.3 (806)	26.8, 24.3 – 29.5 (293)
<i>Area-level deprivation (IMD) quintile (25738)</i> ^{± 3}					
1 (least deprived) (5065)	35.0, 33.7 – 36.3 (1773)	1.0, 0.8 – 1.3 (52)	9.4, 8.6 – 10.2 (474)	59.6, 58.8 – 61.0 (3020)	19.0, 18.9 – 20.1 (963)

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2 (5178)	38.8, 37.5 – 40.2 (2010)	1.2, 0.9 – 1.5 (62)	11.6, 10.8 – 12.5 (602)	61.1, 59.7 – 62.4 (3163)	19.2, 18.2 – 20.3 (996)
3 (5151)	38.2, 36.9 – 39.5 (1968)	1.8, 1.5 – 2.2 (93)	11.0, 10.2 – 11.9 (568)	61.8, 60.4 – 63.1 (3181)	19.6, 18.6 – 20.7 (1011)
4 (5034)	39.0, 37.7 – 40.4 (1965)	1.5, 1.2 – 1.8 (74)	10.9, 10.1 – 11.8 (549)	61.4, 60.0 – 62.7 (3089)	19.8, 18.7 – 20.9 (996)
5 (most deprived) (5310)	34.2, 32.9 – 35.5 (1815)	1.6, 1.3 – 1.9 (83)	13.1, 12.2 – 14.1 (697)	63.8, 62.5 – 65.1 (3390)	22.0, 20.9 – 23.2 (1170)
Primary psychiatric diagnosis (26909)					
None recorded (12746)	29.8, 29.0 – 30.6 (3799)	1.5, 1.3 – 1.7 (187)	12.8, 12.3 – 13.4 (1636)	63.7, 62.9 – 64.6 (8122)	26.2, 25.4 – 27.0 (3339)
Mood disorder (4445)	49.2, 47.8 – 50.7 (2188)	1.5, 1.1 – 1.9 (65)	10.6, 9.8 – 11.6 (473)	59.1, 57.7 – 60.6 (2628)	10.2, 9.3 – 11.1 (453)
Psychotic disorder (613)	68.0, 64.2 – 71.6 (417)	--	6.7, 5.0 – 9.0 (41)	33.0, 29.3 – 36.8 (202)	--
Anxiety or trauma-related disorder (1416)	32.6, 30.2 – 35.1 (462)	1.6, 1.0 – 2.3 (22)	18.4, 16.5 – 20.5 (261)	74.4, 72.0 – 76.6 (1053)	23.7, 21.5 – 25.9 (335)
Eating disorder (191)	38.7, 32.1 – 45.8 (74)	--	14.7, 10.3 – 20.4 (28)	57.6, 50.5 – 64.4 (110)	--
Alcohol misuse (2706)	36.1, 34.3 – 37.9 (976)	1.0, 0.7 – 1.5 (27)	8.8, 7.8 – 9.9 (238)	64.5, 62.6 – 66.2 (1744)	19.1, 17.7 – 20.6 (518)
Alcohol disorder (1305)	37.7, 35.1 – 40.4 (492)	2.1, 1.4 – 3.0 (27)	7.5, 6.2 – 9.1 (98)	66.4, 63.8 – 68.9 (866)	19.7, 17.6 – 21.9 (257)
Substance misuse/disorder (1225)	41.1, 38.3 – 43.8 (503)	1.1, 0.7 – 1.9 (14)	7.8, 6.5 – 9.5 (96)	53.1, 50.3 – 55.9 (651)	17.8, 15.8 – 20.0 (218)
Multi-substance use (888)	41.3, 38.1 – 44.6 (367)	1.5, 0.9 – 2.5 (13)	7.4, 5.9 – 9.4 (66)	50.0, 46.7 – 53.3 (444)	15.0, 12.8 – 17.5 (133)
Personality disorder (1133)	48.2, 45.3 – 51.1 (546)	1.8, 1.1 – 2.7 (20)	8.6, 7.1 – 10.3 (97)	44.7, 41.8 – 47.6 (506)	5.1, 4.0 – 6.6 (58)
Learning difficulties or autism (241)	38.2, 32.3 – 44.5 (92)	4.2, 2.2 – 7.5 (10)	5.4, 3.1 – 9.1 (13)	51.0, 44.7 – 57.3 (123)	10.0, 6.8 – 14.2 (24)

^a Individuals could be referred to more than one service, with the exception of the 'GP only' category where we excluded those with referrals to specialist mental health services, social services or VCSE organisation.

¹ Data on ethnic group were missing for n=565; ² data on IMD score were missing for n=1499; ³ data on IMD score were missing for n=1171; ⁴ The City of Manchester was ranked as the 4th most deprived Local Authority in England; -- denotes low cell count

Mental health and social needs, care gaps and patient characteristics

The majority (96.2%, 25,893/26,909) of individuals were rated as having mental health needs (Table 3). While proportions were high (90% or greater) in all groups, men, those aged 25 years or over and those who were unemployed were more likely to have mental health needs (Table 3).

Table 3: Estimated mental health and social needs by groups of individuals (objective 3) (N = 25893 unless stated)

	Significant mental health needs (n/N)	%, 95% CI	Significant social needs (n/N)	%, 95% CI
Total	25893/26909	96.2 (96.0 – 96.4)	14219/26909	52.8 (52.2 – 53.4)
Women	14347/15019	95.5 (95.2 – 95.8)	7727/15019	51.5 (50.6 – 52.2)
Men	11546/11890	97.1 (96.8 – 97.4)	6492/11890	54.6 (53.7 – 55.5)
<i>Age group</i>				
15-19	3618/3931	92.0 (91.1 – 92.8)	2176/3931	55.4 (53.8 – 56.9)
20-24	4641/4874	95.2 (94.6 – 95.8)	2723/4874	55.9 (54.5 – 57.3)
25-34	6772/6982	97.0 (96.6 – 97.4)	3751/6982	53.7 (52.6 – 54.9)
35-44	5601/5749	97.4 (97.0 – 97.8)	3020/5749	52.5 (51.2 – 53.8)
45-64	4854/4954	98.0 (97.6 – 98.3)	2410/4954	48.7 (47.3 – 50.0)
65+	407/419	97.1 (95.0 – 98.4)	139/419	33.2 (28.8 – 37.8)
<i>Ethnic group (N = 26344)</i>				
White	22643/23421	96.7 (96.4 – 96.9)	12322/23421	52.6 (52.0 – 53.2)
Black	659/695	94.8 (92.9 – 96.2)	407/695	58.6 (54.9 – 62.2)
Indian/Pakistani/Bangladesh i	1079/1193	90.4 (88.6 – 92.0)	582/1193	48.8 (46.0 – 51.6)
Mixed race	506/521	97.1 (95.3 – 98.3)	295/521	56.6 (52.3 – 60.8)
Chinese	--	--	39/73	53.4 (42.0 – 64.5)
Other	--	--	267/441	60.5 (55.9 – 65.0)
<i>Employment status (N = 25410)</i>				
In work or study	9101/9616	94.6 (94.2 – 95.1)	4990/9616	51.9 (50.9 – 52.9)
Unemployed	11308/11585	97.6 (97.3 – 97.9)	6607/11585	57.0.4 (56.1 – 57.9)
Registered sick	2463/2504	98.4 (97.8 – 98.8)	1195/2504	47.7.4 (45.8 – 50.0)
Retired	594/613	96.9 (95.2 – 98.0)	206/613	33.6 (30.0 – 37.4)
Looking after the home or family/other	1027/1092	94.1 (92.5 – 95.3)	484/1092	44.3 (41.4 – 47.3)
<i>Area level deprivation (IMD quintile) (N = 25738)</i>				
1 (least deprived)	4907/5065	96.9 (96.4 – 97.3)	2594/5065	51.2 (49.8 – 52.6)
2	4979/5178	96.2 (95.6 – 96.6)	2703/5178	52.2 (50.8 – 53.6)
3	4916/5151	95.4 (94.8 – 96.0)	2735/5151	53.1 (51.7 – 54.4)
4	4872/5034	96.8 (96.3 – 97.2)	2554/5034	50.7 (49.4 – 52.1)
5 (most deprived)	5092/5310	95.9 (95.3 – 96.4)	2796/5310	52.7 (51.3 – 54.0)
<i>Primary psychiatric diagnosis</i>				
None recorded	N/A	N/A	6588/12746	51.7 (50.8 – 52.6)
Mood disorder	N/A	N/A	2377/4445	53.5 (52.0 – 54.9)
Psychotic disorder	N/A	N/A	245/613	40.0 (36.2 – 43.9)
Anxiety or trauma-related disorder	N/A	N/A	761/1416	53.7 (51.1 – 56.3)
Eating disorder	N/A	N/A	102/191	53.4 (46.3 – 60.4)
Alcohol misuse	N/A	N/A	1436/2706	53.1 (51.2 – 54.9)
Alcohol disorder	N/A	N/A	661/1305	50.7 (47.9 – 53.4)
Substance misuse/disorder	N/A	N/A	754/1225	61.6 (58.8 – 64.2)
Multi-substance use	N/A	N/A	554/888	62.4 (59.2 – 65.5)
Personality disorder	N/A	N/A	598/1133	52.8 (49.9 – 55.7)
Learning difficulties or autism	N/A	N/A	143/241	59.3 (53.0 – 65.4)

-- denotes cell counts too low to present data
N/A due to all people with psychiatric diagnosis having mental health needs

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Among the group identified as having mental health needs, 29.9% (6503/21719) had no active or new referral to mental health services (Table 4i). Proportions of non-referral were higher among men (33.7% vs. 29.8% in women, adjusted Risk Ratio (aRR) 1.14, 95% CI 1.09 to 1.18), younger people (e.g. 42.5% among ages 15-19 years vs. 24.1% for ages 65+, aRR 1.81, CI 1.47 to 2.23), people from a Black ethnic group (42.3% vs. 30.8% among people from a White ethnic group, aRR 1.42, CI 1.29 to 1.57), Indian/Pakistani/Bangladeshi groups (39.5%, aRR 1.32, CI 1.21 to 1.43) and Chinese ethnic group (59.1%, aRR 2.09, CI 1.68 to 2.59) (Table 3 and Table 4i). Within the group identified as having mental health needs, we also observed higher rates of non-referral among people living in areas in the most deprived quintile (34.7% vs. 30.5% in the least deprived quintile, aRR 1.09, CI 1.03 to 1.17). People with a mental health diagnosis of any type had higher rates of referral than those without a recorded diagnosis (of which 40.6% had no active or new referral). Within the group who had a mental health diagnosis, people with alcohol and substance misuse disorders had higher non-referral rates than those with other diagnoses (e.g. alcohol misuse, 31.6% were not referred), as did people with an anxiety or trauma-related disorder (36.9%).

Table 4: Factors associated with non-referral among people with (i) mental health needs and (ii) social needs: risk ratios and 95% confidence intervals (objective 4)

(i) People with mental health needs

	% with mental health needs who had no new or active referral (n/n)	Unadjusted RR (95% CI)	Adjusted RR (95% CI)
Total	29.9 (6503/21719)		
Gender (N = 21719)			
Men	31.8 (3046/9578)	1.12 (1.07 – 1.16)	1.14 (1.09 – 1.18)
Women	28.5 (3457/12141)	1.00	1.00
Age group (N = 21719) *			
15-19	40.6 (1272/3137)	1.86 (1.51 – 2.28)	1.81 (1.47 – 2.23)
20-24	33.9 (1342/3954)	1.55 (1.26 – 1.91)	1.53 (1.25 – 1.89)
25-34	29.3 (1632/5579)	1.39 (1.09 – 1.65)	1.30 (1.06 – 1.60)
35-44	27.0 (1236/4686)	1.24 (1.00 – 1.52)	1.17 (0.95 – 1.44)
45-64	22.5 (948/4140)	1.05 (0.85 – 1.29)	0.98 (0.80 – 1.21)
65+	21.9 (73/334)	1.00	1.00
Ethnic group (N = 21230) *			
White	29.0 (5452/18816)	1.00	1.00
Black	41.3 (239/579)	1.42 (1.29 – 1.57)	1.42 (1.29 – 1.57)
Indian/Pakistani/Bangladeshi	38.7 (368/951)	1.34 (1.23 – 1.45)	1.32 (1.21 – 1.43)
Mixed race	28.0 (128/458)	0.96 (0.83 – 1.12)	0.98 (0.85 – 1.14)
Chinese	61.8 (34/55)	2.13 (1.73 – 2.63)	2.09 (1.68 – 2.59)
Other	33.4 (124/371)	1.15 (1.00 – 1.33)	1.18 (1.02 – 1.36)
Employment status (N = 20419) *			
In work or study	37.2 (2935/7897)	1.00	1.00
Unemployed	26.2 (2467/9421)	0.70 (0.67 – 0.74)	0.71 (0.68 – 0.74)
Registered sick	19.9 (355/1786)	0.53 (0.49 – 0.59)	0.51 (0.46 – 0.56)
Retired	23.2 (113/488)	0.62 (0.53 – 0.73)	0.62 (0.53 – 0.73)
Looking after the home or family/other	34.3 (284/827)	0.92 (0.84 – 1.02)	0.89 (0.81 – 0.99)
Area level deprivation (IMD quintile) (N = 20783) *			
1 (least deprived)	29.5 (1260/4270)	1.00	1.00
2	27.9 (1169/4189)	0.95 (0.88 – 1.01)	0.97 (0.91 – 1.04)
3	28.5 (1165/4088)	0.97 (0.90 – 1.03)	0.97 (0.91 – 1.04)
4	29.6 (1225/4137)	1.00 (0.94 – 1.07)	1.01 (0.95 – 1.08)
5 (most deprived)	32.5 (1334/4099)	1.10 (1.03 – 1.18)	1.09 (1.03 – 1.17)
Primary psychiatric diagnosis (N = 21719)			
None recorded	38.5 (3784/9819)	1.00	1.00
Mood disorder	15.6 (584/3737)	0.41 (0.37 – 0.44)	0.43 (0.40 – 0.47)
Psychotic disorder	3.8 (19/505)	0.10 (0.06 – 0.15)	0.11 (0.07 – 0.18)
Anxiety or trauma-related disorder	34.4 (348/1012)	0.89 (0.82 – 0.98)	0.87 (0.80 – 0.94)
Eating disorder	11.5 (19/165)	0.30 (0.20 – 0.46)	0.33 (0.21 – 0.50)
Alcohol misuse	30.8 (735/2390)	0.80 (0.75 – 0.85)	0.82 (0.77 – 0.87)
Alcohol disorder	27.2 (279/1026)	0.71 (0.64 – 0.78)	0.73 (0.66 – 0.80)
Substance misuse/disorder	32.1 (349/1086)	0.83 (0.76 – 0.91)	0.98 (0.89 – 1.07)
Multi-substance use	29.7 (240/809)	0.77 (0.69 – 0.85)	0.89 (0.79 – 0.99)
Personality disorder	11.4 (110/963)	0.30 (0.25 – 0.35)	0.34 (0.29 – 0.41)
Learning difficulties or autism	17.4 (36/207)	0.45 (0.34 – 0.61)	0.56 (0.41 – 0.75)

Adjusted RRs adjusted for year of presentation, hour of presentation, hospital attended, role of assessor (doctor or nurse) and method of harm. * Not adjusted for hour or year of presentation due to model nonconvergence

(ii) People with social needs

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	% with social needs who had no referral to social or VCSE services (n/n)	Unadjusted RR (95% CI)	Adjusted RR (95% CI)
Total	79.6 (9469/11892)		
<i>Gender (N = 11892) *</i>			
Men	82.3 (4439/5397)	1.06 (1.04 – 1.08)	1.06 (1.04 – 1.08)
Women	77.4 (5030/6495)	1.00	1.00
<i>Age group (N = 11892) ¹</i>			
15-19	70.7 (1301/1841)	0.92 (0.83 – 1.02)	0.94 (0.85 – 1.05)
20-24	77.1 (1763/2287)	1.00 (0.90 – 1.11)	1.03 (0.93 – 1.14)
25-34	81.9 (2536/3095)	1.06 (0.96 – 1.17)	1.09 (0.99 – 1.21)
35-44	82.6 (2065/2500)	1.07 (0.97 – 1.18)	1.10 (0.99 – 1.21)
45-64	83.5 (1716/2055)	1.08 (0.98 – 1.20)	1.11 (1.00 – 1.21)
65+	77.2 (88/114)	1.00	1.00
<i>Ethnic group (N = 11608) *</i>			
White	79.7 (8140/10213)	1.00	1.00
Black	76.5 (273/357)	0.96 (0.91 – 1.02)	0.96 (0.91 – 1.02)
Indian/Pakistani/Bangladeshi	79.3 (399/503)	1.00 (0.95 – 1.04)	1.00 (0.96 – 1.05)
Mixed race	83.6 (224/268)	1.05 (0.99 – 1.11)	--
Chinese	78.1 (25/32)	0.98 (0.82 – 1.18)	--
Other	83.0 (195/235)	1.04 (0.98 – 1.10)	--
<i>Employment status (N = 11204) *</i>			
In work or study	79.2 (3409/4305)	1.00	1.00
Unemployed	82.0 (4515/5508)	1.04 (1.01 – 1.06)	1.03 (1.01 – 1.05)
Registered sick	68.1 (572/840)	0.86 (0.82 – 0.90)	0.87 (0.83 – 0.91)
Retired	79.5 (132/166)	1.00 (0.93 – 1.09)	0.99 (0.92 – 1.08)
Looking after the home or family/other	70.1 (270/385)	0.89 (0.83 – 0.95)	0.88 (0.83 – 0.95)
<i>Area level deprivation (IMD quintile) (N = 11205) *</i>			
1 (least deprived)	81.8 (1839/2249)	1.00	1.00
2	79.0 (1788/2264)	0.97 (0.94 – 0.99)	0.99 (0.96 – 1.02)
3	79.8 (1816/2277)	0.98 (0.95 – 1.00)	1.01 (0.98 – 1.03)
4	79.5 (1721/2166)	0.97 (0.94 – 1.00)	0.99 (0.97 – 1.02)
5 (most deprived)	77.5 (1742/2249)	0.95 (0.92 – 0.98)	0.98 (0.95 – 1.01)
<i>Primary psychiatric diagnosis (N = 11892) ²</i>			
None recorded	76.9 (4135/5375)	1.00	1.00
Mood disorder	79.8 (1617/2026)	1.04 (1.01 – 1.07)	1.03 (1.00 – 1.06)
Psychotic disorder	85.9 (165/192)	1.12 (1.05 – 1.19)	1.11 (1.04 – 1.17)
Anxiety or trauma-related disorder	66.6 (380/571)	0.87 (0.81 – 0.92)	0.86 (0.81 – 0.91)
Eating disorder	79.5 (66/83)	1.03 (0.93 – 1.15)	1.04 (1.06 – 1.12)
Alcohol misuse	83.9 (1077/1284)	1.09 (1.06 – 1.12)	1.09 (1.06 – 1.12)
Alcohol disorder	83.3 (454/545)	1.08 (1.04 – 1.13)	1.07 (1.03 – 1.12)
Substance misuse/disorder	87.6 (595/679)	1.14 (1.10 – 1.18)	1.13 (1.09 – 1.17)
Multi-substance use	87.9 (442/503)	1.14 (1.10 – 1.18)	1.14 (1.10 – 1.18)
Personality disorder	84.3 (428/508)	1.10 (1.05 – 1.14)	1.08 (1.04 – 1.13)
Learning difficulties or autism	87.3 (110/126)	1.13 (1.06 – 1.21)	1.12 (1.05 – 1.20)

Adjusted RRs adjusted for year of presentation, hour of presentation, hospital attended, role of assessor (doctor or nurse) and method of harm. * Not adjusted for hour or year of presentation due to model nonconvergence. ¹ Not adjusted for year of presentation or hospital attended due to model nonconvergence. ² Not adjusted for hour of presentation, hospital attended or method of harm due to model nonconvergence. -- denotes cell counts too low to estimate adjusted RR

Just over half 52.8% (14,219/26,909) of individuals were estimated as having social needs.

Men, those aged under 35, people from a Black ethnic group, those who were unemployed

and people with a substance misuse disorder were more likely to have social needs (Table 3).

Among people with social needs, 79.6% (9469/11892) had no new referral to social and/or VCSE services (Table 4ii). 23.0% (3,269/14,219) also had no active or new referral to mental health services. Proportions of those with no new referral to social and/or VCSE services among those with identified social needs were higher for men (82.3% vs. 77.4% among women, aRR 1.06, CI 1.04 to 1.08), people aged 45-64 (83.5% vs. 77.2% among 65+ year olds, aRR 1.11, CI 1.00 to 1.21), and those who were unemployed 82.0% vs. 79.9% among those in work or study, aRR 1.03, CI 1.01 to 1.05). With the exception of anxiety and trauma-related disorders, individuals with a mental health diagnosis who had social needs had higher rates of non-referral than those with no recorded diagnosis (Table 4ii). People with substance misuse disorders who had social needs had especially high rates of non-referral: substance misuse disorder 87.6%, aRR 1.13, CI 1.09 to 1.17 and multi-substance misuse aRR 87.9%, 1.14, CI 1.10 to 1.18.

DISCUSSION

Main findings

The majority of individuals were estimated as having mental healthcare needs and just over half of individuals were estimated as having significant social needs. In terms of care gaps, almost a third of people presenting to the ED following self-harm who had mental health needs had no new or active referral to mental health services. For people with social needs, the care gap was substantially larger, with eight in ten having no new referral to social or VCSE services. The mental health care gap was higher for men, younger people, those from a Black, South Asian or Chinese ethnic group, those from the most deprived areas, those with no mental health diagnosis and those with an alcohol or substance misuse disorder, or an anxiety or trauma-related disorder. Among individuals with social needs, the care gap (i.e. no new referral to social and/or VCSE services) was higher for men, individuals aged 45-64, those who were unemployed and those with a diagnosed mental disorder (particularly substance misuse).

Strengths and limitations

This is the first study of referrals to mental health, social and VCSE services and GP care and care gaps for people attending hospital following self-harm. The use of a self-harm cohort study allowed detailed assessment of patients' needs, beyond the basic patient measures which are commonly recorded in electronic health records. The main limitation is that we could not include people who did not receive a psychosocial assessment because the information relating to mental health and social needs was not available in this group. Non-assessment has been found to be associated with some indicators of need, including having engaged in substance or alcohol misuse at the time of self-harm [24]. As a consequence, our study is likely to underestimate the needs of people presenting to hospital after self-harm (though mental health needs were consistently high at around 95%). We were able to include self-harm presentations up to 2017 only, due to the availability of data. The single-centre cohort, based in a relatively socioeconomically deprived area of England, may not be representative of the broader population of people presenting to hospital following self-harm.

The use of established measurement scales would have provided more accurate and nuanced measures of mental health and social needs; for example, we were unable to estimate severity of needs or discern the level of impairment to daily activities. In addition, there is likely to be some overlap between mental health and social needs, with some mental health needs potentially met by social care and VCSE services and vice versa. Finally, people may have been receiving help from sources not recorded in the study, for example from private or workplace therapy, from family and friends or from other services.

While we were able to obtain information about existing mental health services and GP care, we were not able to ascertain if people were already receiving input from social services. We did not include people receiving current treatment for mental health as experiencing unmet mental health needs as we concurred that this indicated their needs would be met, though we acknowledge that a current or new referral to services does not necessarily mean that an individual receives appropriate care or any care. Barriers such as

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long waiting times and referrals being rejected by the service can contribute to people experiencing exclusion from follow-up services [9, 25]. Finally, we acknowledge that patients seeking help from an ED following self-harm represent the tip of the iceberg of all self-harm, due to a substantial proportion of people not seeking help [26].

Comparison with existing evidence

Care gaps for mental health in our study were greater in ethnic minority groups. We also found that Black and South Asian groups were more likely to be referred solely to their GP for mental health care. Previous research has found that people from ethnic minority groups who died by suicide were more likely to be unemployed, to live in unstable housing and to live in areas of higher deprivation [27]. Individuals from ethnic minority groups were also viewed as lower risk and were less likely to receive certain types of care such as crisis home treatment services. We have shown that, among ethnic minority groups presenting to hospital for self-harm, not only are levels of social adversity higher, but the care gap is greater. Approaches to reducing ethnic group inequalities in access to mental healthcare include reverse commissioning, training for care providers to deliver more culturally sensitive services and interactions and patient and public involvement of people from ethnic minority groups in designing service provision [28].

We also found elevated care gaps for individuals with social needs among middle aged men, a group previously been identified as at particular risk of experiencing socioeconomic adversity [29]. Socioeconomic difficulties are also strongly associated with suicide in midlife [30]. Our findings suggest that social problems in midlife are accompanied by comparatively low levels of follow-up support for people who have self-harmed. This is particularly important considering the relatively high suicide rates in this age group [1].

In an example of the inverse care law [31], previous research has identified that probability of mental health services referrals following self-harm is lower for people in more deprived neighbourhoods and that rates of self-harm are higher in those same neighbourhoods [32, 33]. While studies have attempted to explain the associations between area-level characteristics and self-harm rates [34, 35], our research provides insight at the individual

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level. While we did not find lower referral rates among people from areas of higher deprivation, we found that the gap between mental health needs and likelihood of referral was greater for people living in the most deprived areas. In other words, the mental health care gap was greater for people in more deprived neighbourhoods seeking help for self-harm.

We found evidence of mental health care needs in the majority of individuals. In a systematic review, 84% of adults presenting to hospital for self-harm had at least one psychiatric disorder, when assessed using a range of diagnostic tools [36]. This suggests our estimate of mental health need in this population is plausible. However, we acknowledge there is uncertainty around our estimate. Previous research has indicated that people who had no diagnosed mental illness had especially low rates of psychosocial assessment and mental health services referral following self-harm [37]. In our study, the mental health care gap was greater among people with no diagnosed mental health condition. Individuals with no diagnosis were more likely to be referred solely to their GP for mental health support. Our findings imply that the absence of a diagnosed mental disorder among people seeking help following self-harm could act as a barrier to accessing aftercare for those with mental health care needs. This finding is consistent with qualitative research on patient and staff experiences of accessing self-harm aftercare [9, 25]. We also found lower levels of referrals to social and VCSE services alongside greater social needs among people with a mental health diagnosis, with greater care gaps for those with a substance misuse diagnosis. Substance misuse has previously been linked to lower likelihood of referral in episodes of self-poisoning [38] and exclusion from mental health services [39]. Research has suggested referrals alone are not sufficient for this group – active follow-up helping to link individuals to services following the referral is recommended [40].

Implications for practice and research

Two key recommendations for hospital presentations involving self-harm are psychosocial assessment by a mental health specialist and to consider referral for psychological therapy [2]. Our findings suggest that the provision of recommended care is not proportionate to need, with men, younger people, those from a Black, South Asian or Chinese ethnic group,

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those from the most deprived areas and those with an alcohol, substance misuse or anxiety or trauma-related disorder having lower levels of access to potentially effective treatments. Efforts to increase provision of mental health support should be targeted towards these groups in particular.

The considerable gaps in access to social and VCSE services identified in this study underline the importance of involving non-health sector professionals in developing treatment plans and conducting psychosocial assessments. A recent review found evidence that non-clinical self-harm services were viewed more positively than clinical services [41]. However, people reported being unsure of which non-clinical services were available to them, in part due to poor integration between social/voluntary services and clinical services.

Future research should focus on integrated approaches to self-harm care. Systems approaches to suicide prevention show promise, particularly multi-component models and those that are tailored to specific needs of communities [42]. Developing new models of integrated care between primary, secondary and VCSE services is a key objective of the Community Mental Health Framework in England [43]. This initiative has potential to reduce inequities in access to mental health and social support. For example, the forty two Integrated Care Systems across England are currently being supported to develop co-designed, evidence-based interventions and reduce fragmentation between services for people who have self-harmed [1, 44]. Investment in aftercare for individuals seeking help for self-harm is vital for addressing the high risks of suicide in this group [45].

Conclusions

We found substantial care gaps among people presenting to hospital following self-harm, with particularly large gaps for individuals with social needs. Care gaps were particularly high among groups known to be at increased risk of suicide: men, those at middle age, unemployed individuals and those with a substance misuse disorder. The greater mental health care gaps in ethnic minority groups suggests services are not adequately recognising and actioning appropriate aftercare following self-harm. Training and support for health and social care providers to engage with people from ethnic minority groups to help develop

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appropriate services is recommended. The role of social and VCSE services in self-harm aftercare is only recently being prioritised in suicide prevention policy. Our findings suggest this is a key area for closing the gaps and reducing inequalities in self-harm aftercare. Improving links between health, social and VCSE services is vital in achieving this.

Author contributions

All authors (SS, HB, CC, LQ, SB, EM, FN, JS, FM, CR, SG and NK) contributed to the conception, planning and design of the study. HB prepared the dataset for analysis and SS led and conducted the analysis. CR, EM, FM, FN, JS, NK, SB and SS co-developed the measures of mental health and social needs. All authors contributed to the interpretation of the results. SS wrote the original draft and all authors contributed to critically reviewing and editing the manuscript. All authors approved the final version to be published. SS acts as guarantor for this paper.

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Transparency declaration

The lead author* affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained. *The manuscript's guarantor.

Data availability statement

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No data are available for sharing. The code used to analyse data are available from the lead study author on request.

Ethics statement

The Manchester Self-Harm Project was granted Section 251 approval by the Confidential Advisory Group and the Health Research Authority for the use of patient data without consent.

Competing interests

NK reports research grants and fees to related his research and implementation work in self-harm and suicide prevention from the Department of Health and Social Care, the National Institute for Health and Care Research, the Healthcare Quality Improvement Partnership, and the National Institute for Health and Care Excellence (NICE). NK does not receive industry funding for research. NK is a member of England's National Suicide Prevention Strategy Advisory Group and is supported by Mersey Care NHS Foundation Trust. NK chaired the NICE guideline development group for the NICE depression in adults' guideline and was a topic expert member for the NICE suicide prevention guideline. NK chaired the guideline development group for the NICE guidelines on the longer-term management of self-harm and was a topic advisor on the 2022 NICE guideline on self-harm. FM was a member of the 2022 NICE guideline development committee. The other authors declare no competing interests.

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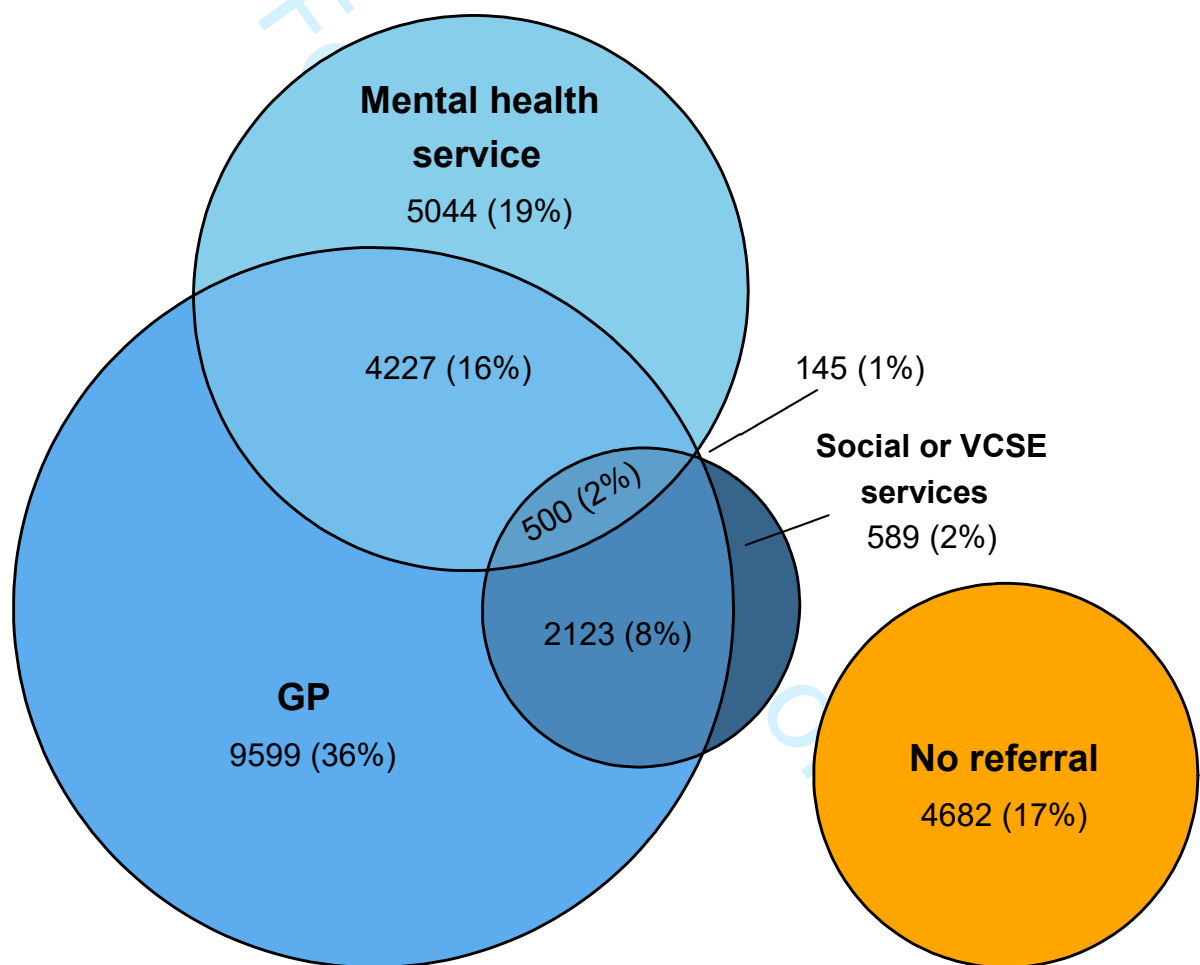


Table S1: Proportions of missing data among assessed self-harm episodes by study population characteristics and study outcomes

	n (%)	n (%) with mental health needs	n (%) referred to mental health services
Total (26909)			
Ethnic group missing	565 (2.1)	532 (94.2)	198 (35.0)
Ethnic group not missing	26344 (97.9)	25361 (96.3)	9718 (36.9)
Employment status missing	1499 (5.6)	1400 (93.4)	588 (39.2)
Employment status not missing	25410 (94.4)	24493 (96.4)	9328 (36.7)
Area level deprivation missing	1171 (4.4)	1127 (96.2)	385 (32.9)
Area level deprivation not missing	25738 (95.6)	24766 (96.2)	9531 (37.0)

Table S2: Proportions of patients referred to mental health services, by type of service ^a

	% , 95% CI (n) referred to mental health services	- %, 95% CI (n) referred to outpatient mental health follow-up	- %, 95% CI (n) referred to crisis or urgent care services	- %, 95% CI (n) referred to community mental health services	- %, 95% CI (n) referred to drug and alcohol services
Total (26909)	36.9, 36.3 – 37.4 (9916)	13.2, 12.8 – 13.6 (3542)	9.8, 9.4 – 10.1 (2623)	3.5, 3.3 – 3.8 (948)	4.0, 3.8 – 4.2 (1072)
Women (15019)	35.5, 34.7 – 36.3 (5331)	13.9, 13.4 – 14.5 (2089)	9.7, 9.3 – 10.3 (1460)	3.8, 3.5 – 4.1 (570)	3.0, 2.7 – 3.2 (445)
Men (11890)	38.6, 37.7 – 39.4 (4585)	12.2, 1.6 – 12.8 (1453)	9.8, 9.3 – 10.2 (1163)	3.2, 2.9 – 3.5 (378)	5.3, 4.9 – 5.7 (627)
<i>Age group</i>					
15-19 (3931)	30.9, 29.4 – 32.3 (1213)	15.0, 13.9 – 16.1 (588)	8.7, 7.8 – 9.6 (340)	2.2, 1.8 – 2.8 (88)	--
20-24 (4874)	33.4, 32.1 – 34.7 (1626)	12.4, 11.5 – 13.3 (604)	10.2, 9.4 – 11.1 (497)	3.5, 3.0 – 4.1 (172)	2.3, 1.9 – 2.7 (110)
25-34 (6982)	38.1, 37.0 – 39.2 (2660)	13.0, 12.2 – 13.8 (904)	10.2, 9.5 – 10.9 (712)	3.7, 3.3 – 4.1 (256)	4.6, 4.2 – 5.2 (324)
35-44 (5749)	38.2, 37.0 – 39.5 (2196)	12.9, 12.1 – 13.8 (743)	8.3, 7.6 – 9.0 (476)	4.1, 3.6 – 4.6 (234)	6.1, 5.5 – 6.7 (349)
45-64 (4954)	39.8, 38.4 – 41.1 (1969)	13.0, 12.1 – 13.9 (642)	11.4, 10.5 – 12.2 (563)	3.7, 3.2 – 4.3 (183)	4.9, 4.3 – 5.5 (241)
65+ (419)	60.1, 55.4 – 64.7 (252)	14.6, 11.5 – 18.3 (61)	8.4, 6.1 – 11.4 (35)	3.5, 2.2 – 5.9 (948)	--
<i>Ethnic group (26344) ¹</i>					
White (23421)	36.9, 36.3 – 37.5 (8648)	13.3, 12.8 – 13.7 (3103)	9.5, 9.1 – 9.8 (2213)	3.6, 3.4 – 3.9 (844)	4.3, 4.0 – 4.6 (1004)
Black (695)	39.1, 35.6 – 42.8 (272)	16.0, 13.4 – 18.9 (111)	10.9, 8.8 – 13.5 (76)	2.9, 1.9 – 4.4 (20)	2.0, 1.2 – 2.1 (14)
Indian/Pakistani/Bangladeshi (1193)	34.0, 31.4 – 36.8 (406)	11.9, 10.2 – 13.9 (142)	10.3, 8.7 – 12.2 (123)	3.8, 2.8 – 5.0 (45)	1.3, 0.8 – 2.1 (15)
Mixed race (521)	41.1, 36.9 – 45.4 (214)	12.7, 10.1 – 15.8 (66)	14.2, 11.5 – 17.5 (74)	--	--
Chinese (73)	26.0, 17.3 – 37.2 (19)	--	--	--	--
Other (441)	36.1, 31.7 – 40.6 (159)	14.1, 11.1 – 17.6 (62)	13.6, 10.7 – 17.1 (60)	--	--
<i>Employment status ² (25410)</i>					
In work or study (9616)	31.3, 30.4 – 32.2 (3009)	12.5, 11.9 – 13.2 (1203)	9.8, 9.2 – 10.4 (940)	2.3, 2.1 – 2.6 (222)	2.3, 2.0 – 2.6 (223)
Unemployed (11585)	39.9, 39.0 – 40.8 (4623)	12.1, 11.5 – 12.7 (1398)	10.9, 10.3 – 11.5 (1262)	3.6, 3.3 – 4.0 (418)	5.4, 5.0 – 5.8 (624)
Registered sick (2504)	40.7, 38.8 – 42.6 (1019)	22.4, 20.8 – 24.0 (560)	3.7, 3.0 – 4.5 (93)	7.7, 6.7 – 8.8 (193)	5.4, 4.6 – 6.3 (135)
Retired (613)	53.8, 49.9 – 57.7 (330)	13.4, 10.9 – 16.3 (82)	10.6, 8.4 – 13.3 (65)	3.0, 6.3 – 13.3 (27)	2.3, 1.4 – 3.8 (14)
Looking after the home or family/other (1092)	31.8, 29.1 – 34.6 (347)	13.0, 11.1 – 15.1 (142)	7.3, 5.9 – 9.0 (80)	4.1, 3.1 – 5.5 (45)	3.1, 2.2 – 4.3 (34)
<i>Area-level deprivation (IMD) quintile (25738) ³</i>					
1 (least deprived) (5065)	35.0, 33.7 – 36.3 (1773)	13.0, 12.1 – 13.9 (658)	9.8, 9.0 – 10.6 (495)	2.9, 2.5 – 3.4 (149)	2.6, 2.2 – 3.0 (130)
2 (5178)	38.8, 37.5 – 40.2 (2010)	13.7, 12.8 – 14.7 (709)	11.5, 10.7 – 12.4 (597)	4.0, 3.5 – 4.5 (205)	3.3, 2.9 – 3.9 (173)
3 (5151)	38.2, 36.9 – 39.5 (1968)	14.0, 13.1 – 15.0 (722)	9.8, 9.0 – 10.6 (505)	3.8, 3.4 – 4.4 (198)	4.5, 4.0 – 5.1 (231)
4 (5034)	39.0, 37.7 – 40.4 (1965)	14.1, 13.1 – 15.1 (708)	9.7, 8.9 – 10.5 (486)	3.6, 3.1 – 4.1 (181)	4.9, 4.4 – 5.6 (248)
5 (most deprived) (5310)	34.2, 32.9 – 35.5 (1815)	11.6, 10.8 – 12.5 (617)	9.1, 8.3 – 9.9 (482)	3.6, 3.1 – 4.2 (192)	4.4, 3.9 – 5.0 (235)
<i>Primary psychiatric diagnosis (26909)</i>					

None recorded (12746)	29.8, 29.0 – 30.6 (3799)	12.5, 11.9 – 13.1 (1587)	8.4, 7.9 – 8.9 (1067)	3.4, 3.1 – 3.7 (427)	1.1, 0.9 – 1.3 (142)
Mood disorder (4445)	49.2, 47.8 – 50.7 (2188)	17.4, 16.3 – 18.5 (773)	14.4, 13.4 – 15.5 (640)	4.2, 3.6 – 4.8 (185)	1.9, 1.5 – 2.3 (83)
Psychotic disorder (613)	68.0, 64.2 – 71.6 (417)	16.5, 13.7 – 19.6 (101)	14.4, 11.8 – 17.4 (88)	9.0, 7.0 – 11.5 (55)	--
Anxiety or trauma- related disorder (1416)	32.6, 30.2 – 35.1 (462)	13.9, 12.2 – 15.8 (197)	7.3, 6.1 – 8.8 (104)	6.1, 5.0 – 7.5 (87)	2.3, 1.6 – 3.2 (32)
Eating disorder (191)	38.7, 32.1 – 45.8 (74)	16.2, 11.7 – 22.2 (31)	13.1, 9.0 – 18.7 (25)	--	--
Alcohol misuse (2706)	36.1, 34.3 – 37.9 (976)	11.0, 9.9 – 12.2 (298)	7.7, 6.7 – 8.8 (208)	2.5, 2.0 – 3.2 (68)	13.5, 12.3 – 14.8 (365)
Alcohol disorder (1305)	37.7, 35.1 – 40.4 (492)	8.0, 6.6 – 9.6 (104)	3.9, 3.0 – 5.1 (51)	2.5, 1.7 – 3.4 (32)	19.2, 17.2 – 21.5 (251)
Substance misuse/disorder (1225)	41.1, 38.3 – 43.8 (503)	10.4, 8.8 – 12.2 (127)	14.4, 12.5 – 16.4 (176)	--	6.8, 5.5 – 8.3 (83)
Multi-substance use (888)	41.3, 38.1 – 44.6 (367)	11.5, 9.5 – 13.8 (102)	10.9, 9.0 – 13.2 (97)	1.9, 1.2 – 3.1 (17)	10.1, 8.3 – 12.3 (90)
Personality disorder (1133)	48.2, 45.3 – 51.1 (546)	16.3, 14.3 – 18.6 (185)	12.4, 10.6 – 14.4 (140)	4.2, 3.2 – 5.6 (48)	1.2, 0.7 – 2.1 (14)
Learning difficulties or autism (241)	38.2, 32.3 – 44.5 (92)	15.4, 11.3 – 20.5 (37)	11.2, 7.8 – 15.8 (27)	--	--

^a Individuals could be referred to more than one service.
¹ Data on ethnic group were missing for n=565; ² data on IMD score were missing for n=1499; ³ data on IMD score were missing for n=1171; ⁴ The City of Manchester was ranked as the 4th most deprived Local Authority in England; -- denotes low cell count

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.	Relevant text from manuscript
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found	10	Population-based study Abstract
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	10	Introduction, paragraphs 1 to 5
Objectives	3	State specific objectives, including any prespecified hypotheses	10	Introduction, paragraph 6
Methods				
Study design	4	Present key elements of study design early in the paper	10	Methods, 'Study design and data sources'
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	10	Methods, 'Study design and data sources', paragraph 1
Participants	6	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants (b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case	10	Methods, 'Study design and data sources', paragraph 1
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	10	Methods, 'Clinical management', 'Assessing clinical management and mental health and social needs of patient' and 'Additional study measures'

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Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6	Methods, ‘Study design and data sources’ and Table 1
Bias	9	Describe any efforts to address potential sources of bias	6 - 7 and 8 - 9	Methods, ‘Clinical management’, ‘Assessing clinical management and mental health and social needs of patients’ and ‘Additional study measures.
Study size	10	Explain how the study size was arrived at		Methods, ‘Study sample’

Continued on next page

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7 0	Methods, ‘Clinical management’, ‘Assessing clinical management and mental health and social needs of patient’ and ‘Additional study measures’
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding		Methods, ‘Statistical analysis’
		(b) Describe any methods used to examine subgroups and interactions		Methods, ‘Statistical analysis’
		(c) Explain how missing data were addressed		Methods, ‘Statistical analysis’
		(d) Cohort study—If applicable, explain how loss to follow-up was addressed		
		Case-control study—If applicable, explain how matching of cases and controls was addressed		
		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy		
		(e) Describe any sensitivity analyses		
Results				
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10 12	Methods, ‘Study sample’ and Results, ‘Characteristics of cohort’
		(b) Give reasons for non-participation at each stage	12	Results, ‘Characteristics of cohort’
		(c) Consider use of a flow diagram		
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	12	Results, ‘Characteristics of cohort’
		(b) Indicate number of participants with missing data for each variable of interest	12	Results, ‘Characteristics of cohort’ and Table S1
		(c) Cohort study—Summarise follow-up time (eg, average and total amount)		
Outcome data	15*	Cohort study—Report numbers of outcome events or summary measures over time		
		Case-control study—Report numbers in each exposure category, or summary measures of exposure		
		Cross-sectional study—Report numbers of outcome events or summary measures	13 17	Results, ‘Clinical management’ and ‘Mental health and social needs, care gaps and patient characteristics’

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Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11 and 13-17	Methods, 'Statistical analysis' and Results, 'Clinical management' and 'Mental health and social needs, care gaps and patient characteristics'
		(b) Report category boundaries when continuous variables were categorized	16	Tables 2 and 3
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period		

Continued on next page

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	Discussion, ‘Main findings’
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Discussion, ‘Strengths and limitations’
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Discussion, ‘Comparison with existing evidence’ and ‘Implications for practice and research’
Generalisability	21	Discuss the generalisability (external validity) of the study results	Discussion, ‘Strengths and limitations’
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Role of the funding source

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.