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4   **Social and Mental Health Predictors of Emergency Department and General Practitioner**
5   **Usage**
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8   **Dr Pooja Saini,** School of Natural Sciences and Psychology, Liverpool John Moores University

9   **Dr Jason McIntyre,** School of Natural Sciences and Psychology, Liverpool John Moores
10   University

11   **Prof Rhiannon Corcoran,** Institute of Psychology, Health and Society, University of Liverpool

12   **Konstantinos Daras,** Public Health, University of Liverpool

13   **Clarissa Giebel,** NIHR CLAHRC NWC, University of Liverpool

14   **Elizabeth Fuller,** Public Advisor, NIHR CLAHRC NWC

15   **Jane Shelton,** Public Advisor, NIHR CLAHRC NWC

16   **Timothy Wilson,** Public Advisor, NIHR CLAHRC NWC

17   **Terence Comerford,** Public Advisor, NIHR CLAHRC NWC

18   **Prof Rajan Nathan,** Cheshire and Wirral NHS Foundation Trust

19   **Prof Mark Gabbay,** NIHR CLAHRC NWC, University of Liverpool

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25   Correspondence: Dr Pooja Saini, School of Natural Sciences and Psychology, 2.28b James Parsons
26   Tower, Liverpool John Moores University, Byrom Street, Liverpool, L3 3AF.
27   Email: P.Saini@ljmu.ac.uk
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1   **Abstract**

2   **Background:** High demand for health services is an issue of current importance in England, in part,

3   because of the rapidly increasing use of the Accident and Emergency (A&E) and GP practices for

4   mental health issues and the high cost of these services.

5   **Aim:** To examine the social determinants of health service utilisation in people with mental health

6   issues.

7   **Design and Setting:** Twenty-eight neighbourhoods (5000 – 10,000 people) on the North West

8   Coast of England, which differed in relative levels of deprivation.

9   **Method:** A comprehensive public health survey was conducted, comprising questions on housing,

10   physical health, mental health, lifestyle, social issues, environment, work and finances. Poisson

11   regression models assessed the effect of mental health comorbidity, mental and physical health

12   comorbidity, and individual symptoms on A&E and General Practice (GP) attendances, adjusting

13   for relevant socioeconomic and lifestyle factors.

14   **Results:** People who had both a physical *and* mental health condition reported attending A&E (RR

15   = 4.63, 95%CI 2.86 to 7.51) and GPs (RR = 3.82, 95%CI 3.15, 4.62) more frequently than all other

16   groups. Having a higher number of mental health symptoms was associated with higher GP and

17   A&E service usage. Depression was the strongest symptom predictor of A&E attendance (RR =

18   1.41, 95%CI 1.05 to 1.90), while anxiety was the strongest symptom predictor of GP attendance,

19   RR = 1.19, 95%CI 1.03 to 1.38.

20   **Conclusion:** Mental health comorbidities increase risk of attendances to both A&E and GPs.

21   Further research into the social attributes that contribute to reduced A&E and GP attendance rates is

22   required.

23   **Keywords: Mental health, Social care, Emergency Department, Primary Care, Service usage**

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How this fits in

- The current A&E 'crisis' in England is linked to health inequality as people living in more deprived areas use NHS services much more.

- Mental health patients are at risk of repeated hospital admissions to hospital and increased number of GP attendances.

- The National Institute of Health Research Collaboration for Leadership in Applied Health Research and Care North West Coast (NIHR CLAHRC NWC) Household Heath Survey (HHS) provides information on the rate of usage of services within regions of the North West Coast.

- Mental health comorbidities increase risk of attendances to both A&E and GPs. Depression predicted higher A&E attendance and anxiety predicted higher GP attendance when adjusting for physical health and socio-economic status.

1   **Introduction**

2   The UK has the second-highest levels of economic inequality in the European Union.[1] High

3   demand for emergency admissions is an issue of pressing importance in England because of the

4   rapidly increasing use of the Accident and Emergency (A&E) for mental health issues and the high

5   cost of these services.[2] The current A&E 'crisis' in England is linked to health inequality as people

6   living in more deprived areas use NHS services substantially more than people in less deprived

7   areas.[3-6] Patients from deprived areas also appear to attend A&E for less serious conditions[4,6-7] and

8   present at A&E nearly two and a half times more than those in the least deprived areas for

9   preventable emergency hospitalisations.[4] Furthermore, people with mental health issues, substance

10   misuse and/or long-term health conditions are most likely to attend A&E[5-6] and are at risk of

11   repeated hospital admissions.[7] Indeed, It has been reported that in 2017, the number of people going

12   to A&E for mental ill-health had risen by nearly half since 2011-12.[8,9]

13

14   In primary care, patients consult General Practitioners (GP) on average six times per year.[10] More

15   frequent attendance in the previous year has been noted for patients who died by suicide compared

16   to patients who remained alive.[11] However, frequent attendance in general practice is associated

17   with excessive service use.[12] Frequent attenders have been shown to have higher rates of common

18   mental health difficulties[13] including depression,[14-15] anxiety,[16] and somatic disorders.[17-19]

19   Additionally, higher consultation rates within primary care have been reported for those living in

20   the most deprived quintile (21.5%) compared with the least deprived quintile (16.1%);[20] suggesting

21   a link between deprivation and common mental health issues**.** Asaria and colleagues[3] found that

22   while increasing accessibility to GPs in deprived areas reduced socioeconomic inequalities in

23   primary care access, it only resulted in modest reductions in A&E usage.

1

2   More knowledge is needed about the determinants of A&E and primary care service utilisation for

3   mental health problems and how this compares across areas of differing deprivation. Moreover, it is

4   important to consider lifestyle, socioeconomic, and accessibility factors when identifying

5   determinants as these may underpin relationships between mental health and service usage. Due to

6   the disparities that exist in the way people use health services, potential gains may be made by

7   addressing health inequalities, particularly for people attending with mental health issues. To co-

8   ordinate care effectively within a given area, up-to-date information about local healthcare

9   utilization for mental health issues is required. In this study, we use data collected by The National

10 Institute of Health Research Collaboration for Leadership in Applied Health Research and Care

11 North West Coast (NIHR CLAHRC-NWC) Household Health Survey (HHS) to explore self-

12 reported service usage within regions of the NWC and to examine patient characteristics that predict

13 attendance at A&E departments and GP surgeries.

14 The specific aims of the study were to:

15   1. Assess the relationship between mental health, A&E and primary care attendance;

16   2. Quantify the extent to which comorbidities relate to service usage;

17   3. Identify individual mental health symptoms that predict service usage.

18

19   **Method**

20 **Participants and design**

21   The NIHR CLAHRC NWC HHS is comprehensive quantitative public health survey co-

22 produced with public and patient advisors, Local Authorities, NHS clinicians, and university

23 partners. Twenty-eight neighbourhoods were surveyed using random probability sampling across

1   the NWC of England, targeting 20 high deprivation neighbourhoods identified by Local Authority

2   partners and eight less deprived areas to serve as comparison neighbourhoods. Each neighbourhood

3   had a population of 5000-10,000 people and the majority of areas were defined by electoral ward

4   boundaries. The survey assessed demographic, socioeconomic, physical health, mental health, and

5   lifestyle factors. We selected a subset of these variables for the present analysis. In total, 4319

6   people were recruited via door-knocking. Research teams conducted face-to-face interviews and

7   recorded responses on tablets. Interviews were conducted between August 2015 and January 2016.

8   Interview teams worked at varying times of day to ensure the sample was representative. This

9   resulted in 55% of interviews being conducted on weekends or after 4pm on weekdays, and 45% of

10   interviews conducted before 4pm on weekdays. The adjusted response rate was 61%. The sample

11   comprised 1854 (43%) men and 2465 (57%) women whose ages ranged from 18 to 95 years (M =

12   49.12, SD = 19.13). The majority of participants (89%) indicated that they were of White European

13   ethnic background. Compared to census data for the North West of England, the sample was biased

14   towards female (our sample: 57%, census: 51%) and BME (our sample: 11%, census: 8%)

15   participants.[21] Participants were reimbursed with a £10 voucher in return for their participation. A

16   detailed description of the sampling procedure is available elsewhere.[22]

17

18   **Measures**

19   Our outcome variable was defined as the number of times respondents reported attending an

20   A&E department or their GP over the previous 12 months. Measures of socioeconomic conditions

21   included education, employment, financial hardship, change in financial circumstances and housing

22   quality. Physical health was assessed with the four physical health dimensions of the EuroQuol

23   five-dimension scale (EQ-5D-5L),[23] which included mobility, self-care, engagement in usual

1 activities and pain. Mental and physical health comorbidity was assessed by asking participants to

2 indicate whether they had any physical or mental health conditions (Yes/No), and then if they

3 responded yes, to indicate which condition or conditions they had from a list of physical and mental

4 health conditions.

5   Four mental health symptoms (depression, anxiety, paranoia and hallucinations) were

6 assessed using a series of validated instruments. Depression was measured using the nine-item

7 Patient Health Questionnaire.[24] Anxiety was measured using the seven-item Generalised Anxiety

8 Disorder scale.[25] Paranoia was measured using the persecution subscale of the persecution and

9 deservedness scale (PaDS-5) for symptoms of paranoia.[26-27] Auditory Verbal Hallucinations (AVH)

10 were assessed using a single item from the Launay-Slade Hallucination Scale: "I have been troubled

11 by hearing voices in my head".[28] When comparing severe to non-severe symptoms, we utilised the

12 published clinical cut-offs for severe symptoms of Depression (> 14 on PHQ-9)[24] and Anxiety (> 14

13 on GAD-7).[25] There are no validated clinical cut-offs for the PaDS-5 paranoia scale,[27] so we

14 categorised people as severe if they scored above the midpoint. People were categorized as

15 experiencing severe AVH if they agreed or strongly agreed with the AVH item.[28] Mental health

16 comorbidity was calculated by summing the number of conditions where someone met the severe

17 criterion.

18   Alcohol consumption was measured by participants indicating if they ever drank alcohol,

19 and if so, how many alcoholic drinks (which we converted to alcohol units dependent on type of

20 alcohol) they had consumed over the past seven days.[29] Practical social support and social contact

21 were assessed based on the level of agreement with the statements 'If I needed help, there are

22 people who would be there for me' and 'If I wanted company or to socialise, there are people I can

1   call on'. (more detailed information on each of the survey variables is given in the online

2   supplementary Appendix A_Table 1).

3   An index of Multiple Deprivation (IMD) score was also entered for each participant based

4   on their Lower Level Super Output Area (LSOA). The IMD is calculated based on indices of

5   deprivation across seven domains: income, employment, education, health and disability, crime,

6   housing, and living environment. Access to GP and A&E departments was assessed with a distance

7   measure (km) calculated using the Routino open source tool.[9] We calculated the shortest road

8   distance between the centre of each postcode in the sampled area and each health facility.[30] The

9   average distance to GP clinics and A&E departments for all LSOAs was then calculated and linked

10   to the LSOA of each participant's residence.

11

12   **Preliminary analyses and data preparation**

13   Descriptive statistics and bivariate correlations between mental health symptoms and

14   healthcare service usage are reported (see Supplementary Appendix B, Table 2). On average,

15   participants attended A&E .69 (SD = 2.74) times and a GP 5.5 (SD = 15.05) times in the previous

16   12 months. The mode was 0 for both A&E attendance (n = 3212) and GP attendance (n = Figure 1

17   shows the mean levels of attendances for GP and A&E services among people classified as having

18   severe symptoms alongside the total sample mean. Listwise deletion was employed to account for

19   missing values in all analyses. The level of missing data was very low at less than 5% for all

20   variables.

21

22   For the regression analyses predicting A&E and GP attendance, we constructed poisson

23   regression models that controlled for potential demographic, socioeconomic, lifestyle, health, and

1   healthcare access confounds. Rate ratios (RR) were calculated for each variable (see tables 1-3) and

2   standard errors were adjusted to account for the multi-stage nature of the sampling procedure. The

3   model was also weight-adjusted to account for demographic variation in non-response.

4

5   **Results**

6   **The relationship between physical and mental health co-morbidity and service use**

7   Figures 2 shows mean A&E and GP attendances as a function of comorbidity.

8   Results of the poisson regression analysis showed that comorbidity significantly predicted greater

9   A&E and GP attendance over the previous 12 months. Specifically, relative to having no health

10   conditions, having only a mental health condition was associated with a 2.1 times higher rate of

11   A&E attendance (RR = 2.10, 95%CI = 1.33 to 3.31) and 2.5 times higher rate of GP visits (RR =

12   2.49, 95%CI = 2.03 to 3.04). Having only a physical health condition(s) was associated with a 2.7

13   times higher rate of A&E attendance (RR = 2.65, 95%CI = 1.78 to 3.95) and a 2.4 times higher rate

14   of attending a GP (RR = 2.43, 95%CI = 2.10 to 2.81). Reporting at least one physical health

15   condition and at least one mental health condition was associated with a 4.6 times higher rate of

16   A&E attendance (RR = 4.64, 95%CI 2.86 to 7.51) and 3.8 times higher rate of attending a GP (RR

17   = 3.82, 95%CI = 3.16 to 4.62). Details of the coefficients for the full model are reported in Table 1.

18

19   **The relationship between mental health comorbidity and service usage**

20   Comorbidity was operationalised as the numbers of mental health symptoms for which the

21   participant met the "severe" criteria as defined earlier. We constructed separate models for each

22   health service. Mean attendances for each level of comorbidity are shown in Figure 4. Models

23   including coefficients for all variables are provided in Table 2.

1   Mental health comorbidity was associated with higher A&E attendance for people with four

2   or more severe symptoms. Specifically, people with four severe symptoms were 2.5 times more

3   likely to attend A&E (RR = 2.54, 95%CI 1.43 to 2.4.52) compared to people with no severe

4   symptoms. For GP usage, having one (RR = 1.16, 95%CI 1.01 to 1.32), two (RR = 1.92, 95%CI

5   1.31, 2.82), three (RR = 1.51, 85%CI 1.23, 1.87), or four (RR = 2.19, 95%CI 1.50 to 3.20) severe

6   symptoms was associated with elevated rates of GP attendance relevant to having no severe

7   symptoms.

8

9   **Mental health symptoms as predictors of A&E and GP attendance**

10   Details of the coefficients for all variables are reported in Table 3. Of relevance to our key

11   research question, depression was the only mental health symptom that was significantly associated

12   with A&E attendance (RR = 1.41, 95% 1.05 to 1.90) and anxiety was the only symptom

13   significantly associated with GP attendance (RR = 1.19, 95% 1.03 to 1.38), while controlling for

14   health, socioeconomic, alcohol consumption and healthcare access variables.

15

16   **Discussion**

17   When controlling for a range of potential confounds, physical and mental health comorbidity was

18   an important risk-factor for A&E and primary care attendance, as was mental health comorbidity

19   alone. Specifically, having both a physical and mental health condition was associated with a three-

20   fold increase in GP attendance and a four-fold increase in A&E attendance. Rates of both A&E

21   attendance more than doubled when people had four severe mental health symptoms. However, GP

22   attendance rates were significantly elevated with any number of severe mental health symptoms

23   compared to having no severe symptoms. When examining individual symptoms, we found

1   depression was associated with more A&E attendances, while anxiety was associated with greater

2   GP attendance. Along with health status, being aged 18-24, from a white ethnic background, and

3   living in disadvantaged circumstances were consistently associated with increased service usage,

4   and living closer to an A&E department predicted greater A&E attendance in all analyses.

5

6   **Comparison with existing literature**

7

8   Being younger and not in employment were the main significant socioeconomic or demographic

9   risk-factors of A&E attendance in this sample, as has been found in previous studies.[5,30] Having

10 problems with self-care, usual daily activities and pain were all significant physical health

11 predictors. As previously reported,[31] living closer to an A&E department was associated with more

12 A&E attendances but distance to GP was not associated with A&E attendance in non-depressed

13 people.

14

15 In line with previous research,[32] the present study confirms that people with anxiety visit GPs more

16 frequently. The association between anxiety and use of GP services may be due to acute

17 exacerbation of anxiety becoming intolerable, and thus patients turn to GPs as their first point of

18 support. . This is in contrast, to severe depression, which is associated with becoming withdrawn for

19 society, particularly for men.[33] Alternatively, severe depression may be viewed as a more urgent

20 concern by carers and relatives due to concerns about imminent risk of self-harm, which in turn

21 may lead to A&E visits.[34] Another reason, could be the feeling of acute anxiety being mistaken for

22 other physical health symptoms[35] and this misattribution prompting increased GP visiting where

23 patients are likely to be seen quicker and by doctors they know, therefore reducing further anxiety

24 brought on by the uncertainty of the length of wait and the social interaction.

Additionally, age, ethnicity, unemployment, and vocational or professional qualifications were

associated with A&E attendance. Previously, ethnicity was shown to be a significant factor for

higher A&E attendance in Black and Asian minority groups compared to white majority groups;[5]

but in this sample, there were significantly more people from white backgrounds attending A&E.

Earlier studies have shown that people from white backgrounds used A&E more than those from

non-white backgrounds[36] although the studies were based on relatively small geographical areas

with high proportions of particular non-white ethnic groups and therefore with limited

generalisability to other areas of the UK.

People with only a physical health condition attended A&E more frequently in the previous 12

months than people with only a mental health condition. People who had both a physical *and*

mental health condition, attended A&E and primary care more frequently than all other groups. Co-

morbid mental health symptoms were also associated with more use of both healthcare services.

However, it was only the people with four or more severe mental health symptoms, and therefore

the most complex needs, who attended A&E more frequently compared to people with no severe

symptoms. Conversely, having any number of mental health symptoms increased people's rate of

GP attendance relative to having no severe symptoms. Both results are consistent with previous

studies that have reported high levels of A&E and GP attendance for mental health patients with

depression and anxiety in the year prior to suicide[32,34] However, further research is needed on data

that examines reasons for service usage to understand why comorbidity might differentially

influence A&E and GP attendance rates.

1 Strengths and limitations

2

3 This study contributes to the knowledge that patients with comorbid health conditions visit both

4 A&E and GPs more than patients with a single condition. Our finding that distance to services

5 predicted service usage even when controlling for other potential confounds also supports this

6 assertion. Previous research suggests that there a large proportion of attendances at A&E are

7 avoidable,[12] and mental health patients were identified as one of the main groups contributing to

8 increasing demand within A&E.[37]

9

10 A strength of using self-reported survey data is the reliability and accuracy of the information

11 provided.[38] A review conducted by Legget and colleagues[39] about self-reported questionnaires on

12 resource utilisation showed good agreement with administrative data such as electronic records,

13 although, visits to general practitioners, outpatient days, and nurse visits had poorer agreement.

14 Overall, self-reported questionnaires were concluded to be a valid method of collecting data on

15 healthcare resource utilisation, however there is an issue of recall bias, particularly after a length of

16 time.[38] Whilst the survey collected data from a wide geographical area from both relatively

17 disadvantaged and advantaged areas, thereby increasing its representativeness, some limitations need

18 to be considered. Considering the focus on people living in disadvantaged neighbourhoods, data are

19 limited to those with a fixed address. Thus, the survey was not able to capture the most disadvantaged

20 groups in the population such as homeless people and unregistered migrants.

21

22 This study used data from the North West Coast of England, which limits generalisability to other

23 regions and populations. While the causal directions proposed here seem the most plausible, due to

1 the cross-sectional design we cannot rule out the possibility that contact with services may in some

2 instances worsen people's mental or physical health.

3

4 **Implications for research and/or practice**

5 More work is needed on whether other available services for severe depression will reduce the

6 number of patients attending A&E through a proactive approach to managing patients, particularly

7 in disadvantaged groups and areas with high prevalence of comorbid health conditions. Raising

8 public awareness of the alternatives to A&E for patients with severe depression, particularly in

9 more deprived areas, may reduce the number of attendances; however, alternatives need to be

10 accessible. The findings from this research suggest that more expertise in A&E and in GP practices

11 for severe depression is needed. A recent report[40] suggests that in-house solutions could include co-

12 locating GP services, use of senior doctors at the front door of the A&E, bringing specialist staff

13 closer to the front door and improved mental health liaison teams. However, to date, there is no

14 evidence to suggest that any of these interventions would improve flow and therefore reduce the

15 number of A&E attendances. Larger and better-designed studies are necessary to address some of

16 these questions. Future interventions to improve access to primary care may be most effectively

17 targeted towards younger adults given the increase in attendances among 18 to 24 year olds. In

18 2012–2013, 10% of all A&E attendances (1.8 million attendances) were for adults aged 18 to 25

19 years.

20

21 These findings validate the recommended 2016 NICE guidance, which includes a focus on

22 comorbidity and aims to provide a range of coordinated services that address people's wider health

23 and social care needs, such as poor housing.[40] While not the focus of the present study, the findings

1   highlight that further research is needed into the social determinants of service usage. The

2   association between higher attendance rates and poorer housing, for example, could be attributed to

3   the condition of social housing and how this impacts on mental health or exacerbates long term

4   physical health conditions.[30]

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Ethical approval

The research was approved by the University of Liverpool Committee on Research Ethics (Ref:

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the study.

Competing Interests

The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or

the Department of Health and Social Care.

Conflict of interests

All authors declare no conflict of interest.

Author contributions

The study was conceived by PS and MG. Statistical analysis and interpretation of the data was

undertaken by JM and reviewed by all of the authors, who also all contributed to the drafting and

revision of the manuscript. All authors have approved the final version of the manuscript.

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