Prevalence and Incidence of Alcohol Dependence: Cross-sectional primary care analysis in Liverpool, UK.

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**Abstract:**

Objectives: Liverpool has high prevalence of alcohol use disorders (AUD) compared to the rest of the UK. Early identification and referral in primary care would improve treatment for people with AUD. This study aimed to identify changes in prevalence and incidence of AUD in primary care in Liverpool, to identify local need for specialist services.

Design: Cross-sectional retrospective analysis of electronic health records.

Setting: NHS Liverpool CCG primary care. Sixty-two of 86 GP practices agreed to share their anonymised EMIS data from 01/01/2017 – 31/12/2021.

Participants: Patients aged over 18 years with a SNOMED code for alcohol dependence or hazardous drinking (N = 4936). Patients were excluded if they had requested that their data was not shared; Practices were excluded if they opted out (N = 2) or did not respond to the data sharing request (N = 22).

Primary & Secondary outcomes: Prevalence and Incidence of AUD diagnoses in primary care over the 5-year period; Demographic profile of patients (Sex, age, ethnicity, occupation); GP postcode; alcohol-related medications; psychiatric and physical comorbidities.

Results: There were significant decreases in incidence of alcohol dependence and hazardous drinking diagnoses over the 5 years (p < .001 in all cases). Prevalence showed less change over time. Diagnoses were significantly higher in more deprived areas (IMD decile 1 vs 2-10). Overall pharmacotherapy prescriptions were lower than national estimates.

Conclusions: There are low levels of identification of alcohol use disorders in primary care in Liverpool, and this is decreasing year on year. There was weak evidence to suggest patients in the most deprived areas are less likely to receive pharmacotherapy once diagnosed. Future research should seek to investigate practitioner and patient perspectives on barriers and facilitators to management of alcohol use disorders in primary care.

**Keywords:** Primary health care, general practice, alcohol dependence, treatment, incidence.

**Article Summary**

Strengths and Limitations of this study

* This study used local primary care data which allowed us to capture seldom heard populations (e.g. people who are homeless) in comparison to larger data sets where these populations are under-represented (e.g. UK Biobank, CRPD).
* This study used GP practice size when calculating incidence and prevalence to allow us to account for variations due to numbers of registered patients.
* We used both GP postcode and individual patient-level residential location Indices of Multiple Deprivation deciles to calculate associations between social deprivation, incidence of hazardous and dependent drinking, and receipt of pharmacotherapy.
* The data is limited in that it cannot tell us if patients were offered and declined pharmacotherapy and the study cannot tell us *why* the incidence of alcohol use disorder diagnoses in primary care have decreased over the last 5-years. It should also be noted that the final 2 years in the analyses were during the COVID-19 pandemic, and changes in identification during this period could be affected by restrictions in health care settings.

**Introduction**

Harmful alcohol use (a pattern of alcohol use that causes damage to health) is a leading factor in premature death and disability worldwide [1]. In the UK, despite a small reduction in alcohol-related hospital admissions in 2020 during the COVID-19 restrictions, there was a 20% increase in alcohol-related deaths from 2019 – the second highest number ever recorded. In addition, alcohol-related liver disease deaths increased by 58% compared to baseline [2]. Early identification of patients in primary care settings (e.g. General Practitioners; GPs) and robust referral and support pathways would facilitate treatment access, with those who remain abstinent for a year or more after treatment presenting a low relapse risk [3]. However, identification of alcohol use disorders in primary care across the UK is low [4,5].

There are numerous social and psychological factors which can affect alcohol-related harm, treatment seeking/access and completion. Globally, people of lower socioeconomic status (SES) are more likely to die or suffer from alcohol-related disease [6-8]. In the UK, social deprivation has been recognised as an important factor in alcohol-related harm, prevalence, and treatment of alcohol dependence (AD) in previous research interrogating large databases (e.g. the Clinical Research Practice Database and UK Biobank), with one study finding deprived areas have higher rates of AD diagnoses, higher mortality, and less support for patients once diagnosed [9]. In this study, only 11.7% of participants were prescribed a relevant pharmacotherapy treatment, and those in the most deprived areas were less likely to be prescribed pharmacotherapy. The COVID-19 pandemic is likely to have further exacerbated social inequalities in access to AD treatment as services were forced to cancel face-to-face contact for individuals with AD, and the proportion of individuals drinking at higher risk levels reportedly increased over the course of the 12 months between March 2020 -2021 [10]. Liverpool, UK, is an example of a city likely to have been affected by these social inequalities as it has the 3rd highest prevalence (2.53 cases/100 people) of AD in England [11] and is also ranked as the 3rd most deprived local authority out of 317 across England [12]. As most of the UK population is registered with a GP, GPs are uniquely placed to identify patients with alcohol use disorders and treat or refer to appropriate services and a clear picture of the incidence and prevalence of alcohol presentations in primary care, as well as associated sociodemographic variables, is needed to understand the impact of the COVID-19 pandemic on identification of alcohol use disorders but also to elucidate local inequalities in AUD presentations.

While the benefits of improving access to treatment are clear, the development of improvements that reduce social inequalities requires a careful prior analysis of AD incidence and AD sociodemographic patient profiles that also takes into account differences between GP practices. Our study sought to accomplish this by identifying the incidence of AD presentations in primary care in Liverpool, sociodemographic characteristics of patients, temporal trends in these variables and the association between sociodemographic characteristics and AD presentations and comparing these observations between Primary Care Networks in LCCG.

**Method**

*Design, Setting and Study Populatio*n

We conducted a cross-sectional analysis of anonymised GP electronic health records in Liverpool Clinical Commissioning Group and requested data from the 86 GP practices within the CCG. Practices provided us with routinely collected patient health data recorded via Egton Medical Information Systems (EMIS). Following the case definition of Alcohol Dependence developed by Thompson and co-workers [13], records of individuals who:

1. Were aged 18 years or over
2. Had a SNOMED code for alcohol dependence or consequences of alcohol dependence (e.g. alcoholic cirrhosis of the liver) between 1st January 2017 and 31st December 2021 were selected.

Patients were excluded if they had requested that their data was not shared (N = 406 citywide); Practices were excluded if they opted out (N = 2) or did not respond to the data sharing request (N = 22), resulting in data being shared by 62 practices in total. Variables extracted from the EMIS system were: Anonymised identifier; Sex; Age; Ethnicity; Postcode of registered GP practice; Occupation; Alcohol use metrics (related diagnoses e.g. Wernicke’s encephalopathy, alcohol consumption, Alcohol Brief Interventions, onwards referrals); Medications to treat alcohol dependence (Disulfiram; Topiramate; Acamprosate; Baclofen; Naltrexone); Major psychiatric and physical comorbidities.

*Patient and Public Involvement*

The research team are active members of Liverpool Centre for Alcohol Research (LCAR). Through our engagement with local patients and stakeholders in LCAR, we invited Melissa Rice to join our team as an expert-by-experience. Through steering group meetings and project development updates, Melissa has been involved in the design of the study (offering expertise on the personal experience of accessing treatment in primary care and associated factors), has reviewed the manuscript and will be the PPI chair on our future work.

*Procedure*

After gaining institutional ethical approval, a Data Sharing Agreement was established between Liverpool John Moores University (LJMU) and NHS Liverpool CCG and reviewed and approved by the NHS Liverpool CCG Information Governance board. Individual practices were contacted by LCCG Business Intelligence team with a brief outline of the study and asked for consent to share their EMIS data with the research team on the 25thApril 2022, with fortnightly reminders sent until the request closed on 23rd June 2022. Anonymised data for identified cases from 1st January 2017 – 31st December 2021 were extracted from 62 practices by Liverpool CCG into an CSV Microsoft Excel file and sent to an NHS.net account belonging to a member of the research team (LO). Data was stored on a secure server only accessible to the research team and downloaded to a password protected network drive at LJMU. Figure 1 displays the data acquisition and processing figures.

<<Insert Figure 1 about here>>

*Data analysis*

All analyses were performed in R Studio [14]. For a more detailed description of database construction and SNOMED and free text codes for hazardous drinking, please see readme file accompanying open access dataset (https://doi.org/10.24377/LJMU.d.00000140). All alcohol codes were reviewed by two researchers (CM; CK) and confirmed to indicate either alcohol dependence (using the case definition in Thompson and co-workers [13]), or harmful drinking [15]. Where there was uncertainty, cases were discussed in the team and the clinical opinion of LO and CK was used assign cases to each category. Anonymised data was recoded to reflect: UK Census 2021 ethnic categories (ethnicity), Diagnostic Statistical Manual for Mental Disorders 5 classifications (DSM-5) (psychiatric comorbidities) and year of first occurrence (2017 – 2021) of anonymised identifier (for incidence). GP postcode was recoded to reflect the 2019 Indices of Multiple Deprivation for England (IMD) deciles, based on the Lower Layer Super Output Area (LSOA) of the GP postcode. The IMD gives a single weighted score for the relative deprivation of a small geographical area (the LSOA) based on seven domains (income, employment, education, health, crime, barriers to housing and services, living environment). We also received patient level LSOA codes, which were recoded to reflect the IMD decile of that LSOA. In the current study IMD deciles were used in the main analyses with 1 = most deprived – 10 = least deprived. Descriptive data for all variables is presented as counts and percentages in Table 1. We used count data for each category (hazardous drinking; alcohol dependence) in each year (2017; 2018; 2019; 2020; 2021) and Chi Square goodness of fit test to compare incidence (new occurrence) and prevalence (total count) between each paired year, applying a correction for 10 multiple comparisons in each set (0.05/10).

We computed the proportion of individuals presenting to their GP practice with alcohol dependence or hazardous use from the number of individuals aged over 18 years registered to that practice, and the variance of this proportion using the ‘escalc’ function from the ‘metafor’ package in R. We conducted a random-effects meta-analysis on the proportion of alcohol dependence cases across 62 GP surgeries we had data for. In line with recommendations [16] we transformed raw proportions using the arcsine square root transformation (escalc function ‘PAS’), which serves to improve normality and stabilise variances in smaller samples. We report back-transformed proportions in text and raw proportions in figures to aid interpretation. The analysis script can be found here [https://osf.io/7ywdz/].

To examine whether deprivation was associated with the proportion of alcohol-dependence cases we used the GP surgery postcode, we first used meta-regression analyses to examine whether IMD was associated with the proportion of alcohol-dependent cases, as well as hazardous drinking. Then, owing to a large number IMDs = 1 (N = 37, 59.7%) we conducted a subgroup analysis in which we compared IMD = 1 vs IMD = 2:10. We provide R2 values for meta-regressions, which indicate the amount of heterogeneity in the models accounted for by the predictor (IMD). To examine whether any associations between IMD and alcohol-dependence were partially explained by demographic characteristics of the patient samples we re-ran our meta-regressions to include the percentage of male (vs female) patients aged 18+ registered in each surgery (Mean = 50.8%, Min = 46.1%, Max = 59.3%). We also examined the % of males and females who identified as ‘British or Mixed British’ as their ethnicity (vs other possible ethnicities) within that surgery. We chose this as it was the most commonly reported ethnicity. However, this analysis is exploratory as the quality of ethnicity reporting was poor (many surgeries reported missing ethnicity data).

Finally, in order to triangulate evidence we also examined whether patient-level deprivation (using patient level IMD data), average age and proportion of male patients, was associated with prevalence of dependence, medication prescribing, and hazardous drinking using meta-regressions.

**Results**

*Demographic characteristics of participants:*

The majority of alcohol diagnoses in primary care in Liverpool over the 5-year period were for male patients (64%) and most described their ethnicity as white British, white Irish or white other (84%). Across the sample, six percent were currently prescribed medication to manage their drinking, with Acamprosate most commonly prescribed (3.9%). Coding of information relating to indices of alcohol use (using some variation of the AUDIT or a consumption score) and referral to other services was variable; while 14% or patients were coded as “referral to community”, the majority of patients did not have onward referral information. A small proportion (0.3%) declined referral to other alcohol services. Inspection of Table 1 also shows that cooccurring mental health diagnoses were common, with 45.6% of patients having a SNOMED code for a co-existing mental health concern, and Anxiety states or Anxiety Disorders (30%) emerging as the most common concern.

Table 1: Demographic information, prescribed medications and cooccurring mental health diagnoses.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Male (N)** | **%** | **Female (N)** | **%** |
| **Gender** | 3173 | 64.30 | 1763 | 35.70 |
| **Age** |  |  |  |  |
| *18 - 24* | 30 | 1 | 26 | 1.5 |
| *25 – 34* | 316 | 10 | 150 | 8.5 |
| *35 – 44* | 626 | 19.7 | 386 | 21.9 |
| *45 - 54* | 878 | 27.6 | 497 | 28.2 |
| *55 – 64* | 857 | 27.0 | 441 | 25.0 |
| *64+* | 465 | 14.7 | 263 | 14.9 |
| **Ethnicity** | **N** | | **%** | |
| *Asian or Asian British* | 47 | | 1 | |
| *Black, Black British, Caribbean or African* | 83 | | 1.7 | |
| *Mixed or multiple ethnic groups* | 65 | | 1.3 | |
| *White British or Irish* | 3997 | | 81 | |
| *White European or other* | 159 | | 3.2 | |
| *Other Ethnic Group* | 33 | | 0.7 | |
| *Missing* | 552 | | 11.1 | |
|  |  | |  | |
| **Medication (total)** | 311 | | 6.3 | |
| *Topiramate* | 11 | | 0.2 | |
| *Acamprosate* | 194 | | 3.9 | |
| *Baclofen* | 97 | | 2.0 | |
| *Disulfiram* | 4 | | - | |
| *Naltrexone* | 5 | | - | |
|  |  | |  | |
| **Onwards referral** |  | |  | |
| *Referral to community* | 704 | | 14.2 | |
| *Referral declined* | 117 | | 0.3 | |
| *No referral information* | 4115 | | 83.3 | |
|  |  | |  | |
| **Cooccurring mental health diagnoses** | 2250 | | 45.6 | |
| *Depression/depressive disorders* | 36 | | 0.7 | |
| *Anxiety states/anxiety disorders* | 1484 | | 30.0 | |
| *Mixed Depression & Anxiety* | 272 | | 5.5 | |
| *Obsessive Compulsive Disorders* | 26 | | 0.5 | |
| *Feeding & eating disorders or problems* | 37 | | 0.7 | |
| *Bipolar & related disorders* | 62 | | 1.3 | |
| *Schizophrenia spectrum & other psychotic disorder or problems* | 158 | | 3.2 | |
| *Personality disorders* | 6 | | 0.1 | |
| *Trauma& stressor related disorders & states* | 136 | | 2.8 | |
| *Alcohol-related mental disorders* | 20 | | 0.4 | |
| *Other* | 11 | | 0.2 | |
|  |  | |  | |
| **Physical disability** | 24 | | 0.5 | |
|  |  | |  | |

*Changes in Prevalence and Incidence:*

Figure 2 displays the incidence and prevalence counts for alcohol dependence and hazardous drinking in each year. The slope of the lines suggests that while there were year on year decreases in new incidence from 2017-20, there was less change in prevalence over the 5 years.

<<Insert Figure 2 about here>>

To assess if these changes in incidence and prevalence were significant between each year, we conducted Chi Square goodness of fit tests between each paired year (corrected for multiple comparisons). Test statistics and significance levels are displayed in Table 2 below. Incidence of hazardous drinking diagnoses in primary care significantly decreased year on year from 2017-20, with no significant difference between 2020-21. Incidence of hazardous drinking decreased significantly year on year from 2017-20, with a significant increase from 2020-21. For prevalence of alcohol dependence, there was a significant increase in prevalence between 2017-19, and significant decreases in prevalence between 2018-20 and 2019-21. For prevalence of hazardous drinking diagnoses, 2020 was significantly lower than all other years.

Table 2: Chi square test statistics and significant for paired year comparisons in incidence and prevalence.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Comparison** | **Incidence** | | | | **Prevalence** | | | |
|  | **Dependence** | | **Hazardous** | | **Dependence** | | **Hazardous** | |
|  | **χ2** | **p** | **χ2** | **p** | **χ2** | **p** | **χ2** | **p** |
| *2017v2018* | 80.77 | **.0001** 🡫 | 48.07 | **.0001**🡫 | 3.68 | .06 | .45 | .50 |
| *2017v2019* | 134.70 | **.0001**🡫 | 75.79 | **.0001**🡫 | 5.13 | **.02** 🡩 | .09 | .76 |
| *2017v2020* | 261.06 | **.0001**🡫 | 174.71 | **.0001**🡫 | .21 | .64 | 15.75 | **.00**🡫 |
| *2017v2021* | 247.32 | **.0001**🡫 | 115.63 | **.0001**🡫 | .00 | 1.00 | .00 | .98 |
| *2018v2019* | 7.40 | **.007**🡫 | 3.25 | .07 | .12 | .73 | .14 | .71 |
| *2018v2020* | 57.80 | **.0001**🡫 | 41.87 | **.0001**🡫 | 5.67 | **.02**🡫 | 10.88 | **.001**🡫 |
| *2018v2021* | 50.85 | **.0001**🡫 | 15.27 | **.0001**🡫 | 3.68 | .06 | .48 | .49 |
| *2019v2020* | 24.36 | **.0001**🡫 | 21.97 | **.0001**🡫 | .12 | .73 | 13.46 | **.0002**🡫 |
| *2019v2021* | 19.85 | **.0001**🡫 | 4.4 | **.04**🡫 | 5.13 | **.02**🡫 | .10 | .75 |
| *2020v2021* | .23 | .63 | 6.70 | **.001** 🡩 | .21 | .64 | 15.93 | **.0001** 🡩 |

\* Arrows in Table indicate direction (increase or decrease) of significant change from previous year.

*Relationship between prevalence, alcohol-related prescriptions and GP surgery-level deprivation:*

To assess the relationship between social deprivation and prevalence of dependence diagnoses (reflecting overall GP caseload for alcohol dependence in these areas), we used meta regression analyses. Figure 3 displays the prevalence of alcohol dependence in GP surgeries as a function of the GP Surgery IMD decile, with the size of the points indicative of the number of patients (aged over 18) registered in that surgery. The pooled prevalence of alcohol-dependent cases across the 62 GP surgeries was .0059 [95% CI: .0052 to .0067; I2 = 87.6%], or approximately 0.6%. There was a significant association between GP surgery IMD and prevalence rates (B = -.0068 [95% CI: -.0093 to .-0042]; Z = 5.21, p < .001: R2 = 36.9%). The inclusion of %males (vs females) registered to the surgery into the model was not a statistically significant predictor (B = .0941 [95% CI: -.0335 to .2218]; Z = 1.45, p = .148), and did not explain any additional variance in the model (model R2 = 37.9%). Similarly, neither % males (B = .0002 [95% CI: -.0006 to .0010]; Z = 0.42, p = .678) nor % females (B = -.0002 [95% CI: -.0010 to .0005]; Z = 0.62, p = .533) reporting as White British or Mixed British were associated with dependence prevalence. Prevalence rates of dependence in the most deprived GP surgeries (IMD = 1: prevalence = .0074 [95% CI: .0064 to .0083) were significantly higher than other GP surgeries (IMDs 2 – 10: prevalence = .0040 [95% CI: .0033 to .0048]; X2 = 28.50, p < .001). This is indicative of a ~84% increase in the prevalence of dependence diagnoses in GP surgeries in the areas of highest deprivation. See figure 3.[[1]](#footnote-1)

<< Insert Figure 3 About Here>>

The pooled prevalence for hazardous drinking across the 62 GP surgeries was .0078 [95% CI: .0069 to .0089, I2 = 90.8%], or approximately 0.8%. There was a significant association between IMD and prevalence rates (B = -.0059 [95% CI: -.0092 to -.0027], Z = 3.59, p < .001: R2 = 19.1%). The inclusion of %males (vs females) registered to the surgery was not a statistically significant predictor (B = .0064 [95% CI: -.1573 to .1702]; Z = 0.08, p = .939), and did not explain any additional variance in the model (model R2 = 17.5%). Similarly, neither % males (B = .0003 [95% CI: -.0008 to .0014]; Z = 0.63, p = .597) nor % females (B = -.0001 [95% CI: -.0011 to .0009]; Z = 0.19, p = .850) reporting as White British or Mixed British were associated with hazardous prevalence. Prevalence rates of hazardous drinking in the most deprived GP surgeries (IMD = 1: prevalence = .0095 [95% CI: .0032 to .0190) were significantly higher than other GP surgeries (IMDs 2 – 10: prevalence = .0057 [95% CI: .0047 to .0067]; X2 = 19.01, p < .001). This is indicative of a ~66% increase in the prevalence of hazardous drinking diagnoses in GP surgeries in the areas of highest deprivation.

We also used meta-regression to assess the relationship between social deprivation and receipt of alcohol-related prescriptions in those who have a diagnosis of alcohol dependence. Figure 4 displays the number of alcohol-related prescriptions as a function of GP surgery IMD decile, with size of points indicative of number of alcohol dependence diagnoses in that surgery. The pooled prevalence of alcohol-related prescriptions in patients diagnosed with alcohol dependence across GP surgeries was .0663 [95% CI: .0528 to .0814: I2 = 36.4%], approximately 6.6%. There was no significant association between GP-level IMD and receipt of alcohol-related prescriptions (B = .0012 [95% CI: -.0185 to .0209]; Z = 0.12, p = .905: R2 = 0.0%). The prevalence of alcohol-related prescriptions was not significantly different (X2(1)= 0.15, p = .706)between the most deprived GP surgeries (IMD = 1: prevalence = .0644 [95% CI: .0491 to .0817]) and other GP surgeries (IMDs 2 – 10: prevalence = .0700 [95% CI: .0420 to .1045]). For hazardous drinking the pooled prevalence of alcohol-related prescriptions was .0448 [95% CI: .-343 to .0566]. There was no significant association between IMD and receipt of alcohol-related prescriptions (B = -.0106 [95% CI: -.0282 to .0071], Z = 1.17, p = .240, R2 = 0.1%). The prevalence was not significantly different (X2(1) = 2.18, p = .139) between the most deprived GP surgeries (IMD = 1: prevalence = .0506 [95% CI: .0385 to .0643]) and other GP surgeries (IMDS 2- 10: prevalence = .0340 [95% CI: .0165 to .0574]).

<<Insert Figure 4 & 5 about here>>

*Patient-level deprivation analyses*

We also performed meta-regression with patient level indicators of deprivation, using the LSOA code related to the patient’s residential location. There was a significant negative association between the prevalence of alcohol dependence and IMD decile of patient LSOA (B - .0050 [95% CI: -.0077 to -.0024], Z = 3.69, p < .001, R2 = 64.6%: see Figure 5a). Mean age of dependent patients was not a significant predictor (B = .0018 [95% CI: -0025 to .0060]), when included in the model (IMD remained significant (B =-.0057 [95% CI: -.0090 to -.0024]). When including the proportion of males in the model IMD remained a significant predictor (B = -.0063 [95% CI: -.0087 to -.0039], Z = 5.14, p < .001), and the proportion of males was a significant negative predictor (B = -.0638 [95% CI: -.1239 to -.0037], Z = 2.08, p = .038, R2 = .78.2%). Examining the prevalence of medication for alcohol dependence demonstrated a weak positive association with IMD decile of patient LSOA (B = .0134 [95% CI: -.0013 to .0289], Z = 1.79, p = .073).

There was a significant negative association between the prevalence of hazardous drinking and IMD score (B = -.0045 [95% CI: -.0063 to .0026], Z = 4.66 p < .001, R2 =74.5%: Figure 5b). Mean age of the hazardous drinking patients was not a significant predictor when included in the model (B = .0015 [95% CI: -.0008 to .0039]), but IMD remained significant (B =-.0054 [95% CI: -.0077 to -.0032]). When including the proportion of males in the model IMD remained a significant predictor (B = -.0056 [95% CI: -.0074 to -.0039], Z = 6.23, p < .001), and the proportion of males was a significant negative predictor (B = -.0658 [95% CI: -.1272 to -.0045], Z = 2.10, p = .036, R2 = 85.3%).

**Discussion**

This study found that in Primary Care in Liverpool, there have been significant decreases in the incidence of alcohol dependence and hazardous drinking diagnoses from 2017 – 2020. Changes in prevalence were more subtle with significant decreases in 2020 due to the COVID-19 pandemic, but not other years during the analysis period. Most presentations were from white males, and almost half of the sample had a co-existing mental health diagnosis. Only ~6% of patients in the sample were prescribed pharmacotherapy to manage their drinking. GP surgeries in the most deprived areas of Liverpool had significantly higher prevalence of alcohol dependence diagnoses per registered patient than those in other IMD deciles.

A strength of the current study is the identification of practices within Liverpool, situated in areas of high social deprivation which should be prioritised for additional funding and support for the management of alcohol patients. We also demonstrated year on year decreases in identification of both hazardous drinking and alcohol dependence in primary care over the last 5 years despite smaller changes in prevalence. This suggests that while GP caseload for alcohol patients remains at a similar level to 5 years ago, this is due to existing patients with alcohol dependence diagnoses and not identification of new cases. However, the study was limited by the variations in coding of data. We had intended to analyse changes in consumption and AUDIT scores over the 5-year period, but it was not clear which item/combinations of items had been used for collection of this data between and within practices. Reporting of onward referrals and follow up plans were also variable, with all patients having a code that indicated referral to Liverpool Community Alcohol Service. There are multiple community treatment providers, private providers and a hospital-based Alcohol Care Team which accepts on the day referrals. Understanding which of these organisations a patient has been referred to would increase our understanding of local need for these services. Using primary care data is also limited as there may be variability in individual practitioners’ perceptions of hazardous vs. dependent drinking [5], and with limited time per patient and no standardised diagnostic procedure, this is unlikely to change. We also cannot know for certain the reasons for low levels of pharmacotherapy prescribing, and it is likely that other factors (GP experience, local practice policies, patient wishes, medicine status on Pan Mersey Formulary) affect the prescribing of pharmacotherapy to manage dependence. For patients who visit the ACT, pharmacotherapy is initiated in all post-detox patients, with follow up managed in an outpatient clinic, so it is feasible that patients who access this service would be reported in hospital data and not primary care data. Finally, the final two years of primary care data were for incidence and prevalence of alcohol diagnoses during the COVID-19 pandemic. It is likely that due to the increases in drinking during this time, these figures are an especially low reflection of actual prevalence and incidence.

Increasing access to treatment in primary care, as well as treatment acceptability and completion would reduce alcohol-related harm and also alcohol-related hospital admissions, a health outcome that has been given not only local but also national and international priority. While nationally, prevalence of alcohol use disorders has increased with subsequent increases in alcohol-related mortality and disease [2,10], a trend which has also been observed globally [17], we have demonstrated local decreases in the incidence of diagnoses identified in primary care over a 5-year period. While previous research suggests that identification in primary care is low nationally [4,5], the significant year on year decreases indicate that this problem is escalating in Liverpool, an area of already high need. NICE guidelines [18] recommend the prescribing of pharmacotherapy to manage alcohol dependence, with previous studies interrogating large national databases finding that 11.7% of patients with alcohol dependence nationally are prescribed pharmacotherapy [9]. Moreover, evidence suggests that these medications are effective in delaying return to drinking [19] and reducing the length of inpatient stays for detoxification and frequency of hospital visits in those who have received a prescription [20,21]. In our study, we identified lower levels of prescribed pharmacotherapy (6.3% across the whole sample) than national averages. Despite patients in the most deprived areas of Liverpool being more likely to be diagnosed with alcohol dependence, there was weak evidence (p = .07) that these patients were less likely to be prescribed medication, based on their patient-level IMD but not based on GP surgery-level deprivation [9]. From 2019/20 to 2020/21 there was a 1% increase in the number of alcohol-related prescription items (acamprosate, disulfiram, nalmefene) [22] but compared to 2014/15 [23] this represents a 15% decrease in overall prescriptions. Studies from the US have indicated that primary care engagement is associated with increased alcohol-related prescriptions [24] and future research should seek to investigate how we can facilitate this engagement.

Our results highlight low, and decreasing, levels of identification of alcohol use disorders in primary care in Liverpool. Low identification and onwards referral has been identified in primary care across Europe and the USA [25,26]; this is problematic as specialist services will not be able to estimate demands based on primary care intelligence, and services will be underfunded [5]. We identified specific areas in Liverpool which have higher levels of incidence and prevalence and would benefit from assertive outreach [27,28]. Levels of alcohol-related prescriptions in primary care were low compared to national estimates [9,22] and were somewhat lower for patients with higher levels of deprivation. GP training surrounding identification and prescribing for alcohol dependence, improved coding practices in the EMIS system and discussion with leading pharmacists to develop guidelines on the Pan Mersey Formulary for prescribing alcohol management medication are key priorities identified by this work. A reduction in drinking brought about by improved identification and referral in primary care would also reduce the associated health conditions that arise from heavy drinking such as cardiovascular disease, cancer, liver disease, accidents, violence and self-harm [29]. In combination these reductions would result in cost savings, improved patient care and treatment pathways, improved mental health and would lessen social inequalities.

In conclusion, this research highlights the association between social deprivation and prevalence and incidence of hazardous and dependent alcohol drinking. Future research should seek to identify perceived barriers and facilitators of access to treatment in primary care from both patient and practitioner perspectives, to identify specific local, national and international need for different treatment pathways for hazardous and dependent drinkers.

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**Contributorship Statement**

CM and MR designed the study with input from PS and NvG. LO and RY contributed a pragmatic critique of the study inclusion/exclusion criteria and gave their clinical opinion on cases where there was uncertainty surrounding the meaning of manual codes. LO advised on the meaning of ambiguous referral codes and received the data from LCCG. CS was a research assistant working on the project who was responsible for recoding the data received from LCCG, initial data filtering and curation. RY provided expertise on the identification of GP training needs and changes in local practice. AJ contributed to data curation, analysis and analytical strategy and reporting. MR advised the team on the relative importance of different factors from a patient perspective. CM produced the first draft of the manuscript and NvG, PS, AJ, RY, MR and LO have provided critical revisions and approved the final manuscript.

**Competing interests**

There are no conflicts of interest.

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**Data sharing statement**

The data for this study is available in the Liverpool John Moores University Data Repository https://opendata.ljmu.ac.uk/. Analysis code can be found here [<https://osf.io/7ywdz/>].

**Ethics approval statement**

This was a retrospective data analysis of anonymised health records and was approved as minimal risk by Liverpool John Moores University Research Ethics Committee (22/PSY/001).

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Figure captions:

Figure 1: Data acquisition flow diagram

Figure 2: Changes in Incidence and Prevalence over the 5 year period.

Figure 3: Prevalence of alcohol dependence in differing GP surgeries as a function of surgery IMD decile.

Figure 4: Proportion of alcohol-dependent patients receiving alcohol-related prescriptions in IMD1 surgeries vs. IMD 2:10 surgeries

Figure 5: Meta-regression of patient-level IMD against a) the proportion of dependence and b) proportion of hazardous drinking.

1. Removal of two outliers in IMD Group 1 (see Figure 3) did not influence the significance the overall subgroup effect (X2(1) = 30.28, p < .001), but slightly reduced the pooled prevalence (.0069 [95% CI: .0062 to .0072) [↑](#footnote-ref-1)