Screening for psychiatric morbidity in the population - a comparison of the GHQ-12 and self-reported medication use

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Abstract

Introduction

Uptake of psychotropic medication has been previously used as a proxy for assessing the prevalence of population mental health morbidity. However, it is not known how this compares with estimates derived from population screening tools.

Objective

To compare estimates of psychiatric morbidity derived by a validated screening instrument of psychiatric morbidity and a self-reported medication uptake measure.

Methods

This study used data from two recent population-wide health surveys in Northern Ireland, a country (UK) with free health services and no prescription charges. The psychiatric morbidity of 7,489 respondents was assessed using the GHQ-12 and self-reported use of medication for stress, anxiety and depression (sDAS medication).

Results

Overall, 19% of respondents were defined as 'cases' and 14.3% were taking sDAS medication. Generally, the two methods identified the same population distributions of characteristics that were associated with psychiatric morbidity though nearly as many non-cases as cases received sDAS medication (46.4% vs. 53.6%). A greater proportion of women and older people were identified as cases according to sDAS medication use, while no such variation was observed between socio-economic status and method of assessment.

Conclusions

This study indicates that these two methods of assessing population psychiatric morbidity provide similar estimates, despite potentially identifying different individuals as cases. It is important to note that different health care systems might be linked to variations in obstacles when accessing and using health care services.

Highlights

- There was a reasonable correspondence between the different methods of assessment.
- A greater proportion of women and older people were identified as cases through the self-reported use of medication.
- An almost equal amount of GHQ-12 cases and non-cases reported being in receipt of medication.

Introduction

Mental disorders constitute a major public health issue due to their economic, psychological and social impact on populations and it is predicted that depression, which is ranked second in the Global Burden of Disease studies, will overtake ischaemic heart disease soon as the major cause of morbidity throughout the world [1].

Arguably, the most commonly used method of assessing population mental health is to undertake a population-wide survey using a recognised instrument for assessing the prevalence of psychiatric morbidity. Examples of such instruments include the World Health Organisation (WHO) Composite International Diagnostic Interview (CIDI) and the Clinical Interview Schedule-Revised (CIS-R), which have been used respectively in the National Comorbidity Survey in the US [2]

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and the British Psychiatry Morbidity Survey [3]. These have been developed from clinical tools and produce assessments for each survey respondent according to the definitions and criteria of ICD-10 and/or DSM-IV [4,5,6]. Data produced by these studies are recognised to be of high quality and repetition at regular intervals can produce evidence of temporal trends in psychiatric burden in society [7]. However, this approach is resource intensive, time-consuming for respondents and requires clinical application or specialist interviewer training [2]. Collectively, these pressures on resources may lead to reduced sample sizes thereby producing further problems with respect to generalisability [3]. Therefore, most large-scale population surveys tend to use self-report assessments that have been validated against more clinically-based assessments and, so, may be undertaken as part of general health surveys [8,9]. One example is the General Health Questionnaire (GHQ) [10] which has previously used as a means of assessing "psychiatric caseness" in the population [11]. However, even these approaches have recognised additional limitations. The majority of ostensibly population-wide studies are based on people who are resident in private households and, consequentially, they do not include homeless people or individuals in institutionalised settings, thus omitting a large proportion of the population with a high prevalence of physical and psychiatric problems [12,13]. Furthermore, response rates to general population surveys tend to be moderate and they have been declining over recent decades [14,15]; non-response bias is an ongoing concern and as it is higher amongst young males [16,17], people with lower socio-economic status [18], or residing in urban centres [19], there may be difficulties generalising findings on specific sub-samples to the population as a whole.

The increased availability of secondary data related to the management and treatment of psychiatric disorders has presented alternative ways to examine population level mental health. Many studies originating in Scandinavian and the Nordic countries [20] have previously used hospitalisation rates [21,22], as well as, individual uptake of psychotropic medication to examine a range of factors, including maternal and pre-natal factors related to attention-deficit/hyperactivity disorder in children [23,24], factors related to impaired psychological health in adolescents and younger adults [25], area effects on psychiatric morbidity [26], the effects of working conditions and early retirement [27,28] and the prevalence and differences in poor mental health across refugees and migrants [29]. Medical records have also been used in validity studies of self-reported medication use, with reports of good agreement and specificity being noted between the two measures, especially in chronically used medicines [30].

The benefits of using psychotropic medication as a proxy for psychological health include: population-wide coverage and face validity, assuming that the available treatment is in accordance with recommendations [31]. The limitations of this approach include the potential for confounding by the access to and use of health services [32] and variability in the availability and use of alternative non-pharmacological treatments. Non-specificity of use may also be an issue as in some cases psychotropic medication might be prescribed for a different non-psychiatric condition, such as the occasional prescription of anti-depressants to patients experiencing pain [33]. There

is a need, therefore, to investigate these two commonly used means of screening for psychiatric morbidity and the nature and degree to which they provide similar prevalence estimates and population distributions. Although both methodological approaches have been explored, and their strengths and caveats have been previously highlighted in terms of the generalisability of the results, they have only been compared against more established measures, e.g. comparison between CIS-R and SCAN [4].

This is the first comparative, analytical study (we are aware of) that directly compares these two methods of measuring population psychiatric morbidity in the same study. Using a large population-based sample in Northern Ireland, we aimed to: i) provide a comparison between estimates of psychiatric morbidity as assessed by a self-reported medication use measure and a recognised psychiatric morbidity questionnaire and ii) compare the characteristics of those classified as cases by each measure.

Methods

The data are derived from the two most recent waves of the Northern Ireland Health Survey (2011/12 and 2013/14). This is a general population interview-based survey designed to provide a regular source of information on a wide range of health issues and is based on a random sample of approximately 5800 addresses drawn from a centralised list of land and property services in Northern Ireland. The fieldwork includes an interview with each resident at the address aged 16 and over, which was undertaken by using computer assisted personal interviewing (CAPI) or where appropriate computer assisted self interviewing (CASI) between April of one year until March of the next year. The response rates were 65% and 66% respectively for these survey waves [34]. Northern Ireland has free at-the-point-of-use healthcare services for individuals who are registered for a health card.

Cohort characteristics

Respondent characteristics were derived from survey responses, and covered an array of demographic and socio-economic characteristics and behavioural factors including age (in 10-year age-groups from 16 to 65+), sex and marital status (three groups: married, cohabiting or civil partnership; never married; separated, divorced, or widowed). Three indicators of socio-economic status were measured; at the individual level, these were housing tenure (owner occupier, social renter, private renter), and social class based on the National Statistics-Socioeconomic Classification (NS-SEC) [35]; and at an area level, the Northern Ireland Index of Multiple Deprivation (a measure of deprivation derived largely from administrative data sources for 890 small census tracts with an average population of circa 1900 [36]). Long standing illness was assessed as a positive response to questions about the presence of 'any physical or mental health condition or illnesses lasting or expected to last 12 months or more', which was then classified as 'limiting' if it reduced the 'ability to carry out day-to-day activities'. Cigarette smoking (grouped as current smoking or not) and drinking were also included (non-drinker,

drinking below recommended limits, drinking above recommended limits that were in place at the time of the survey – defined as 14 units per week for women and 21 units per week for men) as behavioural characteristics of the sample. Measures of psychiatric morbidity included GHQ-12 scores and medication uptake and will be described below.

General Health Questionnaire caseness

The 12-item version of the General Health Questionnaire (GHQ) is a widely used measure of minor psychiatric disorders in the general population [10,37,38] that captures symptoms of anxiety, depression, social dysfunction, and loss of confidence [39]. It was developed as a screening instrument for use in general practice, but it has been used commonly for many years in survey studies. For each of the twelve items/symptoms, respondents were asked whether the symptom was present, not at all, same as usual, more than usual, or much more than usual, and these response options were scored 0,0,1,1, respectively. The scores are summed with high scores indicating the presence of psychiatric morbidity. Responses may be dichotomised by using a cut-off score of four or more to define people as 'cases' and scores 0-3 as non-cases [38]. This definition has been validated by standardised psychiatric interviews and is strongly indicative of depression and anxiety [40,41]. The GHQ-12 was among a series of questionnaires administered to all participants in both survey waves.

Use of sDAS medication

At the end of the GHQ-12 section, a further question was asked about pharmacological treatment for minor psychiatric conditions: *'Are you taking any medicine or tablets for stress, anxiety or depression?'* with responses being *'yes'* or *'no'*. In the rest of this paper we call this "sDAS medication" for brevity.

Analytical approach

The two survey waves were combined to add to the stability of the data and statistical models were constructed and tested to examine differences and the general robustness across the surveys (full models available on request). Categorisation of the responses to the GHQ-12 define respondents as either cases or non-cases and the question on sDAS medication is also binary; respondents, therefore, fall into one of four categories as shown in Figure 1. Cells 'C' and 'D' represent respondents defined as GHQ-12 cases; cells 'A' and 'B' are GHQ-12 non-cases. Respondents in cell 'A' (the majority of the population) are not a GHQ-12 case and not using sDAS medication. Descriptive statistics were used to describe the proportions and characteristics of respondents falling into each of the four cells. The data were weighted by demographic characteristics of the interviewees (including age and sex) in order to reflect the composition of the general population in Northern Ireland. The non-response weights were created by the data custodians at the Information and Analysis Directorate at the Department of Health and the UK Data Archive, aiming to control for respondent characteristics related to survey response rates.

Next, two separate logistic regression models were conducted, one with GHQ-12 case as the dependent variable, the second with 'on medication' as the dependent variable or outcome. This analysis compared the profiles of psychiatric morbidity that were produced by each assessment measure. The reference categories for each regression analysis were cells 'A'+'B' for GHQ-12 cases and 'A'+'C' for sDAS medication use. Additional sensitivity analyses were undertaken comparing GHQ-12 cases and sDAS medication use against cell 'A' alone i.e. a common comparator comprising people who were not defined as cases and were not on medication.

Results

A total of 7,489 respondents over the 2 years completed the GHQ-12 questionnaire and answered the question about sDAS medication; 6.7% (n=539) had missing values in either outcome variable and were excluded from the analysis though they did not vary significantly from the final sample. A total of 1,422 (19%) had GHQ-12 scores of four or more indicating a high likelihood of psychiatric morbidity; 16.8% were male and 20.4% were female. In terms of sDAS medication uptake, 1,072 (14.3%) individuals appeared to receive and use sDAS medication; women showed a higher prevalence of medication use (16.9% and 10.5% respectively). These proportions were stable over the two survey waves.

Table 1 describes the socio-demographic and behavioural characteristics of the four types of respondent described in Figure 1. People who presented with psychiatric morbidity (defined by being a GHQ-12 case or being on sDAS medication) were more likely to be female, unmarried, of lower socio-economic status, in poorer physical health and currently smoking. This pattern was more pronounced among GHQ-12 cases who used sDAS medication - they were twice as likely to be divorced, separated or widowed (24.9% versus 12.2%), approximately half as likely to be in professional classes, three times as likely to be living in social housing (35.8% versus 12.6%), twice as likely to be a smoker, and five times as likely to have a limiting long-standing illness (63.5% versus 11.1%) (compared to respondents in cell A – non GHQ-12 cases who were not on medication). The profile of respondents who were a GHQ-12 case or on medication lay between these categories.

The correspondence between the number of individuals that were identified as cases by the two measures was further investigated through the use of a GHQ-12 variable with three categories (0, 1-3 and >4). There was a strong graded relationship between GHQ-12 caseness and medication use - 40.3% percent of GHQ-12 cases (with a score of 4 or more) used medication compared to 13.4% of people who scored 1-3 and 5.4% with GHQ-12 scores of zero. However, this lower percentage multiplied by the greater number of people with low GHQ-12 scores indicates that there was nearly an equal number of sDAS medication users amongst GHQ-12 cases as non-cases (N=574; 53.6% vs N=498; 46.4%). Indeed, about one-in-five (20.1%) of sDAS medication users had GHQ-12 scores of zero.

Table 2 shows the results of the regression analyses. There were no appreciable differences between the two waves of the survey in terms of sDAS medication uptake or GHQ-12 caseness (full models available on request) and, thus, the results of the combined waves are presented. Overall, each measure confirmed the general demographic, socio-economic and

Figure 1: Relationship between GHQ-12 caseness and sDAS medication use

Psychotropic
medication

	No	Yes
No	A	B
Yes	C	D

GHQ-12
Case

Figure 2: Relationship between GHQ-12 scores (0, 1-3 and >4) and use of psychotropic medication
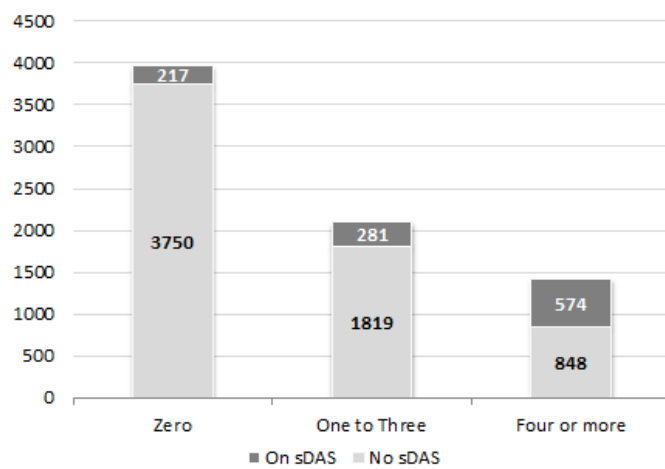
Table 1: Characteristics of population subgroups classified according to GHQ-12 caseness and sDAS medication

	GHQ non-case sDAS Medication-No	GHQ non-case sDAS Medication-Yes	GHQ case sDAS Medication-No	GHQ case sDAS Medication-Yes
Number	5569	498	848	574
Age				
16-24	946 (17.0)	25 (5.1)	163 (19.2)	51 (8.9)
25-34	1030 (18.5)	60 (12.1)	148 (17.4)	77 (13.5)
35-44	946 (17.0)	94 (18.8)	129 (15.2)	123 (21.4)
45-54	908 (16.3)	104 (20.8)	151 (17.9)	150 (26.1)
55-64	698 (12.5)	110 (22.2)	106 (12.5)	104 (18.0)
65+	1041 (18.7)	105 (21.0)	151 (17.9)	69 (12.0)
Sex				
Female	3237 (58.1)	360 (72.5)	522 (61.5)	400 (69.7)
Male	2,332 (41.9)	138 (27.5)	326 (38.5)	174 (30.3)
Marital status				
Married	1959 (35.2)	124 (24.7)	340 (40.1)	198 (34.4)
Never married	2929 (52.6)	268 (53.9)	364 (42.9)	233 (40.7)
Sep/Wid/Divorced	681 (12.2)	106 (21.3)	144 (17.0)	143 (24.9)
Social class				
Higher	628 (11.2)	42 (8.4)	73 (8.6)	42 (7.3)
Intermediate	2275 (40.9)	188 (37.9)	341 (40.2)	172 (30.0)
Lower/ other	2666 (47.9)	268 (53.7)	434 (51.2)	360 (62.7)
Housing tenure				
Owner	3926 (70.5)	312 (62.8)	503 (59.3)	254 (44.3)
Social renter	702 (12.6)	104 (20.8)	175 (20.6)	206 (35.8)
Private renter	941 (16.9)	82 (16.4)	170 (20.1)	114 (19.9)
Area deprivation				
Most deprived	943 (16.9)	107 (21.4)	199 (23.5)	176 (30.6)
More deprived	1041 (18.7)	99 (19.9)	181 (21.3)	130 (22.7)
Average	1249 (22.4)	108 (21.7)	170 (20.1)	100 (17.5)
Less deprived	1192 (21.4)	93 (18.6)	151 (17.8)	101 (17.6)
Least deprived	1144 (20.5)	91 (18.4)	147 (17.3)	67 (11.7)
%LLSI	621 (11.1)	176 (35.3)	264 (31.1)	364 (63.5)
Smoking status				
Current smoker	1107 (19.9)	142 (28.6)	264 (31.1)	248 (43.2)
Drinking status				
Below Rec. limits	3336 (60.0)	263 (53.1)	477 (56.5)	276 (48.3)
Above Rec. limits	961 (17.3)	92 (18.7)	160 (19.0)	113 (19.8)

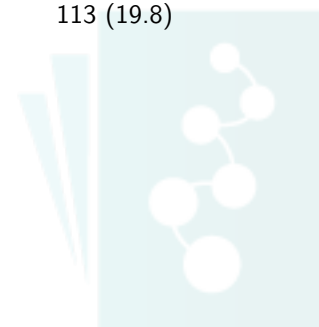NB: Data represent population weighted numbers and percentages within each group.

Table 2: A comparison of the characteristics of those presenting as cases against non-cases, as defined by (i) GHQ-12 only and (ii) assessment using sDAS medication only. Data represent Odds Ratios and 95% Confidence Intervals from logistic regression models.

	GHQ adjusted age/sex	GHQ fully adjusted	sDAS Medication adjusted age/sex	sDAS Medication fully adjusted
Age				
16-24	1	1	1	1
25-34	0.94 (0.73-1.21)	0.90 (0.69-1.19)	1.62 (1.12-2.34)	1.63 (1.11-2.40)
35-44	1.11 (0.87-1.41)	1.04 (0.79-1.38)	2.82 (2.00-3.98)	2.95 (2.03-4.31)
45-54	1.38 (1.09-1.74)	1.14 (0.86-1.51)	3.50 (2.50-4.90)	3.21 (2.20-4.69)
55-64	1.20 (0.94-1.52)	0.85 (0.63-1.14)	3.90 (2.78-5.48)	3.25 (2.20-4.79)
65+	0.87 (0.69-1.10)	0.49 (0.37-0.66)	2.07 (1.47-2.91)	1.32 (0.89-1.97)
Sex				
Male	1	1	1	1
Female	1.27 (1.13-1.42)	1.23 (1.08-1.40)	1.80 (1.58-2.05)	1.89 (1.64-2.19)
Marital status				
Never married	1	1	1	1
Married	0.63 (0.54-0.73)	0.88 (0.74-1.03)	0.64 (0.54-0.76)	0.92 (0.76-1.11)
Sep/Wid/Divorced	1.25 (1.04-1.50)	1.12 (0.91-1.37)	1.27 (1.04-1.55)	1.13 (0.91-1.40)
Social class*				
Higher	1	1	1	1
Intermediate	1.13 (0.92-1.39)	1.08 (0.87-1.34)	1.09 (0.87-.138)	1.05 (0.82-1.34)
Lower/ Other	1.65 (1.36-2.01)	1.11 (0.90-1.38)	1.89 (1.51-2.36)	1.28 (1.01-1.63)
Housing tenure				
Owner	1	1	1	1
Social renter	2.86 (2.49-3.28)	1.51 (1.28-1.79)	3.01 (2.59-3.50)	1.56 (1.30-1.88)
Private renter	1.78 (1.51-2.11)	1.31 (1.09-1.57)	2.10 (1.74-2.53)	1.55 (1.26-1.90)
Area deprivation**				
Most deprived	1	1	1	1
More deprived	0.76 (0.65-0.90)	1.00 (0.83-1.20)	0.73 (0.61-0.88)	0.96 (0.78-1.17)
Average	0.55 (0.46-0.65)	0.82 (0.68-0.99)	0.57 (0.48-0.69)	0.88 (0.72-1.08)
Less deprived	0.52 (0.44-0.66)	0.87 (0.72-1.06)	0.54 (0.48-0.69(	0.94 (0.76-1.16)
Least deprived	0.47 (0.39-0.56)	0.87 (0.71-1.06)	0.44 (0.36-0.54)	0.87 (0.69-1.09)
LLSI				
No	1	1	1	1
Yes	6.46 (5.67-7.37)	5.37 (4.68-6.15)	6.13 (5.34-7.04)	4.99 (4.32-5.77)
Smoking status				
Non-smoker	1	1	1	1
Current smoker	2.15 (1.91-2.43)	1.48 (1.29-1.70)	2.13 (1.86-2.44)	1.36 (1.17-1.59)
Drinking status				
Non-drinker	1	1	1	1
Below Rec. limits	0.70 (0.61-0.79)	0.92 (0.80-1.07)	0.66 (0.57-0.76)	0.89 (0.76-1.04)
Above Rec. limits	0.85 (0.72-1.02)	1.02 (0.84-1.24)	0.92 (0.76-1.11)	1.15 (0.93-1.42)

*Social class was alternatively tested as a linear variable in addition to the categorical results presented above: OR 1.35 95%CI 1.24-1.47; OR 1.04 95%CI 0.95-1.15; OR 1.51 95%CI 1.37-1.66; OR 1.16 95%CI 1.05-1.29 respectively.
**Area deprivation was alternatively tested as a linear variable in addition to the categorical results presented above: OR 0.82 95%CI 0.79-0.86; OR 0.96 95%CI 0.91-1.00; OR 0.82 95%CI 0.79-0.86; OR 0.97 95%CI 0.92-1.02 respectively.

behavioural correlates with psychiatric morbidity described in Table 1, though there were some differences particularly relating to age and sex. The sex difference in the prevalence of psychiatric morbidity was more visible according to medication use than GHQ-12 caseness (OR 1.89; 95%CI: 1.64-2.19; OR 1.23; 95%CI: 1.08-1.40 respectively for females compared to males). The likelihood of reporting psychiatric morbidity as defined by sDAS medication use increased markedly with age but much less so for GHQ-12 caseness; for example, compared to those aged 16-24 the likelihood of being defined as reporting psychiatric morbidity at age 55-64 was OR 0.85; 95%CI: 0.63-1.14 according to GHQ-12 and OR; 3.25 95%CI: 2.20-4.79 according to medication use. It could be argued that this is because the use of psychotropic medication is not recommended at younger ages [42,43], but the increased medication use with age persists even with a 25-34 reference (results available on request). Both measures captured the protective effect of marriage when compared to other categories of marital status, with the trend being slightly stronger with the use of GHQ, although it didn't reach significance for either measure (OR 0.88; 95%CI: 0.74-1.03 and OR 0.92; 95%CI: 0.76-1.11 respectively).

There were very small differences in the association between socio-economic status and psychiatric morbidity with both measures showing the expected prevalence of psychiatric morbidity with increased disadvantage, though the gradients were a little steeper when psychiatric morbidity was assessed using uptake of sDAS medication. Being limited by a long-term condition, as measured by LLSI was strongly associated with psychiatric morbidity and the inclusion of this variable in the fully adjusted models greatly attenuated the association between psychiatric morbidity and socioeconomic status suggesting that much of the social gradients in mental health are linked to the social gradients in physical health. Current smoking was associated with an increased likelihood of psychiatric morbidity with both assessments of caseness producing similar increases in risk compared to non-smokers. Although those drinking alcohol at below the recommended safe limits were less likely to experience psychiatric morbidity than either non-drinkers or those drinking more than the recommended limits, these differences largely disappeared with further adjustment for socio-economic status and measures of physical health, with similar patters produced by GHQ-12 and uptake of sDAS medication.

A sensitivity analysis compared individuals presenting with psychiatric morbidity (defined by GHQ-12 caseness or the use of sDAS medication) with non GHQ-12 cases who did not use medication (full models available on request). Again, the main differences were in terms of age with stronger effects being observed when sDAS medication uptake was used, while variations between measures remained rather subtle, as those defined as GHQ-12 cases were similar in both models, with the exception of gender (GHQ: OR 1.32; 95%CI 1.15-1.50 and Medication: OR 1.90; 95%CI 1.63-2.21 respectively).

Discussion

This study found that about one-third more people were defined as experiencing psychiatric morbidity when a definition based on GHQ-12 caseness was used rather than sDAS medica-

tion usage (19% and 14% respectively). This variation might be linked to the fact that people with more severe symptoms are more likely to receive or use psychotropic medication [31] or that a proportion might receive non-pharmacological therapies, though the availability and use of these services are relatively low in Northern Ireland.

Interestingly, while there was some correspondence between overall GHQ-12 caseness and sDAS medication use, it was clear that the two measures captured different population segments in their respective psychiatric morbidity assessments. Only 40% of GHQ-12 cases were defined as cases according to sDAS medication use; and only 54% of people on sDAS medication had a GHQ-12 cut-off score of 4 or more. Furthermore, there were nearly as many people on medication who were not GHQ-12 cases as there were cases who reported using medication. A possible explanation for this finding is that the medication may be being used to treat presumed minor psychiatric disorders. Due to the phrasing of the relevant survey question, respondents may have reported non-prescribed 'medication' including alternative medicine or therapy. The finding may also represent an over-prescribing trend by GPs. A relatively recent meta-analysis showed that while GPs were good at ruling out appropriately a diagnosis of depression, the modest prevalence of depression in primary care leads to a high proportion of misclassifications and the potential for over treatment with a rate of false positives that outnumber true positives by about 50% [44,45]. It is possible also that the finding represents a group of patients who have been correctly diagnosed and who are being appropriately treated with a medication that has been effective in treating their symptoms and, therefore, in lowering their GHQ-12 scores. This raises the interesting question as to whether non-GHQ cases in receipt of medication should be added to the stated prevalence of psychiatric disorders i.e. that the true prevalence of psychiatric conditions is the sum of people with a GHQ-12 score above the threshold plus people who are using medication for a psychiatric disorder. This is analogous to the assessment of prevalence of raised blood pressure or of diabetes in the population where it is standard practice to add the proportion above the designated cut-off and the proportion on medication (but below the threshold) to give the overall population prevalence. This methodology was used in the British Psychiatric Morbidity Survey for estimating the prevalence of psychosis but not the prevalence of neurotic disorders [3]. The addition of respondents on sDAS medication who were below GHQ-12 threshold scores to respondents who were classified as GHQ-12 cases would increase the prevalence of psychiatric morbidity by 6.6% bringing the overall prevalence to 25.6% (with 8.5% of males being cases and 17.2% of females being cases, respectively). The inclusion of people managed with non-pharmacological interventions could provide a more comprehensive assessment of the true prevalence of psychiatric conditions, in the absence of a tool that can accurately identify mental illness masked by medication uptake. However, a third indicator of mental ill-health might lead to further confusion by introducing additional differences in the numbers and characteristics of people in receipt of psychological therapies.

A greater proportion of women and older people would be categorised as cases if the assessment was based on usage of sDAS medication than on GHQ-12 scores. This is likely to be

linked to a combination of factors related to the differential use of primary care services aligned with treatment- or help-seeking behaviours and a greater propensity to report emotional and psychological symptoms. Primary care utilisation is related to age and sex, as older people and women are more likely to attend their GP, and women are also more likely to present to mental health services [46-49]. This is supported by the higher proportion of women than men with GHQ-12 scores of 4 or more on medication (45.4% and 35.7% respectively). It is possible that differences in adherence rates which are known to be related to age might also contribute to these age gradients [50,51] along with a reluctance to prescribe psychotropic medication in younger people [42].

In the current study both the GHQ-12 and uptake of sDAS medication produced fairly similar rates of psychiatric morbidity according to socio-economic status and behavioural characteristics. However, we would urge some caution in terms of generalisation as the current study was undertaken in a country where access to primary care services is free at the point of use and where there were no charges for prescribed medication. It is possible that significant differences between the measures may be apparent in countries where patients have to pay to attend their GP and/or pay for their medicines. However, systematic variation between GPs in their ability to diagnose minor psychiatric disorders such as depression in primary care should also be considered [43].

It is important to consider the strengths and limitations of the study. The data were drawn from large general household surveys with relatively good response rate and although the exact nature of medication was not independently verified and it is possible that some respondents may have misunderstood or misreported why they were on the medication. The questions relating to GHQ-12 and to sDAS medication were asked together, so, the potential for differential recall was reduced, though the effects of selective reporting due to stigma might have been a factor. It is also recognised that an increasing proportion of psychotropic medication, including antidepressants, is used to treat non-psychiatric conditions [52] and there has been some work to produce algorithms to identify the subset of medicine users who really present with psychiatric disorders [53]. However, this is less of an issue here as respondents were asked specifically about medication for 'stress, anxiety or depression'; though the inclusion of the term "stress" in the assessment of medication use might reduce the strength of the findings through the potential inclusion of non-psychiatric specific indicators. The GHQ-12, as with most screening instruments, is not a perfect indicator of psychiatric morbidity at an individual level and with a sensitivity and specificity in the region of 70-80% when compared to more detailed standards [38] a degree of random misclassification at the individual level is to be anticipated. The expectation is that the instrument correctly quantifies the proportions and characteristics of those affected in the overall population though some studies have indicated systematic ascertainment biases in the GHQ-12 leading to higher estimations amongst the more affluent [54]. We were not able to examine the variation across ethnicity and migration status due to small numbers and this may be important as some studies have suggested that language difficulties can lead to reduced access to health services and lower levels of prescribing for anxiety and depression [55].

Conclusions

In summary, this research has confirmed that these two approaches to the assessment of the psychiatric conditions of the population will produce systematic variation in the magnitude of the overall effect of psychiatric morbidity and in the characteristics of those affected. It is important to reiterate that commonly used methods are imperfect; thus, public health and mental health researchers and planners need to be mindful of the strengths and caveats associated with each method and the interpretation of their results. Further consideration should be given to whether or not the group with low GHQ-12 scores who are on medication should be included in the overall assessment of psychiatric disorders at a population level.

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Statement on conflicts of interest

The authors declare they have no conflicts of interest.

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Ethics approval

Not applicable.

Authors' contributions

FT and DOR were responsible for the inception and design of the study. The analysis was performed by FT, supervised by MD and DOR. All authors contributed to the intellectual content of the paper as well as offering revisions on drafts. All authors read and approved the final manuscript.

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Abbreviations

CAPI	Computer Assisted Personal Interviewing
CASI	Computer Assisted Self Interviewing
CIDI	Composite International Diagnostic Interview
CIS-R	Clinical Interview Schedule-Revised
DSM	Diagnostic and Statistical Manual
GHQ	General Health Questionnaire
GPs	General Practitioner
ICD	International Classification of Diseases
LLSI	Limiting Long Standing Illness
NI	Northern Ireland
NS-SEC	National Statistics Socio-economic Classification
UK	United Kingdom
US	United States
WHO	World Health Organisation