Epidemiology and Psychiatric Sciences (2015), **24**, 542–552.
doi:10.1017/S2045796014000547

ORIGINAL ARTICLE

Prevalence and predictors of psychotropic medication use: results from the Northern Ireland Study of Health and Stress

T. Benson*, S. O'Neill, S. Murphy, F. Ferry and B. Bunting

School of Psychology, University of Ulster, Magee Campus, Northland Road, Londonderry, Northern Ireland BT48 7JL, UK

Background. To identify the predictors of psychotropic medication use and to determine rates and patterns of use in Northern Ireland (NI) among the general population and various subgroups.

Method. Analysis of data from the NI Study of Health and Stress, a representative household survey undertaken between 2004 and 2008 with 4340 individuals. Respondents were asked about prescribed psychotropic medication use in the previous 12 months along with a series of demographic questions and items regarding experience of traumatic life events. Mental health disorders were assessed using the World Health Organization's Composite International Diagnostic Interview.

Results. Females, individuals aged 50–64 years old, those who were previously married, and those who had experienced a traumatic lifetime event were more likely to have taken any psychotropic medication. Use of any psychotropic medication in the population in the previous 12 months was 14.9%. Use among individuals who met the criteria for a 12-month mental health disorder was 38.5%. Almost one in ten individuals (9.4%) had taken an antidepressant.

Conclusions. Compared with other countries, NI has high proportions of individuals using psychotropic medication in both the general population and those who met the criteria for a 12-month mental disorder. However, these results still suggest possible under treatment of mental disorders in the country. In addition, rates of use in those with no disorder are relatively high. The predictors of medication use are similar to findings in other countries. Possible research and policy implications are discussed.

Received 25 February 2014; Revised 20 June 2014; Accepted 23 June 2014; First published online 15 September 2014

Key words: Drug utilisation, Northern Ireland, psychopharmacology, psychotropic drugs.

Introduction

Psychotropic medications are a recommended treatment for a number of mental disorders, with their use appearing to be on the increase (Olfson *et al.* 2002; Paulose-Ram *et al.* 2007; Grandfils & Sermet, 2009; Stephenson *et al.* 2013). Information on rates of psychotropic medication use is important as it facilitates the monitoring of treatments for mental disorders (Beck *et al.* 2005) and adherence to guidelines. Studies which have examined use suggest varying rates: 7.2% in Canada (Beck *et al.* 2005), 10.6% in Southern Australia (Goldney & Bain, 2006) and 11.1% in the USA (Paulose-Ram *et al.* 2007). Meanwhile, cross-national studies have reported overall rates of 6.4 and 12.3% for current and 12-month use of any psychotropic medication in Europe (Ohayon & Lader, 2002; Alonso *et al.* 2004).

Previous studies in Northern Ireland (NI) have provided some information on psychotropic medication use. In 2010/2011, the 12-month prevalence rate was 11% for sedatives/tranquilisers and 12% for antidepressants (National Advisory Committee on Drugs, 2012). Higher rates of antidepressant and anxiolytic prescribing have also been found in areas of high segregation (O'Reilly, 2011). Government datasets are another source of prescribing information. The NI Neighbourhood Information Service reports that 11.5% of the population received medication for mood and anxiety disorders in 2008 (Northern Ireland Statistics and Research Agency, 2008). Meanwhile, more recent data from the Central Services Agency (Northern Ireland) shows that the total number of psychotropic prescriptions issued in 2011 totalled over 4.7 million (Health and Social Care Business Services Organisation, 2011).

Although these studies and datasets provide information on psychotropic medication, they have at least one of the following problems. First, they use data on prescriptions issued, from which one cannot assume consumption. Second, they only look at

* Address for correspondence: Mr T. Benson, School of Psychology, University of Ulster, Magee Campus, Northland Road, Room MB205, Londonderry, Northern Ireland BT48 7JL, UK.
(Email: Benson-T1@email.ulster.ac.uk)

some psychotropic medication classes. Third, they do not consider the context of use, that is, the rates of use among those with mental health disorders. It is also important to examine psychotropic medication use in NI at this point in time as the country has entered a period of relative peace. Evidence is now emerging regarding the impact of years of conflict on the health of the population and it is therefore important to examine the use of medication in relation to experience of this conflict (Ferry *et al.* 2008; Bunting *et al.* 2013*b*).

Aims of the study

The first aim of this study was to examine the patterns of psychotropic medication use in individuals meeting the criteria for various mental disorders and those affected by the NI conflict. The second aim of the study was to identify predictors of psychotropic medication use in the general population.

Material and methods

Sample

The Northern Ireland Study of Health and Stress (NISHS) is a representative household survey, carried out in NI between 2004 and 2008 with English speakers aged 18 years and older. The survey is part of the World Mental Health (WMH) Survey Initiative. Conducted in 28 countries worldwide, these studies used validated and consistent measures in interviews with respondents. Interviews were undertaken by trained interviewers across 3223 households, giving a total of 4340 respondents. Households were selected through multi-stage, clustered and area probability sampling. Individuals in care facilities such as hospitals and residential homes and those in prisons were excluded. The response rate was 68.4%. WMH survey protocols and quality control procedures were implemented (Pennell *et al.* 2008).

The interview was divided into two parts. Part 1 was completed by all participants ($n = 4340$) and contained preliminary questions on core mental disorders and treatment contact, including use of prescription psychotropic medication. Part 2 contained the detailed diagnostic questions for core mental disorders and experience of traumatic events. This part was completed by those with possible signs of a mental disorder following part 1 which asked about mood, wellbeing and experiences, and 50% of those with subthreshold disorders and 25% of respondents selected randomly ($n = 1986$).

Measures

Assessment of disorders

DSM-IV mental disorders (American Psychiatric Association, 1994) were assessed using the World Health Organization's Composite International Diagnostic Interview (WHO CIDI) version 3.0 (Kessler & Üstün, 2008). The NISHS assessed anxiety disorders, mood disorders, impulse control disorders and substance use disorders.

Experience of conflict-related traumatic events

Participants were questioned regarding their experience of a series of traumatic events. A trauma outcome variable was calculated using data on the age at which the event was experienced, the knowledge that the troubles began in 1968, and events associated with the conflict. Individuals were classified into three mutually exclusive categories: no traumatic experiences, any non-conflict-related trauma only, or conflict-related trauma (including individuals with a non-conflict-related trauma) (Bunting *et al.* 2013*b*).

Sociodemographics

Participants were asked about age, gender, marital status and education. Income was calculated by totalling all sources of pre-tax income for the previous month. The household per-capita income was then divided by the median income of the country to give four categories: low, a ratio of 0.5 or less; low-average, a ratio of 0.5–1.0; high-average, 1.0–2.0; and high, greater than 2.0.

Pharmacoepidemiology

Participants were asked 'In the past 12 months did you take any of the following types of prescription medications under the supervision of a doctor, for your emotions, substance use, energy, concentration, sleep or ability to cope with stress?'. Those who endorsed this item were probed for the medication name(s). Participants were provided with an inventory of psychotropic medications to aid recall and were instructed to consult medication packaging if necessary. The medications were coded according to the World Health Organization's Anatomical Therapeutical Chemical classification system (WHO ATC) (World Health Organization, 2012). For this study, psychotropics are divided into six categories: antidepressant, anxiolytic, antipsychotic, hypnotic/sedative, psychostimulant and mood stabiliser. See the online appendix for details of all medications coded in the study.

https://doi.org/10.1017/S2045796014000547 Published online by Cambridge University Press

Statistical analysis

Sample weights were calculated to account for probability of selection, non-response, post-stratification variables such as age and sex and part 1/part 2 differential selections. Numbers reported are unweighted while percentages are weighted proportions.

Psychotropic medication classes (any, antidepressant, anxiolytic, hypnotic/sedative) were used as outcome variables in several logistic regression analyses (Hosmer & Lemeshow, 1989) to explore the factors likely to influence use. A series of dichotomous variables (0 = no, 1 = yes) were entered together as predictors to produce adjusted odds ratios. These predictor variables were: male, female, age 18–34, age 35–49, age 50–64, age 65+, married, never married, separated/widowed/divorced, low income, low-average income, high-average income, high income, primary education, secondary education, A-level education, tertiary education, no trauma, non-conflict-related trauma only, conflicted related trauma and any 12-month disorder. Taylor-linearized estimation was used as the variance estimator (Wolter, 2007) and analysis was implemented using Stata v12 (StataCorp, 2011) to account for the complex survey design.

Results

Sociodemographic characteristics and rates of psychotropic medication use

Table 1 shows the characteristics of the study sample along with prevalence rates for consumption of any psychotropic medication in the previous 12 months. Males comprised 48% of the sample, while the mean age was 45.6 years. Those who were married represented 59.2% of the sample, and just over 50% were educated to the secondary level.

The overall use of any psychotropic medication for the previous 12 months in the population was 14.9%. This comprised 8.9% who had taken one medication only and 6% who had taken more than one. In total, just over half (57.2%) of those who had taken a psychotropic medication had used only one medication.

Overall use was higher in females than males (OR = 1.4, 95% CI = 1.0–1.9) and the adjusted odds for use was two and a half times higher for those aged 50–64 years old than for the youngest age group (OR = 2.5, 95% CI = 1.5–4.0). Individuals who were separated, widowed or divorced were almost twice as likely as married individuals to have taken any psychotropic medication (OR = 1.8, 95% CI = 1.2–2.6). Higher adjusted odds ratios were also found with regards to traumatic events, with those who had experienced both non-conflict-related traumatic events (OR = 1.6, 95% CI = 1.0–2.4) and conflict-related traumatic events (OR = 1.7, 95% CI = 1.2–2.4) more likely than those who had experienced no lifetime traumatic events to have taken any psychotropic.

Rates of use by type of psychotropic medication

Table 2 displays the weighted prevalence rates for the psychotropic medication categories in the study. Antidepressants were the most common type of psychotropic medication taken, used by almost one in ten individuals in the population (9.4%) in the previous 12 months. Antidepressants were also the medication most likely to be used exclusively, with 5.0% of the population having taken at least one alongside no other class of psychotropic medication, equivalent to 49.7% of all antidepressant users. Anxiolytics were used by 4.5%, with hypnotics and sedatives used by 4.3%. Psychostimulants were the medication least likely to be used, consumed by 0.8%.

The adjusted odds of taking antidepressants for females was almost two times that for males (OR = 1.8, 95% CI = 1.2–2.7). There were also age differences for each of the various medication types. Those aged 50–64 years old were the age group with the greatest odds ratios of consuming the three most common types of psychotropic medication, when compared with the youngest age group (antidepressants OR = 2.7, 95% CI = 1.5–4.8; anxiolytics OR = 4.3, 95% CI = 2.0–9.3; hypnotics/sedatives OR = 3.9, 95% CI = 1.7–8.8). The odds for taking hypnotics/sedatives (OR = 2.9, 95% CI = 1.6–5.0) were also significantly higher for those previously married than for those who were married. Those in the high-income group were significantly less likely than those with low-income to have taken both antidepressants (OR = 0.4, 95% CI = 0.2–0.7) and anxiolytics (OR = 0.2, 95% CI = 0.1–0.5). In terms of trauma, odds ratios unadjusted by mental disorders showed both non-conflict and conflict-related groups were more likely than those who had experienced no traumatic lifetime events to have taken antidepressants or hypnotics/sedatives. After controlling for mental disorders, results showed odds ratios were significant only for those who had experienced a conflict-related traumatic event in their lifetime: antidepressants (OR = 1.6, 95% CI = 1.0–2.4), hypnotics/sedatives (OR = 2.0, 95% CI = 1.1–3.7).

Rates of use by mental disorder

Table 3 presents data for the use of psychotropic medication in the previous 12 months by 12-month DSM-IV mental health disorder. Almost two-fifths (38.5%) of those who met the criteria for a 12-month disorder had taken at least one psychotropic medication. Antidepressants were the most common type of

https://doi.org/10.1017/S2045796014000547 Published online by Cambridge University Press

Table 1. *Sociodemographic characteristics and odds ratios for use of any psychotropic medication in the previous 12 months*

Sociodemographic variable (*n*)	Sample (%)	Any psychotropic		
		N	%	OR[a] (95% CI)
Total (4340)	100	733	14.9	–
One psychotropic medication only	–	419	8.9	–
More than one psychotropic medication	–	314	6.0	–
Gender				
Male (1899)	48.0	229	10.2	Reference
Female (2441)	52.0	504	19.4	1.4 (1.0–1.9)
χ^2_1		72.2***		
Age (years)				
18–34 (1127)	30.6	134	10.5	Reference
35–49 (1297)	30.6	210	14.3	1.4 (0.9–2.2)
50–64 (1064)	21.2	251	21.7	2.5 (1.5–4.0)***
65+ (852)	17.7	138	15.7	1.4 (0.7–2.5)
χ^2_3		54.9**		
Marital status				
Married (2553)	59.2	361	13.1	Reference
Never married (1024)	26.8	152	12.3	1.1 (0.7–1.7)
SWD (763)	14.0	220	27.9	1.8 (1.2–2.6)**
χ^2_2		94.4***		
Income[b]				
Low (470)	24.7	114	17.2	Reference
Low-average (494)	25.4	116	16.6	1.0 (0.6–1.4)
High-average (572)	28.3	110	14.9	0.9 (0.6–1.3)
High (450)	21.6	63	13.0	0.8 (0.5–1.5)
χ^2_3		3.8		
Education				
Primary (316)	6.6	61	20.9	Reference
Secondary (2450)	56.5	437	15.4	0.7 (0.3–1.3)
A-Level (1048)	24.4	149	12.9	0.6 (0.3–1.3)
Tertiary (526)	12.5	86	13.6	0.6 (0.2–1.3)
χ^2_3		12.9*		
Trauma[b]				
None (699)	39.4	98	9.3	Reference
Non-conflict-related only (470)	21.7	111	19.3	1.6 (1.0–2.4)*
Conflict-related (817)	39.0	194	19.6	1.7 (1.2–2.4)**
χ^2_2		37.6***		

OR, odds ratios; CI, confidence interval; SWD, separated/widowed/divorced.
Raw numbers and weighted proportions reported throughout.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
[a]Adjusted odds ratios (controlling for all other variables in the model and any 12-month disorder).
[b]Only assessed in participants who completed part 2 of the interview.

medication taken by those with any mental health disorder (25.5%). Mood stabilisers and psychostimulants were least likely to be taken by those with any disorder (2.3%).

With regards to those who met the criteria for a 12-month mood disorder, half (50%) had taken at least one psychotropic medication. Antidepressants were the most common form of medication taken, used by over one-third (36.9%) of this group in the previous 12 months. For those assessed as having an anxiety disorder, almost half (47.5%) indicated they had taken a psychotropic. Again, antidepressants were the most common form of psychotropic medication taken (31.2%).

In terms of any individual disorders, those with panic disorder were most likely to have taken any psychotropic medication (67.3%), whereas those with specific phobia were least likely to have done so (38%).

https://doi.org/10.1017/S2045796014000547 Published online by Cambridge University Press

Table 2. *12-month prevalence rates and odds ratios by type of psychotropic medication*

	Antidepressant			Anxiolytic			Hypnotic/sedative			Antipsychotic			Mood stabiliser			Psychostimulant		
	N	%	OR[a] (95% CI)	*N*	%	OR[a] (95% CI)	*N*	%	OR[a] (95% CI)	*N*	%	OR (95% CI)	*N*	%	OR (95% CI)	*N*	%	OR (95% CI)
Total	465	9.4	–	241	4.5	–	218	4.3	–	121	2.3	–	64	1.3	–	39	0.8	–
Exclusive use	231	5.0	–	65	1.1	–	80	1.7	–	13	0.3	–	4	0.1	–	5	0.1	–
Gender																		
Male	128	6.0	Reference	73	2.7	Reference	66	2.8	Reference	44	1.8	–	20	0.8	–	14	0.7	–
Female	337	12.5	1.8 (1.2–2.7)**	168	6.1	1.4 (0.8–2.4)	152	5.7	1.2 (0.7–2.2)	77	2.8	–	44	1.7	–	25	1.0	–
Age (years)																		
18–34	84	6.1	Reference	30	2.0	Reference	31	2.3	Reference	12	0.8	–	7	0.6	–	3	0.3	–
35–49	152	10.7	1.8 (1.0–3.1)*	71	4.6	2.0 (1.0–4.1)	50	2.9	1.2 (0.5–3.0)	33	2.3	–	14	0.9	–	9	0.8	–
50–64	172	14.8	2.7 (1.5–4.8)***	99	7.7	4.3 (2.0–9.3)***	73	6.2	3.9 (1.7–8.8)**	52	4.4	–	25	2.0	–	20	2.0	–
65 +	57	6.4	0.7 (0.4–1.6)	41	4.7	1.5 (0.6–3.8)	64	7.7	2.2 (0.7–6.8)	24	2.5	–	18	2.2	–	7	1.0	–
Marital status																		
Married	231	8.7	Reference	118	3.9	Reference	84	2.9	Reference	50	2.3	–	35	1.3	–	21	0.8	–
Never married	94	7.0	0.7 (0.4–1.2)	42	2.9	0.9 (0.5–1.6)	47	3.6	2.3 (1.1–4.9)*	32	2.3	–	13	0.9	–	8	0.6	–
SWD	140	16.9	1.3 (0.8–2.0)	81	10.2	1.6 (1.0–2.8)	87	11.4	2.9 (1.6–5.0)***	39	5.2	–	16	1.9	–	10	1.5	–
Income[b]																		
Low	81	11.8	Reference	42	5.6	Reference	29	4.8	Reference	23	2.7	–	7	0.7	–	6	0.7	
Low-average	74	11.0	0.9 (0.6–1.4)	36	5.9	1.0 (0.5–1.8)	36	4.6	0.9 (0.5–1.8)	25	3.2	–	8	1.1	–	11	2.1	–
High-average	76	10.1	0.8 (0.5–1.3)	37	3.9	0.7 (0.4–1.2)	26	3.3	0.7 (0.4–1.5)	15	1.8	–	9	1.2	–	5	0.5	–
High	30	4.9	0.4 (0.2–0.7)**	10	1.3	0.2 (0.1–0.5)***	17	3.5	0.9 (0.4–2.1)	3	0.6	–	6	0.8	–	2	0.5	–
Education																		
Primary	35	12.2	Reference	21	6.9	Reference	23	8.8	Reference	18	6.2	–	8	2.7	–	5	1.8	–
Secondary	286	10.1	0.7 (0.3–1.6)	149	4.9	0.7 (0.3–1.6)	131	4.3	0.4 (0.1–1.0)*	75	2.5	–	37	1.2	–	28	1.1	–
A-Level	89	7.2	0.4 (0.2–1.1)	50	3.5	0.5 (0.2–1.5)	41	3.6	0.3 (0.1–1.1)	17	1.3	–	13	1.2	–	5	0.4	–
Tertiary	55	9.2	0.5 (0.2–1.4)	21	3.0	0.4 (0.2–1.2)	23	3.1	0.5 (0.1–1.6)	11	1.4	–	6	1.1	–	1	0.1	–
Trauma[b]																		
None	61	5.8	Reference	27	2.3	Reference	21	2.1	Reference	11	1.1	–	10	0.8	–	4	0.5	–
Non-conflict-related only	70	11.6	1.3 (0.8–2.1)	34	5.0	1.1 (0.6–2.2)	30	5.7	2.0 (0.9–4.2)	14	2.1	–	6	0.8	–	7	1.1	–
Conflict-related	130	12.3	1.6 (1.0–2.4)*	64	5.7	1.5 (0.8–2.8)	57	5.1	2.0 (1.1–3.7)*	41	3.1	–	14	1.1	–	13	1.3	–

OR, odds ratios; CI, confidence interval; SWD, separated/widowed/divorced.

Raw numbers and weighted proportions reported throughout.

Odds ratios not calculated for antipsychotic, mood stabiliser or psychostimulant due to low counts.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

[a]Adjusted odds ratios (controlling for all other variables in the model and any 12-month disorder).

[b]Only assessed in participants who completed part 2 of the interview.

Table 3. *12-month prevalence rates for each type of psychotropic medication by 12-month mental disorder*

Disorder	Any psychotropic		Antidepressant		Anxiolytic		Hypnotic/sedative		Antipsychotic		Mood stabiliser		Psychostimulant	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Any disorder	393	38.5	282	25.5	155	13.0	103	9.0	70	5.0	40	2.3	23	2.3
No disorder	340	8.6	183	4.8	86	1.6	115	2.6	51	1.3	24	0.5	16	0.5
χ^2_1	240.3***		173.4***		113.4***		37.2***		23.3***		11.3***		12.4***	
Any mood disorder	245	50.0	182	36.9	104	19.7	65	11.9	50	9.7	23	4.9	15	3.4
Dysthymia	45	65.0	34	48.7	21	27.3	11	17.8	11	17.1	6	11.0	5	7.0
Major depressive disorder	187	48.2	140	36.7	74	17.5	43	9.3	33	8.0	16	4.2	11	2.9
Bipolar disorder	55	58.6	42	41.7	27	29.9	19	20.4	15	17.2	6	5.5	3	4.4
Any anxiety disorder	301	47.5	222	31.2	124	16.9	79	11.4	56	7.0	31	2.8	17	2.1
Generalised anxiety disorder	67	66.9	48	45.5	29	24.5	26	27.3	15	13.8	8	9.8	4	3.5
Panic disorder	78	67.3	62	48.9	37	28.3	23	21.4	19	13.6	8	6.5	4	2.8
Social phobia	109	56.2	87	43.7	44	19.4	33	15.8	26	11.9	14	5.9	12	5.7
Specific phobia	133	38.0	103	27.7	66	16.9	38	9.8	34	8.7	16	4.6	10	2.6
PTSD	70	54.5	54	41.7	25	19.1	21	16.1	13	8.6	4	2.8	2	1.5
Agoraphobia without panic	44	56.8	32	42.2	23	27.7	11	14.7	8	11.2	5	7.1	4	7.3

PTSD, posttraumatic stress disorder.

Raw numbers and weighted proportions reported throughout.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Of those assessed as having major depressive disorder, 48.2% had taken a psychotropic medication, whereas this figure was 66.9% for those with generalised anxiety disorder.

Overall, 8.6% indicated they had taken a psychotropic medication in the previous 12 months despite not meeting the criteria for any mental disorder. Further analysis including those with subthreshold disorders decreased this figure to 8%.

Discussion

The present study is the first in the country to consider psychotropic medication use in the context of mental disorders. The rate of 14.9% for 12-month use of any psychotropic medication in the general population is at the higher end of reported rates from other countries. NI has the third highest utilisation rate of the participating WMH survey countries, ranking behind France (19.2%) and Spain (15.5%). The consumption rate is also higher than the European average of 12.3% reported in the European Study of the Epidemiology of Mental Disorders (ESEMeD; Alonso *et al.* 2004). However, it is important to consider the difference in the years of studies. Our study was conducted between 2004 and 2008, with the ESEMeD conducted between 2001 and 2003. Given that several studies suggest an increase in the use of these medications over the years, this may account for our higher rate. Then again analysis of our earliest data suggests a rate of 16.5%, higher than five of the six countries in the ESEMeD. In addition, the NI 12-month prevalence rate for any mental health disorder is one of the highest worldwide (Bunting *et al.* 2013*a*), so it is perhaps not surprising that psychotropic consumption is equally high. Legislation surrounding prescription charges is an obvious potential explanation for differences between countries. Health care in NI is delivered by the UK National Health Service and consultations are free at point of delivery. The majority of prescriptions issued in the province at the time of the study were without charge. The results need to be considered in light of this context. As might be expected, a meta-analysis by Gibson *et al.* (2005) found a negative relationship between charges and consumption. Other explanations as to the varying rates between countries include provision and use of treatment, awareness of disorders and cultural beliefs (McManus *et al.* 2000; Alonso *et al.* 2004).

Over one-third (38.5%) of respondents who met the criteria for a 12-month disorder had taken any psychotropic medication. This is higher than the other rates (19.6% in Israel (Grinshpoon *et al.* 2007); and 32.6% in Europe (Alonso *et al.* 2004)). NI also has a higher proportion of individuals who met the criteria for any mood disorder in the previous 12 months who had taken any psychotropic medication (50 *v.* 21.1% in Israel) (Grinshpoon *et al.* 2007), although this is in line with the European rate of 45.6% (Alonso *et al.* 2004). These trends may represent a greater preference for the use of psychotropic medications in NI by those with a mental health disorder and/or doctors. Nevertheless, these figures still suggest possible under treatment. Almost two-thirds (61.5%) received no psychotropic medication in the past 12 months despite meeting the criteria for a disorder in the same period. Half of those with a mood disorder received no medication. While some of these individuals may be availing of treatments other than medication, Bunting *et al.* (2013*a*) reported that just 40% of individuals meeting the criteria for a mental disorder in the past 12 months received any treatment. Rates of medication use for other disorders, however, were higher. Of those who met the criteria for any anxiety disorder in the previous 12 months, 47.5% had taken any psychotropic compared with 25% in Israel (Grinshpoon *et al.* 2007) and 32.4% in Europe (Alonso *et al.* 2004). In addition, 66.9% of those who met the criteria for 12-month Generalised Anxiety Disorder had taken any psychotropic compared with 18.6% in Israel (Grinshpoon *et al.* 2007) and 25.5% in Europe (Alonso *et al.* 2004).

The rate of 9.4% for 12-month use of antidepressants is one of the highest, if not the highest, rate of consumption among the WMH survey countries. Another study carried out in the USA in the years similar to the present study found a rate of 10.8% (Pratt *et al.* 2011), however this includes those aged 12 and over (the present study interviewed those 18 and over), and used past month prevalence as opposed to our 12-month prevalence. The rate of 9.4% in the present study corroborates the rates of 9.1% found in NI in 2006/2007 and 12% in 2010/2011 (National Advisory Committee on Drugs, 2012). The high rate found in the present study is perhaps not surprising given the 9.6% 12-month prevalence rate for mood disorders in the country, second only to the USA rate of 9.7% (Bunting *et al.* 2013*a*). It should also be noted, however, that one in 20 (4.8%) of those with no disorder in the general population had consumed an antidepressant in the previous 12 months. Moreover, almost one in ten (8.6%) of those who had not met the criteria for any 12-month disorder indicated they had consumed any psychotropic medication. Some disorders (such as sleep disorders) were not assessed in the current study. In addition, those who were subthreshold cases were not included in this figure of 8.6%. Both of these factors may have contributed to an overestimate of unneeded use. Nevertheless, inclusion of those with subthreshold disorders led to a decrease of less than one percentage point to 8%.

https://doi.org/10.1017/S2045796014000547 Published online by Cambridge University Press

Therefore it is possible these results correspond to true unneeded use of medication, such as individuals continuing to take medication despite their state improving. Alternatively, health professionals may be providing medication to individuals not meeting the criteria for relevant disorders. Future research should attempt to ascertain whether it is patients' preferences for medication or doctors' inclinations to prescribe them that are influencing these rates.

The discovery that those previously married are more likely than married individuals to take psychotropics has been previously reported (Alonso *et al.* 2004; Grinshpoon *et al.* 2007). Possible explanations for this include higher odds ratios of mental disorders among this group and factors relating to social support (Lindström & Rosvall, 2012). A positive association between age and psychotropic use has also been consistently found worldwide (Cooperstock & Parnell, 1982). In the present study, however, it was those aged 50–64 years old, rather than the oldest group of participants (65+), who were more likely to have consumed psychotropic medication. The fact that those in care homes were not interviewed may have led to an underestimation of usage in the oldest age group, and higher odds ratios in those aged 50–64 years old, particularly given that recent evidence suggests a higher rate of psychotropic prescribing among this over 65 age group in NI care homes (Maguire *et al.* 2013). Results by Bunting *et al.* (2013*a*) also show that those aged 50–64 years old in the province have the highest proportion of any 12-month anxiety disorder and second highest proportion of any 12-month mood disorder. Another predictor of use was trauma – those who had experienced conflict-related traumatic events, as well as those who had experienced non-conflict-related events, were more likely than individuals who had experienced no traumatic events to have taken psychotropic medication. Almost one in five (19.6%) of those who had experienced conflict-related events had used a psychotropic medication in the past 12 months. The fact that 60.6% of the population have experienced a traumatic event and 39% have experienced a conflict-related traumatic event (Bunting *et al.* 2013*b*), further highlights the importance of providing treatments for those who have experienced mental health difficulties as a consequence of trauma. Policy makers should also ensure that those affected by the conflict are offered appropriate mental health treatments. Even after controlling for presence of a mental disorder, those who had experienced conflict-related trauma were over 1.5 times more likely than those who had experienced no trauma to use antidepressants. This supports the contention by Tomlinson (2012) that some of those most affected by the conflict may use antidepressants as a means of dealing with the transition from conflict to peace. While there was a significant association between use of any medication and gender, when the other variables were accounted for using logistic regression analysis, the odds ratios were non-significant. However, females were almost two times more likely than males to have taken antidepressants, and this finding was significant. The greater likelihood of females to consume psychotropics is a longstanding and established international finding (Cooperstock, 1976; Paulose-Ram *et al.* 2004; Rodrigues *et al.* 2006; Chien *et al.* 2011). Possible explanations include the greater likelihood of females to disclose mental health problems and be prescribed psychotropic medication (Women's Health Council, 2005; Tedstone Doherty & Kartalova-O'Doherty, 2010), and the historical role of women as the family caregiver and healer and the stress arising from their various other roles (Ingram Fogel & Fugate Woods, 2008).

A number of limitations of the research should be considered. The prevalence rates may be an underestimation of true use for a number of reasons. Firstly, the NISHS did not survey individuals in institutions such as prisons, hospitals or care homes. These settings have been previously found to have higher rates of prescribing and/or use than the general population for certain classes of psychotropics (Elger *et al.* 2002; Gasquet *et al.* 2002; Maguire *et al.* 2013). While survey weights were calculated and applied to account for response bias, some non-response bias may still remain. However, the response rate of 68.4% is similar to that of other psychotropic medication surveys (Alonso *et al.* 2004; Goldney & Bain, 2006; Grinshpoon *et al.* 2007). A further limitation of the study was that participants were not asked detailed questions about their medication such as duration of use, dosage and reasons for use. As such, where medications may have had a variety of uses they were classified according to their typical use rather than their actual use for each individual. This is particularly important given the high amount of 'off-label' use of these medications (Baldwin & Kosky, 2007). Where medications had a psychoactive use (e.g., sedative) and another use (e.g., antihistamine), it was assumed that respondents understood from the question wording that we were asking about the psychoactive use(s) of the medications and not their alternative use(s). This lack of information also means that conclusions cannot be drawn about the appropriateness or efficacy of these medications. Furthermore, this study did not consider over-the-counter medications. Another drawback of the study was the use of self-report data. While it may be thought to be more accurate with regards to actual use than prescription data, an objective measure of consumption was not included in the study. While the use of a 12-month recall period may also be viewed as a disadvantage of this study, memory bias was minimised using techniques which have

https://doi.org/10.1017/S2045796014000547 Published online by Cambridge University Press

been previously suggested to aid recall such as a show-card/booklet and asking participants to examine their medication inventories (Strom, 2006). Another strength of the study was that it was part of the WMH Survey Initiative meaning that studies in other countries used the same methods and therefore cross-national comparisons were available.

As previously mentioned, the present study is the first to examine the rate of psychotropic medication use, in those with and without mental health disorders, in the NI population. The rate of general psychotropic medication consumption and particularly antidepressants appears to be among the highest worldwide. While some of this prevalence may be accounted for by time elapsed between studies, comparison with more recent studies still remains high. More detailed analysis shows that use among those with mental disorders is low, with the majority having not received psychotropic medication. In addition, there is a sizeable minority identified as having no disorder who consumed medication, particularly antidepressants. These findings have implications for prescribing practice. It is recommended that prescribing policies promote the need for prescribers to adopt more detailed diagnostic assessment to ensure that those who meet the criteria for a disorder are offered appropriate medication. Individuals who request psychotropic medication should also be carefully assessed to prevent inappropriate prescribing. Future research should examine the doctor–patient relationship in more detail to pinpoint potential causes of under treatment or inappropriate prescribing.

Acknowledgements

None.

Financial Support

The corresponding author was supported by a PhD studentship through a Department for Employment and Learning Northern Ireland (DELNI) award. The NI Study of Health and Stress, including salary of S. M. and S.O'N. was supported by a grant from the Research and Development (R&D) Division in NI. The survey was carried out in conjunction with the World Health Organization WMH Survey Initiative, which is supported by the National Institute of Mental Health (NIMH; R01 MH070884), the John D. and Catherine T. MacArthur Foundation, the Pfizer Foundation, the US Public Health Service (R13-MH066849, R01-MH069864 and R01 DA016558), the Fogarty International Center (FIRCA R03-TW006481), the Pan American Health Organization, Eli Lilly and Company, Ortho-McNeil Pharmaceutical GlaxoSmith Kline and Bristol-Myers Squibb. None of the funders had any role in the data collection, analysis, interpretation of results, preparation of this paper or the decision to submit the paper for publication.

Conflict of Interest

None.

Ethical Standard

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

References

Alonso J, Angermeyer MC, Bernert S, Bruffaerts R, Brugha TS, Bryson H, de Girolamo G, Graaf R, Demyttenaere K, Gasquet I, Haro JM, Katz SJ, Kessler RC, Kovess V, Lépine JP, Ormel J, Polidori G, Russo LJ, Vilagut G, Almansa J, Arbabzadeh-Bouchez S, Autonell J, Bernal M, Buist-Bouwman MA, Codony M, Domingo-Salvany A, Ferrer M, Joo SS, Martínez-Alonso M, Matschinger H, Mazzi F, Morgan Z, Morosini P, Palacín C, Romera B, Taub N, Vollebergh WA (2004). Psychotropic drug utilization in Europe: results from the European Study of the Epidemiology of Mental Disorders (ESEMeD) project. *Acta Psychiatrica Scandinavica* **420**, 55–64.

American Psychiatric Association (1994). *Diagnostic and Statistical Manual of Mental Disorders*, 4th edn. APA: Washington, DC.

Baldwin DS, Kosky N (2007). Off-label prescribing in psychiatric practice. *Advances in Psychiatric Treatment* **13**, 414–422.

Beck CA, Williams JV, Wang JL, Kassam A, El-Guebaly N, Currie SR, Maxwell CJ, Patten SB (2005). Psychotropic medication use in Canada. *Canadian Journal of Psychiatry* **50**, 605–613.

Bunting BP, Murphy S, O'Neill S, Ferry F (2013*a*). Prevalence and treatment of 12-month DSM-IV disorders in the Northern Ireland study of health and stress. *Social Psychiatry and Psychiatric Epidemiology* **48**, 81–93.

Bunting BP, Ferry F, Murphy S, O'Neill S, Bolton D (2013*b*). Trauma associated with civil conflict and posttraumatic stress disorder: evidence from the Northern Ireland study of health and stress. *Journal of Traumatic Stress* **26**, 134–141.

Chien IC, Bih SH, Lin CH, Chou YJ, Lee WG, Lee CH, Chou P (2011). Correlates and psychiatric disorders associated with psychotropic drug use in Taiwan. *Social Psychiatry and Psychiatric Epidemiology* **46**, 77–84.

Cooperstock R (1976). Psychotropic drug use among women. *Canadian Medical Association Journal* **115**, 760–763.

Cooperstock R, Parnell P (1982). Research on psychotropic drug use: a review of findings and methods. *Social Science & Medicine* **16**, 1179–1196.

Elger BS, Geohring C, Revaz SA, Morabia A (2002). Prescription of hypnotics and tranquilisers at the Geneva prison's outpatient service in comparison to an urban outpatient medical service. *Sozial-und Präventivmedizin* **47**, 39–43.

Ferry F, Bolton D, Bunting BP, Devine B, McCann S, Murphy S (2008). *Trauma, Health and Conflict in Northern Ireland*. Northern Ireland Centre for Trauma and Transformation: Omagh. Retrieved 8 February 2013 from http://icrt.org.uk/wp-content/uploads/2012/11/08-May-Trauma-Health-Conflict-Report-first-reprint.pdf.

Gasquet I, Medioni J, Lellouch J, Guelfi JD (2002). Psychotropic prescription in non-psychiatric hospital settings. *European Psychiatry* **17**, 414–418.

Gibson T, Ozminkowski R, Goetzel R (2005). The effects of prescription drug cost sharing: a review of the evidence. *American Journal of Managed Care* **11**, 730–740.

Goldney R, Bain M (2006). Prevalence of psychotropic use in a South Australian population. *Australasian Psychiatry* **14**, 379–383.

Grandfils N, Sermet C (2009). *Evolution 1998–2002 of the Antidepressant Consumption in France, Germany and the United Kingdom*. Institut de recherche et documentation en économie de la santé: Paris. Retrieved 20 March 2013 from http://EconPapers.repec.org/RePEc:irh:wpaper:dt21.

Grinshpoon A, Marom E, Weizman A, Ponizovsky A (2007). Psychotropic drug use in Israel: results from the national health survey. *Primary Care Companion to the Journal of Clinical Psychiatry* **9**, 356–363.

Health and Social Care Business Services Organisation (2011). *Prescription Cost Analysis [data file]*. Health and Social Care Business Services Organisation: Northern Ireland. Retrieved 10 March 2013 from http://www.hscbusiness.hscni.net/services/2266.htm.

Hosmer DW, Lemeshow S (1989). *Applied Logistic Regression*. John Wiley & Sons: New York.

Ingram Fogel C, Fugate Woods N (2008). *Women's Health Care in Advanced Practice Nursing*. Springer Publishing Company: New York.

Kessler RC, Üstün TB (2008). The World Health Organization composite international diagnostic interview. In *The WHO World Mental Health Surveys: Global Perspectives on The Epidemiology of Mental Disorders* (ed. RC Kessler and TB Üstün), pp. 58–90. Cambridge University Press: New York.

Lindström M, Rosvall M (2012). Marital status, social capital, economic stress, and mental health: a population-based study. *Social Science Journal* **49**, 339–342.

Maguire A, Hughes C, Cardwell C, O'Reilly D (2013). Psychotropic medications and the transition into care: a national data linkage study. *Journal of the American Geriatrics Society* **61**, 215–221.

McManus P, Mant A, Mitchell PB, Montgomery WS, Marley J, Auland ME (2000). Recent trends in the use of antidepressant drugs in Australia, 1990–1998. *Medical Journal of Australia* **173**, 458–461.

National Advisory Committee on Drugs (2012). *Bulletin 2: Drug use in Ireland and Northern Ireland*. National Advisory Committee on Drugs: Ireland. Retrieved 2 March 2013 from http://www.drugs.ie/resourcesfiles/research/2012/drug_use_ireland2012.pdf.

Northern Ireland Statistics and Research Agency (2008). *GP Data Mood and Anxiety Disorders [data file]*. Northern Ireland Statistics and Research Agency: Northern Ireland. Retrieved 5 August 2013 from http://www.ninis2.nisra.gov.uk/public/Theme.aspx?themeNumber=134&themeName=Health+and+Social+Care.

Ohayon MM, Lader MH (2002). Use of psychotropic medication in the general population of France, Germany, Italy, and the United Kingdom. *Journal of Clinical Psychiatry* **63**, 817–825.

Olfson M, Marcus SC, Druss B, Elinson L, Tanielian T, Pincus HA (2002). National trends in the outpatient treatment of depression. *Journal of the American Medical Association* **287**, 203–209.

O'Reilly D (2011). Give my head peace: psychotropic drug uptake around the 'peace-lines' in Northern Ireland [abstract]. *Journal of Epidemiology & Community Health* **65**, A14–A15.

Paulose-Ram R, Jonas BS, Orwig D, Safran MA (2004). Prescription psychotropic medication use among the U.S. adult population: results from the third National Health and Nutrition Examination Survey, 1988–1994. *Journal of Clinical Epidemiology* **57**, 309–317.

Paulose-Ram R, Safran MA, Jonas BS, Gu Q, Orwig D (2007). Trends in psychotropic medication use among U.S. adults. *Pharmacoepidemiology & Drug Safety* **16**, 560–570.

Pennell BE, Mneimneh ZN, Bowers A, Chardoul S, Wells JE, Viana MC, Dinkelmann K, Gebler N, Florescu S, He Y, Huang Y, Tomov T, Saiz GV (2008). Implementation of the World Mental Health Surveys. In *The WHO World Mental Health Surveys: Global Perspectives on the Epidemiology of Mental Disorders* (ed. RC Kessler and TB Üstün), pp. 33–57. Cambridge University Press: New York.

Pratt LA, Brody DJ, Gu Q (2011). *Antidepressant Use in Persons Aged 12 and Over: United States, 2005–2008. NCHS data brief, no 76*. National Center for Health Statistics: Hyattsville, MD.

Rodrigues MA, Facchini LA, Lima MS (2006). Modifications in psychotropic drug use patterns in a Southern Brazilian city. *Revista de Saúde Pública* **40**, 107–114.

StataCorp (2011). *Stata Statistical Software: Release 12*. StataCorp LP: College Station, TX.

Stephenson CP, Karanges E, McGregor IS (2013). Trends in the utilisation of psychotropic medications in Australia from 2000 to 2011. *Australian & New Zealand Journal of Psychiatry* **47**, 74–87.

Strom BL (2006). *Pharmacoepidemiology*, 4th edn. Wiley: Chichester, UK.

Tedstone Doherty D, Kartalova-O'Doherty Y (2010). Gender and self-reported mental health problems: predictors of help seeking from a general practitioner. *British Journal of Health Psychology* **15**, 213–228.

Tomlinson MW (2012). War, peace and suicide: the case of Northern Ireland. *International Sociology* **27**, 464–482.

Wolter KM (2007). *Introduction to Variance Estimation*, 2nd edn. Springer: New York.

Women's Health Council (2005). *Women's Mental Health: Promoting a Gendered Approach to Policy and Service Provision*. Women's Health Council: Dublin. Retrieved 29 May 2014 from http://www.drugsandalcohol.ie/11851/1/WHC_Womens_mental_health.pdf.

World Health Organization, Collaborating Centre for Drug Statistics Methodology (2012). *Guidelines for ATC Classification System and DDD Assignment*. WHO: Oslo.

Appendix. Medication coding used in the study

Antidepressant	Antipsychotic	Anxiolytic	Hypnotic/sedative	Mood stabiliser	Psychostimulant
Amitriptyline	Acetophenazine	Buspirone	*Alprazolam*	*Carbamazepine*	Amfetamine
Amoxapine	Amisulpride	Chlordiazepoxide	*Diphenhydramine*	*Gabapentin*	Atomoxetine
Bupropion	Aripiprazole	*Clonazepam*	Estazolam	*Lamotrigine*	Dexamfetamine
Citalopram	Chlorpromazine	*Clonidine*	Ethchlorvynol	*Lithium*	Metamfetamine
Clomipramine	Chlorprothixene	Diazepam	Flurazepam	*Valproic acid*	Methylphenidate
Desipramine	Clozapine	*Droperidol*	Glutethimide		Pemoline
Dosulepin	Flupentixol	Halazepam	Lormetazepam		
Doxepin	Fluphenazine	Hydroxyzine	Nitrazepam		
Escitalopram	Haloperidol	Lorazepam	Pentobarbital		
Fluoxetine	Levomepromazine	Meprobamate	*Promethazine*		
Fluvoxamine	Loxapine	Oxazepam	*Propofol*		
Imipramine	Mesoridazine	Potassium Clorazepate	Quazepam		
Isocarboxazid	Molindone	*Pregabalin*	Secobarbital		
Lofepramine	Olanzapine	*Propranolol*	Temazepam		
Maprotiline	Periciazine		Triazolam		
Mirtazapine	Perphenazine		Zaleplon		
Moclobemide	Pimozide		Zolpidem		
Nefazodone	Prochloroperazine		Zopiclone		
Nortriptyline	Promazine				
Paroxetine	Quetiapine				
Phenelzine	Risperidone				
Sertraline	Sulpiride				
Tranylcypromine	Thioridazine				
Trazodone	Tiotixene				
Trimipramine	Trifluoperazine				
Tryptophan	Triflupromazine				
Venlafaxine	Zotepine				

Medications were coded according to their primary psychoactive/mental disorder use. Medications in italics may have another use or be listed under different categories in the WHO ATC. In these circumstances, their coding category was decided upon according to other pharmacoepidemiological studies.

https://doi.org/10.1017/S2045796014000547 Published online by Cambridge University Press