

1 Predictors of antidepressant use in the English 2 population: analysis of the Adult Psychiatric 3 Morbidity Survey

4 S. Boyle^{1,*}, J. Murphy¹, M. Rosato², D. Boduszek³ and M. Shevlin¹

5 ¹ School of Psychology and Psychology Research Institute, Ulster University, Londonderry, UK

6 ² Bamford Centre for Mental Health and Wellbeing, Ulster University, Londonderry, UK

7 ³ School of Human and Health Sciences, University of Huddersfield, Huddersfield, UK

8 **Objectives.** The rate of antidepressant use in the United Kingdom has outpaced diagnostic increases in the prevalence of
9 depression. Research has suggested that personal and socioeconomic risk factors may be contributing to antidepressant
10 use. To date, few studies have addressed these possible contributions. Thus, this study aimed to assess the relative
11 strength of personal, socioeconomic and trauma-related risk factors in predicting antidepressant use.

12 **Methods.** Data were derived from the Adult Psychiatric Morbidity Survey ($n=7403$), a nationally representative
13 household sample of adults residing in England in 2007. A multivariate binary logistic regression model was developed to
14 assess the associations between personal, socioeconomic and trauma-related risk factors and current antidepressant use.

15 **Results.** The strongest predictor of current antidepressant use was meeting the criteria for an ICD-10 depressive episode
16 [odds ratio (OR)=9.04]. Other significant predictors of antidepressant use in this analysis included English as first
17 language (OR=3.45), female gender (OR=1.98), unemployment (OR=1.82) and childhood sexual abuse (OR=1.53).

18 **Conclusions.** Several personal, socioeconomic and trauma-related factors significantly contributed to antidepressant use
19 in the multivariate model specified. These findings aid our understanding of the broader context of antidepressant use in
20 the United Kingdom.

21 Received 24 January 2018; Revised 4 April 2018; Accepted 6 April 2018

22 **Key words:** Antidepressants, depression, epidemiology, regression analysis, United Kingdom.

23 Rates of antidepressant use in the United Kingdom are
24 amongst the highest in Europe (McClure, 2014) and are
25 continually increasing; recent health statistics pub-
26 lished by the Organisation for Economic Co-operation
27 and Development (OECD, 2017) indicate that in 2015,
28 the estimated daily dosage of antidepressants was
29 94.2/1000 people in the United Kingdom, approxi-
30 mately double the estimated daily dosage in 2005 (47.3/
31 1000). Whilst antidepressant use has increased, the pre-
32 valence of depression has not increased significantly
33 (Baxter *et al.* 2014). According to estimates from the most
34 recent edition of the Adult Psychiatric Morbidity Survey
35 (APMS) the prevalence of depression in England has
36 increased by 1% between 2007 and 2014 (McManus *et al.*
37 2016). In addition, epidemiological evidence suggests
38 that any increases observed in prevalence rates of
39 depression can be explained by population growth and
40 changing age structures (Baxter *et al.* 2014). The reasons

41 behind this disparity between the prevalence of depres-
42 sion and rates of antidepressant use remain unclear
43 (Munoz-Arroyo *et al.* 2006). Depression irrefutably
44 remains a strong predictor of antidepressant use; results
45 from the *European Study of the Epidemiology of Mental*
46 *Disorders* indicated that a diagnosis of depression
47 increases the probability of antidepressant use fivefold
48 (Demyttenaere *et al.* 2008). However, the disparity
49 between antidepressant prescribing rates and rates of
50 depression suggests that depression is only one of many
51 potential risk factors for antidepressant use (Demytte-
52 naere *et al.* 2008). Research has now focused on a range of
53 personal, physical health, socioeconomic and trauma-
54 related factors in predicting antidepressant use
55 (Demyttenaere *et al.* 2008; Butterworth *et al.* 2013; Lewer
56 *et al.* 2015).

57 The small numbers of studies that have addressed
58 antidepressant use in the general population have
59 reported that age and gender are strong predictors
60 (Demyttenaere *et al.* 2008; Lewer *et al.* 2015); the risk for
61 antidepressant use generally increases from young
62 adulthood to middle adulthood [odds ratio (OR)=
63 1.69], and declines in older adulthood (OR=1.45)

* Address for correspondence: S. Boyle, School of Psychology and
Psychology Research Institute, Ulster University, Magee Campus,
Northland Road, Londonderry BT48 7JL, Northern Ireland, UK.
(Email: s.boyle@ulster.ac.uk)

64 (Lewer *et al.* 2015). In addition, epidemiological
 65 evidence has shown that being female is associated
 66 with an approximate 80% increase in risk for anti-
 67 depressant use (Benson *et al.* 2015). This is expected
 68 given that patterns of antidepressant use tend to follow
 69 those for diagnosis of major depressive disorder
 70 (MDD), and epidemiological research has reported that
 71 middle age and female gender are significant risk
 72 factors for MDD (Kessler *et al.* 2003; Hasin *et al.* 2005;
 73 Seedat *et al.* 2009). Social isolation has also been linked
 74 with antidepressant use. Previous research has shown
 75 that loneliness increases the risk of using any psycho-
 76 tropic medication (including antidepressants) in older
 77 adults by about 50% (Boehlen *et al.* 2015). Moreover,
 78 there is evidence that increases in rates of anti-
 79 depressant use may be a consequence of living alone. In
 80 an analysis of the *Health 2000* study it was reported that
 81 those of working age who lived alone had an 80%
 82 higher risk of antidepressant use during the 7-year
 83 follow-up period (Pulkki-Råback *et al.* 2012). There is
 84 relatively little research on antidepressant use by
 85 migrants. A possible explanation is that only a small
 86 proportion (32%) of new migrants to the UK register
 87 with a GP (Stagg *et al.* 2012). Moreover, the Office for
 88 National Statistics has reported that the top-10 coun-
 89 tries of birth for non-UK migrants in 2015 included
 90 countries such as India, Pakistan and China (Office for
 91 National Statistics, 2016). Previous analyses of the
 92 perceptions of mental illness in India for example, have
 93 shown that depression is less often perceived as a
 94 mental disorder than other more serious disorders such
 95 as the psychoses (Wig *et al.* 1980). As such, the medical
 96 approach to treatment is less popular than social or
 97 more traditional healing methods (Wig *et al.* 1980).
 98 Thus, it appears that migrants may be less likely to use
 99 antidepressants as they are (1) less likely to register
 100 with a GP, and consequently are (2) less likely to be
 101 diagnosed with depression and (3) may have cultural
 102 beliefs about mental health and its care that is incon-
 103 sistent with antidepressant use (Wig *et al.* 1980;
 104 Furnham & Malik, 1994; Stagg *et al.* 2012).

105 Prescriptions for antidepressants are increasingly
 106 common for people managing chronic physical
 107 health conditions, such as fibromyalgia and diabetes
 108 (Mojtabai & Olsson, 2011; Mercier *et al.* 2013). Whilst
 109 there is evidence that the prevalence of antidepressant
 110 use is higher in those who have chronic physical con-
 111 ditions, there is little significant evidence for chronic
 112 physical conditions as predictors of antidepressant use
 113 (Demyttenaere *et al.* 2008). This may be due in part to
 114 there being little in the way of a theoretical framework
 115 for understanding the association between physical
 116 health and antidepressant use. If we look to the
 117 relationship between depression and physical health
 118 for more information, research points to the role of the

119 functional impairment (Zeiss *et al.* 1996). According to
 120 the *Integrative Model of Depression*, poor physical health
 121 (without functional impairment) is not a significant
 122 predictor of depression (Lewinsohn *et al.* 1985).
 123 This suggests that evaluating physical health-related
 124 functional impairment (PHFI) as a predictor of anti-
 125 depressant use, rather than the presence of any one
 126 chronic physical condition, would be prudent.

127 Socioeconomic disadvantage has long been recog-
 128 nized as a risk factor for depression (Lorant *et al.* 2003),
 129 and more recently recognized as a risk factor for anti-
 130 depressant use (Butterworth *et al.* 2013). Butterworth
 131 *et al.* (2013) reported that unemployment significantly
 132 increased risk of antidepressant use by more than
 133 2.5 times (OR=2.67) and those who had experienced
 134 financial hardship in the previous year were almost
 135 three times as likely (OR=2.87) to be using anti-
 136 depressants than those who had not. Indeed, all social
 137 disadvantage factors were reported to increase the
 138 likelihood of antidepressant use, although two factors
 139 (rental housing tenure and not finishing high school)
 140 failed to reach statistical significance (Butterworth *et al.*
 141 2013). These findings suggest that socioeconomic
 142 disadvantage is a robust predictor of antidepressant
 143 use, however, further evidence is required to assess the
 144 unique contributions of socioeconomic disadvantage
 145 factors to antidepressant use in a multivariate context,
 146 as only financial hardship remained an independent
 147 predictor of antidepressant use when depression was
 148 controlled for (OR=1.43).

149 There is limited research regarding the role of trauma
 150 exposure in antidepressant use. A small number of
 151 studies have reported significant associations between
 152 antidepressant use and stressful life events (SLE) such
 153 as bereavement (Maguire *et al.* 2017) and divorce
 154 (Monden *et al.* 2015). However, there is little research
 155 addressing cumulative lifetime stress. There is also a
 156 dearth of research regarding the predictive power of
 157 traumatic experiences and antidepressant use. Never-
 158 theless, the literature regarding these risk factors and
 159 depression provides an indication of the nature of these
 160 associations. Depression has been consistently asso-
 161 ciated with victimizing experiences such as domestic
 162 abuse (Campbell *et al.* 1995) and homelessness
 163 (DeForge *et al.* 2008). It is pertinent to address these
 164 relationships between trauma factors and anti-
 165 depressant use further; previous research addressing
 166 the high levels of antidepressant use amongst those
 167 reporting traumatic experiences, for example, child-
 168 hood sexual abuse (CSA), has shown that it can be
 169 problematic (Anda *et al.* 2007; Williams *et al.* 2016).
 170 According to Anda *et al.* (2007) those who had scored
 171 highly on a measure of childhood adversity were three
 172 times more likely to have been using antidepressants
 173 than those who reported no negative childhood

174 experiences. However, adverse childhood experiences
 175 are associated with decreases in antidepressant
 176 response and remission, in addition to high rates of
 177 adverse effects (Williams *et al.* 2016).

178 The aim of this study was to assess the relative
 179 strength of a range of personal, socioeconomic and
 180 trauma-related factors in predicting antidepressant use
 181 in the UK population. Evidence has indicated that these
 182 factors vary in their strength of association. In order
 183 of effect size, previous research has shown that a
 184 diagnosis of depression (OR = 5.00: Demyttenaere *et al.*
 185 2008), financial hardship (OR = 2.87: Butterworth
 186 *et al.* 2013), unemployment (OR = 2.67: Butterworth
 187 *et al.* 2013) and female gender (OR = 1.80: Benson *et al.*
 188 2015) all significantly predict antidepressant use. It has
 189 also been demonstrated that age is a significant but
 190 non-linear predictor of antidepressant use, with its
 191 strength peaking in middle adulthood (OR = 1.69) and
 192 decreasing into older adulthood (OR = 1.45: Lewer *et al.*
 193 2015). Two indicators of socioeconomic disadvantage
 194 (rental housing tenure and low/no educational qualifi-
 195 cations) have shown increased risk for antidepressant
 196 use, but these have not reached significance (Butter-
 197 worth *et al.* 2013). These factors have nevertheless been
 198 included in the investigation as it is difficult to separate
 199 the unique effects of highly correlated risk factors such
 200 as these. The relative strength of other factors (social
 201 isolation, migrant status, PHFI, SLE, victimization and
 202 CSA) in predicting antidepressant use in the population
 203 is currently unknown. It was hypothesized that each
 204 personal (depression, age, gender, social isolation,
 205 migrant status and PHFI), socioeconomic disadvantage
 206 (employment, housing tenure, educational qualifica-
 207 tions and financial hardship) and trauma-related (SLE,
 208 victimization and CSA) risk factor would be indepen-
 209 dently associated with antidepressant use. It was also
 210 pertinent to examine these associations in a multivariate
 211 context to ascertain the individual contributions of each
 212 predictor to antidepressant use when other factors
 213 were considered. It was expected that each predictor
 214 would significantly contribute to the multivariate model
 215 developed for predicting antidepressant use.

216 Methods

217 Participants and study measures

218 The data utilized in the current study were derived
 219 from the APMS conducted in 2007, a representative
 220 sample of the population living in private households
 221 in England (McManus *et al.* 2009). Using the small-users
 222 postcode address file, the National Centre for Social
 223 Research adopted a multi-stage stratified probability-
 224 sampling design. The survey consisted of a phase 1 and
 225 a phase 2 (clinical) interview. For phase 1 of the survey

13214 potentially eligible private households were 226
 identified. One adult aged 16 years or over from each 227
 household was selected for interview using the Kish 228
 grid method (Kish, 1965). To ensure that the results 229
 were nationally representative, the data were weighted 230
 to account for non-response, gender, age and region. 231
 Comprehensive details of the survey methods can be 232
 found in the APMS report appendices (McManus *et al.* 233
 2009). In total, 57% of those eligible agreed to be 234
 interviewed for the APMS, resulting in 7403 successful 235
 interviews (3197 males and 4206 females). The sample 236
 had a mean age of 51.12 years (s.d. = 18.59). The 237
 measures utilized in this analysis were based on 238
 questions asked in the APMS 2007 phase 1 questionnaire. 239

Depression 240

A single categorical variable was generated to reflect 241
 the severity of depressive symptoms. First, respondents 242
 were presented with two screening questions asking 243
 whether they had been 'feeling sad, miserable or 244
 depressed' (1 = yes/0 = no) or '(unable) to enjoy or take 245
 an interest in things' (1 = yes/0 = no) in the past month. 246
 These questions were common to both the fifth edition 247
 of the *Diagnostic and Statistical Manual of Mental* 248
Disorders (DSM-5; American Psychiatric Association, 249
 2013) and the tenth edition of the International Classi- 250
 fication of Diseases (ICD-10; World Health Organisa- 251
 tion, 1993). Second, the APMS used the Clinical 252
 Interview Schedule Revised (CIS-R; Lewis & Pelosi, 253
 1990), a structured clinical interview, to generate a 254
 diagnosis of an ICD-10 2-week depressive episode 255
 (1 = yes/0 = no). The resulting variable grouped 256
 respondents as: 'no' to both screening instruments, and 257
 'no' to diagnosis of a depressive episode (0), 'yes' to 258
 one of the two screening instruments (1), 'yes' to both 259
 (2) or met the criteria for diagnosis of a depressive epi- 260
 sode (3), which superseded responding 'yes' to either/ 261
 both screening instrument(s). Previous analysis of the 262
 concurrence of the CIS-R with other diagnostic tools 263
 has indicated that in relation to the Schedules for Clin- 264
 ical Assessment in Neuropsychiatry (SCAN), the CIS-R 265
 has low sensitivity and high specificity for ICD-10 266
 depressive disorders (Jordanova *et al.* 2004). Thus, the 267
 development of a combined sub-clinical and clinical 268
 variable was necessary to increase the range of 269
 depression severity measured. 270

Demographics 271

Participants were asked about age, gender, social 272
 isolation and migrant status. Age was grouped into four 273
 age bands: 16–29 years; 30–44; 45–59 and 60 or more 274
 years. Gender was classified as either male/female (0/1). 275
 Household size was represented as living alone 276
 (1 = yes/0 = no) and used as an indicator of social 277

278 isolation. First language was summarized as English/not
279 English (1/0) and used as a proxy for migrant status.

280 *Physical health-related functional impairment (PHFI)*

281 This was measured using two items from the *Short*
282 *Form-12* (Ware et al. 1996). Respondents were asked
283 whether, in the past 4 weeks, they had (a) accomplished
284 less work or daily activities due to physical health
285 problems, and whether (b) they were limited in the type
286 of work or daily activities they could do due to physical
287 health problems. Responses were coded as yes (1) or no
288 (0) and summarized as a single physical health indi-
289 cator (0 = no limitation, 1 = one limitation noted and
290 2 = both limitations noted).

291 *Socioeconomic disadvantage*

292 Employment, housing tenure, educational qualifica-
293 tions and financial hardship (debt and borrowing) were
294 used as indicators of individual-level socioeconomic
295 disadvantage. Respondents were asked whether they
296 were or were not in paid employment during the week
297 preceding the interview. A dichotomous variable based
298 on this question was then derived which classified
299 respondents as unemployed (1) or employed (0).
300 Tenure was summarized as those in owner-occupation
301 (0) and those who in rented accommodation (1).
302 Education was assessed in the survey as qualifications
303 attained ranging from none to degree level and above,
304 and was summarized as no qualifications attained
305 (1) or some qualifications attained (0). Next, two
306 variables – debt and borrowing – described respon-
307 dents' experience of financial hardship. Respondents
308 were asked whether, in the past year, had they been
309 seriously behind time in paying each of 14 listed
310 financial obligations (e.g. water bill, mortgage repay-
311 ment, child support). Each response was coded as (yes/
312 no: 1/0), and accumulated into a single index reflecting
313 the difficulty the respondent had with debt in the pre-
314 vious year. Respondents were then asked whether
315 during the previous year they had to borrow money to
316 pay for day-to-day needs from four potential sources
317 (pawnbroker, money lender, bank or friends/family).
318 Responses were coded as (yes/no: 1/0) and accumu-
319 lated into a single variable. For both indices higher
320 scores indicate higher levels of debt or borrowing
321 during the previous year.

322 *Trauma*

323 Experience of three categories of trauma represented
324 lifetime experience of traumatic events for the partici-
325 pants: SLE, victimization and CSA. Experiences of SLE,
326 such as serious illness, bereavement and being made
327 redundant from work were measured using 11 items

derived from the *List of Threatening Experiences* (LTE) as 328
indicators (Brugha et al. 1985). For this analysis, each 329
LTE item was scored to assess having experienced (1) or 330
not having experienced (0) the event and aggregated 331
into a single index with a range of 0–11. Moreover, 332
participants were asked about lifetime experience of 333
victimization. Each of seven items (bullying, violence at 334
work, violence in the home, sexual abuse, expulsion 335
from school, running away from home, homelessness) 336
was scored representing the presence/absence (1/0) of 337
each type of victimization. These were then summed to 338
provide a total victimization score. Higher scores reflect 339
more types of victimization experienced. Regarding 340
CSA, participants were informed that this section of the 341
interview could potentially cause emotional upset, and 342
that all answers would be confidential. It was also self- 343
completed on the computer so the interviewer could 344
not see the responses. Respondents were asked whe- 345
ther, before the age of 16: (a) anyone had talked to them 346
in a sexual way; (b) anyone touched them in a sexual 347
way without consent; or (c) engaged them in sexual 348
intercourse without consent. These three questions 349
were each coded as binary (1 = yes, 0 = no), and then 350
transformed into a single binary variable representing 351
experience of any type of CSA (1 = any CSA; 352
0 = no CSA). 353

Antidepressant use 354

Respondents were asked whether they were currently 355
taking any of the following 13 antidepressant medica- 356
tions (Prozac, Lustral, Seroxat, Effexor, Nardil, 357
Manerix, Tryptizol, Tofranil, Anafranil, Prothiaden, 358
Sinequan, Cipramil, Zispen). If yes, they were asked to 359
show the interviewer the medication package. Produ- 360
cing the wrong medication package resulted in exclu- 361
sion from that particular medication. From this a binary 362
variable was derived classifying respondents as taking 363
no antidepressants (0), or one or more (1). 364

Analysis strategy 365

A multivariate binary logistic regression model was 366
specified and tested using SPSS 24 to assess the impact 367
of predictor variables on the likelihood that respon- 368
dents were currently using an antidepressant. It was 369
expected that the 14 predictors of antidepressant use 370
would produce a statistically significant model. For 371
each predictor, there was $\leq 1.5\%$ of missing data due to 372
participants identifying items as not applicable, 373
answering 'don't know' or refusing to answer. The 374
missing data were missing completely at random 375
(Little's MCAR test: $\chi^2 = 20.789$, $df = 14$, $p = 0.187$) and 376
handled using listwise deletion. Predictors were inclu- 377
ded in the model simultaneously. χ^2 Tests were used to 378
assess the goodness of model fit. 379

380 **Results**

381 There were 417 (5.6%) participants who reported
 382 current use of antidepressants in the cohort and the
 383 cross-tabulations with the predictor variables are
 384 reported in Table 1.

385 Mean scores on cumulative predictors for those cur-
 386 rently taking/not taking antidepressants are presented
 387 in Table 2. On financial hardship (debt and borrowing)
 388 and trauma (SLE and victimization) indicators, mean
 389 scores were consistently higher in the current anti-
 390 depressant use group. For debt, borrowing and victi-
 391 mization, the mean scores of the current antidepressant
 392 use group were more than twice those of the no current
 393 antidepressant use group.

394 As shown in Table 3, all bivariate associations
 395 were statistically significant. Larger effects were observed
 396 for depression, CSA and English as first language. The
 397 weakest effects were observed for living alone and having
 398 no qualifications.

399 Table 3 shows the estimates from the multivariate
 400 logistic regression model where all predictor variables
 401 were entered into the model with current antidepressant
 402 use as the dependent variable. The overall model

Table 1. Counts and percentages for current antidepressant use and risk factors

Predictor	No current ADM use (n = 6971)	Current ADM use (n = 417)
Depression		
None	3947 (56.6%)	92 (22.1%)
Either screener	2216 (31.8%)	154 (36.9%)
Both screeners	807 (11.6%)	171 (41.0%)
Age		
16–29	1012 (14.5%)	36 (8.6%)
30–44	1837 (26.4%)	127 (30.5%)
45–59	1601 (23.0%)	145 (34.8%)
60+	2521 (36.2%)	109 (26.1%)
Female	3886 (55.7%)	307 (73.6%)
Living alone	1940 (27.8%)	147 (35.3%)
English as first language	6563 (94.4%)	408 (97.8%)
PHFI		
None	5325 (75.1%)	214 (51.3%)
Either indicator	549 (7.9%)	46 (11.1%)
Both indicators	1187 (17.0%)	157 (37.6%)
Unemployed	3310 (47.8%)	273 (65.9%)
Renting home	1961 (28.4%)	181 (43.8%)
No qualifications	1966 (28.4%)	139 (33.6%)
CSA	861 (12.5%)	121 (29.9%)

ADM, antidepressant medication; PHFI, physical health-related functional impairment; CSA, childhood sexual abuse.

Pearson’s χ^2 tests for antidepressant use and all risk factors reached statistical significance ($p < 0.001$).

was statistically significant ($\chi^2(19) = 522.76$, $p < 0.001$) and explained between 7% (Cox and Snell’s R^2) and 20% (Nagelkerke’s R^2) of the variance in current

Table 2. Comparison of means and standard deviations of scores on cumulative risk factors between those currently taking or not taking antidepressants

	No current ADM use [mean (s.d.)]	Current ADM use [mean (s.d.)]
Debt	0.17 (0.77)	0.47 (1.27)
Borrowing	0.09 (0.35)	0.24 (0.60)
SLE	3.11 (1.94)	3.98 (2.07)
Victimization	0.43 (0.83)	1.05 (1.31)

ADM, antidepressant medication; SLE, stressful life events. Independent samples t-tests for antidepressant use and all risk factors reached statistical significance ($p < 0.01$).

Table 3. Bivariate and multivariate odds ratios (OR) from binary logistic regression analyses of current antidepressant use and risk factors

	Current ADM use			
	Bivariate		Multivariate	
	OR	95% CI	OR	95% CI
Depression (ref = none)				
Either screener	2.77***	2.18–3.62	2.13***	1.61–2.81
Both screeners	6.81***	5.12–9.10	3.85***	2.81–5.26
ICD-10 depressive episode	22.55***	15.83–32.12	9.04***	6.01–13.60
Age (ref = 60+)				
16–29	0.82	0.56–1.21	0.81	0.49–1.32
30–44	1.60***	1.23–2.08	1.84**	1.29–2.64
45–59	2.10***	1.62–2.71	1.97***	1.43–2.72
Female	2.22***	1.77–2.77	1.96***	1.53–2.51
Living alone	1.41**	1.14–1.74	1.06	0.82–1.36
First language is English	2.82**	1.45–5.50	3.48**	1.51–8.02
PHFI (ref = none)				
Either indicator	2.05***	1.47–2.85	1.52*	1.05–2.18
Both indicators	3.24***	2.61–4.01	1.57**	1.22–2.04
Unemployed	2.12***	1.72–2.61	1.82***	1.40–2.38
Renting home	1.97***	1.61–2.41	1.22	0.95–1.58
No qualifications	1.28*	1.03–1.57	1.01	0.78–1.32
Debt	1.30***	1.21–1.41	1.01	0.90–1.13
Borrowing	2.00***	1.67–2.39	1.15	0.89–1.48
SLE	1.23***	1.17–1.28	1.07	1.00–1.13
Victimization	1.68***	1.55–1.81	1.18**	1.06–1.32
CSA	2.98***	2.38–3.73	1.53**	1.16–2.00

ADM, antidepressant medication; CI, confidence interval; PHFI, physical health-related functional impairment; SLE, stressful life events; CSA, childhood sexual abuse.

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

antidepressant use. Seven of the predictors did not make a statistically significant contribution to the model: age 16–30, living alone, renting home, no qualifications, debt, borrowing and SLE. All other variables remained statistically significant. Overall, the strongest predictor of current antidepressant use was an ICD-10 depressive episode [OR=9.04; confidence intervals (CI)=6.01–13.60], followed by saying yes to both screeners of depression (OR=3.85; CI=2.81–5.26) and English as first language (OR=3.48; CI=1.51–8.02). Use was higher in females than males (OR=1.96; CI=1.53–2.51), and risk of use for those who were middle-aged was double that of those aged 60 or more (OR=1.97; CI=1.43–2.72). Reporting experience of CSA was associated with an approximate 50% increased risk for antidepressant use.

Discussion

The current study utilized data from the APMS to assess a range of important personal, socioeconomic disadvantage and trauma-related predictors for current antidepressant use. The results supported the primary hypothesis. The 14 predictors of antidepressant use were all individually significantly associated with antidepressant use. With regards to the second hypothesis, several of factors that have been investigated previously (depression, middle-age and female gender) individually and significantly contributed to antidepressant use in the multivariate model. These results were consistent with previous research findings (Demyttenaere *et al.* 2008; Butterworth *et al.* 2013; Lewer *et al.* 2015). In this analysis there were increased odds of antidepressant use in the two middle-adulthood groups, and membership of the youngest age group did not significantly increase odds of antidepressant use in comparison to the oldest age group. An explanation for this may be that antidepressant use rises and falls with the lifetime prevalence of depression, which increases into middle adulthood before dropping in older adulthood (Kessler *et al.* 2003). Moreover, of the previously investigated socioeconomic disadvantage indicators, only unemployment significantly independently contributed to the multivariate model. In this analysis unemployment actually performed better than it did in an analysis by Butterworth *et al.* (2013), as it remained a significant predictor of antidepressant use in a model including depression (Butterworth *et al.* 2013). With regards to the other four socioeconomic disadvantaged indicators (renting home, no qualifications, debt and borrowing) the results indicated that they failed to independently contribute to the multivariate model. These mixed results for indicators of socioeconomic disadvantage as predictors of antidepressant use add to an already inconclusive evidence

base (Demyttenaere *et al.* 2008; Butterworth *et al.* 2013; Lewer *et al.* 2015) and highlight the need for further investigation.

Furthermore, this study used some variables that have not been examined in previous research (living alone, migrant status, PHFI, SLE, victimization and CSA), and of these migrant status (English as first language) was the strongest predictor. PHFI, victimization and CSA were also significant predictors of antidepressant use. However, the hypothesis failed to be supported for social isolation (measured by living alone) and SLE, as they failed to independently and significantly contribute to the model. This is surprising as they are both predictors of general psychopathology (Molnar *et al.* 2001; Joutsenniemi *et al.* 2006), and as living alone has previously predicted antidepressant use in a working-age population (Pulkki-Râback *et al.* 2012).

This analysis indicated that even when depressive symptoms are controlled for, those experiencing poor social and economic circumstances are more likely to be prescribed antidepressant medications. As such, it is believed that this analysis adds to the long-term documentation of the failure of our services to address the social causes of depression and distress.

The main strengths of this study are that it is based on a large, nationally representative sample, and that the APMS 2007 survey methods are stringent (McManus *et al.* 2009). In addition, participants in the APMS 2007 were required to show medication packages when reporting which antidepressants they used, arguably a more objective mechanism than recall alone. However, there are limitations associated with this study. First, this was a study of individual-level predictors. It did not take into account broader societal factors, such as reductions in the stigma associated with mental health and its treatment (Angermeyer *et al.* 2017). Next, there can be issues with analyses based on individual-level self-report data. Whilst self-report data are less problematic for factors such as demographics, it may have repercussions for other indicators in this study. Evaluating trauma experienced over the lifetime is complex, involving issues with validity of reports and issues of definition (Goodman *et al.* 1998). Yet, whilst the reliability and validity of self-reported trauma in this study cannot be definitively established, evidence suggests these accounts are reliable in population and clinical samples (Fisher *et al.* 2011). Moreover, this analysis was limited to using first language and living alone as proxies for migrant status and social isolation respectively. Where possible more direct indicators should be utilized, for example UCLA Loneliness Scale (Russell *et al.* 1978).

Diagnosis of an ICD-10 depressive episode was the strongest predictor of antidepressant use in this

513 multivariate analysis. This result is in agreement with
 514 previous literature, but the OR (9.04) was higher than
 515 that recorded in previous work (OR=5.00: Demyttenaere
 516 *et al.* 2008). This is probably due to differences in
 517 the operationalization of depression between studies.
 518 This study utilized a combined variable with ICD-10
 519 depressive episode measured using the CIS-R. Previous
 520 works have utilized 12-month prevalence of depression
 521 measured using the Composite International Diagnostic
 522 Interview (Demyttenaere *et al.* 2008), and 4-week
 523 prevalence using the Mental Health Inventory-5 (Lewer
 524 *et al.* 2015). Further work is required to ascertain a
 525 consensus.

526 Furthermore, it must be taken into consideration
 527 that this survey was completed on private households
 528 only. Research has shown that there are high, often
 529 inappropriate rates of antidepressant prescribing
 530 to the elderly in residing in care homes (Read *et al.*
 531 2016). Our finding that risk of antidepressant use is
 532 highest in middle-age must be interpreted with this
 533 in mind.

534 In conclusion, using a large nationally representative
 535 data set of adults in England, this study provides evi-
 536 dence of the relative strength of a range of personal,
 537 socioeconomic and trauma-related factors in predicting
 538 antidepressant use. This study has confirmed that
 539 depression, age, gender, English as first language,
 540 PHFI, unemployment, victimization and CSA sig-
 541 nificantly predict antidepressant use. These findings
 542 have potentially important clinical implications for
 543 service planning of psychosocial services. There has
 544 been a reduction in stigma regarding mental health
 545 treatment, leading to increased numbers seeking
 546 treatment and massive pressures on resources, parti-
 547 cularly in primary care services (Angermeyer *et al.*
 548 2017). Indeed, GPs in the UK have reported that
 549 they are prescribing more antidepressants because of
 550 poor access to psychosocial services, including long
 551 waiting times (Mental Health Foundation, 2005).
 552 Thus, identifying these predictors is the first step in
 553 identifying those most in need so that psychosocial
 554 services can be targeted towards those groups. It is
 555 recommended that future work builds upon these
 556 findings via the development of 'high-risk' profiles
 557 and longitudinal modelling of the effects of these
 558 predictors on antidepressant use. Further research is
 559 warranted so that the broader context of current anti-
 560 depressant use in the population can be understood
 561 and accounted for.

562 Financial Support

563 This work was supported as part of a wider project
 564 by the Economic and Social Research Council
 565 (ES/N012216/1).

Conflicts of Interest

All authors declare that there are no conflicts of
 interest to disclose.

Ethical Standards

The authors assert that all procedures contributing
 to this work comply with the ethical standards of
 the relevant national and institutional committee on
 human experimentation with the Helsinki Declaration
 of 1975, as revised in 2008. Ethical approval for APMS
 2007 was obtained from the Royal Free Hospital and
 Medical School Research Ethics Committee. The anon-
 ymised data set used in this analysis was available
 freely from the UK Data Archive.

References

- American Psychiatric Association** (2013). *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*. American Psychiatric Publishing: Washington, DC.
- Anda RF, Brown DW, Felitti VJ, Bremner JD, Dube SR, Giles WH** (2007). Adverse childhood experiences and prescribed psychotropic medications in adults. *American Journal of Preventative Medicine* **32**, 389–394.
- Angermeyer MC, van der Auwera S, Carta MG, Schomerus G** (2017). Public attitudes towards psychiatry and psychiatric treatment at the beginning of the 21st century: a systematic review and meta-analysis of population surveys. *World Psychiatry* **16**, 50–61.
- Baxter AJ, Scott KM, Ferrari AJ, Norman RE, Vos T, Whiteford HA** (2014). Challenging the myth of an "epidemic" of common mental disorders: trends in the global prevalence of anxiety and depression between 1990 and 2010. *Depression and Anxiety* **31**, 506–516.
- Benson T, O'Neill S, Murphy S, Ferry F, Bunting B** (2015). Prevalence and predictors of psychotropic medication use: results from the Northern Ireland Study of Health and Stress. *Epidemiology and Psychiatric Sciences* **24**, 542–552.
- Boehlen F, Herzog W, Quinzler R, Haefeli WE, Maatouk I, Niehoff D, Saum KU, Brenner H, Wild B** (2015). Loneliness in the elderly is associated with the use of psychotropic drugs. *International Journal of Geriatric Psychiatry* **30**, 957–964.
- Brugha T, Bebbington P, Tennant C, Hurry J** (1985). The list of threatening experiences: a subset of 12 life event categories with considerable long-term contextual threat. *Psychological Medicine* **15**, 189–194.
- Butterworth P, Olesen SC, Leach LS** (2013). Socioeconomic differences in antidepressant use in the PATH Through Life Study: evidence of health inequalities, prescribing bias, or an effective social safety net? *Journal of Affective Disorders* **149**, 75–83.
- Campbell R, Sullivan CM, Davidson WS** (1995). Women who use domestic violence shelters changes in depression over time. *Psychology of Women Quarterly* **19**, 237–255.
- DeForge BR, Belcher JR, O'Rourke M, Lindsey MA** (2008). Personal resources and homelessness in early life: predictors of depression in consumers of homeless multiservice centers. *Journal of Loss and Trauma* **13**, 222–242.

- 620 Demyttenaere K, Bonnewyn A, Bruffaerts R, De Girolamo G,
621 Gasquet I, Kovess V, Haro JM, Alonso J (2008). Clinical
622 factors influencing the prescription of antidepressants and
623 benzodiazepines: results from the European study of the
624 epidemiology of mental disorders (ESEMeD). *Journal of*
625 *Affective Disorders* **110**, 84–93.
- 626 Fisher HL, Craig TK, Fearon P, Morgan K, Dazzan P,
627 Lappin J, Hutchinson G, Doody GA, Jones PB,
628 McGuffin P, Murray RM, Leff J, Morgan C (2011).
629 Reliability and comparability of psychosis patients’
630 retrospective reports of childhood abuse. *Schizophrenia Bull*
631 **37**, 546–553.
- 632 Furnham A, Malik R (1994). Cross-cultural beliefs about
633 “depression”. *International Journal of Social Psychiatry* **40**,
634 106–123.
- 635 Goodman LA, Corcoran C, Turner K, Yuan N, Green BL
636 (1998). Assessing traumatic event exposure: general issues
637 and preliminary findings for the Stressful Life Events
638 Screening Questionnaire. *Journal of Traumatic Stress* **11**,
639 521–542.
- 640 Hasin DS, Goodwin RD, Stinson FS, Grant BF (2005).
641 Epidemiology of major depressive disorder: results from the
642 National Epidemiologic Survey on Alcoholism and Related
643 Conditions. *Archives of General Psychiatry* **62**, 1097–1106.
- 644 Jordanova V, Wickramasinghe C, Gerada C, Prince M (2004).
645 Validation of two survey diagnostic interviews among
646 primary care attendees: a comparison of CIS-R and CIDI
647 with SCAN ICD-10 diagnostic categories. *Psychological*
648 *Medicine* **34**, 1013–1024.
- 649 Joutsenniemi K, Martelin T, Martikainen P, Pirkola S,
650 Koskinen S (2006). Living arrangements and mental health
651 in Finland. *Journal of Epidemiology & Community Health* **60**,
652 468–475.
- 653 Kessler RC, Berglund P, Demler O, Jin R, Koretz D,
654 Merikangas KR, Rush AJ, Walters EE, Wang PS (2003). The
655 epidemiology of major depressive disorder: results from the
656 National Comorbidity Survey Replication (NCS-R). *JAMA*
657 **289**, 3095–3105.
- 658 Kish L (1965). *Survey Sampling*. Wiley: New York.
- 659 Lewer D, O’Reilly C, Mojtabai R, Evans-Lacko S (2015).
660 Antidepressant use in 27 European countries: associations
661 with sociodemographic, cultural and economic factors.
662 *British Journal of Psychiatry* **207**, 221–226.
- 663 Lewinsohn PM, Hoberman H, Teri L, Hautzinger M (1985).
664 An integrative theory of depression. In *Theoretical Issues in*
665 *Behavior Therapy* (ed. R. Reiss and R. Bootzin), pp. 331–359.
666 Academic Press: New York.
- 667 Lewis G, Pelosi AJ (1990). *Manual of the Revised Clinical*
668 *Interview Schedule (CIS-R)*. Institute of Psychiatry: London.
- 669 Lorant V, Deliège D, Eaton W, Robert A, Philippot P,
670 Anseau M (2003). Socioeconomic inequalities in
671 depression: a meta-analysis. *American Journal of Epidemiology*
672 **157**, 98–112.
- 673 Maguire A, Moriarty J, O’Reilly D, McCann M (2017).
674 Education as a predictor of antidepressant and anxiolytic
675 medication use after bereavement: a population based
676 record linkage study. *Quality of Life Research* **26**, 1251–1262.
- 677 McClure I (2014). The Script Report ([http://www.thedetail.tv/](http://www.thedetail.tv/articles/new-data-shows-northern-ireland-is-a-world-leader-in-prescription-drug-use)
678 [articles/new-data-shows-northern-ireland-is-a-world-leader-](http://www.thedetail.tv/articles/new-data-shows-northern-ireland-is-a-world-leader-in-prescription-drug-use)
679 [in-prescription-drug-use](http://www.thedetail.tv/articles/new-data-shows-northern-ireland-is-a-world-leader-in-prescription-drug-use)). Accessed 5 December 2017.
- McManus S, Bebbington P, Jenkins R, Brugha T (2016). 680
Mental Health and Wellbeing in England: Adult Psychiatric 681
Morbidity Survey 2014. NHS Digital: Leeds. 682
- McManus S, Meltzer H, Brugha TS, Bebbington PE, 683
Jenkins R (2009). *Adult Psychiatric Morbidity in England,* 684
2007: Results of a Household Survey. The NHS Information 685
Centre for Health and Social Care: UK. 686
- Mental Health Foundation (2005). *Up and Running? Exercise* 687
Therapy and the Treatment of Mild or Moderate Depression in 688
Primary Care. Mental Health Foundation: London. 689
- Mercier A, Auger-Aubin I, Lebeau JP, Schuers E, Boulet P,
690 Hermil JL, Van Royen P, Peremans L (2013). Evidence of
691 prescription of antidepressants for non-psychiatric
692 conditions in primary care: an analysis of guidelines and
693 systematic reviews. *BMC Family Practice* **14**, 55. [https://doi.](https://doi.org/10.1186/1471-2296-14-55)
694 [org/10.1186/1471-2296-14-55](https://doi.org/10.1186/1471-2296-14-55). 695
- Mojtabai R, Olfson M (2011). Proportion of antidepressants
696 prescribed without a psychiatric diagnosis is growing.
697 *Health Affairs* **30**, 1434–1442. 698
- Molnar BE, Buka SL, Kessler RC (2001). Child sexual abuse
699 and subsequent psychopathology: results from the National
700 Comorbidity Survey. *American Journal of Public Health* **91**,
701 753–760. 702
- Monden CW, Metsä-Simola N, Saarioja S, Martikainen P
703 (2015). Divorce and subsequent increase in uptake of
704 antidepressant medication: a Finnish registry based study on
705 couple versus individual effects. *BMC Public Health* **15**, 158. 706
- Munoz-Arroyo R, Sutton M, Morrison J (2006). Exploring
707 potential explanations for the increase in antidepressant
708 prescribing in Scotland using secondary analyses of
709 routine data. *British Journal of General Practice* **56**, 423–428. 710
- Office for National Statistics (2016). Population of the United
711 Kingdom by country of birth and nationality 2015 [dataset]
712 ([https://www.ons.gov.uk/peoplepopulationand](https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/datasets/populationoftheunitedkingdombycountryofbirthandnationality)
713 [community/populationandmigration/international](https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/datasets/populationoftheunitedkingdombycountryofbirthandnationality)
714 [migration/datasets/populationoftheunitedkingdomby](https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/datasets/populationoftheunitedkingdombycountryofbirthandnationality)
715 [countryofbirthandnationality](https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/datasets/populationoftheunitedkingdombycountryofbirthandnationality)). Accessed 5 December 2017. 716
- Organisation for Economic Co-operation and Development
717 (2017). *Health at a Glance: 2017*. Organisation for Economic
718 Co-operation and Development Publishing: Paris. 719
- Pulkki-Räback L, Kivimäki M, Ahola K, Joutsenniemi K,
720 Elovainio M, Rossi H, Puttonen S, Koskinen S, Isometsä E,
721 Lönnqvist J, Virtanen M (2012). Living alone and
722 antidepressant medication use: a prospective study in a
723 working-age population. *BMC Public Health* **12**, 236.
724 <https://doi.org/10.1186/1471-2458-12-236>. 725
- Read J, Gibson KL, Cartwright C (2016). Are older people
726 prescribed antidepressants on the basis of fewer symptoms
727 of depression, and for longer periods of time? A survey of
728 1825 New Zealanders. *Australasian Journal of Ageing* **35**,
729 193–197. 730
- Russell D, Peplau LA, Ferguson ML (1978). Developing a
731 measure of loneliness. *Journal of Personality Assessment* **42**,
732 290–294. 733
- Seedat S, Scott KM, Angermeyer MC, Berglund P,
734 Bromet EJ, Brugha TS, Demyttenaere K, De Girolamo G,
735 Haro JM, Jin R, Karam EG (2009). Cross-national
736 associations between gender and mental disorders in the
737 World Health Organization World Mental Health Surveys.
738 *Archives of General Psychiatry* **66**, 785–795. 739

- 740 **Stagg HR, Jones J, Bickler G, Abubakar I** (2012). Poor uptake
741 of primary healthcare registration among recent entrants to
742 the UK: a retrospective cohort study. *BMJ Open* **2**, e001453.
743 <http://dx.doi.org/10.1136/bmjopen-2012-001453>.
- 744 **Ware JE, Kosinski M, Keller SD** (1996). A 12-Item Short-Form
745 Health Survey: construction of scales and preliminary tests
746 of reliability and validity. *Medical Care* **34**, 220–233.
- 747 **Wig N, Suckman M, Routledge R, Srinvasa Murthy R,**
748 **Ladrigo-Ignacio L, Ibrahim H, Harding T** (1980).
749 Community reaction to mental disorders: a key informant
750 study in three developing countries. *Acta Psychiatrica*
751 *Scandinavia* **61**, 111–126.
- 752 **Williams LM, Debattista C, Duchemin AM, Schatzberg AF,**
753 **Nemeroff CB** (2016). Childhood trauma predicts
754 antidepressant response in adults with major depression: data
755 from the randomized international study to predict optimized
756 treatment for depression. *Translational Psychiatry* **6**, 799.
- 757 **World Health Organization** (1993). *The ICD-10 Classification of*
758 *Mental and Behavioural Disorders: Diagnostic Criteria for*
759 *Research*. World Health Organisation: Geneva.
- 760 **Zeiss AM, Lewinsohn PM, Rohde P, Seeley JR** (1996).
761 Relationship of physical disease and functional impairment
762 to depression in older people. *Psychology and Ageing* **11**,
763 572–581.