



## City Research Online

### City, University of London Institutional Repository

---

**Citation:** Adji, A., Rhead, R., McManus, S. & Shoham, N. (2023). Associations between common mental disorders and menopause: cross-sectional analysis of the 2014 Adult Psychiatric Morbidity Survey. *BJPsych Open*, 9(4), e103. doi: 10.1192/bjo.2023.82

This is the published version of the paper.

This version of the publication may differ from the final published version.

---

**Permanent repository link:** <https://openaccess.city.ac.uk/id/eprint/30776/>

**Link to published version:** <https://doi.org/10.1192/bjo.2023.82>

**Copyright:** City Research Online aims to make research outputs of City, University of London available to a wider audience. Copyright and Moral Rights remain with the author(s) and/or copyright holders. URLs from City Research Online may be freely distributed and linked to.

**Reuse:** Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge. Provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

---

---

---

City Research Online:

<http://openaccess.city.ac.uk/>

[publications@city.ac.uk](mailto:publications@city.ac.uk)

---

## Short Report

# Associations between common mental disorders and menopause: cross-sectional analysis of the 2014 Adult Psychiatric Morbidity Survey

Amira Adji, Rebecca Rhead, Sally McManus and Natalie Shoham

**Summary**

We investigated whether women who participated in a household survey in England were more likely to screen positive for possible generalised anxiety disorder and depression during and after menopause. We used logistic regression in secondary cross-sectional analyses of 1413 participants from the 2014 Adult Psychiatric Morbidity Survey data, adjusting for potential confounders (including age, deprivation score and chronic disease).

We found that participants who were post-menopausal were more likely to screen positive for possible depression compared with participants who were pre-menopausal (3.9% v. 1.7%; adjusted odds ratio 3.91, 95% CI 1.23–12.46), but there was no association with perimenopause. We found no evidence of an association between menopausal stage and possible generalised anxiety disorder or symptom score. Clinicians should be aware of the association between menopause and depression,

to best support women. Future research could focus on to what extent associations are driven by somatic features, and how this might be modified.

**Keywords**

Menopause; depression; generalised anxiety disorder; Adult Psychiatric Morbidity Survey; women's health.

**Copyright and usage**

© The Author(s), 2023. Published by Cambridge University Press on behalf of the Royal College of Psychiatrists. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted re-use, distribution and reproduction, provided the original article is properly cited.

Evidence suggests that depressive symptoms can increase among perimenopausal and post-menopausal women,<sup>1–5</sup> although findings are mixed regarding clinical depression.<sup>1</sup> Depressive symptoms have been found to associate with both hormonal levels and bothersome physical symptoms during perimenopause.<sup>6,7</sup> Few studies have investigated the relationship between generalised anxiety disorder and menopause, and results have been inconclusive overall.<sup>8</sup> Nevertheless, one study in China found an association between increased anxiety symptoms and both peri- and post-menopause,<sup>9</sup> and a US study found that the perimenopausal period was associated with new-onset high anxiety levels.<sup>10</sup> There have been few UK studies to compare depression or anxiety across different menopausal stages.

The aim of this study was to investigate the odds of screening positive for possible depression and generalised anxiety disorder (GAD) in women in the menopausal stages relative to the pre-menopausal stage. Our study builds upon previous work by using a nationally representative household survey. Our hypothesis was that women in the pre- and perimenopausal stages would have a higher chance of screening positive for both outcomes, and would report higher levels of anxiety and depression symptoms.

**Method****Sample**

We conducted a secondary analysis of data from the Adult Psychiatric Morbidity Survey (APMS) 2014.<sup>11</sup> The APMS is a household survey conducted once every 7 years for the purpose of understanding the prevalence of mental health problems in England. Data was collected throughout 2014. The sampling process is described in detail elsewhere.<sup>11</sup> We restricted analyses to participants aged 40–59 years who reported female gender and answered menopause-related questions (below).

**Exposure variable**

Data was gathered by computer-assisted self-interviewing. Eligible participants were asked 'Over the last 12 months, to what extent do you think you have been through or are going through the menopause?' Participants who answered 'Yes, I have been through menopause' were defined as being in the post-menopause stage; 'Yes, I am going through menopause' as being in the perimenopause stage; and 'No, not yet' as being in the pre-menopause stage. We also combined the peri- and post-menopausal stages in separate analyses, for comparability with previous research.

**Outcome variables**

Anxiety and depression symptoms were assessed in the face to face part of the interview, using the Clinical Interview Schedule-Revised (CIS-R).<sup>12</sup> The interviewers used computer-assisted self-interviewing to ask if participants experienced symptoms in the past 7 days. Participants screened positive for possible depression or GAD if they met ICD-10<sup>13</sup> criteria for moderate or severe depression or GAD.

We also used total CIS-R score after subtracting the scores for irritability, fatigue, somatic symptoms and sleep problems, which could be inherent symptoms of menopause.

**Covariates**

We adjusted results for several covariates that could confound associations: continuous age in years; quintile of Index of Multiple Deprivation score;<sup>14</sup> self-reported presence of chronic disease (asthma, cancer, epilepsy, diabetes and/or high blood pressure in the past 12 months);<sup>15,16</sup> smoking status (none,  $\leq 14$  average daily number of cigarettes and  $\geq 15$  average daily number of cigarettes);<sup>17,18</sup> Alcohol Use Disorders Identification Test score;<sup>19–21</sup> and educational level (no qualifications, foreign/other, GCSE or equivalent, A level, vocational and degree).<sup>19,22</sup>

**Table 1** Characteristics of analytic sample according to menopausal stage

Characteristics, <i>N</i> = 1413	Menopause status, <i>n</i> (weighted %)			Total
	Pre-menopausal, <i>n</i> = 626 (45.2%)	Perimenopausal, <i>n</i> = 409 (29.4%)	Post-menopausal, <i>n</i> = 378 (25.5%)	
Age, years				
40–44	307 (49.9)	25 (6.1)	7 (1.4)	339 (24.7)
45–54	304 (47.6)	297 (71.2)	153 (41.1)	754 (52.8)
55–59	15 (2.6)	87 (22.8)	218 (57.5)	320 (22.5)
Screened positive for moderate to severe depression				
Present	16 (1.7)	14 (2.9)	20 (3.9)	50 (2.6)
Screened positive for generalised anxiety disorder				
Present	43 (5.9)	35 (7.6)	31 (6.6)	109 (6.6)
Quintile of Index of Multiple Deprivation score				
0.53–8.4	145 (22.4)	81 (19.2)	75 (18.9)	301 (20.6)
8.49–13.0	136 (21.7)	94 (23.9)	90 (26.3)	320 (23.5)
13.79–21	128 (20.2)	94 (22.2)	73 (19.7)	295 (20.6)
21.35–34	113 (17.9)	73 (18.0)	76 (20.0)	262 (18.4)
34.17–87	104 (17.7)	67 (16.8)	64 (15.2)	235 (16.8)
Education level				
No qualifications/other	74 (13.8)	46 (12.3)	79 (21.5)	199 (15.3)
GCSE or equivalent	164 (27.0)	138 (34.9)	123 (32.6)	425 (30.7)
A level	109 (16.2)	71 (16.7)	52 (14.4)	232 (15.9)
Vocational	51 (7.3)	45 (11.6)	27 (7.7)	123 (8.7)
Degree	219 (35.8)	106 (24.6)	90 (23.7)	415 (29.4)
Smoking				
None	287 (46.7)	166 (41.7)	147 (40.7)	600 (43.7)
≤14 average daily number of cigarettes	299 (47.5)	209 (49.1)	200 (52.4)	708 (49.2)
≥15 average daily number of cigarettes	40 (5.8)	34 (9.3)	31 (6.9)	105 (7.1)
Chronic disease				
Present	116 (19.2)	116 (27.6)	108 (28.8)	340 (24.1)
AUDIT score, median (interquartile range)	3 (1–6)	3 (1–6)	3 (1–5)	3 (1–6)

AUDIT, Alcohol Use Disorders Identification Test.

## Statistical analyses

We used logistic regression where the outcome was binary, and linear regression for continuous CIS–R score. All analyses were conducted in Stata version 17 for Mac and Windows.<sup>23</sup> We used original APMS survey weighting, using the *svy* command in Stata, to account for selection and non-response bias. We report unweighted absolute numbers with weighted percentages. We conducted all analyses as complete-case analyses, unadjusted and adjusted for putative confounding variables.

## Results

Of the 7546 participants who were surveyed for the APMS 2014, 4488 reported female gender, 1510 were aged 40–59 years and 1413 (93.6% of those eligible) had answered all relevant menopause-related questions and constituted the analytic sample. Among these, 626 (45.2%) were classed as pre-menopausal; 409 (29.4%) were perimenopausal and 378 (25.5%) were post-menopausal. Further details can be seen in Table 1. The post-menopausal group tended to be older and have no qualifications compared with the other two groups.

### Association between menopause stage and depression

Participants who were post-menopausal were more likely to screen positive for moderate to severe depression (3.9%) than those who were pre-menopausal (1.7%; odds ratio 2.31, 95% CI 1.10–4.89;  $P = 0.028$ ) (Supplementary Table 1 available at <https://doi.org/10.1192/bjo.2023.82>). Notably, the prevalence in women who were post-menopausal was similar to the overall rate in women in the 2014 APMS (3.7%), and higher than that for men (2.9%).<sup>24</sup> Following adjustment, both the size of the effect estimate and the statistical evidence of the association were increased (adjusted

odds ratio 3.91, 95% CI 1.23–12.46;  $P = 0.027$ ) because of negative confounding by age and alcohol dependence score. We found no statistically significant association between perimenopause and screening positive for depression before (odds ratio 1.69, 95% CI 0.73–3.92;  $P = 0.222$ ) or after adjustment (adjusted odds ratio 2.17, 95% CI 0.89–5.28;  $P = 0.089$ ). When combining peri- and post-menopausal groups, evidence of an association with possible depression persisted (before adjustment: odds ratio 1.98, 95% CI 1.00–3.90,  $P = 0.049$ ; after adjustment: odds ratio 2.49, 95% CI 1.11–5.59,  $P = 0.027$ ).

### Association between menopause stage and GAD

We found no statistical evidence of an association between menopause and screening positive for GAD, either before adjustment (perimenopausal group: odds ratio 1.33, 95% CI 0.78–2.27,  $P = 0.299$ ; post-menopausal group: odds ratio 1.14, 95% CI 0.66–1.96,  $P = 0.640$ ) or after adjustment (perimenopausal group: adjusted odds ratio 1.57, 95% CI 0.81–3.04,  $P = 0.182$ ; post-menopausal group: adjusted odds ratio 1.43, 95% CI 0.64–3.21,  $P = 0.383$ ) (Supplementary Table 1). There was also no evidence of association when menopausal groups were combined (before adjustment: odds ratio 1.24, 95% CI 0.78–1.96,  $P = 0.360$ ; after adjustment: odds ratio 1.54, 95% CI 0.80–2.95,  $P = 0.195$ ).

### Association between menopause and CIS–R scores

We found no statistical evidence for an association between total CIS–R score based on non-menopausal symptoms and menopause before adjustment (perimenopausal group: mean increase in score 0.46, 95% CI –0.28 to 1.19,  $P = 0.223$ ; post-menopausal group: mean increase in score 0.55, 95% CI –0.15 to 1.25,  $P = 0.126$ ) or after adjustment (perimenopausal group: mean increase in score 0.52, 95% CI –0.27 to 1.32,  $P = 0.197$ ; post-menopausal group:

mean increase in score 0.76, 95% CI  $-0.22$  to  $1.74$ ,  $P = 0.129$ ) (Supplementary Table 2). There was no evidence of association between CIS-R score and menopause when menopausal groups were combined (before adjustment: odds ratio 0.50, 95% CI  $-0.09$  to  $1.08$ ,  $P = 0.094$ ; after adjustment: odds ratio 0.59, 95% CI  $-0.17$  to  $1.34$ ,  $P = 0.129$ ).

## Discussion

### Main findings

Our results showed that women who are post-menopausal are more likely to screen positive for possible depression than women who are pre-menopausal. However, we found no significant association between perimenopause and possible depression, or between menopause and GAD, or total CIS-R score after accounting for features of menopause.

### Strengths and limitations

Strengths of this study included the use of a nationally representative sample and computer-assisted self-interviewing, which may have encouraged participants to be more honest in reporting sensitive topics.

A key limitation is cross-sectional design, which means that the temporal relationship between variables cannot be elucidated. It is possible that stress associated with depression and anxiety might influence the timing of menopause onset. The numbers who screened positive for GAD and depression were small, which reduced the power to detect clinically relevant associations and precluded further subgroup analysis (e.g. by ethnicity, younger age group or severity of symptoms). Results from the CIS-R were not validated by clinical interview, and this, alongside the inclusion of inherent features of menopause in the outcome measure for some of our analyses, could have led to false positives, or conversely false negatives if symptoms of depression were dismissed as symptoms of menopause. Menopause stage was also determined only by self-report, which could have led to some misclassification. We were unable to adjust for use of hormone replacement therapy, age at menopause onset or surgical menopause. Further research could make use of electronic health records to examine such objective measures, as well as mental health diagnoses and prescriptions.

### Interpretation

There is some evidence that rates of depression improve several years post-menopause, making our finding that post-menopause was the only period of elevated risk surprising.<sup>22</sup> One possible reason that we did not find an association between menopause stage and GAD is that menopausal anxiety might differ from diagnostic criteria for GAD, and may have an irregular temporal pattern or unpredictable onset, meaning that it could be hard to detect in cross-sectional studies.<sup>25</sup> Another possibility, given that we found no association with CIS-R score after removing somatic features of menopause, is that the apparent rise in common mental disorders in this phase is driven by inherent features of menopause, such as night sweats. Future longitudinal research could focus on to what extent this is true and how the association with depression might be modified. Healthcare professionals should be aware of the increased risk of depressive symptoms after menopause.

**Amira Adji**, Division of Psychiatry, University College London, UK; **Rebecca Rhead** , Department of Psychological Medicine, Institute of Psychiatry, Psychology and Neuroscience, King's College London, UK; **Sally McManus**, Violence and Society Centre, City, University of London, UK; National Centre for Social Research, UK; **Natalie Shoham** , Division of Psychiatry, University College London, UK; and Camden and Islington NHS Foundation Trust, St Pancras Hospital, UK

**Correspondence:** Natalie Shoham. Email: [natalie.shoham.16@ucl.ac.uk](mailto:natalie.shoham.16@ucl.ac.uk)

First received 6 Mar 2023, final revision 10 May 2023, accepted 12 May 2023

## Supplementary material

Supplementary material is available online at <https://doi.org/10.1192/bjo.2023.82>

## Data availability

The data that support the findings of this study are available from NHS Digital. Restrictions apply to the availability of these data, which were used under licence for this study.

## Author contributions

N.S. and R.R. suggested carrying out this study. A.A. planned the analyses with N.S. and R.R., carried out initial analyses and drafted the manuscript. S.M. provided feedback on the draft and suggested amendments, having originally proposed inclusion of menopause questions in the Adult Psychiatric Morbidity Survey. All authors edited the manuscript.

## Funding

The authors did not receive any external funding to conduct this research. S.M. is supported by the UK Prevention Research Partnership (number MR-VO49879/1).

## Declaration of interest

N.S. is a trainee editor with *BJPsych Open*, but was not involved in the peer-review process or decision-making process regarding publication.

## References

- Freeman EW. Depression in the menopause transition: risks in the changing hormone milieu as observed in the general population. *Womens Midlife Health* 2015; **1**: 2.
- Mulhall S, Ansel R, Anstey KJ. Variation in symptoms of depression and anxiety in midlife women by menopausal status. *Maturitas* 2018; **108**: 7–12.
- Bromberger JT, Matthews KA, Schott LL, Brockwell S, Avis NE, Kravitz HM, et al. Depressive symptoms during the menopausal transition: the study of women's health across the nation (SWAN). *J Affect Disord* 2007; **103**(1–3): 267–72.
- Bromberger JT, Kravitz HM, Chang YF, Cyranowski JM, Brown C, Matthews KA. Major depression during and after the menopausal transition: study of women's health across the nation (SWAN). *Psychol Med* 2011; **41**(9): 1879–88.
- Freeman EW, Sammel MD, Lin H, Nelson DB. Associations of hormones and menopausal status with depressed mood in women with no history of depression. *Arch Gen Psychiatry* 2006; **63**(4): 375–82.
- Freeman EW, Sammel MD, Liu L, Gracia CR, Nelson DB, Hollander L. Hormones and menopausal status as predictors of depression in women in transition to menopause. *Arch Gen Psychiatry* 2004; **61**(1): 62–70.
- Campbell KE, Gorelik A, Szoek CE, Dennerstein L. Mid-life predictors of late-life depressive symptoms; determining risk factors spanning two decades in the women's healthy ageing project. *Womens Midlife Health* 2020; **6**: 2.
- Bryant C, Judd FK, Hickey M. Anxiety during the menopausal transition: a systematic review. *J Affect Disord* 2012; **139**(2): 141–8.
- Tang R, Luo M, Li J, Peng Y, Wang Y, Liu B, et al. Symptoms of anxiety and depression among Chinese women transitioning through menopause: findings from a prospective community-based cohort study. *Fertil Steril* 2019; **112**(6): 1160–71.
- Bromberger JT, Kravitz HM, Chang Y, Randolph JF Jr, Avis NE, Gold EB, et al. Does risk for anxiety increase during the menopausal transition? Study of women's health across the nation. *Menopause* 2013; **20**(5): 488–95.
- McManus S, Bebbington PE, Jenkins R, Morgan Z, Brown L, Collinson D, et al. Data resource profile: Adult Psychiatric Morbidity Survey (APMS). *Int J Epidemiol* 2020; **49**(2): 361–2e.
- Lewis G, Pelosi AJ, Araya R, Dunn G. Measuring psychiatric disorder in the community: a standardized assessment for use by lay interviewers. *Psychol Med* 1992; **22**(2): 465–86.
- World Health Organization (WHO). *The ICD-10 Classification of Mental and Behavioural Disorders*. WHO, 1993.
- Ministry of Housing Communities & Local Government. *English Indices of Deprivation 2010*. Department for Communities and Local Government, 2011 (<https://www.gov.uk/government/statistics/english-indices-of-deprivation-2010>).

- 15 Roa-Díaz ZM, Raguindin PF, Bano A, Laine JE, Muka T, Glisic M. Menopause and cardiometabolic diseases: what we (don't) know and why it matters. *Maturitas* 2021; **152**: 48–56.
- 16 Russell L, Broderick G, Taylor R, Fernandes H, Harvey J, Barnes Z, et al. Illness progression in chronic fatigue syndrome: a shifting immune baseline. *BMC Immunol* 2016; **17**: 3.
- 17 Parazzini F. Determinants of age at menopause in women attending menopause clinics in Italy. *Maturitas* 2007; **56**(3): 280–7.
- 18 NHS England. *Stopping Smoking for Your Mental Health*. NHS England, 2021 (<https://www.nhs.uk/live-well/quit-smoking/stopping-smoking-mental-health-benefits/>).
- 19 Ceylan B, Özerdoğan N. Factors affecting age of onset of menopause and determination of quality of life in menopause. *Turk J Obstet Gynecol* 2015; **12** (1): 43–9.
- 20 Kuria MW, Ndetei DM, Obot IS, Khasakhala LI, Bagaka BM, Mbugua MN, et al. The association between alcohol dependence and depression before and after treatment for alcohol dependence. *ISRN Psychiatry* 2012; **2012**: 482802.
- 21 Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. *Addiction* 1993; **88**(6): 791–804.
- 22 Bromberger JT, Epperson CN. Depression during and after the perimenopause: impact of hormones, genetics, and environmental determinants of disease. *Obstet Gynecol Clin North Am* 2018; **45**(4): 663–78.
- 23 StataCorp. *Stata Statistical Software: Release 17*. StataCorp, 2021 (<https://www.stata.com>).
- 24 McManus S, Bebbington P, Jenkins R, Brugha T (eds). *Adult Psychiatric Morbidity Survey 2014: Mental health and Wellbeing in England*. NHS Digital, 2016 (<https://www.gov.uk/government/statistics/adult-psychiatric-morbidity-survey-mental-health-and-wellbeing-england-2014>).
- 25 Vesco KK, Haney EM, Humphrey L, Fu R, Nelson HD. Influence of menopause on mood: a systematic review of cohort studies. *Climacteric* 2007; **10**(6): 448–65.

