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Gendered associations between time-related underemployment and mental health: longitudinal evidence from 21 waves of cohort data

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ABSTRACT

Background Underemployment is an increasing feature of global labour markets. However, the mental health impacts of underemployment remain relatively under-researched. Longitudinal evidence is particularly sparse, as is accounting for gender differences in the association. Addressing key gaps, this study examines the association between time-related underemployment and mental health in Australian adults.

Methods Pooled panel data from 21 waves (2002–2022) of the Household, Income and Labour Dynamics in Australia survey (n=18 288 participants, 124 531 observations) was used. Fixed-effects linear regression and Mundlak adjustment modelling was conducted to examine how time-related underemployment (not underemployed, underemployed 1–5, 6–10, 11–20 and ≥21 hours) was associated with 5-item mental health scale, with adjustment for time-varying confounders.

Results A stepwise (or dose-dependent) association was observed between increasing time-related underemployment and mental health for both genders, with the strongest association observed in those underemployed by ≥21 hours for both women (−1.88, 95% CI −3.09 to −0.67) and men (−2.24, 95% CI −3.59 to −0.89). Some gender differences were observed. Most notably, more women in our sample were underemployed compared with men.

Conclusions Addressing rising underemployment in labour markets has the potential to improve population mental health for everyone. Furthermore, targeted social policy to reduce gendered exposure to underemployment in Australia is also key to mental health gains in working-age women.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Current evidence examining the relationship between underemployment and mental health is scant, with extant studies reporting varied results.

WHAT THIS STUDY ADDS

⇒ Using nationally representative longitudinal data, this study provides evidence of a dose-dependent relationship between time-related underemployment and mental health for both genders and highlights the differential exposure of women to underemployment in Australia.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study emphasises the need for governments to prioritise policies that reduce underemployment — not only to harness the untapped potential of the workforce and boost economic productivity, but also to achieve meaningful improvements in population mental health.

INTRODUCTION

Underemployment is a persistent and growing phenomenon globally.[1–3] Yet, in comparison to the abundance of research examining the impact of unemployment, underemployment is relatively under-researched.[2] This lack of attention has been critiqued, given that examining unemployment alone is insufficient to understand the shortcomings in the labour market.[4] Importantly, underemployment can also significantly influence people's lives, affecting financial, social and health outcomes.[2 5 6] In the context of this study, we were interested in the implications of underemployment for mental health. Mental health is an important public health issue, with depressive and anxiety disorders contributing heavily to the global disease burden.[7] Crucially, employment is a dynamic, and therefore, modifiable, social determinant of mental health.[8] As such, examining the effect of underemployment on mental health has the potential to highlight areas where improvements in population health may lie.

Underemployment is the underutilisation of the productive capacity of the employed population.[4] It describes a variety of different employment situations and, as such, is a broad and multidimensional term.[9] Typically, underemployment can be either time-related underemployment (where a person's working hours are insufficient or less than they are willing and available to do) or other (which includes skill-related underemployment, or working below one's qualifications or skill set, and income-related underemployment when a feature of the worker's workplace or employer causes their salary to be lower than it would be otherwise).[2 4] Underemployment is considered a psychosocial work stressor,[9] and there is some evidence that it is negatively associated with mental health. However, while some longitudinal studies have demonstrated an association between time-related underemployment and poorer mental health,[10–12] others have found no association.[5 13] Other studies have reported varied

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results. For example, a 2003 study found no association between 'hours-underemployment' and depression symptoms, but a positive association between 'income-underemployment' and depression.[5] Yet, it is notable that both studies reporting null findings for time-related underemployment acknowledged low power as a limitation of their analyses and were between-person comparisons,[5 13] whereas those demonstrating an association had large sample sizes and used within-person comparisons or propensity score matching.[10–12] Meanwhile, two recent longitudinal studies examined subjective underemployment constructs (eg, underpayment, involuntary temporary or part-time work, preferring more work hours and overqualification/skills-based underemployment).[14 15] While one study demonstrated that preferring more work hours and being overskilled in current job were both associated with poorer mental health,[15] the other found only involuntary temporary work (out of 7 measures) predicted greater symptoms of psychological distress over time.[14] Ultimately, the effect of underemployment on mental health remains under-researched, with further robust studies needed to substantiate the impact on mental health.

Importantly, underemployment is gendered. One reason for this is that underemployment rates are generally higher among groups that have a greater proportion of people working part time.[16] As such, women are over-represented.[16] Marginalised groups (including women) are also considered more likely to experience underemployment due to resource deprivation and other intersecting structural inequalities (eg, classism, racism, sexism).[14] In Australia, while underemployment is rising for everyone (accounting for almost 12% of its 14.5 million employed people in 2024),[1 16] there is a persistent gender gap in underemployment.[17] Prime-working age women (25–44 years) are underemployed for three times longer than men of the same age.[16] A key reason for this is the constrained choices and labour-force trade-offs that women experience due to their disproportionately high unpaid care and labour responsibilities compared with men.[18 19] Women not only trade-off hours (time-related underemployment) but are also over-represented in other forms of underemployment, such as income-related underemployment (lower paying jobs) and skill-related underemployment (often with experience and qualifications that exceed those required for their current role).[1 20] Pertinent to the rationale for this paper, the majority of extant underemployment and health research does not consider this differential exposure nor examine how the association may differ between genders. The latter is important as although (or perhaps because) underemployment is more common among women, it could be that the mental health implications of underemployment are greater for men due to strong gender norms and expectations surrounding masculinity and the resultant pressures on men to be providers/main breadwinners.[21 22]

This study examines the association between time-related underemployment and mental health in prime working-age (25–64 years) Australian women and men. Using 21 waves of longitudinal data, this study represents an update on earlier Australian work that used 13 waves of the same dataset,[10] with some important distinctions. Specifically, this study is unique in applying a gendered lens, stratifying by gender, as well as controlling for covariates considered common causes of the association between underemployment and mental health, such as unpaid labour and household configuration. Moreover, an update on this work is timely given that underemployment has been rising in recent decades in Australia[1] and has been identified as a key concern for government.[23] Despite this focus, attention has centred on understanding the economic impact of labour underutilisation,[1 23] and not health or welfare-related concerns. Examining potential population health effects of underemployment, therefore, represents a key gap that this study sought to address.

METHODS

Data and analysis sample

This study uses longitudinal panel data from the Household, Income and Labour Dynamics in Australia (HILDA) survey. HILDA is a nationally representative population-based cohort study of over 7000 Australian households that has been running since 2001.[24] A rolling and dynamic panel dataset, HILDA collects detailed information annually on a wide range of family and labour market dimensions, as well as health and economic measures.[24] Data are collected via face-to-face interviews and a self-completion questionnaire from household members over the age of 15. HILDA's response rates are comparatively high for a panel data set (>90% for those continuing in the survey).[25] Importantly, a top-up sample of over 2000 households was added in 2011 to ensure representativeness of the Australian population.[25] Since 2011, over 17 000 individuals have contributed to the annual HILDA waves. Given the observational nature of this study, we accordingly followed the Strengthening the Reporting of Observational Studies in Epidemiology guidelines in conducting this research (see online supplemental table S1).

The variables of interest in this study were all available from wave 2 of HILDA. As such, analysis for this study used pooled data from 21 annual waves of HILDA (2002–2022), with the population of interest restricted to employed adult Australians aged 25–64 years. Of the 44 460 participants (434 947 observations) in waves 2002–2022, there were 25 577 participants (233 103 observations). Of those, 19 972 (161 947 observations) were employed. The resultant analytical sample across all contributing waves, after excluding participants with missing data from variables of interest, was 18 288 participants (124 531 observations), 9312 women and 9156 men. Figure 1 outlines

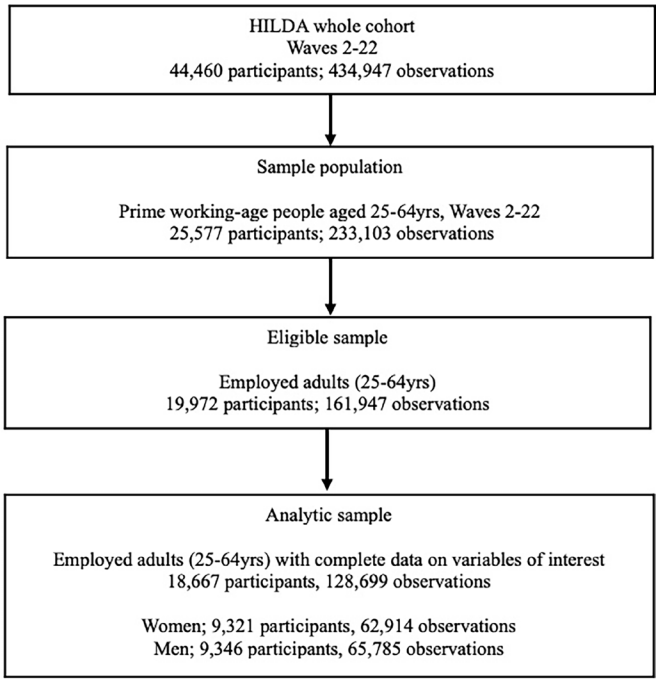


Figure 1 Flow chart showing selection of analytical sample. HILDA, Household, Income and Labour Dynamics in Australia.

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the selection of participants into the analytical sample. Overall, there was minimal missingness with 6.5% participants in the eligible sample missing from the analytical sample (complete case set) samples (figure 1). See online supplemental text S2 and online supplemental tables S2a,b for missingness description and assessment.

Exposure variable: underemployment

HILDA collects information on job characteristics and opinions on working conditions and hours in every annual wave. We constructed a detailed measure of time-related underemployment based on previous research using HILDA,[10] which aligns with how the Australian Bureau of Statistics defines underemployment[16]—whereby one's work hours are less than what that individual would prefer and is available for. For a person to be considered underemployed in our research, they had to satisfy the following inclusion criteria:

1. They were employed.
2. In a usual week, they worked less than or equal to 38 hours per week.
3. They would prefer to work more hours if they were available.

In addition, participants were asked to nominate the number of hours they would like to work (if these were available to them). From this, we were able to deduce the number of hours of underemployment by calculating the difference between a person's hours worked in a usual week and the hours they would prefer to work per week. From this, and in line with previous research,[10] we then created a five-category underemployment variable as follows:

- Did not experience any underemployment (reference category).
- Would prefer to work an additional 1–5 hours a week.
- Would prefer to work an additional 6–10 hours a week.
- Would prefer to work an additional 11–20 hours a week.
- Would prefer to work an additional 21 hours a week or more.

We note that these categories complemented the observed distribution of the histogram of preference for more hours and that, among our sample of underemployed persons, the majority reported wanting to work an average of 12 additional hours per week.

Outcome variable: mental health

HILDA collects data on a wide range of health outcomes, including mental health. The 5-item mental health scale (MHI-5), part of the internationally accepted Short Form-36 Health Survey,[26] is one such measure. Assessing symptoms of depression and anxiety as well as positive markers of mental health in the 4 weeks prior to the survey, the MHI-5 is both a validated measure of depression as well as an effective screening instrument for other common mental health disorders.[27 28] Importantly, the tool has also demonstrated validity within the Australian and HILDA context.[25 29] The MHI-5 is expressed on a 0–100 scale, with lower scores indicating poorer mental health.[26] In this study, the MHI-5 score was analysed as a continuous numerical variable.

Covariates

Based on the literature, the following variables were considered plausible prior common causes of both underemployment and mental health and so were included in our models as confounders: age, age^2, year, state, equivalised household disposable income (quintiles), educational attainment (school not completed, year 12, diploma or certificate, bachelor's degree and above), long-term health condition or disability (yes, no), place of residence (city, regional, remote), ethnicity/Indigenous status (non-indigenous Australian/Indigenous or Torres Strait Islander Australian, other English-speaking country, non-English-speaking country), unpaid labour time (household work, childcare, other care, outdoor tasks (all in hours/week)) and household configuration (concerning partner status and presence of dependent children).

Statistical analysis

All statistical analyses were performed using Stata V.18.0. Descriptive analysis was followed by two types of statistical analyses to examine the longitudinal association between underemployment and mental health. Given the average lower working hours of women compared with men, as well as their disproportionate share of unpaid labour, all analyses were conducted separately for men and women. The first and main model was a fixed effects linear regression model to examine how within-person changes in underemployment status were associated with changes in mental health. Fixed effect models are regression models where the group means are fixed (non-random), in contrast to a random effects model where the group means are a random sample from a population.[30 31] This is because fixed effect regression models use only within-person observations (of the same individual) that change over time, so each person is only being compared with themselves, effectively serving as their own control, and maximising exchangeability of the sample.[30 31] This provides an important benefit with respect to estimating causal effects. Using fixed effects modelling lessens potential confounding bias given unobserved time-invariant factors (such as ethnicity, personality type and individual negative affectivity) that may influence employment and mental health are accounted for.[30 31] Mundlak regression modelling was then performed as a secondary sensitivity analysis for our main analysis. Application of the Mundlak adjustment is a unique analytical technique that allows the user to exploit the strengths of both a within-person as well as a between-person approach.[32 33] Thus, we were able to verify the results of our fixed-effects model while also presenting results that closely mirror a random-effects model where groups of those who are underemployed can be compared with those who are not underemployed (between-person effect).

RESULTS

Descriptive results

The characteristics of our sample are presented in table 1. While the mean age of our female and male sample was similar, there were key gender differences evident in several variables of interest. Women's mean mental health scores were 2 points lower than those of men (74 vs 76). A higher percentage of men were not classified as underemployed (90%) compared with women (85%). There was also a higher percentage of women in each of the underemployment categories compared with men, with the greatest difference observed in the 6–10 hours underemployed groups (5% vs 2.5%). Mean unpaid labour hours were considerably higher for the female sample, with women doing an average of 12 hours/week more than men. A higher percentage of women than men lived in households as a lone parent with dependent children (6% vs 1%) or lone parent with non-dependent children (5% vs 2.5%). A third of men and 39% of women resided in coupled households with dependent children. While more men than women had a diploma/certificate (41% vs 30%), a higher proportion of women held a bachelor's degree or above (41% vs 31%). The distribution for ethnicity,

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Table 1 Sample characteristics (reported as pooled observations)

	Female	Male
Participants, n (%)	9321 (50)	9346 (50)
Observations, n (%)	62 914 (49)	65 785 (51)
Age, years (mean±SD)	42.6±10.8	42.8±10.9
Mental health, MHI-5 score* (mean± D)	73.7±16.4	75.7±15.7
Underemployment status, n (%)		
Not underemployed	53 324 (84.8)	59 453 (90.4)
1–5 hours	3653 (5.8)	2782 (4.2)
6–10 hours	3112 (4.9)	1547 (2.4)
11–20 hours	2202 (3.5)	1411 (2.1)
21 hours and over	623 (1.0)	592 (0.9)
Unpaid labour, hours/week (mean±SD)		
Total unpaid labour (inclusive of all below)	31.9±25.3	20.4±15.9
Household work	17.8±12.2	9.4±7.4
Childcare	10.5±17.5	6.1±9.6
Care for elders/disabled	0.9±5.3	0.5±3.7
Outdoor tasks	2.6±3.9	4.4±5.2
Household structure, n (%)		
Couple no children	17 646 (28.1)	17 843 (27.1)
Couple with children <15	20 512 (32.6)	25 600 (38.9)
Couple with children >15 (dependent students or non-dependent children)	8517 (13.5)	8854 (13.5)
Lone person	7279 (11.6)	8928 (13.6)
Lone parent with children <15	3624 (5.8)	624 (1.0)
Lone parent with children >15 (dependent students or non-dependent children)	3000 (4.8)	1638 (2.5)
Other (other related no children <15, group household unrelated, multifamily)	2336 (3.7)	22 298 (3.5)
Educational attainment, n (%)		
School not completed	10 735 (17.1)	10 346 (15.7)
Year 12	7677 (12.2)	7834 (11.9)
Diploma/certificate	18 727 (29.8)	27 197 (41.3)
Bachelor's degree and above	25 775 (41.0)	20 408 (31.0)
Ethnic background, n (%)		
Non-indigenous Australian	48 746 (77.5)	50 292 (76.5)
Indigenous/Torres Strait Islander Australian	1132 (1.8)	1056 (1.6)
Other English-speaking country	5642 (9.0)	7166 (10.9)
Non-English-speaking country	7394 (11.8)	7271 (11.1)
Equivalised household disposable income, quintiles, n (%)		
1st quintile	3052 (4.9)	3120 (4.7)
2nd quintile	7855 (12.5)	8750 (13.3)
3rd quintile	13 564 (21.6)	13 901 (21.1)
4th quintile	17 516 (27.8)	17 919 (27.2)
5th quintile	20 927 (33.3)	22 095 (33.6)
Long-term health condition, disability or impairment, n (%)		
Yes	11 239 (17.9)	11 210 (17.0)
No	51 239 (82.1)	54 575 (83.0)
Place of residence, n (%)		
Major city	41 167 (65.4)	42 837 (65.1)
Regional/rural	20 763 (33.0)	21 868 (33.2)
Remote	984 (1.6)	1080 (1.6)
Labour force characteristics		
Paid work hours, hours/week in all jobs (mean±SD)	32.9±13.3	43.2±12.2
Employment arrangement, n (%)		
Permanent full time	25 770 (41.3)	39 930 (60.9)
Permanent part time	13 864 (22.2)	2010 (3.1)
Casual and labour hire	9805 (15.7)	6156 (9.4)
Fixed term	5598 (9.0)	4170 (6.4)
Self-employed	7391 (11.8)	13 254 (20.2)

*The MHI-5 is expressed on a 0–100 scale, with lower scores indicating poorer mental health.
MHI-5, 5-item mental health scale.

household income, long-term health condition and place of residence was similar for both our male and female sample. Table 1 also provides some labour force characteristics for our sample. Mean paid working hours were higher for men than women (43 hours/week vs 33 hours/week). Considerably more men than women were employed in permanent full-time jobs (61% vs 41%). The percentage of women in permanent part-time work was much higher than for men (22% vs 3%). Women were also overrepresented in casual (16% vs 9%) and fixed term work (9% vs 6%), while more men were self-employed (20% vs 12%).

Analytical results

Fixed effects model

Table 2 presents the crude and adjusted coefficients from the linear fixed effects regression for the association between our categories of underemployment and mental health, stratified by gender. For both men and women, our results show a stepwise association between increasing severity of time-related underemployment and poorer mental health. In the adjusted models, compared with those who were not underemployed, there was only weak evidence of an association between 1 and 5 hours of underemployment and poorer mental health (women −0.40, 95% CI −0.86 to 0.05; men −0.41, 95% CI −0.89 to 0.08). For those underemployed by 6–10 hours, an association was observed for women (−0.73, 95% CI −1.24 to –0.22), but not for men (−0.35, 95% CI −1.04 to 0.33). Increasing time-related underemployment was then associated with increasing effect estimate sizes in both men and women. The mental health of women experiencing 11–20 hours underemployment was almost 1.5 points lower compared with when experiencing no underemployment (−1.45, 95% CI −2.08 to –0.83) and for men it was 1 point lower (−1.01, 95% CI −1.80 to –0.23). Finally, compared to when not underemployed, women experiencing the highest amount of time-related underemployment (21 hours and over) had 1.9-point lower mental health scores (−1.88, 95% CI −3.09 to –0.67), while men had an average of 2.2-point lower scores (−2.24, 95% CI −3.59 to –0.89). We tested for gender interaction and found no evidence of gender differences in the association between our different categories of underemployment and mental health scores.

Mundlak model

Table 3 presents the adjusted coefficients from the Mundlak regression sensitivity analysis. The within-person results aligned with the results of the fixed effects models. For the between-person results, compared with the reference group of those not underemployed, both men and women in all categories of underemployment had poorer mental health. Effect size estimates were slightly larger than the within-person models and, as per the trend in all models, 'a dose-dependent' response was evident in both for both women and men.

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Table 2 Fixed effects regression examining associations between mental health and underemployment in employed adults (25–64) over 22 waves (waves 1–22) of HILDA, stratified by gender

	Women 9321 persons, 62 914 observations		Men 9346 persons, 65 785 observations	
	MH score b coefficient* (95% CI; p value)		MH score b coefficient* (95% CI; p value)	
Underemployment	Crude model	Adjusted model†	Crude model	Adjusted model†
Not underemployed	Reference group	Reference group	Reference group	Reference group
1–5 hours	−0.39 (−0.85 to 0.07; p=0.097)	−0.40 (−0.86 to 0.05; p=0.084)	−0.31 (−0.80 to 0.18; p=0.214)	−0.41 (−0.89 to 0.08; p=0.098)
6–10 hours	−0.73 (−1.25 to −0.22; p=0.005)	−0.73 (−1.24 to −0.22; p=0.005)	−0.29 (−0.99 to 0.40; p=0.413)	−0.35 (−1.04 to 0.33; p=0.315)
11–20 hours	−1.48 (−2.11 to −0.85; p<0.001)	−1.45 (−2.08 to −0.83; p<0.001)	−1.06 (−1.86 to −0.27; p=0.009)	−1.01 (−1.80 to −0.23; p=0.012)
21 hours and over	−1.90 (−3.12 to −0.67; p=0.002)	−1.88 (−3.09 to −0.67; p=0.002)	−2.39 (−3.76 to −1.03; p=0.001)	−2.24 (−3.59 to −0.89; p=0.001)

*Estimated regression coefficient or estimated mean difference (MH-5 trans score on a 0–100 scale).
†Adjusted models controlled for age, age-squared, year, state, educational attainment, equivalised household disposable income, long-term health condition, unpaid labour time (household work, childcare, other caregiving, outdoor tasks), household structure (partner status, dependent children, etc), and remoteness/place of residence.
HILDA, Household, Income and Labour Dynamics in Australia; MH, mental health.

DISCUSSION

This longitudinal study examined the association between underemployment and mental health in working-age Australian adults. Our fixed-effects regression analysis over 21 waves of data assessed within-person associations between increasing levels of time-related underemployment and the mental health of men and women separately. Results suggest some gender differences exist, but overall, compared with not being underemployed, a stepwise (or dose-dependent) association was observed with increasing time-related underemployment for both men and women. The most notable association between underemployment and mental health for both genders was observed in those underemployed by 21 hours and over, followed by those who wanted to work an additional 11–20 hours/week. Mundlak adjustment models revealed similar within-person results to our main fixed-effects model. Meanwhile, the larger effect sizes observed in the Mundlak between-person results suggest that the relationship between underemployment and mental health is also influenced by between-person differences, such as people's circumstantial or job-related characteristics.

The results of our study largely align with the limited prior longitudinal evidence examining time-related underemployment and mental health. The dose-dependent negative association observed between increasing time-related underemployment was similarly reported in the earlier Australian study applying similar methodology to the HILDA dataset.[10] Furthermore, our findings align with a UK study (also employing fixed-effects regression analysis) reporting higher levels of psychological distress in those transitioning from full-time employment to underemployment,[11] and a Chinese study reporting that underemployment was associated with a decline in workers' mental health.[12] However, it is notable that none of these studies stratified their analysis by gender. In contrast to our findings and the aforementioned studies, a German longitudinal study (that did examine

Table 3 Mundlak regression sensitivity analysis examining associations between mental health and underemployment in employed adults (25–64) over 22 waves (waves 1–22) of HILDA, stratified by gender*

	Women 9321 persons, 62 914 observations	Men 9346 persons, 65 785 observations
Underemployment indicators	MH score b coefficient† (95% CI; p value)	MH score b coefficient† (95% CI; p value)
Between-person		
Not underemployed	Reference group	Reference group
1–5 hours	−0.68 (−1.10 to −0.27; p=0.001)	−0.68 (−1.13 to −0.23; p=0.003)
6–10 hours	−0.96 (−1.41 to −0.51; p<0.001)	−0.74 (−1.33 to −0.14; p=0.015)
11–20 hours	−1.85 (−2.39 to −1.30; p<0.001)	−1.61 (−2.24 to −0.99; p<0.001)
21 hours and over	−2.58 (−3.57 to −1.58; p<0.001)	−3.01 (−3.97 to −2.05; p<0.001)
Within-person		
Not underemployed	Reference group	Reference group
1–5 hours	−0.41 (−0.84 to 0.02; p=0.061)	−0.39 (−0.85 to 0.07; p=0.097)
6–10 hours	−0.69 (−1.15 to −0.22; p=0.004)	−0.30 (−0.95 to 0.28; p=0.332)
11–20 hours	−1.45 (−2.01 to −0.89; p<0.001)	−0.99 (−1.63 to −0.34; p=0.003)
21 hours and over	−1.90 (−2.94 to −0.87; p<0.001)	−2.22 (−3.23 to −1.22; p<0.001)

*All models adjusted for age, age-squared, year, state, educational attainment, equivalised household disposable income, long-term health condition, unpaid labour time (household work, childcare, other caregiving, outdoor tasks), household structure (partner status, dependent children, etc) and remoteness/place of residence. And between person model also controlled for ethnicity/Indigenous status.
†Estimated regression coefficient or estimated mean difference (MH-5 trans score on a 0–100 scale).
HILDA, Household, Income and Labour Dynamics in Australia; MH, mental health.

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gender differences) found no association between time-related underemployment and mental health among men or women.[13]

Established theoretical models to explain the association between unemployment and health may apply to underemployment.[34 35] In particular, the stress-process model is drawn on to understand the relationship with mental health, given underemployment (like unemployment) can be both economically and emotionally stressful.[12 36] Furthermore, according to latent deprivation theory, underemployment can also have psychological impacts by depriving individuals of key latent functions such as time structure, social relations and a sense of purpose and identity.[35] Australian research has also demonstrated that underemployment lowers subjective well-being,[6] with the adverse effects of underemployment in part-time workers not dissimilar to those seen with unemployment (for both women and men).[6] Moreover, rates of underemployment have been shown to be significant drivers of suicide mortality in Australia.[37] Ultimately, while there are multiple plausible mechanisms by which underemployment negatively impacts mental health, the detrimental effects cannot be understated, particularly when considering the issue at a population health level.

This study confirms that more employed women are underemployed compared with men in Australia. While we found no evidence of interaction by gender in the association between underemployment and mental health scores, we note the possibility of our analysis being underpowered. As such, further studies should seek to investigate the extent to which underemployment may impact men and women differently. The differential exposure to underemployment we observed for women is likely attributable to several factors; unpaid family responsibilities that constrain women's paid work choices being paramount.[18] High childcare costs, family policies that disincentivise secondary earner labour force engagement, and persistent gendered social norms around caregiving mean that part-time work is highly normative for Australian women.[38 39] This contributes appreciably to women's differential rates of time-related underemployment.[18] Moreover, it has been shown that working in female-dominated occupations or industries thwarts working as many hours as desired, especially for women.[40] Importantly, while the results of our study suggest both men's and women's mental health suffers as a result of increasing underemployment, the impact of lower levels of time-related underemployment on women's mental health is an important finding. Given so many women work part time in Australia, even small increases in the number of paid work hours to reduce underemployment (which could be facilitated by better family and social policies) have the potential to improve women's mental health at a population level.[38 39] Effect sizes for men in the upper time-related underemployment categories were almost double the mental health penalty observed for men reporting 11–20 hours of underemployment, and we theorise that high hours of underemployment may impact men's mental health more than women's due to strong gender norms regarding male breadwinning/provider roles remaining entrenched in Australia.[21 22]

Nonetheless, the following limitations must be considered when interpreting the findings of our study. Despite the MHI-5 being a highly validated mental health measure,[27 28] a key limitation of this research is that all measures are self-reported and thus susceptible to self-reporting bias and the possibility of misclassification bias. A further limitation is common methods bias, given that some participants may systematically overstate their underemployment and poorer mental health due to negative affect, with this leading to spuriously inflated associations. Furthermore, given that a reciprocal relationship likely exists between underemployment and mental health, we acknowledge reverse causation as a potential limitation. Restricting our sample to the employed population is also a limitation. While it would be preferable to encompass the whole working-age population in our sample (particularly to facilitate the inclusion of women who often move in and out of employment during prime working years), methodological constraints pertaining to the derivation of our underemployment measure prevented this. As such, our findings are not only susceptible to healthy-worker bias but may also under-represent those who move between unemployment and underemployment.

In conclusion, this study provides robust longitudinal evidence of a dose-dependent relationship between time-related underemployment and mental health for both men and women. Results highlight that concerted efforts to reduce underemployment can not only deliver benefits to the economy by utilising the spare capacity of the workforce—but can also potentially enact positive population mental health gains.

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Contributors JE, BC and TK conceived, designed and planned the study. JE accessed the data and conducted the data analysis. YT verified the data analysis. JE, BC, YT, LR and TK interpreted the results. JE wrote the manuscript and compiled the tables and figures and is responsible for the overall content (as guarantor). JE, BC, YT, LR and TK contributed to drafts and revisions, all approving the final version and were collectively responsible for the decision to submit the manuscript for publication.

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Ethics approval The HILDA Survey is conducted by the Melbourne Institute of Applied Economic and Social Research at the University of Melbourne on behalf of the Australian Commonwealth Government Department of Social Services (DSS). All respondents provided informed consent to participate in the HILDA Survey. The HILDA research project was approved by the Human Research Ethics Committee at the University of Melbourne (ethics ID no. 1647030) and conformed to the principles embodied in the Declaration of Helsinki.

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