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**Underemployment and its impacts on mental health among those with
disabilities: evidence from the HILDA cohort**

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ABSTRACT

Background: Underemployment (defined as when a person in paid employment works less hours than their desired full working capacity) is increasingly recognised as a component of employment precarity. This paper sought to investigate the effects of underemployment on the mental health of people with disabilities.

Methods: Using 14 waves of the Household, Income and Labour Dynamics in Australia (HILDA) survey, we used fixed-effects models to assess whether the presence of a disability modified the association between underemployment and mental health. Both disability and underemployment were assessed as time varying factors. Measures of effect measure modification were presented on the additive scale.

Results: The experience of underemployment was associated with a significantly greater decline in mental health when a person reported a disability (mean difference -1.38 (95% CI -2.20, -0.57) compared to when they did not report a disability (mean difference -0.49 (95% CI -0.84, -0.14). The combined effect of being underemployed and having a disability was nearly one point greater than the summed independent risks of having a disability and being underemployed (-0.89, 95% CI -1.75, -0.03).

Conclusion: People with disabilities are not only more likely to experience underemployment, but also more likely to have their mental health adversely affected by it. There is a need for more research and policy attention on how to ameliorate the effects of underemployment on the mental health of persons with disabilities.

Key words: Underemployment, mental health, disabilities, and employment precarity.

What is already known on this subject?

- Underemployment, defined as working for fewer hours than desired, has been previously associated with declines in mental health

What this study adds?

- People with disabilities are more likely to experience under-employment than people without disabilities;
- Further, people with disabilities experience greater underemployment-associated declines in mental health compared to those without disabilities

INTRODUCTION

Underemployment occurs when a person is working below their full working capacity.¹ It is conceptualised as an inferior, lesser, or lower quality type of employment relative to a person's expectations,² for example, when a person is working in a job for less hours than their desired full working capacity.³ In Australia, like many other countries of the world, the underemployed population represents a significant^{4 5} and rising number of people.⁵

Conceptually, underemployment can be considered an aspect of precarious employment, which also includes other factors such as employment insecurity, individualized bargaining relations between workers and employers, low wages and economic deprivation, limited workplace rights and social protections, and powerlessness to exercise legally granted workplace rights.⁶ There is an increasing evidence base to suggest that employment precarity is an emerging social determinant of health⁷ and research has demonstrated the damaging effects of job insecurity, organisational restructuring and temporary employment on both physical (e.g., cardiovascular risk and coronary events) and mental health.⁸ Some researchers have suggested that the impact of employment precarity may become more apparent as nation states erode employment protection.⁹

Certain populations are likely to be more vulnerable to underemployment than others.¹ Recent work from Australia suggests that lower skilled workers, women and younger workers are particularly exposed to underemployment.¹⁰ Another group that may be vulnerable to underemployment are people with disabilities. The 2015 the Survey of Disability, Ageing and Carers (SDAC),¹¹ indicates that people with disabilities may comprise up to 8% (n=785,400) of workers in Australia. Compared to other workers,

people with disabilities are much more likely to experience greater pay inequity and job insecurity than those without disabilities.^{12 13} There is also increasing evidence that these poor quality working conditions are associated with considerable declines in the mental health of people with disabilities.^{14 15} We would note that there has been no research on the mental health effects of underemployment on people with disabilities.

Using 14 annual waves of longitudinal data, we seek to examine whether being underemployed (e.g., when a person wants to work additional hours, but these are not obtainable) has a different effect on the mental health of people when they do and do not report disabilities. Based on the past research reviewed above, we hypothesise that people with disabilities are 1) more likely to experience underemployment, and; 2) likely to experience greater declines in mental health related to underemployment than people without disabilities.

METHOD

Data source

The Household, Income and Labour Dynamics in Australia (HILDA) survey is a longitudinal, nationally representative study of Australian households established in 2001. It collects detailed information annually from over 13,000 individuals within over 7,000 households.¹⁶ The response rate to wave 1 was 66%.¹⁶ The survey covers a range of dimensions including social, demographic, health and economic conditions using a combination of face-to-face interviews with trained interviewers and a self-completion questionnaire. Although data are collected on each member of participating households, interviews are only conducted with those older than 15 years of age.

The initial wave began with a large national probability sample of Australian households occupying private dwellings.¹⁶ Additional persons have been added to the sample as a result of changes in household composition. For example, if a household member left his or her original household (e.g. children left home, or a couple separated), then all new persons living with the original sample member are included. Inclusion of these new households is the main way in which the HILDA survey maintains sample representativeness. A top-up sample of 2,000 people was added in 2011 to allow better representation of the Australian population using the same methodology as the original sample.¹⁷ The response rates for the HILDA survey are above 90% for respondents who have continued in the survey and above 70% for new respondents being invited into the study.¹⁶ The main variables examined in this study were available in all annual waves of HILDA (2001 to 2014).

Outcome variable

Mental health was assessed using the five-item Mental Health Inventory (MHI-5), a subscale from the Short Form-36 (SF-36) general health measure. The MHI-5 assesses symptoms of depression and anxiety (nervousness, depressed affect) and positive aspects of mental health (feeling calm, happy) in the past 4 weeks. The MHI-5 has good validity and is recognized as an effective screening instrument for mood disorders or severe depressive symptomatology in the general population.^{12,15,16,36} It has been validated as a measure for depression using clinical interviews as the gold standard.<sup>18-
20</sup> The current analyses use the continuous MHI-5 score (scale 1 to 100), with higher scores representing better mental health. Although there is no universally accepted translation of MHI-5 score difference to clinical meaningfulness, a difference of three

points on the norm based scale (T-score) has been suggested to reflect a minimally important difference at the individual level.²¹

Exposure variable

Our measure of underemployment aligns with the definition used by the Australian Bureau of Statistics, which is based on the average hours a person works in a week in relation to their preference and availability to work more hours.³ It is also broadly consistent with the approach used by the International Labour Organization (ILO)²² but is conceptually distinct from the wider concept of inadequate employment situations, which may include inadequate or insufficient use of a worker's occupational skills, income, or overwork.²² The criteria for a person to be defined as underemployed were that they were:

- Employed;
- Working less than a standard fulltime week (<40 hours) in a usual working week, and;
- Would prefer to work more hours if these were available

We analysed this as a binary variable and excluded persons who were self-employed, as these people are able to set their own work hours.

Effect modifier

Information on long-term health conditions and disabilities was collected in all waves using a definition derived from the International Classification of Functioning, Disability and Health (ICF) framework.²³ Participants were asked if they had an

‘impairment, long-term health condition or disability which restricts their everyday activities that had lasted, or was likely to last, for a period of six months or more’. We examined disability as a time-varying factor over all of participants’ contributed waves.

Confounders

We chose variables that could plausibly be prior common causes of underemployment, disabilities and symptoms of depression and anxiety. These included: age (measured continuously), employment arrangement (permanent, casual or labour hire, or fixed-term contract), occupational skill level (low [sales, machinery workers, and labourers], medium [technical and trade workers, community and personal service workers, and clerical and admin workers], and high [managers and professionals] according to the Australian and New Zealand Standard Classification of Occupations occupational groupings),²⁴ education (less than year 12 (high school), year 12, diploma or certificate, bachelor degree), and weekly household income (equivalised). As described below, time invariant variables such as gender are already implicitly controlled for in fixed-effects models.

Analytic approach

We conducted cross-tabulations (frequencies and percentages) of disability and underemployment. We use fixed-effects linear regression models to assess the relationship of within-person changes in a person’s mental health in relation to within-person changes in their underemployment and disability status. Fixed-effects models exclude between person variation in the exposures and outcomes from consideration. These are particularly useful where unobserved time-invariant confounding is likely to

create biased causal estimates.²⁵ However, by excluding between person variation, fixed-effects models are more restrictive than traditional regression approaches and often have lower statistical power. For example, fixed-effects models do not provide separate estimates for any time-invariant variables, such as gender. We tested effect measure modification by including an interaction term between time-varying disability and time-varying underemployment in fixed-effects models. The statistical significance of this relationship was examined by assessing the statistical significance of the interaction term (i.e. beta coefficient) and results of a likelihood ratio test comparing a model with the interaction term and main effects to one that includes main effects only. We then used the approach to presenting effect modification results recommended by Knol and VanderWeele²⁶ and present estimates and 95% CI within strata of disability and underemployment. We computed measures of effect measure modification on the additive scale.

RESULTS

The process for selection the analytic sample can be seen in Figure 1. As can be seen in Table 1, gender and occupational skill level were relatively evenly distributed. Most people were employed permanently, and had obtained a post-school diploma or certificate. The majority of people were living as a couple with at least one dependent. Disabilities was reported in about 15% of observations overall.

--- Please insert Table 1 ---

23.62% of people with disabilities reported being underemployed, compared to 19.54% of those persons without disabilities (Table 2). Conditional on being underemployed, the mean number of additional hours desired by those people with disabilities was 2.73 hours a week, compared to 2.09 for those persons without disabilities.

--- Please insert Table 2 ---

Coefficients for the fixed-effects model can be seen in Table 3, the outcome being the MHI-5 (scored from 1 to 100). When a person reported a disability and underemployment their mental health was 3.39 (95% CI -4.19, -2.58, $p < 0.001$) points lower on the MHI-5 than when that same person reported no disability and no underemployment. Looking at the stratum specific results for those with disabilities, being underemployed was associated with a significant decline on the MHI-5 (mean difference -1.38 95% CI -2.20, -0.57, $p = 0.001$) compared to when these people were not underemployed. For those with no disabilities, being underemployed was associated with significantly poorer scores on the MHI-5 compared to when these people were not under-employed (mean difference -0.49 95% CI -0.84, -0.14, $p = 0.006$). These results also suggest evidence of effect measure modification. The estimates obtained here indicate that the combined effect of being underemployed and having a disability on mental health is nearly one point greater than the summed independent risks of having disabilities and being underemployed (-0.89, 95% CI -1.75, -0.03, $p = 0.044$).

DISCUSSION

The results of this paper suggest that the combined impact of experiencing both disability and underemployment is associated with a greater decline in a person's mental health than the effects of either of these states when summed as individual factors. Based on this, it appears that the intersection of disability and underemployment is likely to be a particularly vulnerable time in a person's life.

One of the strengths of this study was its methodological approach and large sample size. Fixed-effects models are increasingly recognised as being among the most robust ways to assess causality as they control for all time-invariant person specific effects, even if unobserved.²⁷ At the same time, fixed effects analyses do have their limitations. For one, they are unable to control for reverse causation, whereby mental health may impact on underemployment. This being said, previous work we have conducted suggests that it is appropriate to analyse work-related exposures and mental health contemporaneously.²⁸ Thus, we would expect that this is not a substantial source of bias. We used a best-practice approach to unpack the interaction between disability and underemployment,²⁶ which suggests that the combined effect of these variables is particularly damaging to mental health. Last, we based our study on a large national cohort of working people, and because of this, have substantial statistical power to estimate effects.

In saying this, our study does have a number of limitations. For one, other aspects of underemployment, including inadequate employment, may also be important but were not addressed in this analysis.³ There is also a need to consider factors connected to the HILDA survey that might impact on the generalizability of our study, including the slightly greater retention of persons of higher versus lower socio-economic status.

Another source of bias in this study is possibly connected to the fact that both our outcome and exposure measures were self-reported, which could lead to dependent misclassification. In saying this, the MHI-5 subscale has been validated against gold-standard clinical measures in numerous previous studies and has been shown to have good sensitivity and specificity. We excluded self-employed persons for conceptual reasons regarding the ability of these persons to self-determine their hours of work, however this only represented a small number of people.

This paper contributes to the growing evidence base about the damaging effects of precarious employment^{7 8 29} and, more specifically, supports previous research demonstrating the detrimental effects of underemployment on mental health.^{1 10 30-33} Underemployment is related to precarity via working time arrangements and is conceptually different from broader job quality, which involves intrinsic work-tasks (e.g., job control, job demands) and employment conditions and relationships, (e.g., terms of contracts and rewards).²⁹ Distinct from previous research, our paper is the first to look at the effects of both disability and underemployment on mental health. Among employed people, those with disabilities are more likely to be underemployed, and underemployment is associated with a significantly greater decline in mental health for this group as well.

In a previous paper, we proposed several possible mechanisms through which underemployment may affect mental health.¹⁰ These were discussed using Jahoda's latent deprivation model,³⁴ which argues that the loss of employment not only results in a loss of income, but also the deprivation of five "latent" functions including time structure, social contact, collective purpose, social identity/status, and activity.³⁴ The

loss of these functions may explain the damaging effects of underemployment to persons with disabilities, who also appear to be more affected by unemployment than people without disabilities.¹⁵ However, more so than other groups, people with disabilities are at greater risk of exclusion from employment³⁵ as well as other forms of social and political exclusion. People with disabilities are also more likely to face multiple types of social and economic disadvantage compared to those without disabilities, including lower income and educational attainment.³⁶ The combination of these disadvantages are likely to go some way to explaining why people with disabilities experience greater declines in their mental health when they report underemployment compared to those without a disability.

In Australia (and many other OECD countries), there is a renewed commitment to improving the employment outcomes of people with disabilities.³⁷ At the same time, we know that there is worsening underemployment⁵ and an increasing concerns that employment is becoming ever-more precarious, particularly for the most vulnerable in the community.^{7 29} These trends highlight the need for researchers, policy makers and service providers to address underemployment as an emerging determinant of health. In our paper, we have shown that underemployment has a negative effect on mental health, this appears to be particularly damaging for people with disabilities. We suggest that more research is needed to develop a better understanding of the precise mechanisms through which underemployment affects mental health across the entire working population.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

AUTHOR CONTRIBUTIONS

AM designed the study. AM and TK conducted analysis. ZA provided advice on the analysis. ZA, AK, DP and ADL contributed to the interpretation of results. AM wrote

the draft with input from all authors. All authors approved the final version of this manuscript and its previous drafts.

Figure 1. Sample selection

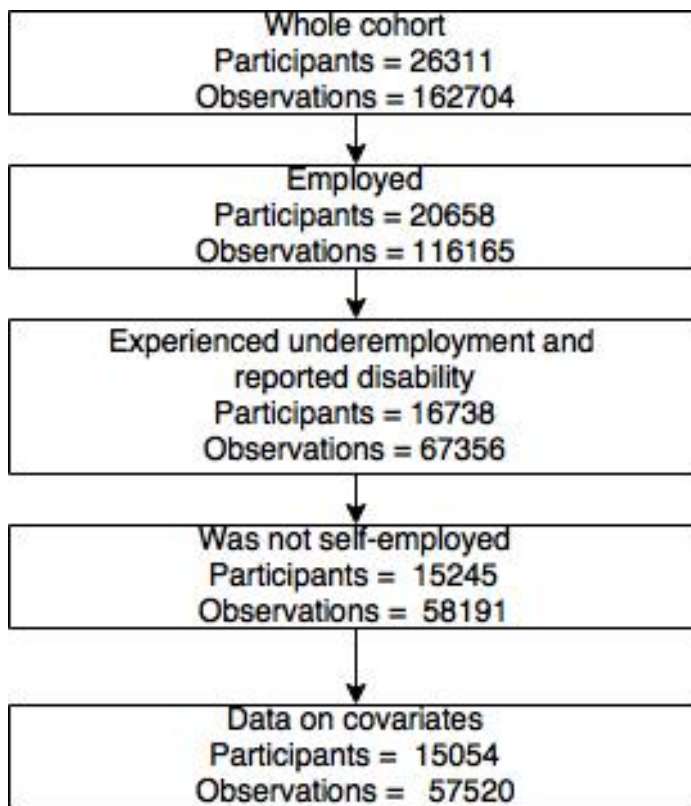


Table 1. Description of the analytic sample pooled across all contributing waves, 2001 to 2014, persons= 15,054, observations= 57,520, average waves contributed=3.8

	Mean	Std Dev
MHI	75.77	15.56
Age	36.74	13.79
	Obs	%
Underemployment		
Yes	45,926	79.84
No	11,594	20.16
Gender		
Male	27,973	48.63
Female	29,547	51.37
Occupational Skill level		
Low	16,667	28.98
Medium	24,241	42.14
High	16,612	28.88
Household structure		
Couple no children	14,047	24.42
Couple with children	27,711	48.18
Lone parent with children	5,350	9.3
Lone person	7,502	13.04
Other	2,910	5.06
Disability		
Yes	10,566	15.03
No	55,983	84.97
Education		
Postgrad	5,299	9.21
Bachelor	8,748	15.21
Diploma or certificate	17,407	30.26
Year12	11,104	19.3
Less than year 12	14,962	26.01
Employment arrangement		
Permanent	36,975	64.28
Casual/labour hire	15,675	27.25
Fixed-term	4,870	8.47

Table 2. Description of underemployment experienced in the analytic sample pooled across all contributing waves, 2001 to 2014, persons= 15,054, observations= 57,520, average waves contributed=3.8

	Disability (Obs= 8,647) %	No disability (Obs= 48,873) %
No underemployment	76.38	80.46
Underemployment	23.62	19.54

Notes: Obs= observations.

Table 3. Interaction terms, disability and underemployment impact on mental health, HILDA, 2001 to 2014, persons= 15,054, observations= 57,520, average waves contributed=3.8

	No under-employment (95% CI)	Under-employed (95%CI)	Impact of underemployment by disability status
No disability	0.00 (Reference)	-0.49 (-0.84, -0.14) p=0.006	-0.49 (-0.84, -0.14) p= 0.006
Disability	-2.01 (-2.46, -1.55) p<0.001	-3.39 (-4.19, -2.58) p<0.001	-1.38 (-2.20, -0.57) p=0.001
Impact of disability by underemployment status			
	-2.01 (-2.46, -1.55) p<0.001	-2.89 (-3.77, -2.06), p<0.001	
EMM on additive scale : -0.89 (-1.75, -0.03) p=0.044			

Notes: models adjust for age (measured continuously), employment arrangement, occupational skill level, education, and weekly household income. Time invariant variables (gender, country of birth) are not separately identified in fixed effect models. 95% CI= Lower confidence interval and Upper confidence interval at 95% level; p= p values which gives the likelihood of getting similar or more extreme results if the true coefficient was in fact zero.

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