Associations between neighbourhood socioeconomic disadvantage and psychological distress among Australian adults: longitudinal analysis of the HILDA survey (2007–2021)

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ABSTRACT

Background Mental disorders contribute substantially to the global burden of disease. The neighbourhood socioeconomic environment is a key determinant of mental health, even after accounting for individual-level socioeconomic factors. However, few longitudinal studies have examined this relationship. This study examined longitudinal associations between neighbourhood socioeconomic disadvantage and psychological distress from three perspectives: overall associations, trends over time and changing neighbourhood exposures.

Methods Data were from the Household, Income and Labour Dynamics in Australia Survey wave 7 (2007) to wave 21 (2021), a nationally representative household-based cohort study, including 109 604 observations. Mental health was assessed using the Kessler Psychological Distress Scale (K10), analysed as a continuous variable, score range 10–50. Neighbourhood socioeconomic disadvantage was measured using derived spatially and temporally consistent census-based data, analysed in quintiles. Multilevel and fixed effects linear regression models were used.

Results Psychological distress increased with neighbourhood socioeconomic disadvantage, with K10 scores 1.35 points higher (95% CI 1.14 to 1.55) in the most disadvantaged neighbourhoods compared with the least. However, the rate of change in distress over time did not vary by neighbourhood disadvantage. An association was observed between changes in disadvantage and changes in psychological distress for the most socioeconomically disadvantaged neighbourhoods.

Conclusion The findings from nationally representative longitudinal data show that individuals living in more disadvantaged neighbourhoods consistently experienced higher psychological distress compared with those in less disadvantaged neighbourhoods. These inequalities remained stable over time, and limited evidence of change suggests that the association may reflect persistent differences between individuals living in different neighbourhoods.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Existing research supports an association between neighbourhood disadvantage and poor mental health; however, there is a dearth of longitudinal studies on this association, particularly in Australia.

WHAT THIS STUDY ADDS

⇒ Psychological distress was higher in more disadvantaged neighbourhoods, with a graded association observed.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ These findings highlight the persistent inequalities in mental health associated with neighbourhood socioeconomic disadvantage.

INTRODUCTION

Mental disorders are a significant contributor to the global burden of disease and rank among the top 10 causes of disability-adjusted life years (DALYs). These disorders are highly prevalent across all regions, affecting almost one billion people globally.[1] Australia has one of the highest DALY rates,[1] with recent data estimating that 43% of Australians over the age of 16 years have experienced a mental disorder.[2] Socioeconomic factors have been shown to strongly influence the development and severity of mental disorders.[3]

The neighbourhood socioeconomic environment has emerged as a key social determinant influencing mental health.[3] Those residing in disadvantaged neighbourhoods may be exposed to more stressors such as inadequate health-enhancing infrastructure (eg, greenspace),[4 5] fear of crime and social incivilities[3 6] or limited access to health services.[3] The accumulation of these stressors has been associated with an increased risk of experiencing poor mental health.[3 6 7] However, the association may reflect not only contextual factors but also compositional effects. As cities continue to grow, gentrification and lack of affordable housing have constrained lower income households to living in more affordable areas, which are consequently measured as more disadvantaged.[8 9]

Numerous studies in countries such as the United Kingdom,[10 11] the Netherlands,[12 13] France[14] and the United States[15] have identified an association between neighbourhood disadvantage and poor mental health. However, with the exception of Jokela,[10] these studies were cross-sectional, or data

were collected more than two decades ago, which may limit their ability to understand causal pathways and current trends.

Although the prevailing conclusion in developed countries suggests that there is a correlation between neighbourhood disadvantage and poor mental health, some studies provide weaker support. For example, a study among young adults found no association between neighbourhood disadvantage and psychological distress at baseline (2010) or follow-up (2019). However, results collected during the COVID-19 period (2020) revealed that distress was more than three times higher in the most disadvantaged neighbourhoods compared with the least disadvantaged.[16] This may be a result of lockdown measures. Confining individuals to disadvantaged areas and limiting mobility to less disadvantaged areas may magnify the mental health impacts of residing in these neighbourhoods.[14]

In Australia, cross-sectional studies over the past two decades have highlighted inequalities in mental health across neighbourhoods.[17–20] Population health surveys have consistently found greater prevalence of psychological distress in the most disadvantaged neighbourhoods. For instance, in 2012, 16.1% of individuals in the most disadvantaged areas reported high or very high psychological distress, compared with 6.9% in the least disadvantaged.[17] The prevalence of anxiety and depression also disproportionately affected those living in more disadvantaged neighbourhoods.[17 18]

Although many studies support an association between neighbourhood disadvantage and poor mental health, there is a dearth of longitudinal studies. In Australia, two longitudinal studies were identified, both providing further evidence of inequalities in mental health across neighbourhoods. However, one study was geographically specific to Brisbane, Queensland and excluded those who moved during the study period, which may limit its generalisability.[21] The second study, by Jokela,[22] examined data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey from 2001 to 2010 and determined that neighbourhood disadvantage was associated with poorer mental health. However, the relationship was largely due to between-person differences with no association between changes in neighbourhood disadvantage and changes in mental health identified. The findings suggest that the observed relationship is more likely driven by selective residential mobility rather than by the neighbourhoods themselves.[22] While Jokela's findings provide valuable insight, more recent data are needed to examine whether these trends persist, particularly given evidence that psychological distress has increased since 2010.[2 23] Evidence shows widening social and health inequalities in Australia, leaving the most socioeconomically disadvantaged more vulnerable to poor health outcomes[24] and this may have changed the relationship between neighbourhood conditions and mental health. Factors such as housing affordability concerns, the rising cost of living and the growing influence of smartphones and social media, particularly among younger populations, may have contributed to the overall rise in psychological distress during this period.[23 25] In addition, the COVID-19 lockdowns further highlighted the potential influence of neighbourhood environments on these inequalities.[26]

This study builds on existing evidence by analysing 15 years of HILDA data (2007–2021) to assess whether neighbourhood disadvantage remains a substantial contributor to psychological distress. Longitudinal evidence is essential for not only examining overall inequalities but also understanding how inequalities are trending over time and making stronger causal assertions when examining how changes in exposures are associated with changes in outcomes. Therefore, this study aims to examine longitudinal associations between neighbourhood socioeconomic disadvantage and psychological distress, measured using the Kessler Psychological Distress Scale (K10), a validated tool for population health surveys with policy relevance in Australia.[27] While the HILDA Survey includes the Mental Health Inventory-5 in every wave, the K10 is often preferred due to its ease of administration and scoring.[28] Although the K10 captures symptoms over the past 4 weeks, it is reassessed every 2 years, allowing for the examination of changes in distress over time and in response to neighbourhood-level conditions. The study period spans the COVID-19 pandemic, allowing for the assessment of neighbourhood socioeconomic conditions on mental health during a time of heightened social and economic stress. Specifically, this study will examine: (1) overall neighbourhood socioeconomic inequalities in psychological distress; (2) trends in psychological distress by neighbourhood level of socioeconomic disadvantage (ie, are neighbourhood inequalities in psychological distress widening or narrowing over time) and (3) associations between changes in neighbourhood socioeconomic disadvantage and changes in psychological distress (ie, is a change in the level of disadvantage, such as through (de)gentrification or relocating to a neighbourhood with a different level of neighbourhood disadvantage, associated with a change in psychological distress).

METHODS

Data were from the HILDA Survey. Commencing in 2001, the HILDA Survey is a nationally representative household-based longitudinal study that collects information about economic and personal well-being, labour market dynamics and health.[29] Data are collected annually through interviews and questionnaires from household members aged 15 years or over. The baseline wave of the HILDA Survey (2001) included 13 969 participants (7682 households). The sample has increased with new household members and was further expanded in wave 11 with 5462 individuals (2153 households).[29]

This present study used all waves of the HILDA Survey that included the K10, which was administered in every second wave from wave 7 (2007) to wave 21 (2021), comprising of 130 388 observations. We restricted our sample to adults, leaving 124 048 in-scope observations following omission of those under 18 years of age (6340 observations). Observations were excluded due to missing data on occupation (n=70), and K10 (n=13 757). The remaining 110 221 observations were merged with the Index of Relative Socio-economic Disadvantage (IRSD) data, with 617 excluded due to missing IRSD data, resulting in a final analytic sample of 109 604 observations (88.3% of the in-scope sample) analysed in the present study.

Measures

Outcome variable

Psychological distress: measured using the 10-item Kessler scale of non-specific psychological distress (K10),[27] introduced in wave 7 (2007) of the HILDA Survey and included in every second wave through the Self-Completion Questionnaire (SCQ). All participants completing a Person Questionnaire are also asked to complete the SCQ either online or in hardcopy.[30] The average annual SCQ response rate for waves 7–21 was 89.6%.[29] The K10 is used to identify depression and anxiety symptoms by asking respondents 10 questions about their experiences in the past 4 weeks, for example, 'In the last 4 weeks, about how often did you feel tired out for no good reason?'; 'In the last 4 weeks, about how often did you feel so sad that nothing could cheer you up?'. The response options are all of the time, most of the time,

some of the time, a little of the time and none of the time and are scored 5 to 1, respectively, resulting in a final score between 10 and 50.[30] K10 scores are measured continuously in this study, however, scores of 10–21 may indicate low to moderate distress, 22–29 high distress and 30–50 very high distress.[30]

Exposure variable

Neighbourhood socioeconomic disadvantage: measured using the Australian Bureau of Statistics (ABS) IRSD. The IRSD is a weighted combination of 17 economic and social variables measuring disadvantage (eg, percent of: unemployed; employed people classified as labourers; low rent private dwellings).[31]

Although the HILDA Survey provides ABS socioeconomic indexes for participants, using an index from one census year is not recommended for longitudinal analysis for two reasons: it is derived from census data collected every 5 years, limiting its timeliness; and geographical boundaries are updated with each census. To address these limitations, we used annual IRSD estimates, standardised to 2021 Statistical Areas Level 1 (SA1) geography, allowing for spatial and temporal consistency across waves. This approach enables changes in neighbourhood socioeconomic disadvantage to be interpreted as reflecting actual temporal changes rather than shifts in census boundaries. The method for generating this data is described in detail elsewhere.[32] Neighbourhoods were classified into quintiles with quintile 1 (Q1) the *most* disadvantaged, and quintile 5 (Q5) the *least* disadvantaged.

Covariates

Education: at each wave, participants' highest level of education attained was recorded, using a nine-category measure, that was subsequently coded in this study to four categories: (1) bachelor's degree or higher, (2) advanced diploma, diploma or certificate, (3) year 12 and (4) year 11 or below.

Occupation: at each wave, participants' current occupation was recorded and coded according to the Australian and New Zealand Standard Classification of Occupations and classified into nine categories, which were subsequently coded in this study to three categories: (1) high (manager; professional), (2) medium (technicians and trades workers; community and personal service workers; clerical and administrative workers) and (3) low (sales workers; machinery operators and drivers; labourers). An additional category (4) was created for those not in the labour force, including retired, home duties/childcare, own illness, injury or disability, looking after ill or disabled person, travel, working in an unpaid voluntary job or 'other activity'.

Household income: at each wave, gross household income was derived by summing the regular financial year income of all household members, excluding irregular income, collected from individual respondents. The fully imputed variable, provided in the HILDA Survey, accounts for missing data due to item non-response. For analysis, household income was coded to seven income range categories: (1) $156 000 or more, (2) $130 000–$155 999, (3) $104 000–$129 999, (4) $78 000–$103 999, (5) $52 000–$77 999, (6) $26 000–$51 999 and (7) less than $25 999.

Age: the age at last birthday as of 30 June immediately preceding when the fieldwork was conducted for that wave, subsequently coded to seven categories: (1) 18–24, (2) 25–34, (3) 35–44, (4) 45–54, (5) 55–64, (6) 65–74, (7) 75 years and over.

Sex: participants were asked to select either male or female.

Movers: participants were asked if they had changed address since the last interview. This was coded into two categories: (1) mover (participants who had relocated since last wave) and (2) stayer (those who had not moved since last wave).

Statistical analysis

The overall (ie, pooled) association was assessed using linear mixed effects regression with a continuous measure for psychological distress and a categorical exposure for neighbourhood socioeconomic disadvantage, with Q5 (*least* disadvantaged) as the reference group, adjusted for age, sex, education, occupation and household income. The random effects included random intercepts for SA1 (neighbourhood) and person to account for the nested data structure (ie, repeated waves within persons, persons nested within SA1s) (model 1). To examine trends in psychological distress over time across levels of neighbourhood socioeconomic disadvantage, model 1 was extended by adding an interaction term between wave and neighbourhood socioeconomic disadvantage was added (model 2). Differences in trends over time were examined using fixed effects and a likelihood ratio test. Finally, associations between changes in neighbourhood socioeconomic disadvantage and changes in psychological distress were examined using a linear fixed effects model adjusted for time-varying age, education, occupation and household income (model 3). Changes in psychological distress and neighbourhood socioeconomic disadvantage were modelled using repeated measures across waves in the fixed-effects analysis, where K10 scores and neighbourhood socioeconomic disadvantage (quintile category derived for each wave using 2021 SA1 geography) were both time-varying.

Additional sensitivity analyses were undertaken to examine any impact on the associations due to the COVID-19 pandemic. From March 2020 to October 2021, Australia adopted national and state-specific lockdown measures to suppress community transmission.[33] Our sensitivity analyses comprised separate models excluding wave 21, as field work for this wave was conducted between July 2021 and March 2022.[29] Data were analysed using Stata MP V.18.[34]

RESULTS

The sociodemographic characteristics and mean K10 scores for waves 7 and 21 are presented in table 1. K10 scores were higher in Q1 (*most* disadvantaged) compared with Q4 and Q5 (*least* disadvantaged) in every wave. Psychological distress was also higher among females, those with lower education, lower occupational category (or not in the labour force), lower income, younger age and those classified as movers.

Overall association between neighbourhood socioeconomic disadvantage and psychological distress

The results of each model are presented in table 2. K10 scores increased over time at a rate of 0.18 points per wave (95% CI 0.17 to 0.19) with one wave corresponding to 1 year. In model 1, there was a graded association between neighbourhood socioeconomic disadvantage and psychological distress. Compared with individuals in Q5 (*least* disadvantaged), K10 scores were 1.35 points higher (95% CI 1.14 to 1.55) in Q1 (*most* disadvantaged).

Trends in psychological distress by level of neighbourhood socioeconomic disadvantage

No association was found between neighbourhood socioeconomic disadvantaged and psychological distress over time, that is, K10 scores in disadvantaged neighbourhoods did not differ

Table 1 Descriptive statistics and mean K10 scores for the analytic sample: HILDA Survey wave 7 (2007) and wave 21 (2021)

	2007 n=10 464		2021 n=14 466	
	%	Mean (SD) K10	%	Mean (SD) K10
Neighbourhood disadvantage				
Q1 (most disadvantaged)	18.1	16.67 (6.89)	18.5	19.22 (8.44)
Q2	21.4	15.96 (6.43)	19.5	17.83 (7.59)
Q3	17.4	15.68 (6.24)	20.8	17.56 (7.28)
Q4	21.7	15.28 (5.67)	20.3	17.20 (6.99)
Q5 (least disadvantaged)	21.5	14.57 (4.96)	20.9	16.74 (6.67)
Sex				
Male	46.3	15.17 (5.73)	46.0	16.90 (7.01)
Female	53.7	15.96 (6.34)	54.0	18.34 (7.72)
Education				
Bachelor degree or higher	22.6	14.77 (5.06)	31.2	16.81 (6.42)
Advanced diploma, diploma or certificate	29.8	15.41 (5.93)	34.3	17.66 (7.54)
Year 12	15.5	15.93 (6.20)	15.4	19.08 (8.20)
Year 11 or below	32.1	16.18 (6.71)	19.1	18.00 (7.94)
Occupation				
High	24.9	14.57 (4.91)	27.4	16.85 (6.37)
Medium	26.5	15.23 (5.40)	23.7	17.82 (7.36)
Low	14.7	15.90 (6.04)	13.1	18.23 (7.75)
Not in labour force	34.0	16.49 (7.14)	35.8	18.01 (8.05)
Income				
<$26 000	14.7	17.20 (7.45)	5.8	18.94 (8.68)
$26 000–$51 999	20.0	16.13 (6.65)	14.6	18.05 (8.04)
$52 000–$77 999	18.2	15.44 (5.77)	13.1	18.22 (7.98)
$78 000–$103 999	16.2	15.07 (5.42)	12.1	18.42 (7.98)
$104 000–$129 999	11.9	15.03 (5.33)	11.2	17.83 (7.39)
$130 000–$155 999	7.7	14.95 (5.24)	10.3	17.67 (7.12)
$156 000 plus	11.3	14.58 (5.11)	33.1	16.75 (6.45)
Age				
18–24	12.9	16.97 (6.56)	10.3	21.65 (8.66)
25–34	16.4	16.15 (6.35)	19.4	19.46 (7.90)
35–44	19.3	15.57 (5.96)	16.4	18.22 (7.34)
45–54	19.7	15.71 (6.21)	15.6	17.42 (7.28)
55–64	14.5	14.80 (5.79)	16.2	16.32 (6.74)
65–74	10.2	14.46 (5.33)	13.1	15.00 (5.69)
75 and over	7.1	14.83 (5.38)	9.1	15.10 (5.47)
Movers				
Movers	17.1	16.53 (6.76)	15.9	19.54 (8.24)
Stayer	82.9	15.40 (5.91)	84.1	17.32 (7.22)

HILDA, Household, Income and Labour Dynamics in Australia.

in their rate of increase by level of neighbourhood disadvantage (likelihood ratio test $\chi^2(4)=6.72$, p=0.082).

Changes in psychological distress by changes in level of neighbourhood socioeconomic disadvantage

There was evidence of an association between changes in neighbourhood socioeconomic disadvantage and changes in psychological distress for Q1 (*most* disadvantaged) only (β 0.19, 95% CI 0.02 to 0.36). Transitions between neighbourhoods are presented in table 3.

Sensitivity analysis

When excluding wave 21, the overall association between neighbourhood socioeconomic disadvantage and psychological distress remained across all quintiles, with the graded association still evident.

However, for trends in psychological distress by level of neighbourhood socioeconomic disadvantage, an association was observed for Q1 (*most* disadvantaged) (β 0.05, 95% CI 0.02 to 0.09). No association was found between changes in psychological distress and changes in neighbourhood socioeconomic disadvantage. The results of each model, wave 7–19, are presented in table 4.

Table 2 Psychological distress differences by level of neighbourhood socioeconomic disadvantage, 2007–2021

n=1 09 604	β (95% CI)
Model 1 (pooled)†	
Time (waves)	0.18 (0.17 to 0.19)
Q5 (least disadvantaged)	ref
Q4	0.22 (0.06 to 0.38)*
Q3	0.41 (0.23 to 0.59)**
Q2	0.74 (0.55 to 0.93)**
Q1 (most disadvantaged)	1.35 (1.14 to 1.55)**
Model 2 (trends)†	
Q5 (least disadvantaged)×Time	ref
Q4×Time	−0.00 (−0.03 to 0.02)
Q3×Time	0.01 (−0.01 to 0.04)
Q2×Time	−0.01 (−0.04 to 0.02)
Q1 (most disadvantaged)×Time	0.02 (−0.00 to 0.05)
LR test	$\chi^2(4)=6.72$, p=0.082
Model 3 (fixed effects)‡	
Q5 (least disadvantaged)	ref
Q4	0.01 (−0.10 to 0.12)
Q3	0.02 (−0.11 to 0.14)
Q2	−0.02 (−0.16 to 0.12)
Q1 (most disadvantaged)	0.19 (0.02 to 0.35)*

*p ≤ 0.05; **p ≤ 0.001.
†Adjusted for age, sex, education, occupation and household income.
‡Changes in psychological distress by changes in level of neighbourhood socioeconomic disadvantage.

DISCUSSION

This study found that residents from more socioeconomically disadvantaged neighbourhoods experienced higher levels of psychological distress compared with those in more advantaged neighbourhoods. K10 scores increased in line with disadvantage. Our findings align with prior Australian cross-sectional studies linking neighbourhood disadvantage to psychological distress.[17 19 20]

Despite the increase in K10 scores between 2007 and 2021, psychological distress in disadvantaged neighbourhoods did not increase at a greater rate compared with other neighbourhoods. When excluding wave 21, an association was identified for Q1 (*most* disadvantaged); however, the 0.05-point difference in K10 scores is not a clinically significant change.[35] It is conceivable that the impact of residing in a disadvantaged neighbourhood occurs prior to adulthood and inequalities are maintained rather than compounding later in life.[36 37] Early-life socioeconomic disadvantage not only affects health behaviours in adulthood but can also limit socioeconomic opportunities. Therefore, early-life conditions can shape lifelong health trajectories and maintain inequalities.[37] This may explain our findings, as our sample only included adults.

Table 3 Transition between quintile of neighbourhood socioeconomic disadvantage 2007–2021*

	Final distribution by neighbourhood quintile, %					
Neighbourhood quintile distribution 2007	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Total**
Q1 (most disadvantaged)	79.63	11.74	4.31	2.79	1.52	100
Q2	11.88	67.75	13.13	4.50	2.74	100
Q3	3.95	12.94	65.74	13.64	3.73	100
Q4	2.15	4.04	13.92	68.03	11.87	100
Q5 (least disadvantaged)	1.33	2.53	3.74	11.67	80.73	100
Total % †	18.46	19.47	19.98	21.15	20.94	100.00

*This table reports the change in quintiles of neighbourhood socioeconomic disadvantage over time. For example, 79.63% of participants located in a Q1 neighbourhood in 2007 remained in a Q1 neighbourhood, 11.74% transitioned to Q2, 4.31% to Q3, 2.79% to Q4 and 1.52% to Q5.
†Column totals represent the percentage of participants in each quintile in 2021.

An association between changes in the level of neighbourhood socioeconomic disadvantage and changes in psychological distress was identified only in Q1 (*most* disadvantaged) when wave 21 was included. However, when excluding wave 21, no association was found. These findings suggest that the observed association between neighbourhood disadvantage and psychological distress may be largely due to stable differences between individuals living in neighbourhoods with varying levels of disadvantage rather than by changes in neighbourhood conditions directly causing changes in mental health. Our findings are in line with those reported by Jokela,[22] who found no notable changes in mental health when moving between neighbourhoods and provide support for the notion of selective residential mobility. Individuals may selectively choose or be compelled to move to a neighbourhood based on their health or socioeconomic factors.[38] Disadvantaged neighbourhoods may lose healthier residents to less disadvantaged neighbourhoods while individuals with poor health may relocate to more disadvantaged neighbourhoods.[38]

Table 4 Sensitivity analyses of psychological distress differences by level of neighbourhood socioeconomic disadvantage, 2007–2019

n=95 138	β (95% CI)
Model 1 (pooled)†	
Time (years)	0.14 (0.13 to 0.15)
Q5 (least disadvantaged)	ref
Q4	0.25 (0.07 to 0.42)*
Q3	0.44 (0.25 to 0.63)**
Q2	0.77 (0.57 to 0.97)**
Q1 (most disadvantaged)	1.39 (1.18 to 1.61)**
Model 2 (trends)†	
Q5 (least disadvantaged)×Time	ref
Q4×Time	0.00 (−0.03 to 0.04)
Q3×Time	0.02 (−0.01 to 0.05)
Q2×Time	0.00 (−0.03 to 0.03)
Q1 (most disadvantaged)×Time	0.05 (0.02 to 0.09)*
LR test	$\chi^2(4)=13.45$, p=0.009
Model 3 (fixed effects)‡	
Q5 (least disadvantaged)	ref
Q4	0.04 (−0.07 to 0.15)
Q3	0.09 (−0.04 to 0.22)
Q2	0.02 (−0.13 to 0.16)
Q1 (most disadvantaged)	0.16 (−0.02 to 0.33)

*p ≤ 0.05; **p ≤ 0.001.
†Adjusted for age, sex, education, occupation, and household income.
‡Changes in psychological distress by changes in level of neighbourhood socioeconomic disadvantage.

The finding that the within-person association only appears when wave 21 is included may be attributed to COVID-19 restrictions, which limited movement beyond one's neighbourhood. For residents of disadvantaged neighbourhoods, these restrictions likely compounded existing adverse socioeconomic and physical conditions, such as overcrowding and limited access to services.[26] Furthermore, restrictions on travel to less disadvantaged neighbourhoods, for activities such as using greenspace to exercise, may have exacerbated the negative mental health effects associated with living in disadvantaged neighbourhoods.[26] Therefore, COVID-19 restrictions may have disproportionately affected the mental health of residents in disadvantaged neighbourhoods.

While our study did not aim to identify the underlying mechanisms driving neighbourhood socioeconomic inequalities in psychological distress, the findings highlight the importance of population-level policies and interventions to address disparities. For example, the Australian Government's National Urban Policy aims to create more liveable and equitable urban areas by improving social, economic and environmental conditions, actions which may promote positive mental health and reduce disparities.[39] In particular, interventions that improve access to high-quality education, affordable and secure housing, local employment opportunities, greenspace and reliable public transport, especially when targeted to disadvantaged neighbourhoods, have the potential for the greatest impact. These attributes of urban liveability have been identified as key modifiable actions for reducing health inequities and improving well-being.[9] However, to ensure the effectiveness of policies and interventions, future research should aim to understand the underlying mechanisms contributing to neighbourhood socioeconomic inequalities in psychological distress. Identifying neighbourhood attributes that have the potential to modify the association between neighbourhood disadvantage and psychological distress can provide valuable opportunities for policies aimed at reducing inequalities. Furthermore, considering the evidence indicating that the influence of neighbourhood disadvantage may manifest prior to adulthood, future studies should broaden their scope to encompass children and adolescents.

Our study has several key strengths. First, the data were obtained from the HILDA Survey, a multilevel, nationally representative, longitudinal survey.[29] The use of longitudinal data spanning 15 years may provide a stronger position to make causal inferences between neighbourhood socioeconomic disadvantage and psychological distress. Second, the K10 is a widely recognised and accepted measure.[27] In Australia, the K10 has

policy relevance as it is frequently used to assist policymakers within the healthcare system to assess and track the prevalence of mental disorders.[27] Third, we used spatially and temporally consistent IRSD data to analyse the effect of changes in neighbourhood socioeconomic disadvantage over time. Having annual data enhance the accuracy of our analysis, aligning with the study's aim to examine the impact of neighbourhood changes. Despite these strengths, there are limitations. While the IRSD is a widely used indicator of neighbourhood disadvantage, it does have some limitations. First, it represents the overall level of disadvantage across an area and does not capture within-area variation.[40] Second, the IRSD is limited to information collected in the census and may not capture other important dimensions of disadvantage, such as crime or access to services and infrastructure, which are not included in the index.[41] Therefore, while the IRSD is useful for examining neighbourhood contextual effects, it may understate some forms of social and structural disadvantage that may also impact health. Non-response may be introduced by the SCQ, which contains the K10 and is administered only to individuals who complete the Person Questionnaire. In addition, poor mental health has been linked with greater survey attrition, and this may lead to an under-representation of those experiencing higher psychological distress.[42] Nevertheless, the wave-on-wave response rates in the HILDA Survey remain high.[43] Social desirability bias may result in individuals under-reporting psychological distress; however, the K10 in the HILDA Survey is self-administered, and participants seal their responses in an envelope. This may mitigate some bias compared with surveys that rely on interviews.[30] Furthermore, while treating the K10 as a continuous variable allows for the detection of small changes in psychological distress over time, a limitation is potential clustering of scores at the lower end of the scale.

Our findings from nationally representative longitudinal data provide further evidence of neighbourhood socioeconomic inequalities in psychological distress. Considering the profound effects of mental disorders on individuals and society, further investigation into when and how mental health disparities develop is necessary to inform targeted interventions aimed at reducing neighbourhood socioeconomic inequalities and improving population health.

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Contributors RAR led the conceptualisation and design of the study, conducted the statistical analyses, interpreted the results and drafted the original manuscript. SM assisted with the study design, provided critical input on the statistical methods, contributed to the discussion and contextualisation of findings, provided critical feedback and helped revise the manuscript. JG-T assisted with data analysis, contributed to the interpretation and contextualisation of findings, provided critical feedback and helped revise the manuscript. SF contributed to the writing and editing of the introduction and discussion, as well as contextualisation of findings, provided critical feedback and helped revise the manuscript. JNR contributed to the study design, assisted with data analysis and interpretation of findings, provided critical feedback and helped revise the manuscript. SM, JG-T, SF and JNR approved the final version for submission. RAR is the guarantor.

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Ethics approval This study involves human participants and was approved by The HILDA Survey University of Melbourne Human Ethics Committee (#1955879). Participants gave informed consent to participate in the study before taking part; The HILDA survey's ethical approval was given by the Human Ethics Advisory Committee of the University of Melbourne (ID number 1647030).

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Data availability statement Data may be obtained from a third party and are not publicly available. The HILDA dataset is publicly available and accessible by authorised researchers and data users who have obtained permission from the DSS. This paper uses unit record data from Household, Income and Labour Dynamics in Australia Survey [HILDA] conducted by the Australian Government Department of Social Services (DSS). The findings and views reported in this paper, however, are those of the author[s] and should not be attributed to the Australian Government, DSS, or any of DSS' contractors or partners. DOI: https://doi.org/10.26193/24EJST.

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