Gender and care: Does gender modify the mental health impact of adolescent care?☆

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ABSTRACT

Young carers are people aged 25 years or less who deliver unpaid informal care to a family or a friend living with a physical or mental illness, a disability, problems related to alcohol/substance use or an elderly relative. Young caring has negative impacts on the mental health of adolescents. Gender patterns underpinning this association have not been explored. We examined gender differences in the mental health effect of informal care among Australian adolescents. We used data from the Longitudinal Study of Australian Children (LSAC). Participants were categorised as non-carers or young carers at 14/15 years old. Although we acknowledge that gender is non-binary, information about gender identity was not collected in LSAC during adolescence. We used the study child's sex as reported at age 14/15 years to categorise adolescents as boys or girls. Mental health was measured using the Kessler Psychological Distress scale (K10) at ages 18/19. We conducted multivariable linear regression models and assessed effect modification by fitting an interaction term between gender and informal care. Informal care was associated with poorer mental health among boys (β: 0.97, 95%CI: -0.01, 1.95), and girls (β: 1.66, 95%CI: 0.63, 2.69). Overall, in comparison to boy non-carers, girl carers had the highest level of distress (β: 4.47; 95%CI: 3.44, 5.51), yielding high predicted scores of K10. While the mental health effects of young care were stronger for girls, there was limited evidence of effect modification as the difference in mental health disparities due to informal care between girls and boys was small (β: 0.69) with high uncertainty levels (95%CI: -0.72, 2.11). Psychological distress scores were higher for girls than boys in both caring categories. Support strategies should focus on identifying and supporting boy and girl carers to reduce the adverse mental health impact of young informal care.

1. Introduction

Internationally, most caring demands of people living with long-term conditions are met through the support of family and friends (OECD, 2021). Commonly referred to as informal carers, these unpaid care providers engage in roles of high complexity and intensity (Triantafillou et al., 2010). Whilst acknowledging the complexity of these caring demands, we use the term "informal care" throughout to differentiate informal carers from those who provide care as part of their employment or voluntary work (Triantafillou et al., 2010).

Some informal carers are "young carers". Young carers are defined as people aged 25 years or less delivering unpaid care to someone with a physical or mental illness, a disability, problems related to alcohol/substance use or an elderly relative (Leu & Becker, 2014). International estimates show that 2–8% of the population under 25 years may be defined as young carers (Becker, 2007). In Australia, the Survey of Disability, Ageing and Carers identified 235,300 young carers in 2018, equivalent to 6% of the population aged 15–24 years (Australian Bureau of Statistics, 2018). Most of these young carers undertake primary caring roles (Australian Bureau of Statistics, 2018), providing the majority of care and playing a vital role in delivering care for people with long-term conditions.

The provision of care by adolescents can impact their mental health (Stamatopoulos, 2018). Two recent systematic reviews identified that

young care is consistently associated with increased levels of mental distress and poor psychological wellbeing (Fleitas Alfonzo et al., 2022; Lacey et al., 2022). Emerging longitudinal evidence suggests there is a causal effect of caring (Brimblecombe et al., 2020; King et al., 2021; Nakanishi et al., 2022). Using a representative sample of Australian adolescents, King et al. (2021) found that undertaking caring roles at 14/15 years led to increased levels of psychological distress at 18/19 years. Similar findings are reported in the UK, where young care has been longitudinally associated with elevated levels of distress (Nakanishi et al., 2022) and poor psychological wellbeing (Brimblecombe et al., 2020; Nakanishi et al., 2022). Given that most mental health problems start in adolescence and youth (Kessler et al., 2007), informal care can increase the risk of adult poor psychological health among adolescent carers. Preventative strategies are needed to mitigate the detrimental effect of young informal care. However, the patterning and factors underpinning the higher rates of psychological symptoms in young carers are unclear (Fleitas Alfonzo et al., 2022; Lacey et al., 2022).

In adults, the distribution of informal care is gendered, with women accounting for 59% (Eurocarers, 2021) to 60.2% (Australian Bureau of Statistics, 2021) of all informal carers internationally. In addition to this, the mental health costs of informal care are larger for women than men (Bom et al., 2018; Lacey et al., 2019). A recent analysis of the caregiving trajectories and mental health of men and women carers found that while women carers clearly displayed poorer mental health than their non-caring counterparts, evidence of a mental health penalty of informal care was absent for men (Lacey et al., 2019). While the distribution of informal care is similar for boys and girls (Warren & Edwards, 2017), engaging in these roles could have different implications for their mental health. Informal care may compound feelings of isolation and dissonance in boys, who transgress gender norms by assuming roles that are traditionally expected from women (Zygouri et al., 2021). On the other hand, girls are overrepresented as primary carers and providing support with complex tasks (Untas et al., 2022; Warren & Edwards, 2017). This difference in the distribution of caring roles is important because more caring activities in adolescence (e.g. daily caring) has a larger prospective effect on mental health than roles of lesser frequency (King et al., 2021).

In 2003, a cross-sectional study in the U.S. comparing the mental health of young carers and their non-caring peers found that among participants aged 8–11 years, the association between young informal care and depression and anxiety was stronger for boys than girls, while no gender differences were observed among those aged 12–18 (Hunt et al., 2005). These findings, however, provide little evidence of gender patterns on the mental health effects of young informal care. Longitudinal evidence is needed to establish a temporal order between informal care and adolescent mental health. To date, gender differences in the association between young caregiving and mental health using longitudinal data have not been examined (Lacey et al., 2022). More importantly, gender patterns in this association have not been explored in Australia. This is a significant gap in evidence because if the mental health effects of young caring are gendered, targeting the affected group may have a greater impact on decreasing mental health inequalities between young carers and their non-caring peers than non-specific approaches. On the other hand, in the absence of gendered effects, targeted interventions will have little impact on reducing such inequalities.

Knowledge of gendered impacts of care is essential in low-resource settings where population-wide interventions are unfeasible. Due to the overall paucity of research on young carers' mental health and the lack of recognition of young carers internationally (Leu et al., 2022), support services available to them are scarce (Hutchings et al., 2021). Access to support services was further restricted by the COVID-19 pandemic, leading to the closure of many young carer services internationally (Blake-Holmes & McGowan, 2022). Therefore, identifying those at high risk is crucial to the efficient allocation of resources to those who are most vulnerable to the detrimental effects of informal care. This paper seeks to fill an existing evidence gap by elucidating the impact of gender on the longitudinal association between informal care and mental health among adolescents. Thus, using a representative sample of Australian adolescents, we examine if gender modifies the mental health impact of informal care.

2. Methods

This paper follows the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. We used secondary data from the Longitudinal Study of Australian Children (LSAC). LSAC is a population-based study that follows two cohorts of Australian children, collecting biennial information about social, economic, familial and health conditions. In 2004, a two-stage sample design was undertaken to recruit a representative sample of Australian children. A total of 311 postcodes were selected as a first stage. To ensure a proportional representation of each Australian region, these postcodes were stratified by states and territories. Eligible children living in these postcodes were randomly selected from the Medicare database. Cohort K recruited children aged 4–5 years at baseline and Cohort B children aged 0–1 years. Data sources of LSAC includes the study child, their parents or caregivers, teachers and childcare workers (Soloff et al., 2006).

This paper focused on data from cohort K and excludes cohort B, since data on informal care for the younger cohort (B) is only available for one wave. Data on informal care was collected for the first time from cohort K in 2014 when participants were aged 14–15 years. Data on covariates was extracted from wave 5 at ages 12–13, data on exposure to informal care was extracted from wave 6 at ages 14–15 and data on mental health was extracted from wave 8 at ages 18–19 (Mohal et al., 2022).

2.1. Exposure: informal care

Data on informal care was collected from the study child. Adolescents were asked the following question to ascertain their exposure to informal care: *"Do you help someone who has a long-term health condition, has a disability or is elderly, with activities that they would have trouble doing on their own"*. Answers to this question was used to create a binary variable: non-carers and carers.

2.2. Outcome: mental health

Mental health status was self-reported by the study child and measured with 10 items of the Kessler Psychological Distress Scale (K10) (Kessler et al., 2002). The Kessler Psychological Distress Scale (K10) was the only measure of mental health collected at ages 18/19 from LSAC participants. The K10 is a highly validated measure of psychological morbidity widely used in people aged 17 years and over in routine screening for mental illness and population-based surveys (Australian Bureau of Statistics, 2009; Commonwealth of Australia Department of Health, 2020). The questionnaire includes questions about experiences of psychological distress in the past four weeks. Answers to these questions were ranked from 1 "none of the time" to 5 "all of the time". K10 has been used in Australia with validated cut-off points to indicate categories of psychological distress, such as the Australian Bureau of Statistics categorisation (Australian Bureau of Statistics, 2009). Under this classification, participants are categorised as experiencing low (total score of 10-15), moderate (total score of 16-21), high (total score of 22-29) or very high (total score of 30-50) levels of psychological distress (Australian Bureau of Statistics, 2009). High scores of K10 are indicative of probable mental illness including anxiety, depression and other mental disorders (Andrews & Slade, 2001; Slade et al., 2011). This scale was primarily developed in English (Kessler et al., 2002) and translated into over 20 languages (National Comorbidity Survey, 2005). Its use is available for free (National Comorbidity Survey, 2005). We used total scores for all questions, ranging from 10 to 50, as a continuous measure, with higher scores indicating poorer mental health.

2.3. Effect modifier: gender

We acknowledge that gender is non-binary, however information about gender identity was not collected in LSAC wave 6. Therefore, we used the study child's sex as reported by their parents at age 14/15 years to categorise adolescents as boys or girls.

2.4. Confounding factors

Confounding factors for the association between informal care and mental health were extracted from wave 5. These included maternal education (diploma/certificate, Year 12, under Year 12), parental cultural background (both parents born in Australia, at least one parent born in Anglo-English country, at least one parent born in non-English speaking country and at least one parent identifies as Indigenous Australian), living with a household member with a disability (no, yes), living with both parents at home (no, yes), living with children under five years of age (no, yes), quintiles of weekly household income, parental employment (both parents employed, one parent employed and both unemployed), number of siblings in household and quintiles of area level of deprivation using the Index of Relative Socio-Economic Disadvantage (IRSD). These indexes are derived from each National Census; the ones used here were extracted from the Census 2011. With the exception of IRSD, all of these variables were reported by the parents. These confounding factors were identified as common causes of informal care and mental health (see Supplementary File 1).

2.5. Statistical analysis

Participants socio-demographic characteristics in wave 5 (2012) were described according to caring status and gender. Additional descriptive analyses included the assessment of scores of psychosocial difficulties at wave 5 (2012) and mental health at follow-up (wave 8, 2018) for boys and girls in each caring category.

In order to assess effect modification on the additive scale, we fitted a multivariable linear regression model with the confounders, exposure (caring status) and effect modifier (gender) included as main effects, and an interaction term between the exposure and effect modifier. Using linear combination of regression parameters ("lincom" command in Stata 16) we estimated stratum specific effects for each joint category of informal care and gender, with boy non-carers as the reference category. Also using linear combination of regression parameters, we calculated the mental health effects of informal care separately for boys and girls (see Supplementary file 2 for an extended description of our statistical analysis). This approach is recommended by VanderWeele and Knol (2014) when assessing additive effect modification of a continuous outcome. The margins command was used to estimate model predicted means of mental health scores for boys and girls in each caring category. The results are presented following the recommendations of Knol and VanderWeele (2012). All analyses were conducted in STATA 16. The Stata code used in these analyses are available in the Supplementary file 2.

2.6. Missing and non-response

A total of 4983 adolescents who participated in wave 1 of LSAC were assessed for eligibility. From these, 2063 non-carers and 1213 young carers were eligible for inclusion, having participated in waves 5 to 6 and provided data about informal care. Of these a total of 511 non-carers and 337 young carers did not participate in wave 8, while 235 participants had missing data on the outcome and confounding factors. The total sample of participants with complete data was 2193 (1420 non-carers and 773 young carers). A comparison of participants in the analytical sample and those with missing data is shown in Supplementary File 3. Among participants in the complete case sample, 35.3% were young carers and 74.7% non-carers. The proportion of young carers was larger among participants with missing data (40.6% carers and 59.4% non-carers). We identified similar retention rates for girls and boys. There was better retention of participants with high maternal education, those living with both parents at home, higher quintiles of household income, least deprived areas and employed parents. However, these differences were not substantial.

2.7. Multiple imputation

To address attrition and non-response, we repeated our analyses in an imputed dataset. We performed multiple imputation using chained equations with 100 replications. All covariates, informal care and mental health outcome were included in the imputation model with the following ancillary variables: number of siblings, area of remoteness, birth plurality (indicating if the child was born in a single or multiple birth), presence of two parents in household and parental relationship to the child (biological parents/adoptive parents/stepparents/other caregiving arrangements). These variables were extracted from wave 1. We generated model predicted mental health scores by using the "mimrgns" command (Klein, 2021).

2.8. Sensitivity analyses

A further set of models were conducted to adjust for psychosocial difficulties at Wave 5 (2012) and measured using the Strengths and Difficulties Questionnaire (SDQ). SDQ measures emotional symptoms, conduct problems, hyperactivity, peer relationships problems and pro-social behaviours, and is an appropriate measure of psychosocial morbidity among children and adolescents aged 2–17 years old (Muris et al., 2003), and is strongly correlated with other adolescent measures of psychological symptomatology. A total difficulties score was derived from four subscales (hyperactivity, emotional, peer problems and conduct problems), with higher scores indicating poorer mental health (Muris et al., 2003). High total difficulties scores are strongly correlated with a diagnosis of mental health disorders, including depression and anxiety. SDQ was reported by the primary carer of the study child, usually the mother. Parental report of SDQ was preferred over the study child and teachers' report as this measure has demonstrated the strongest validity (Goodman, 2001).

Another set of sensitivity analyses using inverse probability treatment weights to maximise the exchangeability between carers and non-carers was conducted to test the robustness of our findings. We estimated propensity scores from a model regressing the exposure (X) on the confounding factors (C). Using these propensity scores, carers were weighted as $1/(\Pr[X = 1|C])$, and non-carers as $1/(\Pr[X = 0|C])$ (Hernán & Robins, 2020).

2.9. Role of the funding source

The funding source had no role on the study design, analysis, interpretation of results, manuscript preparation or submission of the final report.

3. Results

The total number of participants in the analytical sample was 2193 (see Fig. 1). Table 1 displays the distribution of the outcome and other covariates across the sample. More boys than girls reported providing informal care (38.1% vs 32.4%). Most participants lived with both parents (86.3%) and had non-Indigenous Australian parents (58.1%). Among boys and girls, a higher proportion of young carers lived with someone with a disability, in lower income households and in socioeconomic deprived areas than their non-caring counterparts. Young carers were also slightly overrepresented in households where both parents were unemployed and living with children under 5 years.

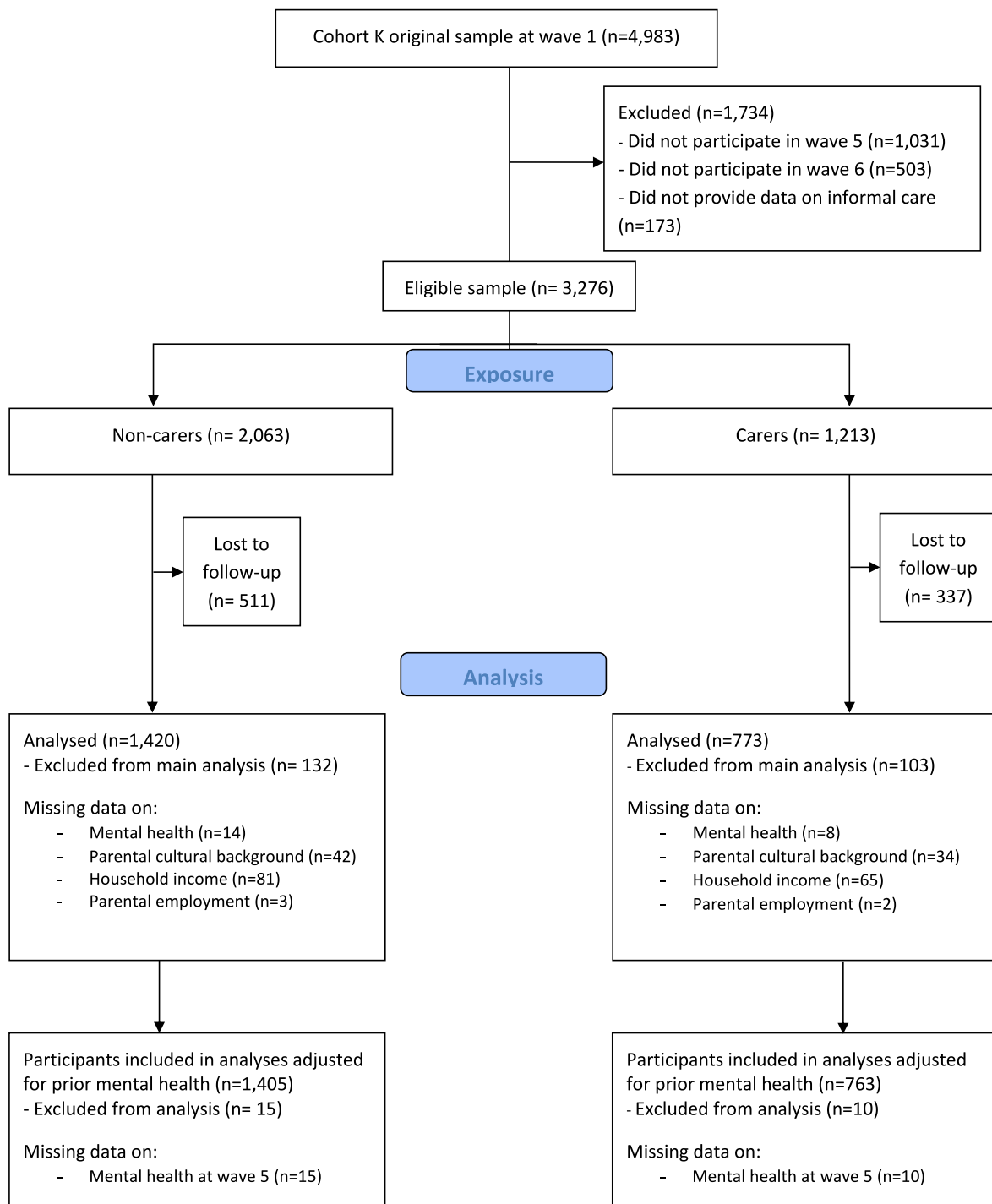The mental health effects of each joint category of gender and care

Fig. 1. Participant's flowchart.

are shown in Table 2, with boy non-carers as the reference group. On average, boy carers had poorer mental health than their non-caring counterparts (β: 0.97, 95%CI: -0.01, 1.95). In contrast to boy non-carers, girl non-carers had poorer mental health (β: 2.81, 95%: 1.97, 3.65). The mental health differences in K10 attributed to being a girl carer was 4.47 points higher than boy non-carers (95%CI: 3.44, 5.51).

While informal care had detrimental mental health effects among both gender groups, gender stratified mental health differences in K10 scores between carers and non-carers were larger for girls (β: 1.66, 95%: 0.63, 2.69), than boys (β: 0.97, 95%CI: -0.01, 1.95). However, there was little evidence of additive effect modification; that is, the difference in mental health scores between boys and girls attributed to informal care

was 0.69 with a 95% confidence interval ranging from -0.72 to 2.11. This confidence interval indicates high uncertainty in these estimates, and only weak evidence to support the hypothesis that gender modifies the mental health effects of informal care.

Fig. 2 shows model predicted scores of Kessler psychological distress. Notably, mean scores for psychological distress for the least disadvantaged girls (non-carers) were larger than the scores of the most disadvantaged boys (carers). This reflects the (on average) poorer psychological health among girls. More significantly from a clinical standpoint, girls who were undertaking informal caring roles at ages 14/15 displayed an average score of psychological distress of over 22 at 18/19 years (vs 20.6 in girl non-carers), the starting point for the "high level

Table 1
Distribution of mental health and covariates by caring status and gender.

	Boys (n = 1101)		Girls (n = 1092)		All (n = 2193)
	Non-carers (n = 682, % = 61.9)	Carers (n = 419, % = 38.1)	Non-carers (n = 738, % = 67.6)	Carers (n = 354, % = 32.4)	
Outcome					
Mental health, mean (sd)	17.6 (7.39)	18.7 (8.44)	20.3 (7.86)	22.3 (9.18)	19.5 (8.22)
Covariates					
Maternal education	n (%)	n (%)	n (%)	n (%)	n (%)
Diploma/certificate	218 (31.9)	129 (30.8)	253 (34.3)	122 (34.5)	722 (32.9)
Year 12	85 (12.46)	50 (11.9)	92 (12.5)	32 (9.04)	259 (11.8)
Under year 12	379 (55.6)	240 (57.3)	393 (53.3)	200 (56.5)	1212 (55.3)
Parental cultural background					
Both parents born in Australia	402 (58.9)	248 (59.2)	426 (57.7)	197 (55.7)	1273 (58.1)
One parent born in Anglo-English country	181 (26.5)	104 (24.8)	201 (27.2)	107 (30.2)	593 (27.0)
One parent born in non-English speaking country	84 (12.3)	>10 (np[a])	>10 (np[a])	>10 (np[a])	289 (13.2)
One parent identifies as Indigenous Australian	>10 (np[a])	<10 (np[a])	<10 (np[a])	>10 (3.11np[a])	38 (1.73)
Household member with disability					
No	452 (66.3)	242 (57.8)	528 (71.5)	194 (54.8)	1416 (64.6)
Yes	230 (33.7)	177 (42.2)	210 (28.5)	160 (45.2)	777 (35.4)
Both parents at home					
Yes	593 (87.0)	362 (86.4)	644 (87.3)	294 (83.1)	1893 (86.3)
No	89 (13.1)	57 (13.6)	94 (12.7)	60 (17.0)	300 (13.7)
Lives with children under 5					
No	632 (92.7)	385 (91.9)	680 (92.1)	325 (91.8)	2022 (92.2)
Yes	50 (7.33)	34 (8.11)	58 (7.86)	29 (8.19)	171 (7.80)
Household income (quintiles)					
1 (lowest)	110 (16.1)	71 (17.0)	114 (15.5)	75 (21.2)	370 (16.9)
2	144 (21.1)	79 (18.9)	137 (18.6)	65 (18.4)	425 (19.4)
3	135 (19.8)	90 (21.5)	165 (22.4)	69 (19.5)	459 (20.9)
4	138 (20.2)	83 (19.8)	132 (18.0)	82 (23.2)	435 (19.8)
5 (highest)	155 (22.7)	96 (22.9)	190 (25.8)	63 (17.8)	504 (23.0)
Areal level deprivation (quintiles)					
1 (most deprived)	145 (21.3)	94 (22.4)	138 (18.7)	88 (24.9)	465 (21.2)
2	115 (16.9)	67 (16.0)	153 (20.7)	63 (17.8)	398 (18.2)
3	162 (23.8)	95 (22.7)	146 (19.8)	74 (20.9)	477 (21.8)
4	131 (19.2)	79 (18.9)	151 (20.5)	62 (17.5)	423 (19.3)
5 (least deprived)	129 (18.9)	84 (20.1)	150 (20.3)	67 (18.9)	430 (19.6)
Parental employment					

Table 1 (continued)

	Boys (n = 1101)		Girls (n = 1092)		All (n = 2193)
	Non-carers (n = 682, % = 61.9)	Carers (n = 419, % = 38.1)	Non-carers (n = 738, % = 67.6)	Carers (n = 354, % = 32.4)	
Both employed	462 (67.7)	277 (66.1)	541 (73.3)	231 (65.3)	1511 (68.9)
Only one employed	183 (26.8)	114 (27.2)	173 (23.4)	103 (29.1)	573 (26.1)
Both unemployed	37 (5.43)	28 (6.68)	24 (3.25)	20 (5.65)	109 (4.97)
Number of siblings, mean (sd)	1.53 (0.98)	1.63 (1.07)	1.55 (0.96)	1.49 (1.03)	1.55 (1.00)
Psychosocial difficulties[b], mean (sd)	7.63 (5.40)	8.04 (5.95)	5.76 (4.50)	4.71 (5.48)	6.97 (5.25)

[a] Not publishable: frequency and percentages censored to protect the identity of participants.
[b] Measured through the Strengths and Difficulties Questionnaire at ages 12/13 (wave 5, 2012).

Table 2
Mental health effects of informal care modified by gender (n = 2193).

|	Non-carers		Carers		β (95%CI) for informal carers stratified by gender[a,b]
Gender	n	β (95%CI)[a]	n	β (95%CI)[a]	
Boys	682	ref	419	0.97 (-0.01, 1.95) 0.052	0.97 (-0.01, 1.95) 0.052
Girls	738	2.81 (1.97, 3.65) <0.001	354	4.47 (3.44, 5.51) <0.001	1.66 (0.63, 2.69) 0.002
Additive EMM (interaction term):			0.69 (95%CI: -0.72, 2.11) p = 0.339		

Notes.
[a] Adjusted for maternal education, parental cultural background, living with a household member with a disability, living with both parents at home, living with children under five years of age, quintiles of weekly household income, parental employment, number of siblings in household and quintiles of area level of deprivation.
[b] Non-carers as the reference.

of distress" category under the K10 score categorisation (Australian Bureau of Statistics, 2009).

Supplementary File 4 shows the mental health effects of informal care after adjusting for psychosocial difficulties at ages 12/13 (SDQ). We identified minimal differences between the main results and analyses adjusted for SDQ. Among boys, the mental health effects of informal care were slightly attenuated to 0.86 (95%CI: -0.11, 1.83). Such effects were also attenuated among girls, who showed a 1.33 change in K10 scores attributed to informal care (95%CI: 0.31, 2.35). After adjusting for SDQ, gender differences in mental health changes attributed to informal care were not supported (β: 0.47 (95%CI: -0.93, 1.87)). Multivariate linear regression outputs before and after SDQ adjustment are presented in supplementary file 5. Our models were substantiated in sensitivity analyses for imputed models (see Supplementary File 6) and analyses using inverse probability weighting (see Supplementary File 7).

Predicted means of K10[a]

■ Non-carers ■ Carers
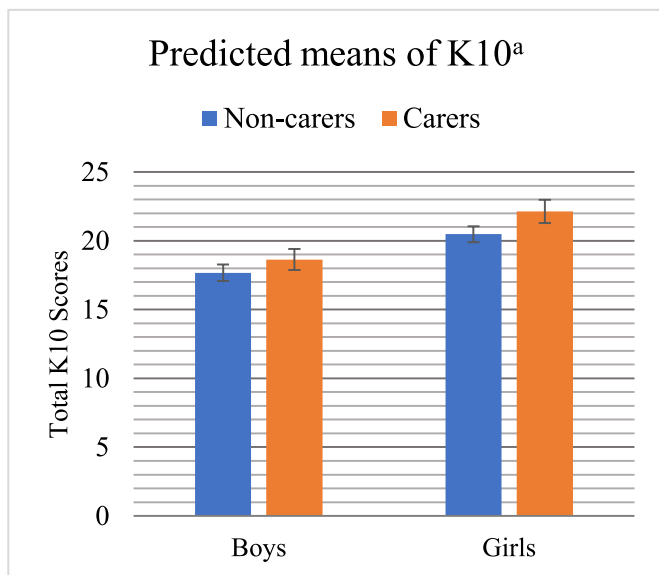
Fig. 2. Model predicted means of Kessler 10 scores of Psychological Distress. Note: [a]Adjusted for maternal education, parental cultural background, living with a household member with a disability, living with both parents at home, living with children under five years of age, quintiles of weekly household income, parental employment, number of siblings in household and quintiles of area level of deprivation.

4. Discussion

4.1. Summary of results

Adolescent carers showed higher levels of psychological distress in early adulthood than their non-caring peers. While the mental health effects of informal care were larger for adolescent girls, evidence for effect modification by gender was inconclusive. On average, adolescent girls had worse mental health than boys, irrespective of their caring status. Our models were supported across sensitivity tests adjusting for prior mental health, using an imputed sample and in analysis with inverse probability treatment weights.

4.2. Strengths and limitations

Our study has many strengths. While previous research explored a gender-stratified association between informal care and mental health outcomes such as depression and anxiety (Haugland et al., 2019; Hunt et al., 2005), no study has investigated this association using a longitudinal sample. This gap in evidence was recently highlighted in a systematic review (Lacey et al., 2022). Our paper fills this gap by assessing gender differences in the mental health effects of informal care among adolescents for the first time. In addition, this paper uses a representative sample of the population improving generalisability. Moreover, we use longitudinal data, ensuring temporality, where the exposure to informal care precedes the outcome (mental health). Temporality is an important criterion to assess causality because it avoids bias due to reverse causation, whereby people with poor (or good) mental health are selected into informal caring roles. Lastly, this paper uses highly validated measures of psychological distress, preventing measurement errors in the outcome.

However, this paper may also be subjected to some limitations. First, exposure to informal care, covariates and mental health outcomes were reported by the adolescents and their parents. The use of self-reported data could potentially introduce measurement bias. This is particularly important when reporting exposure to informal care. It has been suggested that many young carers do not identify as such, and others choose

to hide their caring role for fear of stigmatisation (Smyth et al., 2011). Many of them do not relate to the term "young carer" or perceive their roles as a normative part of family responsibilities (Smyth et al., 2011). The caregiving role may be particularly normalised among girls, explaining the small gender differences in caring prevalence observed among boys (38.1%) and girls (32.4%). As such, the underreporting of adolescent caring could attenuate our estimates. On the other hand, if, due to normative constructions of caregiving as a feminised activity, girls were to report informal care only when their caregiving demands were substantial, our effect modification estimates would be biased away from the null. However, our analyses did not support gender effect modification, which could suggest that girls and boys who identified as young carers were likely engaging in a similar amount of caregiving.

Another limitation pertains to the definition of caregiving. Due to sample limitations, we were unable to disaggregate the extent of caring demands undertaken by adolescents. This is an important distinction because informal care impacts mental health in a dose-response manner, with a greater extent of caring activities showing the largest mental health effects (King et al., 2021). In addition, there is little clarity on whether light caring demands imply a departure from normative adolescent tasks compared to engaging in roles of greater extent and complexity (Becker, 2007). This departure from normative roles is theorised as one of the drivers of the mental health strain of young informal care (Becker, 2007). Thus, the lack of nuance in the extent of caring demands arising from binary definitions of caring can potentially mask the true psychological impact of informal care, attenuating the observed effects. Another factor that requires consideration is the young carer's relationship with their caring recipient, as caring for an adult relative, especially a parent, denotes a more significant departure from normative adolescent roles than caring for a sibling (Hendricks et al., 2021). The limited sample size did not allow us to account for this factor in our analytical models. In addition, we did not have information on gender identity, which may influence the uptake of caring and the observed mental health outcomes. We recommend that future research interrogates the impact of gender on this association using larger samples and more comprehensive definitions of gender and informal care.

Lastly, we note that the prevalence of young carers in the sample differs from previous Australian estimates (Australian Bureau of Statistics, 2018). While the Survey of Disability Aging and Carers asks participants whether they help with a specific array of activities, LSAC does not list any potential caring demand within the identification question. The use of a broader definition of caring may have led to the classification of some participants who provide support with regular household tasks as young carers. If young caring were to affect mental health only through substantial and complex caregiving demands, the LSAC categorisation could lead to non-differential exposure misclassification. Given that the misclassification of young informal carers may balance the probability of poor mental health between the exposed and unexposed groups, this measurement error could bias our estimates towards the null.

4.3. Research in context

Contrary to research on adult caregivers (Bom et al., 2018; Lacey et al., 2019; Xiong et al., 2020), the uptake of informal care was similar for boys and girls, with boys reporting a slightly higher prevalence of caring. Moreover, while informal care in adults disproportionately impacts women's mental health (Bom et al., 2018; Lacey et al., 2019; Xiong et al., 2020), our findings suggest differences in the mental health effects of informal care between girls and boys are small, with limited evidence of effect modification. Importantly, our findings substantiate cross-sectional evidence on gendered differences in the association between young informal care and mental health. Our results align with those reported by Hunt et al. (2005), who found that across children aged 12–18 years, young carers reported more symptoms of depression and anxiety than their non-caring peers, with similar estimates for boys

and girls. Our results also support cross-sectional evidence on young adult carers in Norway, where comparable risks of depression and anxiety associated with informal care were found in men and women (Haugland et al., 2019).

In the current Australian evidence context, our findings align with longitudinal research reporting adverse mental health effects of informal care among older carers (Mohanty & Niyonsenga, 2021). To our knowledge, only one paper explored the longitudinal effect of adolescent care on later mental health using an Australian sample (King et al., 2021). Using LSAC, King et al. (2021) identified that adolescent care was associated with poor mental health four years later. However, the authors did not investigate the role of gender in this association. As such, ours is the first study to examine the gendered effects of adolescent care using population-based data in Australia.

While boy and girl carers showed poorer mental health than their non-caring peers, girls displayed poorer mental health in both conditions (caring and non-caring) than boys. Our findings align with adolescent mental health research, showing that mental distress levels, as well as the risk of depression and anxiety, are higher among girls (Lund et al., 2018). The gender gap in mental health commences during adolescence to continue over the life course (Lund et al., 2018). Research in mental health trajectories among adolescents also shows that mental health symptomatology increases faster and persists for longer for girls than they do for boys (Murray et al., 2022). Therefore, it is possible that boys who suffered from psychological distress after exposure to informal care may have recovered by the age 18/19 years.

Nonetheless, our findings do not support effect modification by gender. In our study, a similar proportion of boys and girls were identified as young carers. It is plausible that the absence of gendered effects is related to similar exposure to informal caring roles in boys and girls. Informal caring demands can be highly stressful for girl and boy carers. Adolescent carers often live in a state of constant readiness worrying that the health of their caring recipient could worsen (Mauseth & Hjalmhult, 2016). Moreover, their caring demands can impose substantial time pressures, preventing their participation in social activities (Stamatopoulos, 2018). The continuous distress attributed to the caregiving role and feelings of isolation and loneliness may explain the observed mental health effects in girl and boy carers.

It is also worth highlighting that the carers identified in our sample engaged in caring roles during adolescence, a crucial development period (Viner et al., 2015). It is at this stage when the onset of most lifetime mental health disorders occurs (Kessler et al., 2007). Considering that poor youth mental health is a strong predictor of low educational achievement (Hale et al., 2015), unemployment (Hale et al., 2015; Mousteri et al., 2019) and poor adult psychological health (Johnson et al., 2018), adolescent care could be placing young carers at risk of lifetime disadvantage relative to their non-caring peers.

4.4. Conclusion

The current paper has important implications for youth mental health. First, the uptake of informal care among Australian adolescents is not gendered. While girl carers displayed the highest scores of psychological distress, informal care in adolescence exerts adverse mental health effects in early adulthood among both boys and girls. We emphasise the urgent need for mental health services and future research on adolescents' mental health to explore strategies to identify and support young carers, regardless of gender, to reduce mental health inequalities relative to their non-caring peers.

Authors' contribution statement

LFA, TK, GD and AS conceptualised the research question and study design. LFA carried out data request, cleaning and analysis. All authors contributed toward the interpretation of results. LFA drafted the first version of the manuscript. TK, GD and AS revised the manuscript and contributed towards the final draft. All authors contributed towards the revised manuscript. All authors approved the submitted version of the article.

Ethical statement

The Longitudinal Study of Australian Children (LSAC) was approved by the Australian Institute of Family Studies Ethics Committee. LSAC meets the ethical standards highlighted in the National Statement on Ethical Conduct in Research Involving Humans, ensuring its performance fulfils the ethical requirements set on the Declaration of Helsinki.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data. This study uses secondary data from the Longitudinal Study of Australian Children (LSAC). LSAC is conducted by the Department of Social Services (DSS), the Australian Institute of Family Studies (AIFS) and the Australian Bureau of Statistics (ABS). LSAC data is accessible through the ADA dataverse with approval from the Australian Data Archive and the National Centre of Longitudinal Data.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmph.2023.101479.

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