

Longitudinal Cohort Study of Depression and Anxiety Among Older Informal Caregivers Following the Initial COVID-19 Pandemic Response in Aotearoa New Zealand

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Abstract

Objectives: To assess the impact of providing care and conditions of care on psychological wellbeing among older informal caregivers following the initial period of COVID-19 pandemic restrictions in Aotearoa New Zealand.

Methods: Data were from population-based cohorts of older adults participating in the 2020 Health, Work and Retirement longitudinal survey ($n = 3839$, 17.4% informal caregivers). Changes in symptoms of depression and anxiety over 2018–2020 surveys associated with sociodemographic factors, caregiving, cohabitation with the care recipient, assistance provided with activities of daily living, support in providing care, and opportunity cost of care were assessed.

Results: Increased depression, but not anxiety, was associated with providing informal care. Among caregivers, lower living standards and cohabitation were associated with increased depression. Lower living standards, unemployment, and lower help from friend/family networks were associated with increased anxiety.

Discussion: Economic hardship and social capital provide targets for supporting psychological wellbeing of older caregivers during periods of pandemic restrictions.

Keywords

anxiety, caregiving, COVID-19, depression, older adults

Introduction

Following the initial ‘elimination’ approach to the COVID-19 pandemic in New Zealand (Baker et al., 2020), people with chronic health conditions, disabilities, and their caregivers were identified among populations of concern (Anderson et al., 2020). Informal caregiving for friends or family due to illness, injury, disability or older age forms a significant, but often invisible, part of the workforce (Maidment, 2016). The economic value of informal caregiving was three times Medicaid expense for all long-term health services and supports expenditure in the U.S. in 2017 (Reinhard et al., 2019) and was estimated to be \$10.8 billion or 5% of New Zealand’s GDP in 2013 (Grimmond, 2014). Driven and shaped by self-efficacy, emotional attachment and sense of responsibility in interdependent relationships (Horrell et al., 2015), informal care roles span physical, emotional and financial dimensions, including support for activities of daily living, social contact, financial and medical action, decision-making and advocacy (Gott et al., 2015). Secondary impacts of fulfilling these roles mean that informal caregivers may

forego opportunities for other activities such as employment, social and recreational activities due to time, location and resource constraints associated with providing care (Gott et al., 2015; Horrell et al., 2015; Jorgensen et al., 2010). The impacts of providing care on psychological stress of informal caregivers is understood to be influenced by the caregiver’s background and contextual factors, as well as these primary and secondary impacts of the care situation (Pearlin et al., 1990), with a misfit of demands and available resources associated with experiences of ‘burnout’ among informal caregivers (Roth et al., 2015). In New Zealand, prior research with informal caregiver groups indicate significant deficits in formal support available in the provision of care roles under normal circumstances (Jorgensen et al., 2010),

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with care for activities of daily living (ADLs), falls history and cohabitation with care recipient significant contributors to burnout among informal caregivers of people with dementia (Chan et al., 2021).

Concern for caregivers during the pandemic has been driven by potentials for increased caregiving duties, isolation, barriers to service use, and barriers to resumption of social and employment activities associated with fears of exposure of ‘vulnerable’ care recipients (Kent et al., 2020). The increased risk associated with contracting the virus with older age has additionally highlighted risks for psychological wellbeing among older adults (De Pue et al., 2021), who represent a significant proportion of those providing informal care (Grimmond, 2014; OECD, 2019). In light of the potential for the pandemic’s dual stressors on older caregivers, the current work draws upon emerging evidence regarding the impacts of the pandemic on informal care and longitudinal data from a representative sample of older adults to examine the risk of poor psychological outcomes among this group following an initial ‘hard and fast’ period of pandemic restrictions in New Zealand.

Informal Care in Prior Disasters

Research following previous disasters has highlighted challenges that both formal and informal caregivers confront during and after disasters (e.g. Christensen & Castañeda, 2014; Gibson et al., 2018; Ozaki et al., 2017). A recent scoping review of this literature indicates mixed outcomes among informal caregivers, with challenges varying with care recipients’ needs, care arrangements, caregivers’ demographic characteristics, resource accessibility, social capital, and disaster agents (Pickering et al., 2021). This body of work indicates existing resources may provide resilience, with public and social disaster responses at times increasing access to resources (e.g. Gibson et al., 2018; O’Sullivan et al., 2018; Uekusa, 2019; Wakui et al., 2017). Further, fuelled with community altruism (Solnit, 2010) and emerging sense of disaster *communitas* (Matthewman & Uekusa, 2021), emergent and existing community groups often reach out to groups perceived as being vulnerable following disasters and attempt to fill the gaps in social and health services. This community response was evident during the early months of the pandemic response in New Zealand (e.g. Nadkarni, 2020). Such emergent social capital has been identified as an important driver for caregivers’ capacity to cope with economic, emotional, logistic and other forms of challenges in times of disaster (Uekusa, 2019). Overall, international research on informal caregivers in disasters highlight these events as heralding shifting demands and resources in the provision of informal care.

Impact of the COVID-19 Pandemic on Psychological Wellbeing of Informal Caregivers

The impact of the COVID-19 pandemic on demands and resources of informal caregiving roles will no doubt vary

across and within countries and over time. Emerging evidence confirms that many informal caregivers reported increased caregiving duties in the early months of the pandemic across several countries including samples from Germany (Budnick et al., 2021), Italy (Rainero et al., 2021), the U.S. (Beach et al., 2021; Cohen et al., 2021; Hwang et al., 2021) and China (Lee et al., 2021). In a survey of 1000 informal caregivers aged 40–85, Budnick et al. (2021) found that while most reported no change in their care situation during the early months of the pandemic, substantial proportions of those who cared for someone with dementia or who usually relied on professional help reported an increased burden of care and feelings of anxiety. An Italian national study of people caring for a family member with dementia following the first 7 weeks of quarantine restrictions indicated an increase in burden of care associated with increased symptoms in the care recipient, with significant portions of caregivers reporting worsening cognitive, behavioural and motor function symptoms in the care recipient, as well as increased feelings of depression, anxiety and distress (Rainero et al., 2021). Acknowledging the potential for increased stress in the general population during this period, a comparison of family caregivers and non-caregivers in the U.S. during the early months of the pandemic (Beach et al., 2021) found that when controlling for sociodemographic factors, family caregivers reported poorer outcomes including greater symptoms of depression, anxiety and lower financial wellbeing compared to non-caregivers. Such works reaffirm concerns for the wellbeing of caregivers, indicating that some caregivers experienced increased demands of their care roles in the early months of the pandemic restrictions, with greater demands associated with poorer health and financial outcomes.

A limitation of these early studies is a lack of pre-pandemic symptoms by which outcomes and existing social and psychological vulnerabilities may be evaluated. In an effort to address this limitation, a cross-sectional survey investigating impacts of pandemic lockdown in Italy asked family caregivers of people with dementia to report their feelings of depression and anxiety prior to and following lockdown (Altieri & Santangelo, 2021). Results indicate that both those with high and low levels of resources in their care role reported increased feelings of depression after lockdown. However, those with low resources reported a high but consistent level of anxiety pre–post lockdown while those with high resources reported increased anxiety post-lockdown. While vulnerable to confounding associated with retrospective self-report, these findings highlight the importance of pre-pandemic reference measures for understanding individual-level predictors of psychological impacts of the pandemic response among informal caregivers.

Adopting a different approach to evaluating the impact of the pandemic on psychological wellbeing of caregivers, Rodrigues et al. (2021) utilised separate samples to compare indicators of depression symptom frequency among

caregivers and non-caregivers from surveys of representative samples of Austrian adults conducted in 2015 and the early months of 2020. Their findings show that differences in depression symptom frequency between informal caregivers and non-caregivers widened in 2020 compared to 2015 and that the increase was greater for those who provided more hours of care per week. While limitations of these methods, such as differences between adults sampled and period effects associated with the extended follow-up are well recognised, results provide new evidence of increased symptoms of depression among informal caregivers in the early months of the pandemic. While limited to studies commenced prior to the pandemic, these evaluations may be meaningfully strengthened by comparisons of symptoms over a shorter pre-pandemic follow-up period, assessment of individual-level change, and how change may vary with potential stressors in caregiving situations

The COVID-19 Response and Caregiving in New Zealand

New Zealand adopted a ‘hard and fast’ response to the COVID-19 pandemic to eliminate the coronavirus in the community (Baker et al., 2020; Henrickson, 2020). Under this approach, from 19 March 2020, borders were closed to non-citizens/residents, physical distancing was strongly encouraged, and by 25 March a ‘lockdown’ protocol was enforced, in which people were confined to their homes and household contacts (known as ‘bubbles’) except for essential purposes, such as attending work as an essential worker, visiting the supermarket, and physical exercise (Baker et al., 2020; Trnka et al., 2021). Community members considered ‘vulnerable’ or ‘at-risk’ to the virus, such as those over the age of 70 years or who had an existing long-term health condition, were urged to remain strictly isolated and to not leave their homes (Cheung et al., 2020). Data from a large national online survey of adults during this Level 4 (most restrictive) lockdown indicated that members of ‘bubbles’ with one or more vulnerable people left their home fewer times over a 1 week period than those without a vulnerable person (Kearns et al., 2021) indicating that vulnerable community members adhered to the public health notice. Online surveys of psychological wellbeing during this initial lockdown indicated that around 30% of adults experienced psychological distress and 16% experienced moderate to high symptoms of generalised anxiety, although this rate declined with participant age (Every-Palmer et al., 2020).

After 5 weeks of restrictions and with rapidly declining case numbers, the country relaxed stay-at-home requirements (Baker et al., 2020), and health officials advised that household ‘bubbles’ could be carefully extended to include an informal caregiver of someone with a health condition who was normally resident elsewhere, childcare where parents returned to work, or individuals who lived alone (Trnka et al., 2021). Restrictions on social contact and social distancing

were lifted after 11 weeks (Baker et al., 2020). However, ongoing concern about risk of exposure in the community among those vulnerable to the virus continued to present a barrier to expansion of ‘bubbles’ as restrictions were relaxed (Trnka et al., 2021). Nationally, the impacts of economic upheaval and an unprecedented increase in unemployment (Fletcher et al., 2021) continued to be felt, although eased by government support packages.

While the impacts of the pandemic in New Zealand have undoubtedly been mitigated by the country’s ‘hard and fast’ response, little is known regarding the impact of the pandemic and associated response on older informal caregivers. Understanding the psychological stress experienced by this group and how this may be related to conditions of the caregiving role is vitally important to identify actions which may mitigate the impacts of current and future disaster events on this valued but often invisible section of the healthcare workforce. The current research extends existing international findings indicating increased psychological stress among informal caregivers by comparing changes in symptoms of depression and anxiety among informal caregivers and non-caregivers following the initial period of pandemic restrictions in New Zealand using a longitudinal pre–post design and an existing well-characterised and representative sample of older respondents. Secondly, acknowledging the heterogeneity of care situations and the potential benefits of identifying conditions which may exacerbate psychological stress associated with provision of care in the early months of the pandemic, we assess whether changes in depression and anxiety among informal caregivers were influenced by characteristics of care situations. To represent the components of care situations which may influence caregiver stress, we draw upon the conceptual framework proposed by Pearlin et al. (1990) to characterise background and contextual factors, primary stressors (i.e. the needs of care recipients) and secondary stressors (i.e. conflicts with activities outside the care role) influencing caregiver’s experiences of stress.

Research Design

Data from a large random sample of adults aged 55–84 participating in the 2018 and 2020 waves of the New Zealand Health, Work and Retirement (HWR) longitudinal survey were used in the current research. The 2020 survey was conducted following initial COVID-19 restrictions being lifted nationally on 9 June 2020. Analyses assessed the association of caregiving and potential caregiving stressors with symptoms of depression and anxiety in 2020, and whether these associations were maintained when controlling for symptom levels at 2018 survey. Respondent sociodemographic characteristics were included as background factors influencing stress in all models, that is, age, gender, marital status, material living standards and employment status. Considering well-recognised tensions between remaining in

employment and health in later life (Zhan et al., 2019), as well as heightened concern regarding exposure to the virus associated with employment (Kent et al., 2020; Trnka et al., 2021), both the impact of employment and employment as an essential service worker were modelled. Initial models assessed whether levels and changes in symptoms of depression and anxiety differed between older informal caregivers and non-caregivers. Information from the caregiver module at 2020 survey was then used to assess whether potential stressors of caregiving roles were associated with differences in levels and rates of change in symptoms of depression and anxiety among caregivers. In line with factors identified by Pearlin et al. (1990), we assess cohabitation with the care recipient, assistance in providing care from friend and family networks and from formal community organisations as contextual factors of caregiving. To characterise primary stressors of the caregiving role, we assess assistance provided for (instrumental) activities of daily living (ADLs/IADLs) of the care recipient. Finally, we assess secondary stressors of the caregiving role in terms of opportunity costs associated with providing care (i.e. resources and activities forgone in light of the caregiving role). These detailed longitudinal data have unique potential to characterise the psychological wellbeing of informal caregivers during the early months of the COVID-19 pandemic and to examine characteristics of care and care situation associated with increased symptoms of psychological stress over time.

Methods

Study Design and Participants

Data collection for the 2018 and 2020 HWR surveys was approved by the Massey University Human Research Ethics Committee [SOA 18/34; SOA 20/07]. Participants are provided with an information sheet at each survey wave, and consent to participate inferred by return of a completed questionnaire. The 2020 wave of the HWR study comprised responses to a postal survey of health and wellbeing in later life. Participants were respondents from among large random samples of older adults drawn from the national electoral roll and recruited to the study between 2006 and 2020. Around 97.6% of New Zealand citizens and residents aged 50+ are enrolled (New Zealand Electoral Commission, 2016). Cohort sample size was determined with reference to the Dillman et al. (2014) sample size calculation for representative population surveys. Design and response weights were calculated to account for over-sampling of persons of Māori descent, and response relative to the age, gender, area-level socioeconomic deprivation, and Māori descent of original random samples.

The 2020 survey form was posted to the sample on 11 June 2020, three days after first-wave COVID-19 restrictions ended in New Zealand. Data used in the current work represent survey responses received prior to a second period of

restrictions implemented in the Auckland region on 12 August 2020 ($N = 3959$). [Supplementary Figure S1](#) illustrates recruitment source of these early respondents to the 2020 survey. In terms of longitudinal data, of the $N = 3964$ respondents to the 2018 survey, $n = 3056$ responded to the 2020 survey prior to the second period of restrictions and were considered for inclusion in the current longitudinal analyses. Comparisons indicate that these early longitudinal respondents were slightly older, had higher material living standards and lower symptoms of anxiety compared to those who had not responded by this time ([Supplementary Table S1](#)). Indicators of depression and anxiety were obtained from respondents at 2018 and 2020 survey. Participants who reported their caregiving status at 2020 survey and provided adequate data on at least one outcome variable (i.e. no less than eight of the 10 depression scale items or four of the five anxiety scale items) were considered for inclusion in analyses.

Depression and Anxiety Outcome Measures

Symptoms of depression and anxiety were assessed, using measures designed for the assessment of older adult populations in epidemiological studies, namely, the Center for Epidemiologic Studies Depression Scale (CES-D10: [Andresen et al., 1994](#)) and Geriatric Anxiety Inventory short form (GAI-SF: [Byrne & Pachana, 2011](#)). The CES-D10 comprises 10 questions assessing frequency of symptoms of depression in the past 7 days on a four-point scale of 0 (*Rarely or none of the time*) to 3 (*All of the time*), with two questions reverse scored such that higher scores indicate higher symptom frequency (summed total score range 0–30). The GAI-SF comprises five questions assessing the presence of symptoms of anxiety in the past 7 days against response options coded 0 (*No*) or 1 (*Yes*) with a summed total score range 0–5. Analyses of longitudinal responses indicated that the CES-D10 and GAI-SF displayed temporal invariance over the 2018–2020 survey waves prior to total score calculation. Established cut off scores were used to describe the prevalence of clinically significant symptoms of depression (CES-D10 scores ≥ 10 : [Andresen et al., 1994](#)) and anxiety (GAI-SF scores ≥ 3 : [Byrne & Pachana, 2011](#)).

Caregiving Status

To enable representation of a range of low-high intensity caregiving conditions, participants were classified as caregivers if they reported that they had provided practical assistance to someone with a long-term illness, disability or frailty for, at least, 3 hours a week in the past 12 months. Participants who indicated that they provided care were asked to report characteristics of their caregiving role. Where more than one person was cared for, respondents were asked to respond regarding the person they spent the most time caring for in the last 12 months. In addition to aspects of the

caregiving role that were the focus of the current investigation, care recipient's age, frequency of care and caregiver's relationship to care recipient were collected to further characterise care relationships. On average, care recipients were 71.4 ($SD = 21.3$) years of age, caregivers' spouse (32.3%), parent or in-law (34.1%) or other relationship (33.6%). Caregivers had been providing care to the primary care recipient for an average of 7.4 years ($SD = 9.7$), and three quarters provided care several times a week or more, providing on average 29.6 hours ($SD = 48.1$) of care per week.

Background Factors

Respondents reported their age, gender, relationship status and SES (using an indicator of material living standards). Material living standards were assessed using the Economic Living Standards Index short form (ELSI-SF), a 25-item non-income measure of material wellbeing in New Zealand (Jensen et al., 2005). Scores range from 0 to 31 with higher scores indicating better living standards, interpreted as indicating 'good' (31–25), 'comfortable' (24–17), and 'hardship' (16–0) in living standards. To assess the potential for increased psychological symptoms among respondents who were essential service workers, participants were asked: 'Since the COVID-19 pandemic was declared by the World Health Organisation on March 11 2020 have you...': 'engaged in any paid employment?' and 'been considered an essential service worker?'. The yes/no response options were dummy coded into variables indicating *not being in paid employment, being paid employment as an essential service worker, or engaged in other paid employment*.

Contextual, Primary and Secondary Components of Caregiver Stress

Cohabitation: To assess psychological stress associated with living or not living in the same house as the care recipient, caregivers were asked 'Does/did the person you care(d) for live...?', with responses coded as 1 (*live with you*) vs. 0 (*live elsewhere*).

Assistance in providing support for ADL/IADL: Items assessing receipt of assistance in providing support for (instrumental) activities of daily living (ADLs/IADLs) from informal networks and formal organisations were administered. Responses were coded as indicating 1 (*Yes, help is received*) vs. 0 (*Help is needed but not provided/Help is not needed/NA*) from a list of potential sources. Help from *friends and family* was calculated as the sum of help from: children; siblings; spouse/partner; other family/whānau; friends; and neighbours (score 0–6). Help from *organisations* was calculated as the sum of help from: publicly funded services; support agencies you or your family pay for; or voluntary support agencies (score 0–3).

Support provided for ADL/IADL: Caregivers were asked to indicate types of support provided to the person they care(d) for in the past 12 months in relation to a list of 19 activities of daily living (e.g. bathing, dressing, toileting, transferring, continence and eating) and instrumental activities of daily living (e.g. using the phone, grocery shopping, preparing meals, housekeeping, laundering, using transportation, taking medications and managing finances; LaPlante, 2010; Spector & Fleishman, 1998). A total score (range 0–19) was calculated representing the number of ADL/IADLs for which assistance was provided.

Secondary opportunity costs of care: Nine items assessing the presence/absence of impacts of providing care on opportunities in the past 12 months were adopted from the Canadian General Social Survey (GSS) and administered in the 2020 survey. Previous analyses indicated that responses were best captured by factor scores representing three broad dimensions of impacts of end of life care among a large sample of caregivers aged 45+ in the Canadian GSS (Williams et al., 2016). Exploratory factor analyses using maximum likelihood estimation and orthogonal geomin rotations to assess 1–3 factor models of data from the current sample (Supplementary Table S2). Model fit was assessed with reference to Root Mean Square Error of Approximation values less than or equal to 0.06, and Comparative Fit Index values close to or greater than 0.95 and standardised root mean square residual values less than or equal to 0.08 (Hu & Bentler, 1999). In light of the presence of a first factor displaying high–moderate loadings for all items in all three models, the weak–moderate association of only one or two items with additional factors, the limited interpretability of the additional factors, and modest improvement in model fit with additional factors, a one-factor model representing overall opportunity cost of the caregiving role was selected as the most parsimonious model, with higher scores indicated greater opportunity cost (factor score $M = 0.05$, $SD = 0.79$; $\min = -0.93$ $\max = 2.49$).

Analysis

Analyses were conducted using Mplus 8.4, and models estimated using a maximum likelihood estimation with robust standard errors. In light of small proportions of missing data among participants who met inclusion criteria, 10 multiply imputed datasets including all model covariates and item-level indicators for the CES-D10 and GAI-SF were generated for each analysis using Bayesian estimation to reduce biases associated with missing data. Prior to imputation, datasets had less than 1.5% missing data on any background covariate, and less than 3.2% missing on any indicator of a component of caregiver stress (see supplementary materials for reporting of missing data and complete case analyses).

Design and survey weights were applied to account for the study's over-sampling design and sociodemographic factors associated with survey response. Weighted summary

statistics and analysis coefficients, and unweighted numbers of observations, are reported. Descriptive statistics were used to summarise participant background characteristics and symptoms of depression and anxiety by caregiving status and to describe conditions of care among informal caregivers. Univariate logistic regression was used to assess characteristics associated with caregiving status. To assess whether psychological outcomes differed by caregiving status among older adults in the early months of the pandemic response, multiple regression models were used to estimate the association of caregiving status with symptoms of depression and anxiety when controlling for background factors in 2020. To assess whether changes in symptoms over the 2-year follow-up period (pre–post pandemic response) differed by caregiving status, outcomes at the 2020 survey were additionally regressed on outcomes at 2018 survey. Negative binomial models were used to account for the non-normal count distribution of anxiety symptom scores.

To assess the impacts of potential contextual, primary and secondary stressors of the caregiving situation on psychological outcomes among caregivers in the early months of the pandemic, multiple linear regression models were used to assess the association of these factors with symptoms of depression and anxiety in 2020 among participants who were caregivers and provided data on their caregiving situation at 2020 survey. To assess whether significant predictors in these models reflected factors associated with a change in symptoms over the 2-year follow-up period (pre–post pandemic response), outcomes at 2020 survey were regressed on outcomes at 2018 survey among caregivers who provided longitudinal data on one or more outcomes.

Results

Of the $N = 3959$ responses (57% female; aged 55–92, $M = 67.2$, $SD = 7.3$) to the 2020 survey, $n = 3877$ provided

information on their caregiving status ($n = 721$ caregivers; a weighted 17.3% of adults providing care, with 15.0% reporting that they provided care at least weekly). Of these, $n = 3839$ provided adequate data on one or more outcome variables ($n = 718$ caregivers). Weighted sample characteristics overall and by caregiving status for the included sample are presented in Table 1. Overall, 17.4% of the included sample reported providing care in the past 12 months. Univariate comparisons indicate that compared to non-caregivers, caregivers were more likely to be younger, female, in a married or *de facto* relationship, have lower material living standards, report a higher frequency of depression symptoms and to meet criteria for clinically significant symptoms of depression (26.6% vs. 20.7%; OR = 1.39, 95% CI = 1.10, 1.75). However, groups displayed no significant difference in employment status, symptoms of anxiety or clinically significant symptoms of anxiety (carers 16.5% vs. non-carers 15.9%; OR = 1.05, 95% CI = 0.80, 1.37).

Association of Care with Depression in 2020

Multiple regression models predicting outcomes among older adults at 2020 survey were conducted to assess the association of depression and anxiety with informal caregiving when controlling for background sociodemographic factors (Table 2). Caregiving continued to display a small positive association with depression symptom frequency when background sociodemographic predictors were also modelled. Lower depression symptom frequency in 2020 was also associated with being in a married or *de facto* relationship and higher living standards, while higher depression symptom frequency was associated with not being in paid employment.

A longitudinal subsample of $n = 2954$ ($n = 531$ caregivers) provided adequate outcome data at 2018 survey, replying to the 2020 survey over an average lag of 22.0 months ($SD = 1.2$). When symptoms of depression at 2018 survey were

Table 1. Descriptive Statistics for Sociodemographic Factors, and Indicators of Depression and Anxiety Following Lifting of Lockdown Restrictions in June 2020 by Caregiving Status ($n = 3839$), with Logistic Regression Assessing Univariate Odds of Caregiving by Characteristic.

Characteristic	Overall	Non-caregiver	Caregiver	OR (95% CI)
Age (M , SD)	67.22 (7.73)	67.42 (7.73)	66.31 (7.67)	0.98 (0.97, 1.00)*
Female	53.2%	51.2%	62.8%	1.61 (1.31, 1.98)***
Married or <i>de facto</i>	73.5%	72.3%	79.2%	1.46 (1.15, 1.86)**
Material living standards (M , SD)	25.10 (5.82)	25.29 (5.70)	24.24 (6.26)	0.97 (0.96, 0.99)***
Employment				
Emp, non-essential worker	24.4%	24.1%	25.4%	[REF]
Emp, essential worker	23.6%	23.3%	25.3%	1.03 (0.78, 1.37)
Not in employment	52.0%	52.6%	49.3%	0.89 (0.70, 1.14)
Psychological stress				
Depression symptoms (M , SD)	6.15 (4.78)	6.00 (4.74)	6.82 (4.93)	1.04 (1.01, 1.06)**
Anxiety symptoms (M , SD)	0.90 (1.48)	0.88 (1.47)	0.95 (1.52)	1.03 (0.97, 1.10)

Note. Data represent multiply imputed datasets weighted for survey design and response characteristics; OR (95% CI) indicates univariate odds ratio with 95% confidence interval; Emp. = employed; * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 2. Multiple Regression Models Predicting Depression and Anxiety Symptoms Following Lifting of Lockdown Restrictions in June 2020 by Caregiving Status and Background Sociodemographic Factors ($n = 3839$), and by Symptoms at 2018 Survey Among the Longitudinal Subsample ($n = 2954$).

Factor	Depression Symptoms 2020		Anxiety Symptoms 2020	
	Cross-Sectional	Longitudinal	Cross-Sectional	Longitudinal
	B (95% CI)	B (95% CI)	B (95% CI)	B (95% CI)
Caregiver	0.49 (0.04, 0.95)*	0.40 (0.00, 0.80)*	-0.03 (-0.20, 0.14)	0.05 (-0.13, 0.23)
Age	0.00 (-0.03, 0.02)	0.01 (-0.02, 0.03)	-0.02 (-0.03, -0.01)**	-0.01 (-0.02, 0.00)
Female	0.12 (-0.23, 0.47)	0.24 (-0.06, 0.54)	0.26 (0.12, 0.40)***	0.10 (-0.05, 0.26)
Married or <i>de facto</i>	-0.56 (-1.01, -0.12)*	-0.09 (-0.49, 0.30)	0.14 (-0.03, 0.30)	0.05 (-0.14, 0.25)
Material living standards	-0.35 (-0.38, -0.31)***	-0.13 (-0.16, -0.10)***	-0.06 (-0.07, -0.05)***	-0.03 (-0.04, -0.01)***
<i>Emp, non-essential work</i>	[REF]	[REF]	[REF]	[REF]
<i>Emp, essential work</i>	0.09 (-0.38, 0.56)	-0.05 (-0.50, 0.39)	0.00 (-0.19, 0.19)	0.02 (-0.21, 0.24)
Not in employment	0.66 (0.19, 1.13)**	0.28 (-0.10, 0.66)	0.11 (-0.07, 0.28)	0.03 (-0.17, 0.23)
2018 symptoms	—	0.62 (0.58, 0.67)***	—	0.52 (0.48, 0.56)***

Note. Results based on multiply imputed datasets weighted for survey design and response characteristics; unstandardised coefficients with 95% confidence intervals are presented; Emp. = employed; * $p < .05$, ** $p < .01$, *** $p < .001$.

regressed on the 2020 outcome, the association of caregiving with depression remained (Table 2, column 2), indicating that being a caregiver was associated with a small increase in symptoms of depression over the follow-up period. Higher living standards were associated with lower symptoms of depression over time.

Association of Care with Anxiety in 2020

As in univariate models (Table 1), there was no significant association of caregiving with symptoms of anxiety when background sociodemographic factors were modelled (Table 2, column 3). Greater symptoms of anxiety in 2020 were associated with lower age, being female, and lower material living standards. Among the longitudinal subsample, when symptoms of anxiety at 2018 survey were regressed on the 2020 outcome, the association with caregiving remained non-significant (Table 2, column 4). A greater increase in symptoms of anxiety over time was associated with lower material living standards.

Association of Components of Caregiver Stress with Depression and Anxiety in 2020

Descriptive statistics including background sociodemographic, contextual, primary, and secondary caregiving stressors among the sample of $n = 708$ caregivers who met inclusion criteria and provided data on components of caregiving are presented in Table 3. Of these, $n = 525$ provided longitudinal outcome data across the 2018–2020 surveys and were included in models predicting longitudinal change in symptoms. The longitudinal subsample is described the right-hand column of Table 3.

Results of multiple regression analyses predicting depression symptom frequency among caregivers are reported in Table 4. Results of cross-sectional models indicate that greater depression symptom frequency in 2020 was associated with lower material living standards, not being in paid employment, living with the care recipient, less help from friend and family networks in providing care and a greater opportunity cost of the caregiving role. When 2020 symptoms were regressed on 2018 symptoms in the longitudinal subsample, increases in depression symptoms at 2020 survey were associated with lower economic living standards, and living with the care recipient.

Results of regression analyses predicting symptoms of anxiety among caregivers are reported in Table 4. Greater symptoms of anxiety at 2020 survey were associated with lower economic living standards, being employed as an essential service worker, not being in paid employment, and less help from friend and family networks in providing care. When 2020 symptoms were regressed on 2018 symptoms in the longitudinal subsample, increases in anxiety symptoms at 2020 survey were associated with lower economic living standards, not being in paid employment, and less help from friend and family networks in providing care.

Discussion

This research uses a unique longitudinal dataset to examine symptoms of depression and anxiety among a sample of older adults in New Zealand following an 11-week period of pandemic restrictions March–June 2020. Analyses assessed whether levels and rates of change in symptoms in these early months of the pandemic response were associated with providing informal care, and the components of informal

Table 3. Summary Statistics for Predictor and Outcome Variables for the 2020 Survey Caregiver Sample ($n = 708$) and 2018-2020 Longitudinal Subsample of Caregivers ($n = 525$).

Characteristic	Cross-Sectional	Longitudinal
Age (range 55–85; M, SD)	66.28 (7.67)	68.23 (7.49)
Female	63.1%	61.5%
Married or <i>de facto</i>	79.1%	78.7%
Material living standards (M, SD)	24.20 (6.27)	24.84 (5.83)
Employment		
Employed, non-essential work	25.4%	22.5%
Employed, essential work	25.0%	23.9%
Not in employment	49.6%	53.6%
Caregiving		
Cohabiting	48.5%	52.5%
Help from family (M, SD)	1.34 (1.38)	1.33 (1.34)
Help from organisations (M, SD)	0.68 (0.85)	0.70 (0.86)
# ADL/IADL supported (M, SD)	8.23 (4.33)	8.25 (4.24)
Opportunity cost of care (M, SD)	0.06 (0.76)	0.06 (0.74)
Psychological stress		
2020 depression symptoms (M, SD)	6.85 (4.93)	6.69 (4.72)
2018 depression symptoms (M, SD)	—	6.34 (4.61)
2020 anxiety symptoms (M, SD)	0.96 (1.52)	0.93 (1.49)
2018 anxiety symptoms (M, SD)	—	0.97 (1.50)

Note. Data represent multiply imputed datasets weighted for survey design and response characteristics.

Table 4. Multiple Regression Models Predicting Depression and Anxiety Symptoms Following Lifting of Lockdown Restrictions in June 2020 by Background Contextual, Primary and Secondary Components of Caregiver Stress Among Caregivers in the 2020 Sample ($n = 708$), and by Symptoms at 2018 Survey Among the Longitudinal Subsample ($n = 525$).

Factor	Depression Symptoms 2020		Anxiety Symptoms 2020	
	Cross-Sectional	Longitudinal	Cross-Sectional	Longitudinal
	B (95% CI)	B (95% CI)	B (95% CI)	B (95% CI)
Age	−0.05 (−0.12, 0.02)	−0.01 (−0.06, 0.05)	−0.02 (−0.04, 0.01)	−0.02 (−0.04, 0.01)
Female	0.06 (−0.83, 0.94)	0.30 (−0.42, 1.01)	0.18 (−0.14, 0.49)	−0.05 (−0.38, 0.27)
Married or <i>de facto</i>	−1.05 (−2.26, 0.17)	−0.85 (−1.97, 0.27)	−0.05 (−0.42, 0.32)	−0.14 (−0.57, 0.30)
Material living standards	−0.24 (−0.31, −0.17)***	−0.10 (−0.16, −0.04)**	−0.04 (−0.07, −0.02)***	−0.02 (−0.05, 0.00)*
<i>Emp, non-essential work</i>	[REF]	[REF]	[REF]	[REF]
<i>Emp, essential work</i>	0.67 (−0.45, 1.78)	−0.32 (−1.26, 0.63)	0.54 (0.10, 0.99)*	0.36 (−0.15, 0.88)
Not in employment	1.55 (0.47, 2.62)**	0.17 (−0.68, 1.02)	0.71 (0.31, 1.11)***	0.52 (0.06, 0.98)*
Cohabiting	0.99 (0.06, 1.93)*	1.11 (0.33, 1.90)**	0.04 (−0.30, 0.38)	−0.04 (−0.42, 0.34)
Help from family	−0.38 (−0.69, −0.07)*	−0.12 (−0.38, 0.14)	−0.19 (−0.32, −0.07)**	−0.14 (−0.27, 0.00)*
Help from organisations	0.42 (−0.11, 0.96)	0.44 (−0.02, 0.90)	0.00 (−0.21, 0.21)	−0.11 (−0.33, 0.12)
# ADL/IADL supported	−0.09 (−0.20, 0.02)	−0.07 (−0.17, 0.03)	0.00 (−0.04, 0.04)	0.00 (−0.05, 0.05)
Opportunity cost of care	0.98 (0.35, 1.61)**	0.35 (−0.16, 0.85)	0.19 (−0.03, 0.42)	0.14 (−0.08, 0.35)
2018 symptoms	—	0.60 (0.52, 0.69)***	—	0.49 (0.41, 0.57)***

Note. Analyses based on multiply imputed datasets weighted for survey design and response characteristics; unstandardised coefficients with 95% confidence intervals are presented; *Emp.* = employed; * $p < .05$, ** $p < .01$, *** $p < .001$.

caregiving roles in terms of background sociodemographic factors, contextual factors of cohabitation and availability of assistance with care, the care activities provided by the caregiver, and secondary opportunity costs of care. Results indicate that, on average, informal caregivers reported

slightly higher and increased symptoms of depression, but not anxiety, compared to other older adults, with lower material living standards associated with higher and increased symptoms of both depression and anxiety. Caregivers displayed a higher rate of significant symptoms of depression

compared to non-caregivers (26.6% vs. 20.7%), indicating that the small overall differences in depression symptom frequency reflected not only sub-clinical elevation in symptoms of depression. Overall, 16.1% of older adults reported significant levels of anxiety at 2020 survey. While this rate is comparable to rates of moderate-high symptoms of anxiety among adults drawn from an online panel survey and assessed using the GAD-7 during the lockdown period in New Zealand (15.6%: [Every-Palmer et al., 2020](#)), they are somewhat higher than estimates for adults of comparable age, with point estimates for age groups for those 55 and over (ranging 5.9%–5.0%). Differences may be attributable to differences in measures of anxiety, the period of assessment (after vs. during the period of pandemic restrictions), and greater representation achievable using random sampling and postal survey methods in the current research. An overall increase in symptoms of depression but not anxiety observed in the current work was similarly observed by [Altieri and Santangelo \(2021\)](#) among caregivers of people affected by dementia in Italy during an initial period of pandemic lockdown, using retrospective recall of pre-lockdown symptoms. Limited populated-based longitudinal research designs and the cross-national differences in conditions of caregiving in the early months of the pandemic (notably in terms of pandemic severity and public health response) render comparisons of findings regarding the early impact of the pandemic on informal caregivers problematic. However, current conclusions using a longitudinal design and a non-caregiving comparison group provide evidence that such findings may not reflect biases in recall among caregivers or an overall change in symptoms of psychological stress among the general population.

Current observations add to our understanding of psychological wellbeing of informal caregivers and older adults in the community overall following the initial COVID-19 pandemic response. On average, older adults demonstrated remarkable resilience following the early months of pandemic restrictions, with support for those in material hardship representing a meaningful target for policies aimed at maintaining psychological wellbeing of older adults at this time. Further research will be needed to understand the, likely unequal, short-to-medium term impacts of the pandemic on groups of older adults and the factors that influence variability in these experiences. Finally, in line with recent internal research, current findings highlight caregivers as a group at risk of psychological distress. At a time when formal care services have been provided with additional resources to protect wellbeing of staff and those in their care, similar support acknowledging the vital role and challenges faced by informal caregivers during periods of restrictions on social and service contacts is needed.

The current opportunity to assess components of caregiving which may influence psychological stress among older informal caregivers in the early months of the pandemic allows us to acknowledge the heterogeneity in burden among

caregiving roles and to formulate responses to alleviate these conditions. Current analyses indicate that lower material living standards and cohabitation with the care recipient were associated with increased symptoms of depression among caregivers over the follow-up period. These longitudinal results suggest that the observed cross-sectional associations of unemployment, lower help from friends and family, and greater opportunity cost of care with higher symptoms of depression in 2020 did not reflect factors associated with worsened depression symptoms but reflect existing stressors in caregiver roles. In terms of anxiety, lower material living standards, unemployment and lower help from friend and family networks were associated with increased symptoms of anxiety over the follow-up period. Older caregivers employed as essential service workers during the early months of the pandemic displayed higher but not increased symptoms of anxiety in the early months of the pandemic compared to other older working caregivers. As this association was not observed in the overall sample, these findings may reflect anxiety associated with stressors experienced by caregivers employed in essential service roles (e.g. health, pharmacy, first responders, public safety, grocery store and food distribution workers), rather than exacerbation of anxiety associated with caregiving during the pandemic.

The current research furthers our understanding of the key role of background contextual components of caregiver stress which may be exacerbated following a period of pandemic restrictions. Controlling for pre-pandemic assessments, lower material living standards, unemployment, cohabitation with the care recipient, and lower help from friends and family in supporting activities of daily living were associated with declines in psychological wellbeing among older informal caregivers following the initial pandemic response. Symptom elevation associated with lower material living standards and unemployment in particular suggest that a focus on the existing resources under which unpaid care is provided may be compounded by the pandemic and public health response. Increases in symptoms of psychological stress following the initial response associated with cohabitation with the care recipient and low levels of support from friend and family networks are particularly relevant to pandemic restrictions, in which caregivers may be particularly isolated in their caregiving role. Capitalising on normally available supports and a sense of *communitas* observed to emerge during disaster events ([Matthewman & Uekusa, 2021](#)), future pandemic responses may meaningfully support caregivers by making explicit provisions for and facilitating safe extensions of household ‘bubbles’ to include others who may normally or may be enabled during periods of restrictions on work or other responsibilities to provide help (e.g. via testing, advice on suitable periods and protocols for isolation of linked households, and supply and advice on use of personal protective equipment such as masks and hand sanitiser). Similarly, where respite care may normally be provided, or a new need identified, these services should be made available. Such

caregiver-centred policies would require explicit communication and guidance prepared for this population to advise them of available support, services and advice during periods of lockdown. Protecting informal caregivers from burnout does and will continue to reduce the burden on formal healthcare providers at a time when services may be overwhelmed and entry into formal healthcare facilities may pose particular risk to persons with underlying health conditions.

Strengths of this research include the use of data from a large sample of older adults randomly selected from a nationally representative and well characterised sampling frame. In contrast to research conducted using online panel surveys, the current design and postal survey mode enabled responses from a large cross-section of the older population, which could be weighted to characteristics of the sampling frame. In the current sample of adults aged 55+, results indicate that the proportion of older adults reporting providing informal care at least weekly (15.0%) was comparable to the average of 13% among adults aged 50+ in surveys conducted in 2015–2017 across 22 OECD countries (OECD, 2019). Similarly, 63% of older informal caregivers in the current sample were female, with 59% of those providing daily care being female (not reported, data available on request). These figures are comparable to the OECD average of 61% of those providing informal daily care being women (OECD, 2019) and the 2013 New Zealand census indicating that 63% of informal carers were women (Grimmond, 2014). In line with results of the 2009–2010 New Zealand Time Use Survey regarding informal care provision (Grimmond, 2014), informal carers in the current sample provided an average of 30 hours of unpaid care per week. These comparisons broadly support the representativeness of the sample of New Zealand caregivers responding in the current research. Further, commentaries have highlighted a reliance on post-pandemic assessments as a key limitation of observational research methods assessing the psychosocial health impacts of COVID-19 (Bell et al., 2021). The availability of longitudinal assessments of depression and anxiety in the 2018 and 2020 HWR surveys enabled the current study to provide context to cross-sectional associations between conditions of care and mental health outcomes following the initial COVID-19 restrictions in New Zealand, and represent a significant methodological step forward in understanding the impacts of components of the care role in the post-pandemic period, enabling differentiation of factors associated with existing *vs* increasing psychological symptoms.

Limitations and Implications for Future Research

A key limitation of the current research is the 2-year lag between pre–post pandemic assessments. Although the lack of differences between caregivers and non-caregivers in levels of depression and anxiety in 2018 (Supplementary Figure S2) and consistency with similar pre–post lockdown symptom assessments (Altieri & Santangelo, 2021) provide

some evidence that observed effects reflect changes associated with the pandemic period, the current design cannot rule out that the observed trajectories of symptoms of depression and anxiety 2018–2020 did not pre-date the period of pandemic restrictions. Caregiver stress can be a dynamic experience, with the provision of care, availability of family and organisational support, and psychological adaptation to the caregiving role just some of the factors which may vary with time and circumstances. As such, current results are best interpreted as representing changes in psychological distress among those who were informal caregivers in the 12 months leading up to 2020 survey and with reference to experiences of contextual, primary and secondary stressors reported at 2020 survey. Finally, while current assessments of components of caregiving were selected with references to conceptual components of caregiver stress (Pearlin et al., 1990), it is possible that pertinent aspects of care situations under pandemic restrictions may not have been captured. Work is underway to develop tools to assess the impacts or added burden of caregiving roles under pandemic conditions (e.g. Sheth et al., 2021). Future exploratory research may provide further insights into factors beyond the general components of caregiving that may impact informal caregivers during these events. Current models also do not clearly account for the emergence of (unexpected) resources supporting care roles during the pandemic. Disaster sociologists have long observed and theorised the emergence of a state of ‘disaster altruism’ in the wake of disasters (Matthewman & Uekusa, 2021). Additionally, early qualitative interviews with family caregivers in the U.S. (Lightfoot et al., 2021) have identified positive aspects of care during the COVID-19 pandemic, including strengthening family relationships, increasing social connectedness, recognising resilience of the care recipient, and use of technologies in caregiving and healthcare delivery (see also Rodrigues et al., 2021). Bolstered by these ‘silver linings’ of care during the pandemic, and recognised benefits of caregiving as a valued capability among older caregivers (Horrell et al., 2015), further exploration of enablers (and obstacles) to care roles emerging in this period will provide deeper understanding of the experiences of informal care during the pandemic.

Conclusion

The COVID-19 pandemic and response in New Zealand posed several practical and psychological risks to the well-being of older adults and caregivers. However, while providing informal care for someone with a long-term illness, disability or frailty was associated with a small increase in symptoms of depression, results overall illustrate remarkable resilience among the older population following the early pandemic response in New Zealand. Contextual factors of care (e.g. material living standards, unemployment, availability of help from friends and family, and living with care recipient) were linked to increased psychological stress, with

higher, but not increased symptoms of psychological stress associated with greater opportunity costs of care and essential service work. While conclusions regarding the impact of informal care during the pandemic are likely to vary with location, outbreaks and public health response over time, current findings provide clear economic, resource and social targets for supporting psychological wellbeing informal caregivers in following early periods of strict pandemic restrictions on movement, service use and inter-household contact.

Data Sharing and Data Accessibility

De-identified data, statistical output and survey forms supporting this research have been archived to the Open Science Framework and are available by contacting the corresponding author. Data collection for the 2018 and 2020 HWR surveys was approved by the Massey University Human Research Ethics Committee [SOA 18/34; SOA 20/07].

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Supplemental Material

Supplemental material for this article is available online.

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