Short term impacts of the COVID-19 pandemic and response on older adults

FINDINGS FROM THE HEALTH, WORK AND RETIREMENT STUDY

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Summary

This research examined the early impacts of the COVID-19 pandemic on the health and wellbeing of older adults in Aotearoa New Zealand. Aotearoa New Zealand's 'elimination' approach to the COVID-19 pandemic saw borders closed, physical distancing strongly encouraged, and people confined to their homes except for essential purposes. Community members considered 'vulnerable' or 'at-risk' to the virus, such as those over the age of 70 years or an existing long-term health condition, were urged to remain strictly isolated.

While this period saw unprecedented challenges to physical, mental, and social wellbeing, a reliance on routinely collected data and post-pandemic surveys has limited our understanding of the impact of the early months of the pandemic and response on wellbeing. Drawing on a large national sample of New Zealanders aged 55-92 surveyed in 2020 following lifting of initial COVID-19 lockdown restrictions and participating in a longitudinal study 2014-2020, this report describes hardship assistance sought by older adults as a result of the pandemic, the impacts of the early months of the pandemic period on wellbeing, and how these impacts varied according to social factors associated with inequalities.

Social factors assessed were based on existing literature on disaster-related vulnerability among older adults and included age, gender, education, employment status, providing informal care, housing tenure, and urban/rural living arrangements. Results confirm inequalities in wellbeing in 2020 were associated with all social determinants of health. However, longitudinal analyses indicate limited evidence of negative impacts of the COVID-19 pandemic on wellbeing among older people in Aotearoa New Zealand. Inequities in wellbeing during the early phase of the pandemic reflect pre-existing risk associated with social determinants of health and wellbeing.

Key findings:

- Among older adults, 8.8% reported receiving hardship assistance from the government and 2.4% from NGOs because of the COVID-19 pandemic. Around 50% of older business owners accessed government assistance to support their business. Very small proportions of older adults made a hardship withdrawal from Kiwisaver (<1%).
- While most older adults owned their home without a mortgage (66%), around 20% had a mortgage on their home and 8% of those with a mortgage had received assistance from lenders as a result of the pandemic.
- Analysis of trends 2014-2020 provide little evidence that wellbeing indicators of **physical health**, **mental health**, **symptoms of depression**, and **loneliness** deviated from pre-pandemic trends.
- A snapshot of older adults in 2020 indicated better physical health was associated with higher education qualifications, owning current home without a mortgage, being in paid employment, and living in an urban location; however, trends 2014-2020 indicating these inequalities pre-dated the pandemic period.
- On average older adults displayed no change in **mental health** over time. A snapshot of older adults in 2020 indicated greater mental health was associated with being in paid employment, not providing informal care, and owning current home without a mortgage; however, trends 2014-2020 indicate these inequalities pre-dated the pandemic period.
- **Clinically significant levels of depressive symptoms** were reported by 21% of older adults following the early months of the pandemic. Analysis of trends 2014-2020 indicate a small

average increase in depression symptoms over time. A snapshot of older adults in 2020 indicated that greater symptoms of depression were associated with not having a tertiary qualification, not being in paid employment, providing informal care, and not owning current home without a mortgage; trends 2014-2020 indicate these inequalities pre-dated the pandemic period.

- **Loneliness** was reported by 40% of older adults following the early months of the pandemic. Trends 2014-2020 indicate a small average decline in loneliness over time. A snapshot of older adults in 2020 indicated that higher loneliness was associated with tāne/male gender, not being in paid employment, having rental or other non-ownership housing tenure, and living in an urban location.

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Introduction

This report presents findings from a study of the psychosocial and physical health impacts of the COVID-19 global pandemic on older adults in Aotearoa New Zealand. Older adults are often believed to have disproportionately experienced negative outcomes from the pandemic disaster, which highlighted the increased mental health, morbidity and mortality risks for older adults. However, older adults' vulnerability should not be overemphasised and overgeneralised as the pandemic has not affected them equally. Drawing on a large sample of older New Zealanders (*n*=4351), we have surveyed indicators of health, wellbeing and functional abilities among older adults drawn from a nationally representative sampling frame (the electoral roll). Longitudinal data contributes to a policy response framework for older people (as a large population group with health vulnerabilities) while exploring the experiences, strengths, and needs of different groups of older New Zealanders during the pandemic.

Literature Review: Older adults in the global pandemic

Background

The New Zealand government adopted a "hard and fast response" approach to the initial pandemic declared in March 2020, and successfully eliminated COVID-19 community transmission after the initial 7-week-long Level 3-4 lockdown (Baker et al., 2020; Henrickson, 2020). However, the infection, morbidity and mortality rates have been disproportionately distributed. Of the total number of confirmed cases in Aotearoa New Zealand, 73.6% of the confirmed cases are found among younger age groups (49 and under), while all 26 deaths have occurred in older age groups (50+), and no one under the age of 49 so far died from COVID-19 in Aotearoa New Zealand (Ministry of Health, 2021). Thus, community members, who were considered vulnerable and at-risk to the coronavirus such as older adults (particularly those over the age of 70) and others with existing long-term health condition, were urged to be strictly isolated and stay home whenever the alert level goes up (Cheung et al., 2020). However, staying at home means that older adults, who are less likely to use online communications, must organise the delivery of groceries and medications, restrict access to health care centres, and maintain a distance from family and friends which effectively means complete social isolation for those who live alone. Early in the pandemic, commentators in the UK (Brooke & Jackson, 2020) or the US (Hoffman et al., 2020) warned of the dangers of these restrictions for the health of older adults. There was wide-spread concern about the effects of social isolation on older adult's mental health (Armitage & Nellums, 2020; Douglas et al., 2020; Meng et al., 2020).

While the pandemic has affected the entire population, it has not affected all populations equally. Earlier studies on the impacts of the pandemic on health and wellbeing highlight the increased risks for particular social groups, older adults included. In Aotearoa New Zealand, an epidemiological study conducted by Jefferies et al. (2020) shows how the confirmed COVID-19 cases are tending to be younger adults, European New Zealanders and higher SES, whereas adverse health outcomes and mortality are associated with older age, being/working in nursing/aged care, and being Pasifika peoples or Asians and people of Asian descent. Wiki et al. (2020) use a geospatial method to visualise population vulnerability across Aotearoa New Zealand by health, sociocultural and socioeconomic factors. Their study demonstrates how the confirmed cases are concentrated in urban areas such as Tāmaki Makaurau Auckland and Ōtautahi Christchurch, yet older residents in geographically remote, rural communities are also at greater risk as these smaller rural communities have more vulnerable healthcare systems and offer fewer resources.

While the impacts of the COVID-19 pandemic in Aotearoa New Zealand have been mitigated by the country's elimination approach, experiences of depression and anxiety were common during- and post-lockdown. Higher rates of depression, anxiety and stress during the pandemic were found

among younger age groups (Gasteiger et al. 2021), and the surge in depression among them, especially due to the strict lockdown measures and consequent social isolation, is consistent with international research (see, e.g., Duan et al., 2020; Li et al., 2021; Oosterhoff et al., 2020). Various New Zealand and international studies show that, in terms of mental health impacts, children, adolescents and younger adults have poorer outcomes than their older counterparts. Despite declining health, older adults may have developed higher resilience by experiencing and coping with previous disasters, life challenges and adversities (e.g., Ferraro, 2008; MacLeod et al., 2016; Rafiey et al., 2016).

However, this does not mean that we can overgeneralise or overestimate older people's resilience and underestimate the health and social inequalities that confront older people who are very diverse in terms of their social characteristics, psychological capabilities and pandemic experiences. Some early empirical evidence has supported the fears of increased mental health issues among older people, showing that anxiety and other forms of psychological distress were high during the early stages of the pandemic. High percentages of anxiety and depression were found among people aged over 60 years in China (Meng et al., 2020). A more comprehensive population study (Qiu et al., 2020) contrasts with earlier evidence that older adults reported lower levels of distress than their younger counterparts (Bruine de Bruin, 2020). Thus, issues of mental health and wellbeing among older adults during the pandemic need to be further explored and clearly addressed. Little is still known regarding the impact of the pandemic and associated response on older people in Aotearoa New Zealand and beyond.

Contextualising older adults in disasters and pandemics

Compared to the general population, older adults disproportionally experience negative outcomes from disasters, whether natural or human-induced hazards (Cutter et al., 2003; Klinenberg, 2002; Ngo, 2001; Norris et al., 2002; Peek, 2013, Tuohy & Stephens, 2011). Most disaster victims are aged over 60 (Hewitt, 2007; García-Herrera et al., 2010; Peek 2013), and, in the wake of extreme events such as the 1995 Chicago Heat Wave, the 1995 Great Hanshin Earthquake, the 2003 European Heat Wave, the 2004 Indonesian Tsunami, the 2005 Hurricane Katrina, the 2010-2011 Canterbury earthquake sequence and the 2011 Great East Japan Earthquake and Tsunami, older people's vulnerability was exacerbated in different ways. Due to physical decline and inability to react to the disaster warnings and dangers, older adults may be more likely to be injured or die during extreme events (Cutter et al., 2003; García-Herrera et al., 2010; Perry & Lindell, 1997). Some older adults live alone and are socially isolated, which may lead to further social isolation, mental health issues and "lonely deaths" during/after disasters (Aldrich, 2017; Jenkins et al., 2007; Klinenberg, 2002; Ngo, 2001; Tuohy & Stephens, 2011); in particular, older adults may experience difficulty with communication technologies that provide social connection during or after disasters (Peek, 2013). Older adults may be unable to respond to disaster warnings, overlooking dangers and risks (Peek, 2013) while adapting to the "new reality" following disasters can be a significant challenge for older adults (Humber & Urabe, 2015) and older adults may have smaller or fixed incomes with which to respond to and recover from disasters (i.e., many are social security and pension recipients) (Ngo, 2001). Despite this evidence, age specific concerns are typically not integrated into the disaster preparedness plans, leading to older adult's needs and abilities being unknown (Tuohy & Stephens, 2011). Disasters often expose pre-existing social inequalities, thereby providing an opportunity to understand and address these social issues that confront older adults in everyday life as well as in the face of disasters. As Rodríguez et al. (2006) suggest, "the best way to understand disaster effects is to know what the community was like before the event" (p.xvii). This applies to the framing of the current COVID-19 pandemic and its impact on our diverse communities.

Findings from international research remain equivocal regarding the specific vulnerability, and resilience, of older adults to psychological distress during the current pandemic disaster. A wide-

ranging internet survey in China (Wang et al., 2020) showed that, although psychological distress was high, there was no difference between age groups. In the U.S., a large population sample (Bruine de Bruin, 2020) reported that older age was associated with less depression and anxiety. Furthermore, a Canadian and US survey (Klaiber et al., 2020) found that older adults reported higher emotional wellbeing than younger adults even though they were subjected to the same COVID-19 stressors. The authors concluded that older people are more likely to be resilient (see also MacLeod et al., 2016; Parr-Brownlie, 2020). While there is still a lack of theoretical underpinnings, it is understandable that older adults have already coped with significant life transitions and adversities and developed higher psychological resilience "reference points".

One of the issues revealed by equivocal findings is that categorising older people as one group based on chronological age portrays older adults as a homogeneous group of powerless vulnerable people (Margan et al., 2021). However, older adults have experienced diverse levels and trajectories of health and wellbeing and age alone may not be a strong predictor for people's mental wellbeing during the pandemic. Some have coped well with pandemic-related challenges, and others have regarded the pandemic and subsequent lockdowns as being "breeze" or even positive for various reasons (see, e.g., Lightfoot et al., 2021; Stephens & Breheny, 2021). However, those with fewer financial, material, emotional and network resources are more likely to report poor and declining health at earlier stages. Ageist constructions of the older person are in danger of neglecting emerging and pre-existing social inequalities within the older population.

International research shows that people's social connectedness and economic wellbeing have significant impacts on mental wellbeing and actual rates of mortality during the pandemic (Aldrich, 2020; Fraser et al., 2021; Jean-Baptiste et al., 2020; Nicholson & Flett, 2020; Rollston & Galea, 2020). Although older adults may be more resilient, they are also at greater risk not only because of their age but also due to their general circumstances. To consider vulnerability in terms of diversity in SES, health, work, gender, ethnicity, housing, living location, education, and social connectedness, we have investigated the unequal effects of the COVID-19 pandemic and short-term responses of older New Zealanders in regard to social determinants of health and wellbeing.

Potential for pandemics to increase social inequities in wellbeing among older adults

We first reviewed and identified the social factors, which have potentially enhanced inequalities in health and wellbeing among older adults in Aotearoa New Zealand during the 2020 initial lockdown. Health and ageing research has identified the social factors generally associated with older people's health and wellbeing such as age, gender, ethnicity, SES, housing tenure, employment, caregiving status, rural-urban residence (see, e.g., Allen & Alpass, 2020; Allen et al., 2019; Stephens et al., 2010; Watson & Hall, 2008).

We hypothesised that some of these factors contributed to adverse effects on health and wellbeing among older New Zealanders during the earlier phase of the pandemic response. In addition, disaster research has provided empirical evidence that, in the wake of disasters, people not only experience disruptive and destructive impacts, but also become altruistic and resourceful to others, especially those who are vulnerable (Matthewman & Uekusa, 2021; Solnit, 2010), which supports psychological resilience in the short-term response to extreme events including the COVID-19 pandemic. Indeed, short-lived disaster altruism, emerging social connectedness and remarkable responses to the pandemic have been observed, especially during the earlier phase of the pandemic (e.g., Monbiot, 2020; Nadkarni, 2020), which, to a certain extent, may have had a positive effect on the immediate health and wellbeing of older New Zealanders.

Age

Older adults have disproportionately experienced negative outcomes from the previous disasters compared to the general population (e.g., Tuohy et al., 2015), and global responses to the COVID-19 pandemic have also highlighted older adults in general as at higher risk of morbidity and mortality (Rahman & Jahan, 2020; WHO, 2020). In Aotearoa New Zealand, early estimates indicate a risk of mortality of 3.6% for people in their 60s, and 8.0% and 14.8% for people in their 70s and 80s (Brooke & Jackson, 2020).

However, older adults are not a homogeneous group. Due to the intersectional effect, recent predictors suggest up to 50% higher risk for Māori elderly (Steyn et al., 2020). Older adults in Aotearoa New Zealand display diverse levels and trajectories of health and wellbeing as they age, with those of low material wealth displaying poor health at earlier ages (Allen & Alpass, 2020). Thus, our assessment of vulnerability for older people extends beyond age itself as the primary predictor for adverse outcomes.

Gender

Mallapaty (2020) reported based on studies conducted in Spain, Switzerland and the UK that the risk of dying from COVID-19 is almost twice as likely for men than women. However, in Aotearoa New Zealand, Every-Palmer et al. (2020) found that data collected during the initial lockdown indicated a much smaller gender gap in terms of mental wellbeing. Gender inequality has not been widely addressed in Aotearoa New Zealand research on the health and wellbeing of older adults during the pandemic although international research shows that the social impacts of COVID-19 have been gendered (Wenham et al., 2020). Reports of family violence and physical and sexual assaults (e.g., Every-Palmer et al., 2020) show how existing gender norms and patriarchy contribute to the unequal experiences of the pandemics between older females and males. Furthermore, older women are at increased risk of social isolation during the lockdowns (Ministry for Women, 2020).

Race/Ethnicity

Inequalities between ethnic and racial groups are well recognized and reflected in differences for health outcomes (Stephens et al., 2020; Steyn et al., 2021). For example, in Aotearoa New Zealand, researchers have noted the empirical evidence for health inequalities and the likely compounded effects of underlying health conditions, socioeconomic disadvantages, health care (access) inequalities, employment inequalities, housing quality inequalities, cultural and linguistic barriers, and other forms of structural racism in higher risk of contracting COVID-19 and of deaths (MacLeod et al., 2020; Steyn et al., 2021). These inequalities also indicate that Māori are at higher risk of undetected outbreaks (James et al., 2020); Pasifika communities are understood as more likely to suffer the physical effects of COVID-19 due to underlying health conditions and various forms of health and social inequalities (Lotoala et al., 2014; Steyn et al., 2021); coupled with the (re)surge of anti-Asian sentiment worldwide, the impact of COVID-19 may exacerbate the risk of mental health problems among Asian communities (Abbott et al., 2003; Ho et al., 2003).

SES

SES is a well-established basis of inequalities in health, and economic wellbeing is one of the strong predictors of poor mental health, especially depression and anxiety (Allen et al., 2019). The HWR longitudinal study of older New Zealanders has repeatedly demonstrated how the effects of lifelong inequalities remain and can be exacerbated in older age (e.g., Allen & Alpass, 2020; Stephens et al., 2010). Those with limited financial resources and stable income are less able to cope with depression and anxiety in lockdown (Nicholson & Flett, 2020) and those who suffer economic impacts report greater distress (e.g., Li & Mutchler, 2020; Rollston & Galea, 2020).

Housing tenure

Housing quality and tenure, which is also strongly associated with SES and other variables, has been shown to have important effects on the health of older adults (Allen et al., 2019) and is an aspect of COVID-19 response experiences that must be taken into consideration. For example, while loneliness has been expected to generally increase in older adults under lockdown conditions (Brooke & Jackson, 2020), this may only apply to older people in particular living situations. Those who do not own their home in older age are higher risk of loneliness and poor mental health (Szabó et al., 2019) while quality of housing has been associated with loneliness and quality of life (Stephens et al., 2019). Those in poorer housing situations and who are renters are likely to be more vulnerable to the psychological effects of disasters (Tuohy & Stephens, 2011). While these observations may in part represent existing inequalities determining both holding a rental tenure in older age and lower wellbeing outcomes, surges in house prices, cost of living and increased insecurity of tenure associated with increased weekly cost, sale, and competition for rental housing stock observed in the country following the pandemic have great potential to widen existing inequalities in wellbeing between those with and without secure housing tenure.

Employment

Many older adults are in paid work. In Aotearoa New Zealand, older workers (employed people aged 55 years and over) comprise around 25% of all employed people (New Zealand Department of Labour, 2008). Furthermore, many older people are engaged in unpaid essential work such as caregiving for children, grandchildren, spouses, parents or other family members. The number of whānau, informal or family caregivers has increased in Aotearoa New Zealand in line with the ageing population, and the population of caregivers in older age groups (55+) has increased at faster rate than in the general population (Alpass et al., 2017).

During the 2020 initial lockdown, essential workers, those who lost their jobs and those caring for an older person reported the greatest stress (Allen et al., 2022; Stephens & Breheny, 2021). Employment status is typically associated with people's SES and economic wellbeing, and job loss is typically associated with increased depression, anxiety and low self-esteem (Panchal et al., 2021). However, earlier studies also show that, during the initial lockdown, being "essential workers" displayed an inverse effect (see, e.g., Bell et al., 2021; Panchal et al., 2021).

Caregiving status

According to Pearling et al. (1990), caregiver stress is attributable to the intersections of social characteristics, resource availability and the hardships and problems directly anchored in caregiving and strains associated with activities outside of caregiving. Therefore, being informal or whānau family caregivers during the pandemic mean that caregivers are more likely to experience "triple burden" and higher risk of mental health issues if they experience social structural constraints including limited access to emotional and economic resources (Allen et al., 2022; Uekusa, 2019).

Rural inequality

Rural-urban inequality must be taken into consideration. Depopulation, outmigration, ageing and rural decline are associated with a variety of rural disparities including health inequality (e.g., Fearnley et al., 2016; Nel et al., 2019). Even under normal conditions, access to healthcare and social services is already limited to rural residents, especially Māori in deprived living conditions in rural Aotearoa, and rural communities have more vulnerable healthcare systems and face the lack of resources (see Wiki et al., 2021). International research shows that the pandemic has made such pre-existing rural gaps worse (Mueller et al., 2021).

Financial hardship assistance

Government interventions have been designed to support those considered most vulnerable to the impacts of the pandemic. Access to and use of support is indicative of need as well as benefit, and thus it can be difficult to evaluate the short-term impact of such interventions for individuals. In April 2020, we consulted with stakeholders in our research on employment in later life to identify key assistance programmes available at that time. These groups identified support accessed by individuals themselves (welfare, material assistance from NGOs, assistance from lenders and access to Kiwisaver) and business owners as a result of the pandemic.

Aims

This report aims to assess the early impact of the COVID-19 pandemic and response on indicators of mental wellbeing among older adults: 1) **physical health**, 2) **mental health**, 3) **symptoms of depression**, and 4) **loneliness.** Data from respondents to the 2020 wave of a national longitudinal survey of adults aged 55-92 conducted in the early months of the COVID-19 pandemic are used to answer the following key questions:

- What was the uptake of hardship assistance initiatives among older adults that may mediate the financial impacts of the pandemic on wellbeing?
- What were the impacts of the COVID-19 pandemic and response on wellbeing of older people in light of long-term trends?
- How does vulnerability reflect demographic and social factors such as age, gender, SES, employment status, housing quality, caregiving status, and rural-urban location?
- Which groups are the most at risk of health inequalities during the early phase of the pandemic?

Responses to the 2020 survey are used to describe the risk factors among the older population at 2020 survey. Longitudinal data from participants in the 2020 survey obtained 2014-2020 are used to characterise changes physical health, mental functioning, symptoms of depression, and loneliness in the early months of the pandemic.

Method

Ethical approval

Data collection was approved by the Massey University Human Research Ethics Committee [SOA 15/72; SOA 18/34; SOA 20/07].

Sample and survey design

Data were collected in the four 2014-2020 biennial waves of the HWR longitudinal survey (see Allen et al., 2021). The HWR is an ongoing study of ageing in Aotearoa New Zealand that was established in 2006, with new participant cohorts recruited to maintain representation of younger adults as cohorts age, and to reduce the impacts of attrition on estimates. The New Zealand national electoral roll is used as the sampling frame for recruitment. Approximately 97.6% of eligible voters (New Zealand citizens or permanent residents who have lived in Aotearoa New Zealand continuously for one year or more at some point) aged over 50 years are enrolled (New Zealand Electoral Commission, 2016). Oversampling of persons of Māori descent was undertaken to ensure adequate representation of older Māori. Participants in the 2020 survey were recruited from random samples drawn from the national electoral roll in 2006 (ages 55-70, born 1936-1952), 2009 (ages 49-89, born 1920-1960), 2014 (ages 55-65, born 1949-1959), 2016 (ages 55-65, born 1951-1960), 2018 (ages 55-

57, born 1961-1963) and 2020 (ages 55-65, born 1954-1965). Sampled adults are sent an initial postal survey and respondents re-surveyed at subsequent follow-up waves.

Surveys were conducted on a biennial basis and launched June-July of each survey year. The 2020 wave survey materials were posted to the sample on 11 June 2020, three days after Aotearoa New Zealand moved to Alert Level 1, with 81% of responses received within 6 weeks. These data were used in the current report to investigate the short-term impacts of the COVID-19 pandemic and response. Data collected in survey waves conducted in 2014, 2016 and 2018 were used to assess levels and rates of change on indicators of health and wellbeing prior to the pandemic. Technical reports and materials supporting HWR survey waves 2014-2020 can be found on the HART website (https://hart.massey.ac.nz).

Participants were considered for inclusion in current analyses if they responded to the 2020 survey (*N* = 4,351 overall; *n* = 1,543 Māori) and in longitudinal analyses if they had also responded to one or more surveys conducted 2014-2018 (*n* = 3,478 overall; *n* = 1136 Māori). Among longitudinal respondents overall, 58.8% had responded to all four waves, 25.8% to three, and 15.3% to two, largely reflecting recruitment of new participant cohorts to the study in 2016 and 2018.

Sample weights were applied to weight responses to characteristics of the sampling frame. Design weights were calculated to account for over-sampling of adults of Māori descent from the electoral roll and probability of sampling by birth cohort. Survey weights were calculated as the inverse probability of response with reference to age, gender, Māori decent, and area-level socioeconomic deprivation (Atkinson et al., 2014) of original random samples drawn from the electoral roll.

Measures

Demographic and social factors

Age, gender, self-reported ethnicity(s), highest level of education, housing tenure, employment, and provision of informal care for whānau or others were assessed at 2020 survey. Ethnicity was classified and described based on ethnic group(s) to which participants reported belonging.

Participants were asked to indicate their current work status and hours per week in paid employment. Responses were categorised as currently "*in paid employment*" *vs* "*not in paid employment*".

Participants were also asked to report tenure related to their primary residence. Responses were grouped into categories of "*Owned without a mortgage*", "*Owned with a mortgage*" or "*Rented or other arrangement*" based on conceptual understanding of ownership structures for a person's primary place of residence (**Appendix A**).

Provision of informal care was defined as providing practical assistance to someone with a long-term illness, disability, or frailty for at least three hours a week in the past 12 months (*Yes/No*). Circumstances of caregiving, including frequency of care, living arrangements, age of care recipient, relationship to care recipient, and reason for care are described in **Appendix B**.

Differences in experiences of urban and rural populations were captured using a dichotomous variable (1 *urban* / 0 *rural*) defining "urban" location as participant residence in an area with a population size of 30,000 or more using the Urban Rural Index (2018, v1.0) developed by Statistics New Zealand (Stats NZ, 2020).

Physical and Mental health

Physical and mental related functioning were assessed using items of the SF-12v2 Australian and New Zealand form (Ware et al., 2002). Standardised total scores for the physical and mental component scores were calculated with reference to normative subscale scores for the adult population derived from the 2008 New Zealand General Social Survey and factor score coefficients derived from the 2006-2007 New Zealand Health Survey (Frieling et al., 2013), such that are interpreted relative to an average adult population score of 50 and standard deviation of 10.

Depression

Depression symptom frequency was assessed using the 10-item Center for Epidemiologic Studies Depression Scale (CES-D10: Andresen et al., 1994), designed for assessment of older adult populations in epidemiological studies. Participants indicated the frequency with which they had experienced each of ten symptoms of depression in the past 7 days. Items were recoded and summed such that higher scores indicated greater depression symptom frequency (range 0-30) and established cut off scores were used to describe the prevalence of clinically significant symptoms of depression (scores ≥ 10, reported as sample %).

Loneliness

The six-item de Jong Gierveld Loneliness Scale was used to assess experience of social and emotional loneliness (Gierveld & Tilburg, 2006). Participants indicated the degree to which three items reflecting experiences of social loneliness (sample item: "there are plenty of people I can rely on when I have problems") and three items reflecting experiences of emotional loneliness (sample item: "I experience a general sense of emptiness") applied to the way they feel now. Response options were "yes", "more or less" or "no". Items were recoded to provide a binary item score

indicating any experience of loneliness, and item scores summed to indicate greater experiences of loneliness (range 0-6) with scores ≥ 2 considered to indicate loneliness (reported as sample %).

Government and NGO assistance

Receipt of hardship assistance was assessed using Yes/No responses to the question "Have you received any hardship assistance as a result of the COVID-19 pandemic?" Specific items included "Government assistance to support your business (if applicable)", "Assistance from lenders, such as a mortgage holiday from your bank", "Government assistance such as welfare benefits", "Material assistance from non-government organisations, such as food banks", and "A Kiwisaver hardship withdrawal".

Analyses

Analyses were conducted in Mplus 8.3 using maximum likelihood estimation with robust standard errors (Muthén & Muthén, 2015). An $\alpha = 0.05$ was used as an assessment of statistical significance and 95% confidence intervals (95% CI) reported. Survey weights were applied to adjust for sampling design and characteristics associated with response. In recognition of researcher's obligations under Te Tiriti O Waitangi to support achievement of equitable health and wellbeing outcomes for Māori across the life course, results are presented for older adult respondents overall and for those who identified as having Māori ethnicity.

Demographic, social and outcome variables for respondents to the 2020 survey were characterised using descriptive statistics. Use of government and non-government hardship assistance due to the impacts of the pandemic were described to illustrate proportions of older adults who accessed these initiatives.

To describe trends in outcomes over time, observed means and individual growth curves were first inspected, and linear unconditional Latent Growth Curve Models used to assess the fit of an overall linear functional form of change over surveys 2014-2020. Quadratic models were then fit to assess departure from a linear model of change with the 2020 survey. Model fit was assessed with reference to the Sample Size Adjusted Bayesian Information Criteria (SSABIC), Root Mean Square Error of Approximation (RMSEA), comparative fit index (CFI) and Standardized Root Mean Square Residual (SRMR). Acceptable fit indices were determined as RMSEA values less than or equal to 0.06, and CFI values close to or greater than 0.95 and SRMR values less than or equal to 0.08 (Hu & Bentler, 1999).

To assess the association of social factors with wellbeing outcomes in 2020, associations of social factors with wellbeing were assessed using multiple regression for all respondents to the 2020 survey wave, and regressed on model intercept (2020 survey wave) for each Latent Growth Curve Model. To acknowledge that differences observed in 2020 may pre-date the pandemic period and for groups to be differently impacted in the early months of the pandemic, the association of factors as predicting linear and quadratic change 2014-2020 in each wellbeing outcome were also assessed.

Results

Snapshot of older adults in 2020

Descriptive statistics for respondents to the 2020 survey overall and for those who identified as having Māori ethnicity, are reported in **Table 1** and described below. Around 36% of respondents to the 2020 survey identified as having Māori ethnicity (unweighted %). Multiple regression analyses assessing the association of social factors associated with wellbeing outcomes in the respondent sample overall are reported in **Table 2,** and among Māori respondents in **Table 3**.

Table 1. Descriptive statistics for the 2020 survey sample, and health and wellbeing outcomes at 2020 survey overall (n = 4,351) and for those with a Māori ethnic identity (n = 1,543).

	Overall respondents	**Māori respondents**
Ethnicity[a]		
%European	93.2	71.4
%Māori	11.6	100.0
%Pacific	2.4	4.1
%Asian	2.3	2.8
%other	11.5	8.6
%not reported	0.1	-
Age (M, SD)	68.3 (7.6)	68.1 (8.1)
Gender		
%Female	52.3	51.8
Highest qualification		
%No quals	14.5	27.7
%Secondary School	21.4	22.0
%Postsecondary/trade	38.0	31.4
%Tertiary quals	26.0	18.7
%not reported	0.1	0.2
In paid employment		
%No	52.7	50.3
%Yes	46.4	48.1
%not reported	0.9	1.6
Housing tenure		
%Owned w/o a mortgage	65.7	52.3
%Owned with a mortgage	19.7	19.8
%Rented or other	13.1	26.0
%not reported	1.5	1.9
Provided informal care		
%No	80.5	78.7
%Yes	17.4	18.9
%not reported	2.1	2.4
Location		
%Rural	45.7	50.3
%Urban	54.3	49.7
Wellbeing		
Physical functional health (M, SD)	46.0 (10.5)	43.0 (11.3)
Mental functional health (M, SD)	50.1 (9.9)	48.2 (10.3)
Depression symptoms (M, SD)	6.1 (4.7)	7.0 (5.1)
%Depressed	21.2	29.0
%missing	1.3	1.5
Loneliness (M, SD)	1.6 (1.7)	1.7 (1.7)
%Lonely	39.9	43.3
%missing	1.8	2.0

Note. Summary statistics weighted for survey design and response characteristics; at 2020 survey *n* = 47 respondents were missing scores for physical and mental health; [a]Totals are greater than 100% as participants could select more than one ethnic group.

Social characteristics and wellbeing in 2020

As reported in **Table 1**, the respondent sample had a weighted average age of 68 (range 55-92; 63% aged 65+), around 52% were women and 26% of older adults held a tertiary qualification. 46% of the sample were currently in paid employment and around 18% of older adults provided informal care for whānau, a friend, or family member in the past 12 months. Around 66% owned their own home without a mortgage, 20% owned a home with a mortgage and 13% held a rental or other housing tenure. In terms of residential location, 54% lived in areas with a population of 30,000 or greater (22% resided in the Tāmaki Makaurau Auckland region).

In terms of wellbeing, average physical health was within half a standard deviation of the New Zealand adult population mean (*M* = 50, *SD* = 10). Mental health for older adults was within half a standard deviation of the population mean. Around 21% reported levels of symptom frequency indicative of depression, and around 40% were classified as lonely.

Social factors associated with poorer wellbeing in 2020

As reported in **Table 2**, greater age was associated with lower physical health, but with greater mental function, lower symptoms of depression, and lower loneliness. There were no differences in gender on wellbeing indicators, however, being in the wāhine/female respondent group was associated with lower loneliness. Holding a tertiary education qualification was associated with better physical health and lower depression symptom frequency but was not associated with mental health or loneliness. Being in paid employment was associated with better wellbeing across all four indicators. Compared to the majority who owned their own home without a mortgage, those who owned their own home with a mortgage reported poorer physical health, poorer mental health and greater depression symptom frequency but did not differ on loneliness. On average those who held a rental (or other) tenure had worse outcomes on all four indicators. Living in an urban area was associated with higher physical health and with greater loneliness.

Table 2. Factors predicting wellbeing outcomes at 2020 survey among older adult survey respondents.

	Physical health		Mental functioning		Depression symptom freq.		Loneliness score	
n	4111		4111		4090		4086	
	Est. (95% CI)	*p*	Est. (95% CI)	*p*	Est. (95% CI)	*p*	Est. (95% CI)	*p*
Age	**-0.21 (-0.28, -0.15)**	**<.001**	**0.20 (0.13, 0.26)**	**<.001**	**-0.05 (-0.08, -0.02)**	**.002**	**-0.03 (-0.04, -0.02)**	**<.001**
Female	0.38 (-0.34, 1.11)	.300	-0.65 (-1.38, 0.08)	.081	0.29 (-0.06, 0.64)	.104	**-0.30 (-0.42, -0.17)**	**<.001**
Tertiary education	**2.06 (1.26, 2.85)**	**<.001**	0.40 (-0.38, 1.18)	.317	**-0.55 (-0.92, -0.18)**	**.003**	-0.07 (-0.21, 0.06)	.279
In paid employment	**4.00 (3.11, 4.89)**	**<.001**	**3.09 (2.18, 4.00)**	**<.001**	**-1.39 (-1.82, -0.95)**	**<.001**	**-0.35 (-0.50, -0.19)**	**<.001**
Caregiver	-0.02 (-0.99, 0.95)	.970	**-1.74 (-2.68, -0.79)**	**<.001**	**0.65 (0.21, 1.08)**	**.004**	0.08 (-0.08, 0.24)	.334
Owned w/o mortgage	*[REF]*							
Owned w/ mortgage	**-2.16 (-3.12, -1.21)**	**<.001**	**-1.78 (-2.70, -0.87)**	**<.001**	**0.85 (0.41, 1.29)**	**<.001**	0.13 (-0.03, 0.29)	*.122*
Rental or other	**-3.85 (-5.06, -2.64)**	**<.001**	**-3.07 (-4.30, -1.83)**	**<.001**	**1.50 (0.93, 2.07)**	**<.001**	**0.40 (0.20, 0.59)**	**<.001**
Urban location	**0.76 (0.03, 1.49)**	**.041**	-0.52 (-1.24, 0.20)	.155	0.21 (-0.14, 0.55)	.241	**0.13 (0.01, 0.26)**	**.036**

Note. Analyses based on data weighted for study design and response characteristics; unweighted number of cases (*n*) reported; bolded font indicates multivariate effects significant at the $p < .05$ level.

Social characteristics and wellbeing in 2020 among older Māori

As reported in **Table 1**, respondents who identified as Māori had an average age of 68 (range 55-85; 60% aged 65+), around 52% were women and 19% held a tertiary qualification. 48% were currently in paid employment and around 19% had provided informal care for whānau, a friend, or family member in the past 12 months. Around 52% owned their home without a mortgage, 20% owned a home with a mortgage and 26% held a rental or other housing tenure. In terms of residential location, 50% lived in areas with a population of 30,000 or greater (16% resided in the Tāmaki Makaurau Auckland region).

In terms of wellbeing, average physical health was around half a standard deviation below the New Zealand adult population mean. Average mental health was within half a standard deviation of the population mean. Around 29% reported levels of symptom frequency indicative of depression, and around 43% were classified as lonely.

Social factors associated with poorer wellbeing in 2020 among older Māori

As reported in **Table 3**, greater age was associated with lower physical health, but with greater mental health, lower symptoms of depression, and lower loneliness. Gender displayed little impact on wellbeing indicators, however being in the wāhine/female respondent group was associated with lower loneliness. Holding a tertiary education was associated with better mental health, lower depression symptom frequency, and lower loneliness, but was not associated with physical health. Being in paid employment was associated with better wellbeing across all four indicators. Compared to those who owned their own home without a mortgage, those who owned their own home with a mortgage and those who held a rental (or other) tenure reported poorer physical health, poorer mental health and greater depression symptom frequency but did not differ from those who owned their own home in terms of loneliness. Living in an urban area was associated with higher depression symptom frequency.

Table 3. Factors predicting wellbeing outcomes at 2020 survey among older Māori survey respondents.

	Physical health		Mental functioning		Depression symptom freq.		Loneliness score	
n	1437		1437		1434		1431	
Factor	Est. (95% CI)	*p*	Est. (95% CI)	*p*	Est. (95% CI)	*p*	Est. (95% CI)	*p*
Age	**-0.15 (-0.26, -0.05)**	**.005**	**0.22 (0.12, 0.31)**	**<.001**	**-0.08 (-0.13, -0.04)**	**.001**	**-0.02 (-0.04, -0.01)**	**.011**
Female	1.18 (-0.21, 2.57)	.096	0.43 (-0.86, 1.72)	.515	-0.14 (-0.82, 0.54)	.685	**-0.33 (-0.57, -0.10)**	**.005**
Tertiary education	1.00 (-0.91, 2.92)	.304	**1.81 (0.30, 3.31)**	**.019**	**-1.1 (-1.84, -0.36)**	**.004**	**-0.30 (-0.54, -0.05)**	**.018**
In paid employment	**5.48 (3.81, 7.15)**	**<.001**	**4.06 (2.57, 5.55)**	**<.001**	**-2.46 (-3.23, -1.70)**	**<.001**	**-0.27 (-0.53, -0.02)**	**.036**
Caregiver	-0.82 (-2.64, 0.99)	.375	**-1.78 (-3.11, -0.44)**	**.009**	0.41 (-0.33, 1.14)	.282	**0.25 (0.01, 0.48)**	**.045**
Owned w/o mortgage								
Owned w/ mortgage	**-2.29 (-4.12, -0.47)**	**.014**	**-1.88 (-3.39, -0.37)**	**.015**	**0.88 (0.12, 1.64)**	**.023**	0.12 (-0.16, 0.40)	.400
Rental or other	**-4.90 (-6.55, -3.26)**	**<.001**	**-4.04 (-5.59, -2.49)**	**<.001**	**1.69 (0.86, 2.52)**	**<.001**	0.24 (-0.07, 0.56)	.134
Urban location	-0.27 (-1.66, 1.12)	.701	-0.44 (-1.73, 0.84)	.500	**0.70 (0.01, 1.39)**	**.046**	0.12 (-0.12, 0.36)	.338

Note. Analyses based on data weighted for study design and response characteristics; unweighted number of cases (*n*) reported; bolded font indicates multivariate effects significant at the $p < .05$ level.

Use of pandemic assistance initiatives in 2020

Proportions of respondents who accessed each type of assistance as a result of the COVID-19 pandemic are presented for the overall sample in **Table 4** and for Māori respondants only in **Table 5**.

Of the 12.9% of who were self-employed in the sample overall, 51.3% indicated that they had accessed government assistance to support their business. Of those who owned their home with a mortgage, 7.7% indicated that they had received assistance from lenders. Among older adults overall, 8.8% reported receiving hardship assistance from the government and 2.4% from NGOs as a result of the COVID-19 pandemic. Very small proportions of older adults made a hardship withdrawal from Kiwisaver (<1%).

Table 4. Frequency statistics for item responses to '*Have you received any hardship assistance as a result of the COVID-19 pandemic?*' among older adults overall (*n* = 4351)

	No	Yes	No response
[a] Government assistance to support your business	47.7%	51.3%	0.9%
[b] Assistance from lenders, such as a mortgage holiday from your bank	88.4%	7.7%	3.8%
Government assistance such as welfare benefits	83.8	8.8%	7.4%
Material assistance from non-government organisations, such as food banks	90.5%	2.4%	7.0%
A Kiwisaver hardship withdrawal	92.0%	0.8%	7.2%

Note. Observed *n* reported; summary statistics weighted for survey design and response characteristics; [a] proportion of currently self-employed i.e., % of *n* = 576 respondents overall; [b] proportion of homeowners with a mortgage i.e., % of *n* = 951 respondents.

Of the 11.2% of older Māori who were self-employed, 54.4% indicated that they had accessed government assistance to support their business. Of those who owned their home with a mortgage, 7.8% indicated that they had received assistance from lenders. Among older Māori respondents, 15.4% reported receiving hardship assistance from the government and 12.1% from NGOs. Very small proportions made a hardship withdrawal from Kiwisaver (<1%).

Table 5. Frequency statistics for item responses to '*Have you received any hardship assistance as a result of the COVID-19 pandemic?*' and univariate linear regression predicting wellbeing outcomes in 2020 associated with accessing assistance among Māori respondents (*n* = 1543)

	No	Yes	No response
[a] Government assistance to support your business	44.9%	54.4%	0.7%
[b] Assistance from lenders, such as a mortgage holiday from your bank	89.6%	7.8%	2.7%
Government assistance such as welfare benefits	76.8%	15.4%	7.8%
Material assistance from non-government organisations, such as food banks	80.6%	12.1%	7.3%
A Kiwisaver hardship withdrawal	91.3%	0.8%	7.9%

Note. Observed *n* reported; summary statistics weighted for survey design and response characteristics; [a] proportion of currently self-employed i.e., % of *n* = 173 Māori respondents; [b] proportion of homeowners with a mortgage i.e., % of *n* = 359 Māori respondents.

Overall wellbeing trends among older adults 2014-2020

Demographic characteristics of the longitudinal sample are presented in **Appendix C**. Summary statistics for wellbeing outcomes 2014-2020 and unconditional linear and quadratic latent growth models for each outcome are presented in **Appendix D**. Models indicate little evidence of acceleration or deceleration of change in wellbeing outcomes following the early months of the pandemic response among older adults overall (*n* = 3478), nor among older Māori respondents (*n* = 1136) in the longitudinal sample.

On average, older adults displayed a small linear decline in physical health over time, no change in mental health over time, a small linear increase in depression symptom frequency over time, and a small linear decline in loneliness over time (**Figure 1**). Models of quadratic change did not significantly improve models of the available data, suggesting no average deviation from average linear trends in wellbeing indicators for older adults at 2020 survey.

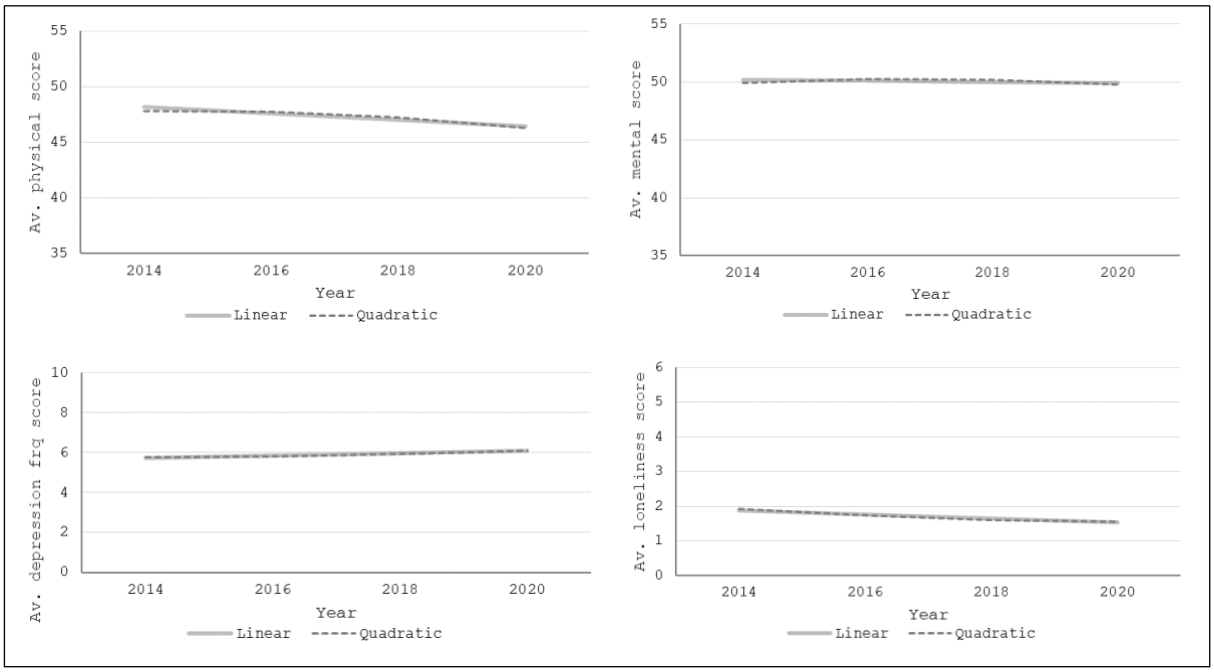

Figure 1. Estimated average linear and quadratic trajectories of wellbeing outcomes among older adults overall for models of change 2014-2020 (*n* = 3478).

On average, data provided by older Māori displayed a small linear decline in physical health over time, no change in mental health over time, no change in depression symptom frequency over time, and a small linear decline in loneliness over time (**Figure 2**). Models of quadratic change did not significantly improve models of the available data, suggesting no average deviation from average linear trends in wellbeing indicators for older Māori at 2020 survey.

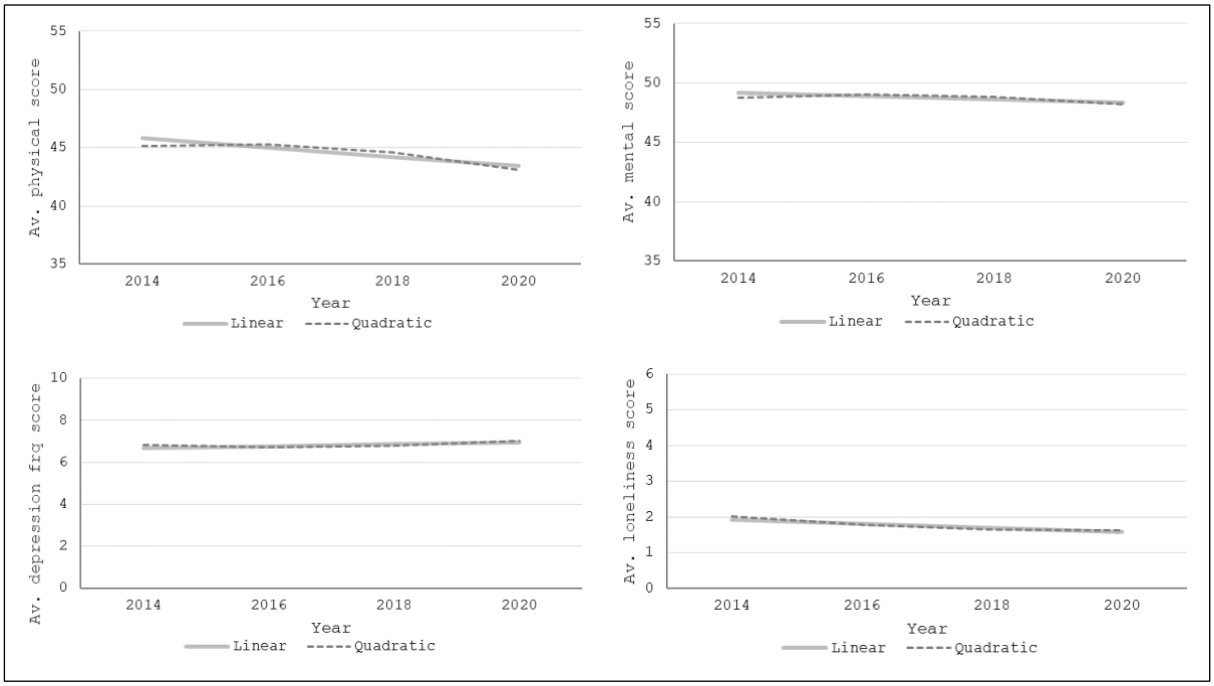

Figure 2. Estimated average linear and quadratic trajectories of wellbeing outcomes among older Māori for models of change 2014-2020 (*n* = 1136).

Social factors associated with wellbeing trends 2014-2020

To assess whether the association of social factors with key wellbeing outcomes in 2020 reflect inequalities which may have pre-dated or been exacerbated in the early months of the pandemic, we examined the association of covariates with model intercept (outcome at 2020 survey) and linear and quadratic slope factors for each of the four wellbeing outcomes across the 2014-2020 surveys.

Physical health

As reported in the previous section, older adults reported a small average linear decline in physical health over time. Conditional latent growth curve models assessing the association of each social factor with linear and quadratic change in physical health over time were fit for the overall sample. No social factor predicting a quadratic change in physical health 2014-2020 improved the fit of the model to the data, and the linear model was retained to examine the impact of social factors on long-term trends.

Consistent with cross-sectional analyses, in the longitudinal model greater physical health in 2020 was associated with lower age, holding a tertiary education, being in paid employment, owning a house without a mortgage (compared to either owning a house with a mortgage or with having a rental/other housing tenure), and living in an urban location (**Table 6**).

Table 6. Factors predicting physical health at 2020 survey and linear change over 2014-2020 surveys among older adults overall.

	Intercept (2020)		Linear change (2014-2020)	
Overall (*n* = 3335)	**Est. (95% CI)**	***p***	**Est. (95% CI)**	***p***
Age	**-0.23 (-0.32, -0.15)**	**<.001**	**-0.03 (-0.06, -0.01)**	**.010**
Female	0.20 (-0.60, 1.00)	.618	0.04 (-0.23, 0.31)	.748
Tertiary education	**2.01 (1.15, 2.87)**	**<.001**	-0.01 (-0.31, 0.29)	.957
In paid employment	**3.93 (2.91, 4.96)**	**<.001**	0.21 (-0.10, 0.52)	.188
Caregiver	0.09 (-1.00, 1.17)	.875	0.13 (-0.23, 0.49)	.471
Owned w/o mortgage	*[REF]*		*[REF]*	
Owned w/ mortgage	**-2.45 (-3.53, -1.37)**	**<.001**	-0.11 (-0.49, 0.27)	.580
Rental or other arrangement	**-3.77 (-5.14, -2.40)**	**<.001**	-0.26 (-0.69, 0.18)	.244
Urban location	**0.83 (0.02, 1.64)**	**.045**	**0.42 (0.15, 0.68)**	**.002**

Note. Analyses based on data weighted for study design and response characteristics; bolded font indicates multivariate effects significant at the $p < .05$ level.

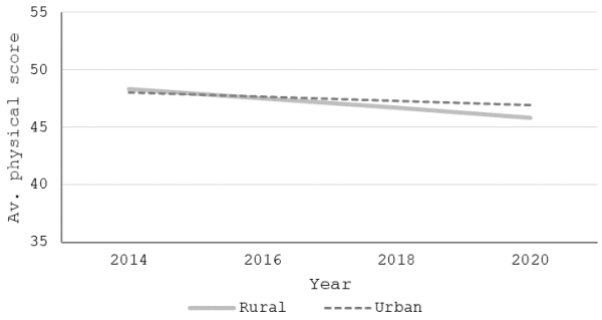

Figure 3. Estimated average linear change in physical health by urban location among older adults.

Analyses of factors associated with linear change in physical health over time indicate that most differences observed in 2020 were highly stable over time (**Table 6**). However, younger age, and living in an urban location (**Figure 3**) were associated with a less negative trajectory of physical health over time.

On average, older Māori respondents displayed a small average linear decline in physical health over time. Conditional latent growth curve models assessing association of each social factor with linear and quadratic change in physical health over time were also fit to data provided by Māori respondents. No social factor predicting quadratic change in physical health 2014-2020 improved the fit of the model to the data, and the linear model was retained to examine the impact of social factors on long-term trends.

Consistent with cross-sectional analyses, in the longitudinal model (**Table 7**) greater physical health in 2020 was associated with being in paid employment and owning a house without a mortgage (compared to either owning a house with a mortgage or with having a rental/other housing tenure).

Table 7. Factors predicting physical health at 2020 survey and linear change over 2014-2020 survey among older Māori respondents.

	Intercept (2020)		Linear change (2014-2020)	
Māori (*n* = 1077)	**Est. (95% CI)**	***p***	**Est. (95% CI)**	***p***
Age	-0.12 (-0.24, 0.00)	.058	-0.03 (-0.07, 0.02)	.309
Female	1.46 (-0.05, 2.97)	.059	**0.59 (0.01, 1.17)**	**.048**
Tertiary education	1.27 (-0.86, 3.39)	.243	-0.71 (-1.44, 0.02)	.058
In paid employment	**6.06 (4.30, 7.82)**	**<.001**	0.54 (-0.12, 1.21)	.110
Caregiver	-0.96 (-3.08, 1.15)	.372	0.40 (-0.33, 1.13)	.282
Owned w/o mortgage				
Owned w/ mortgage	**-2.01 (-3.99, -0.03)**	**.047**	-0.78 (-1.59, 0.04)	.062
Rental or other arrangement	**-4.73 (-6.48, -2.98)**	**<.001**	-0.09 (-0.82, 0.65)	.822
Urban location	-1.43 (-2.93, 0.08)	.064	0.15 (-0.41, 0.71)	.608

Note. Analyses based on data weighted for study design and response characteristics; bolded font indicates multivariate effects significant at the $p < .05$ level.

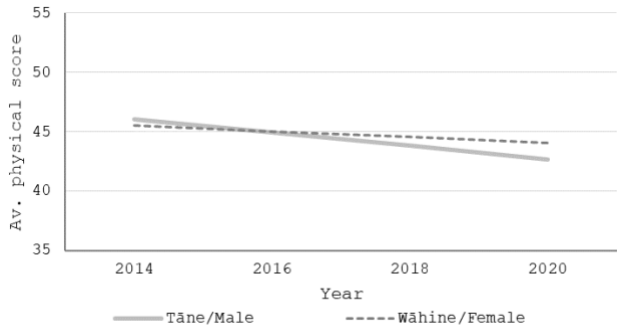

Figure 4. Estimated average linear change in physical health by gender among older Māori.

Analyses of factors associated with linear change in physical health among older Māori over time indicate that most differences observed in 2020 were highly stable over time (**Table 7**). However, a small association of gender with linear change over time indicated that on average tāne/male respondents displayed a greater decline in physical health than wāhine/female respondents (**Figure 4**).

Mental health

Older adults displayed no change in mental health over time. Conditional latent growth curve models assessing the association of each social factor with rates of linear and quadratic change in mental health over time were fit for the longitudinal sample overall. No social factor predicting quadratic change in mental health 2014-2020 improved the fit of the model to the data, and the linear model was retained to examine the impact of factors on long-term trends.

Consistent with cross-sectional analyses, in the longitudinal model (**Table 8**) greater mental health in 2020 was associated with higher age, with being in paid employment, with not providing informal care, and with owning current residence without a mortgage (compared to either owning a house with a mortgage or with having a rental/other housing tenure).

Table 8. Factors predicting mental healthat 2020 survey and linear change over 2014-2020 surveys among older adults.

	Intercept (2020)		Linear change (2014-2020)	
Overall (*n* = 3335)	**Est. (95% CI)**	***p***	**Est. (95% CI)**	***p***
Age	**0.20 (0.11, 0.29)**	**<.001**	0.00 (-0.03, 0.03)	.935
Female	-0.68 (-1.49, 0.13)	.099	**-0.41 (-0.72, -0.10)**	**.010**
Tertiary education	0.38 (-0.50, 1.26)	.403	-0.04 (-0.37, 0.30)	.824
In paid employment	**3.23 (2.21, 4.24)**	**<.001**	**0.45 (0.08, 0.82)**	**.016**
Caregiver (past 12 months)	**-1.29 (-2.29, -0.28)**	**.012**	-0.16 (-0.57, 0.26)	.452
Owned w/o mortgage				
Owned w/ mortgage	**-2.15 (-3.21, -1.09)**	**<.001**	-0.10 (-0.56, 0.36)	.678
Rental or other	**-3.60 (-4.98, -2.22)**	**<.001**	0.12 (-0.40, 0.64)	.652
Urban location	-0.77 (-1.59, 0.05)	.064	0.02 (-0.28, 0.33)	.884

Note. Analyses based on data weighted for study design and response characteristics; bolded font indicates multivariate effects significant at the $p < .05$ level.

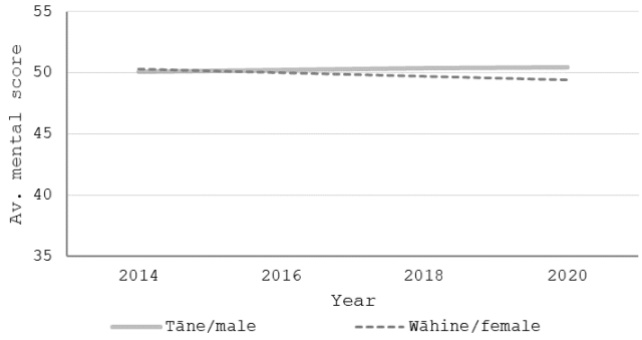

Figure 5. Estimated average linear change in mental functioning by gender among older adults.

Analyses of factors associated with linear change in mental health indicate that most effects observed in 2020 were highly stable over time (**Table 8**). However, an association of gender with linear change over time indicated that, on average, wāhine/female respondents displayed a greater decline in mental health than tāne/male respondents (**Figure 5**).

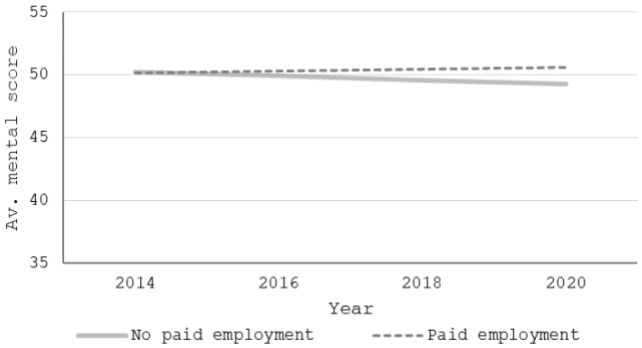

Figure 6. Estimated average linear change in mental functioning by employment status among older adults.

Additionally, an association of employment status with linear change over time indicated that, on average, those who were not in paid employment displayed a more negative change in mental health than those who were in paid employment (**Figure 6**).

As reported, older Māori respondents displayed no average change in mental health over time. Conditional latent growth curve models assessing the association of each social factor with rates of linear and quadratic change in mental health over time were fit for the longitudinal data provided by Māori respondents. No social factor was associated with a quadratic change in mental health 2014-2020, and the linear model was retained to describe the impact of factors on long-term trends.

Consistent with cross-sectional analyses, in the longitudinal model (**Table 9**) greater mental health in 2020 among Māori respondents was associated with higher age, with being in paid employment, with not providing informal care, and with owning current residence without a mortgage (compared to either owning a house with a mortgage or with having a rental/other housing tenure).

Table 9. Factors predicting mental health at 2020 survey and linear change over 2014-2020 surveys among older Māori respondents.

	Intercept (2020)		Linear change (2014-2020)	
Māori (*n* = 1077)	**Est. (95% CI)**	***p***	**Est. (95% CI)**	***p***
Age	**0.23 (0.12, 0.35)**	**<.001**	0.01 (-0.04, 0.06)	.706
Female	0.52 (-0.88, 1.92)	.468	**0.70 (0.05, 1.35)**	**.034**
Tertiary education	1.48 (-0.32, 3.28)	.107	0.15 (-0.64, 0.94)	.714
In paid employment	**5.53 (3.86, 7.20)**	**<.001**	**1.19 (0.46, 1.93)**	**.001**
Caregiver (past 12 months)	**-1.62 (-3.17, -0.06)**	**.042**	-0.39 (-1.3, 0.52)	.404
Owned w/o mortgage				
Owned w/ mortgage	**-2.58 (-4.30, -0.87)**	**.003**	0.45 (-0.63, 1.52)	.416
Rental or other	**-3.62 (-5.32, -1.93)**	**<.001**	0.17 (-0.68, 1.02)	.692
Urban location	-0.62 (-2.02, 0.78)	.383	0.22 (-0.45, 0.90)	.515

Note. Analyses based on data weighted for study design and response characteristics; bolded font indicates multivariate effects significant at the $p < .05$ level.

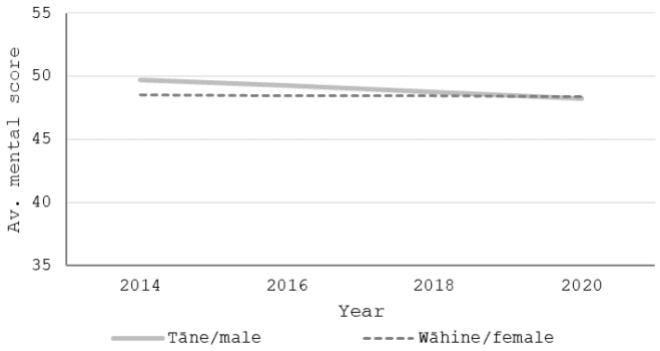

Figure 7. Estimated average linear change in mental functioning by gender among older Māori.

Analyses of factors associated with linear change in mental health indicate that most effects observed in 2020 were highly stable over time (**Table 9**). However, an association of gender with linear change over time indicated that on average tāne/male respondents displayed a more rapid decline in mental health over time than wāhine/female respondents (**Figure 7**).

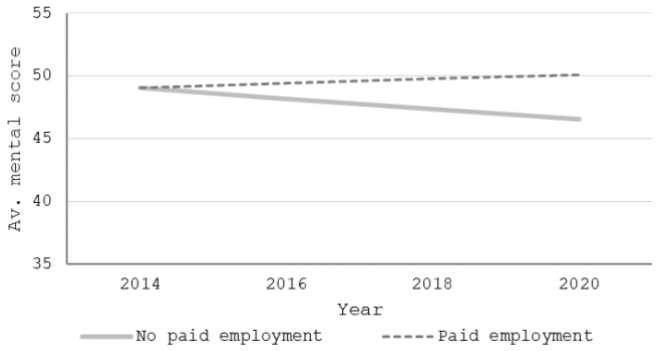

Figure 8. Estimated average linear change in mental functioning by employment status among older Māori.

Additionally, an association of employment status with linear change over time indicated that, on average, those who were not in paid employment displayed a more negative change in mental health than those who were in paid employment (**Figure 8**).

Depression symptoms

As reported, older adult respondents displayed a small average linear increase in depression symptom frequency over time. Conditional models assessing the association of each social factor with linear and quadratic change in depression symptom frequency over time were assessed in the overall longitudinal sample. No social factor was associated with a quadratic change in depression symptom frequency 2014-2020, and the linear model of change was retained to examine the impact of factors on long-term trends.

Consistent with cross-sectional analyses, in the longitudinal model (**Table 10**) higher depression symptom frequency in 2020 was associated with lower age, with not having a tertiary qualification, with not being in paid employment, with providing informal care, and with having a mortgage or a rental/other housing tenure (compared to owning without a mortgage).

Table 10. Factors predicting depression symptoms at 2020 survey and changes in symptoms over 2014-2020 surveys among older adults.

	Intercept (2020)		Linear change (2014-2020)	
Overall (*n* = 3335)	**Est. (95% CI)**	***p***	**Est. (95% CI)**	***p***
Age	**-0.06 (-0.10, -0.02)**	**.008**	0.00 (-0.01, 0.01)	.908
Female	0.21 (-0.19, 0.61)	.306	0.12 (-0.01, 0.25)	.061
Tertiary education	**-0.58 (-1.00, -0.16)**	**.007**	0.07 (-0.08, 0.21)	.367
In paid employment	**-1.58 (-2.08, -1.08)**	**<.001**	-0.15 (-0.31, 0.01)	.064
Caregiver (past 12 months)	**0.50 (0.02, 0.98)**	**.041**	0.05 (-0.12, 0.22)	.578
Owned w/o mortgage	*[REF]*		*[REF]*	
Owned w/ mortgage	**0.94 (0.43, 1.44)**	**<.001**	0.04 (-0.15, 0.23)	.687
Rental or other	**1.84 (1.12, 2.56)**	**<.001**	-0.17 (-0.43, 0.08)	.181
Urban location	0.21 (-0.19, 0.61)	.307	**-0.16 (-0.29, -0.02)**	**.021**

Note. Analyses based on data weighted for study design and response characteristics; bolded font indicates multivariate effects significant at the $p < .05$ level.

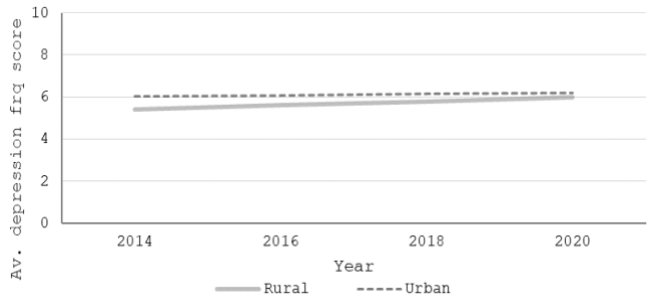

Figure 9. Estimated average linear change in depression symptom frequency by urban location among older adults.

Analyses of factors associated with linear change in depression symptom frequency indicated that all group differences observed in 2020 reflected inequalities that were highly stable over time (**Table 10**). However, while displaying a non-significant difference at 2020 survey, living in a rural location displayed a greater increase in depression symptom frequency over time (**Figure 9**).

Older Māori respondents displayed no average change in depression symptom frequency over time. Conditional latent growth curve models assessing the association of each social factor with rates of linear and quadratic change in depression symptom frequency over time were fit for the longitudinal data provided by Māori respondents. No social factor was associated with a quadratic change in depression symptom frequency 2014-2020, and the linear model was retained to examine the impact of factors on long-term trends.

Consistent with cross-sectional analyses, in the longitudinal model (**Table 11**) higher depression symptom frequency in 2020 among Māori respondents was associated with lower age, not having a tertiary qualification, not being in paid employment, with having a mortgage or a rental/other housing tenure (compared to owning without a mortgage), and living in and urban location.

Table 11. Factors predicting depression symptoms at 2020 survey and linear change in symptoms over 2014-2020 surveys among older Māori respondents.

	Intercept (2020)		Linear change (2014-2020)	
Māori (*n* = 1077)	**Est. (95% CI)**	***p***	**Est. (95% CI)**	***p***
Age	**-0.09 (-0.15, -0.04)**	**.001**	0.00 (-0.03, 0.02)	.761
Female	-0.09 (-0.82, 0.65)	.819	-0.16 (-0.44, 0.13)	.278
Tertiary education	**-1.35 (-2.23, -0.47)**	**.003**	0.01 (-0.33, 0.35)	.959
In paid employment	**-2.76 (-3.65, -1.88)**	**<.001**	**-0.39 (-0.75, -0.04)**	**.030**
Caregiver (past 12 months)	0.58 (-0.44, 1.60)	.264	0.13 (-0.21, 0.48)	.446
Owned w/o mortgage				
Owned w/ mortgage	**1.17 (0.19, 2.16)**	**.020**	-0.10 (-0.47, 0.28)	.621
Rental or other arrangement	**1.58 (0.72, 2.43)**	**<.001**	-0.14 (-0.52, 0.23)	.456
Urban location	**0.93 (0.17, 1.68)**	**.017**	0.09 (-0.18, 0.37)	.505

Note. Analyses based on data weighted for study design and response characteristics; bolded font indicates multivariate effects significant at the $p < .05$ level.

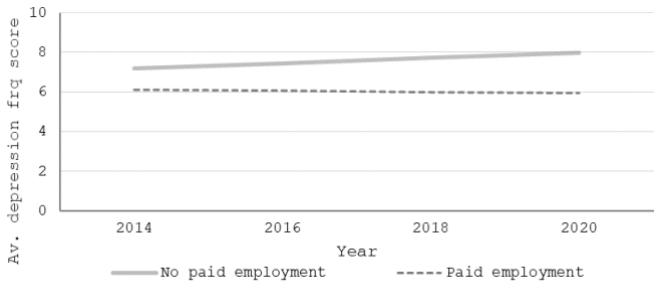

Figure 10 Estimated average linear change in depression symptom frequency by employment status among older Māori.

Analyses of factors associated with change in symptom frequency indicated that differences observed in 2020 reflected inequalities that were highly stable over time (**Table 11**). However, an association of employment with linear change over time indicated that on average older Māori who were in not paid employment displayed a greater increase in depression symptom frequency over time compared to those who were in paid employment (**Figure 10**).

Loneliness

Older adult respondents displayed a small average linear decline in loneliness over time. Conditional models assessing the association of each social factor with linear and quadratic change in loneliness over time were assessed in the overall longitudinal sample. No social factor was associated with a quadratic change in loneliness 2014-2020, and the linear model of change was retained to examine the impact of factors on long-term trends.

Consistent with cross-sectional analyses, in the longitudinal model (**Table 12**) higher loneliness in 2020 was associated with lower age, with being male, with not being in paid employment, with having a rental/other housing tenure (compared to owning without a mortgage), and with living in an urban location.

Table 12: Factors predicting loneliness at 2020 survey and changes in loneliness over the 2014-2020 surveys among older adults.

	Intercept (2020)		Linear change (2014-2020)	
Overall (*n* = 3335)	**Est. (95% CI)**	***p***	**Est. (95% CI)**	***p***
Age	**-0.04 (-0.05, -0.03)**	**<.001**	0.00 (0.00, 0.00)	.741
Female	**-0.26 (-0.4, -0.12)**	**<.001**	0.03 (-0.02, 0.07)	.191
Tertiary education	-0.10 (-0.26, 0.05)	.176	**0.06 (0.01, 0.11)**	**.015**
In paid employment	**-0.38 (-0.56, -0.21)**	**<.001**	-0.05 (-0.1, 0.01)	.100
Caregiver (past 12 months)	0.02 (-0.17, 0.20)	.864	0.04 (-0.01, 0.10)	.111
Owned w/o mortgage				
Owned w/ mortgage	0.18 (-0.01, 0.37)	.067	-0.01 (-0.07, 0.06)	.895
Rental or other arrangement	**0.52 (0.28, 0.75)**	**<.001**	0.00 (-0.07, 0.06)	.920
Urban location	**0.19 (0.05, 0.33)**	**.007**	-0.01 (-0.05, 0.04)	.717

Note. Analyses based on data weighted for study design and response characteristics; bolded font indicates multivariate effects significant at the $p < .05$ level.

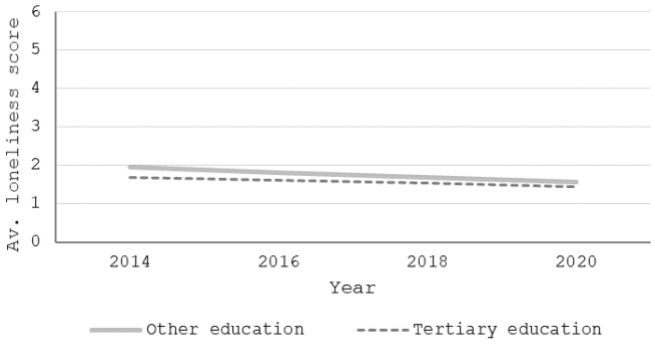

Figure 11 Estimated average linear change in loneliness by qualification group among older adults.

Analyses of factors associated with linear change in loneliness indicated that all group differences observed in 2020 reflected inequalities that were highly stable over time (**Table 12**). However, while education was not associated with loneliness in 2020, on average, those who had a tertiary education displayed a slower decline in loneliness over time compared to those who had other qualifications.

Older Māori respondents displayed a small overall decline in loneliness over time. Conditional models assessing association of each social factor with linear and quadratic change in loneliness over time were assessed in the sample of older Māori. A small association of employment status with a quadratic change in loneliness 2014-2020 was observed (univariate association: est = 0.09, *p* = .026; 95% CI = 0.01, 0.18). Compared to the employment-conditional linear latent growth curve model, inclusion of the quadratic term improved model fit across all indicators and sample size adjusted BIC was reduced. Compared to the multivariate linear model, inclusion of the quadratic function of change in loneliness predicted by employment improved model fit across all indicators and sample size adjusted BIC was reduced. As such, a model incorporating a quadratic function of change in loneliness conditional on employment status, and a linear function conditional on all social factors, was retained to assess the impact of social factors on long term trends.

Consistent with cross-sectional analyses, in the longitudinal model of data provided by older Māori (**Table 13**) higher loneliness in 2020 was associated with lower age, with being male, with not holding a tertiary qualification, with not being in paid employment, and with owning a house with a mortgage (compared to owning without a mortgage).

Table 13. Factors predicting loneliness at 2020 survey and changes in loneliness over the 2014-2020 surveys among older Māori respondents.

	Intercept (2020)		Linear change (2014-2020)	
Māori (*n* = 1077)	**Est. (95% CI)**	***p***	**Est. (95% CI)**	***p***
Age	**-0.02 (-0.04, -0.01)**	**.011**	0.00 (-0.01, 0.01)	.793
Female	**-0.30 (-0.53, -0.07)**	**.010**	0.00 (-0.09, 0.08)	.932
Tertiary education	**-0.36 (-0.62, -0.10)**	**.006**	-0.09 (-0.19, 0.00)	.060
In paid employment	**-0.39 (-0.66, -0.12)**	**.004**	0.20 (-0.05, 0.45)	.121
Caregiver (past 12 months)	0.22 (-0.04, 0.49)	.098	**0.14 (0.04, 0.24)**	**.006**
Owned w/o mortgage	*[REF]*			
Owned w/ mortgage	**0.30 (0.01, 0.59)**	**.046**	-0.05 (-0.18, 0.08)	.432
Rental or other arrangement	0.26 (-0.01, 0.54)	.063	**-0.12 (-0.24, 0.00)**	**.049**
Urban location	0.11 (-0.11, 0.34)	.322	0.05 (-0.04, 0.13)	.285

Note. Analyses based on data weighted for study design and response characteristics; bolded font indicates multivariate effects significant at the p < .05 level; inclusion of a quadratic term to describe change in the multivariate conditional latent growth curve model proved an inadmissible model of the available data due to a correlation ≥1 between the latent linear and quadratic slope factors. Variance for the quadratic parameter was fixed to 0 to enable estimation; association of 'in paid employment' with quadratic change parameter: est = 0.11, *p* = .011; 95%CI = 0.03, 0.19.

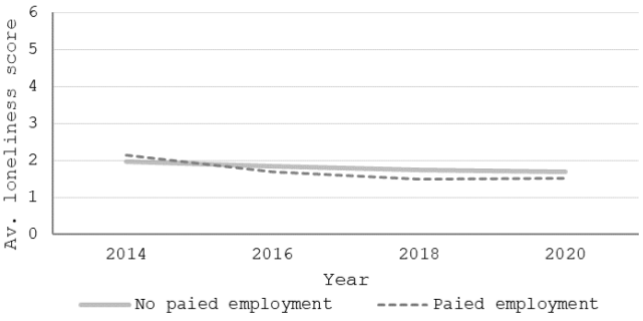

Figure 12 Estimated average quadratic change in loneliness by employment group among older Māori.

Analyses of factors associated with change in slope indicated that differences observed in 2020 reflected inequalities that were highly stable over time among older Māori respondents (**Table 13**). Decline in loneliness decelerated slightly over time for those in paid employment, with decline evident prior to the 2018-2020 measurement points.

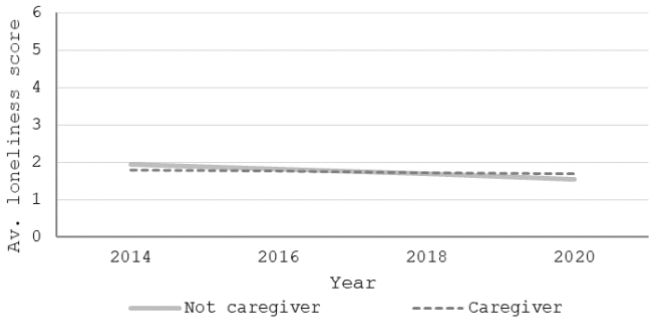

Figure 13 Estimated average linear change in loneliness by caregiver status group among older Māori.

While caregiving status was not associated with loneliness in 2020, being a caregiver was associated with a less positive change in loneliness over time (**Table 13**), indicating that while not providing care was associated with an average decline in loneliness, average loneliness among caregivers stable over time (**Figure 13**).

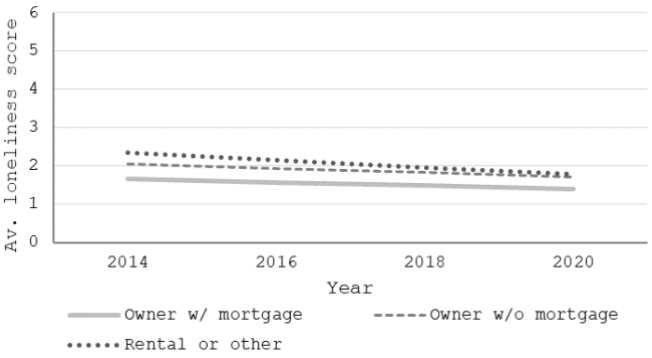

Figure 14 Estimated average linear change in loneliness by housing tenure group among older Māori.

Finally, while holding a rental (or other non-owner) housing tenure was not associated with loneliness in 2020, rental housing tenure was associated with a greater average decline in loneliness over time compared to those who owned without a mortgage (**Figure 14**).

Discussion

While the analyses variously identified inequalities in wellbeing outcomes by age, gender, education, employment, caregiving, housing tenure and urban/rural living, there was little evidence that these inequities changed following the early months of the pandemic response. Despite predictions of negative overall impacts of the pandemic and response on older New Zealanders, these data indicated that in general the mental health of older people was good and stable over time, and these findings were generally mirrored in the Māori ethnic group analyses. This supports suggestions that, rather than older people being a vulnerable group per se, they can bring greater psychological resilience to a pandemic disaster (see, e.g., Li & Mutchler, 2020; Rollston & Galea, 2020; Parr-Bronwnlie, 2020). However, this may also depend on the resources that older people possess prior to disaster events. Better mental health during the early months of the pandemic was associated with higher age and with being in paid employment, whereas poorer mental health was associated with being a caregiver and with having a mortgage or rental housing tenure. This result supports prior observations that SES and economic stability are strong predictors of mental wellbeing among older adults (Kavé et al., 2012; Leitner & Leitner, 2012). Similarly, physical health decreased slightly with age but was not discernibly affected by the first lockdown. Rather, good physical health was associated with other social factors such as holding a tertiary qualification, being in paid employment, living in an urban location and owning a house without a mortgage.

Loneliness did not increase over time or during the lockdown. This effect may be attributed to overall low levels of longlines among older adults and descriptions of increased support and more frequent contact from family, friends, community groups and government agencies during the initial lockdown period (see Lightfoot et al., 2021; Stephens & Breheny, 2021), which alleviated any sense of isolation and loneliness among older adults. While analyses indicated little change over time the groups with poorer loneliness outcomes (again, those who were younger, male, unemployed, living in rental housing and in urban locations) indicate more vulnerable groups for targeted support.

In general, these baseline results show that older New Zealanders' short-term pandemic experiences were diverse due to varying social demographic characteristics, structural constraints and circumstances. The notion of intersectionality (Crenshaw, 1991) needs to be integrated into future studies to explore the complexity of diverse experiences among older New Zealanders and to address varying forms of health and social inequalities.

In future research on responses to life disruptions and disasters among older adults, their potential resilience must be considered. Some psychologists and disaster researchers argue that older people are more likely to be resilient because of their prior experiences of withstanding and coping with life disruptions, lack of resources and living in isolation (see, e.g., MacLeod et al., 2016; Parr-Brownlie, 2020). Indeed, a survey respondent wrote a comment:

> I was surprised at how well I coped for an 83-year-old. My two children contacted me more than usual, but I was able to assure them that I am used to living alone and am very independent in my normal life.

Following the initial pandemic response across 26 countries, Kowal et al. (2020) found that older adults reported higher emotional wellbeing than younger adults, who were the most stressed during the COVID-19 outbreak.

Some survey respondents shared their feeling of loneliness and how the initial lockdown was mentally challenging. For example, a survey respondent wrote:

> I felt lonely and started to miss physical touch at times, like a "skin hunger". I had weird dreams as well.

However, these comments were not the norm. Instead, most survey respondent comments described increased support and more frequent contact from family, friends, community groups and government agencies (see Stephens & Breheny, 2021).

Furthermore, disasters expose pre-existing social inequalities and provide unique opportunities to address and respond to the otherwise invisible and complex social justice issues. Grassroot groups such as Student Volunteer Army (SVA) and One Whanau at a Time pinpointed where the support was needed as the pandemic has disrupted and created "gaps" in economic, healthcare, human and social services (see, e.g., McMeeking & Savage, 2020; Nadkarni, 2020; Wynn, 2021). For example, as Nadkarni (2020) reported, SVA partnered with New World and worked as "shopping aids" for older adults who had limited online communication capacity and were urged to stay home.

Remarkable grassroot responses to support the elderly in various forms were evident during the initial lockdown and have recently been seen again during the second Level 4 lockdown in August 2021 (see, e.g., Wynn, 2021). Vital support was also provided by iwi and (extended) whānau members. Some of the survey respondents wrote comments about their positive experiences of increased whānau and community support efforts:

> During the COVID-19 pandemic quarantine, we agreed that my son do all our supermarket shopping to avoid me standing in long queues. Our Tūhoe Iwi delivered groceries for 5 weeks and meat only the following weeks, which we are still receiving.

Other respondents indicated the importance of people and organisations "checking in" on them:

> Once I had hooked into having groceries delivered from the supermarket, I was fine … I was most impressed by the fact that 3 separate organisations phoned to check if I was alright. More friends and family phoned a lot to see if I needed anything. I didn't imagine I would catch the virus- (rightly or wrongly). I had a warm and proud feeling as to how our fellow countrymen behaved and coped with the difficulties of lockdown.

Isolated older people are particularly impacted by the pandemic and lockdowns as their usual access to healthcare and social services was disrupted. Although these community responses driven by disaster altruism partially and spontaneously filled the gaps in the disrupted healthcare and social services (including the traditional family support systems) due to the lockdown measures, we emphasise that disaster responses and healthcare in general should not remain "outsourced" to volunteers and altruism. As with previous disasters, the pandemic has exposed human resourcefulness, but it has also exposed health inequalities among older adults. Disaster and health researchers have the knowledge to identify the socially vulnerable groups such as older adults before a next disaster occurs, which can help us predict certain people's limited capacities to respond to and cope with unprecedented events.

The current pandemic is ongoing, and HWR have re-surveyed the longitudinal sample in 2021 which to include a new set of developments in disaster response. A second report, based on changes across time from 2020 to 2021, will follow. The second survey includes measures directly related to the pandemic experiences, including digital communication and health behaviours. This will provide one-year follow up data enabling assessment of the longer-term impacts and a more holistic view of the pandemic impact and response designed to contribute to a disaster response framework for older people.

Strengths and Limitations

Methods employed in the current research support its aims through the collection of representative data. Specifically, the sampling and postal survey methods employed by the New Zealand Health, Work and Retirement study make available person-level data on well-validated measures of

wellbeing among older adults and the identification of a range of social risk factors. Much research conducted in the early months of the pandemic relied heavily on online surveys, often promoted via social media. These methods bias samples towards those with access, interest, and familiarity with these platforms. Additionally, the lack of a sampling frame or information on uptake prevent examination of factors associated with response. In contrast, respondents to the NZHWR are recruited from random samples drawn from a nationally representative sampling frame, enabling the calculation of survey weights to reduce biases associated with response, with the use of a postal survey mode further reducing barriers to participation associated with online surveys. Additionally, the over-sampling design renders the NZHWR a unique resource representing the experiences of older Māori. These methods support the studies representation of wellbeing and hardship assistance sought by older adult population during the early months of the pandemic in Aotearoa New Zealand.

Longitudinal data on wellbeing outcomes for those recruited to the study prior to 2020 enabled us to describe how levels of wellbeing in 2020 reflected long term trends established prior to the COVID-19 pandemic, and whether these trends differed for groups with different social risk factors. The current analytic approach assesses whether a model incorporating a non-linear change better characterised data observed over four time points 2014-2020 compared to a linear trend and specifically whether acceleration or deceleration of trends 2014-2018 changed 2018-2020. These research methods are critical for understanding the impact of disasters on wellbeing and due to the inherent unpredictability of events, are generally not possible without ongoing population-based longitudinal studies. Studies mobilized soon after awareness of a risk of a potential pandemic event arises, perhaps incorporated into government pandemic readiness plans, may have similar benefits. However, such initiatives require ready availability of research protocols, resources, and expertise to launch such a research initiative quickly and face the risk of not being mobilised in time to characterise wellbeing prior to events, or to be launched when none eventuates. Notably, the 2020 wave of the NZHWR survey was delayed by two weeks due to restrictions on printeries and postage of non-essential mail. While this has little impact on current findings, it does point to risks to health and social research initiatives associated with the COVID-19 pandemic response.

There are also limitations of the current work, particularly in terms of the classification of social risk factors. Current analyses treat social risk factors as time-invariant i.e., that status in 2020 was stable over the 2014-2020 observation period. Indeed, many characteristics, including (relative) age, gender and highest level of education may be reasonably considered stable over the 6-year follow up period in this group, with home ownership and urban location also relatively stable for the older population. However, employment status and caregiving status may be relatively variable and thus how well these characterise status over extended periods of time may be less informative. Secondly, factors associated with diversity within groups were not captured. For example, while current results do not indicate care status as a significant predictor of increase in depression in 2020, this likely reflects heterogeneity y within caregivers (e.g., burden of the care role) captured in the latent growth curve models, and a lack of information on caregiving status when characterising wellbeing trends 2014-2018. Similarly, employment status, classified here as in paid employment vs not in paid employment, does not capture the variation in employment conditions pertinent to the COVID response (e.g., working from home, public facing, and essential service roles) and varying impacts on industries (e.g., tourism and accommodation, hospitality, air transport etc). Future analyses assessing the impact of these factors on outcomes over a shorter period of follow-up, for participants for which they were known to be stable characteristics, or treating them as time-varying characteristics, may prove a more sensitive examination of changes in wellbeing for these groups associated with the pandemic period.

Gender was not a significant factor for the immediate outcomes of physical and mental health, depression symptoms, and loneliness. However, further studies must examine the indirect impacts

of the pandemic on older women. For example, international research indicates increased violence against women during lockdown (Mittal & Singh, 2020; Peraud et al., 2021; Usta et al., 2021). Older women are an under-studied group in research on domestic violence during the pandemic in Aotearoa New Zealand.

Finally, a limitation of the current results is that both the domestic and international situation under which the 2020 data were collected evolved rapidly. While, 81% of responses were received and receipted by researchers within 6 weeks of survey launch, evidence from the Ministry of Health COVID-19 Health and Wellbeing Survey, highlighted fluctuations in wellbeing, particularly with reported local case numbers (Ministry of Health, 2020b). The current analyses do not capture these variations and are best understood as reflecting hardship assistance access, wellbeing and social factors following the initial months and easing of restrictions following the early months of the COVID19 pandemic.

Conclusions

Findings indicate very limited or no short-term impact of the COVID-19 pandemic and responses on the physical health, mental health, depressive symptoms, or loneliness of older adults in general. The findings show that both vulnerability and resilience were not distributed evenly during the early phase of the pandemic due to the pre-existing social determinants of health and wellbeing. Among both Māori and non-Māori respondents, poorer physical health and mental health, higher depressive symptoms, and greater loneliness were consistently associated with SES and economic factors (e.g., being unemployed, having a mortgage or being renters), caregiving role, and rural-urban inequality. Thus, overall perceived health inequalities and negative health outcomes among older New Zealanders during this period were attributable to pre-existing social inequalities.

Aotearoa New Zealand has experienced further lockdowns and levels of restriction through and since 2020, notably with the community outbreaks leading to localised lockdowns in August 2020 and March 2021, the initial COVID-19 Delta strain community outbreak in August 2021 and Omicron strain outbreak in January 2022. The impacts of the pandemic on New Zealanders are anticipated to change significantly across time as the risks of COVID-19 and protections of public health responses evolve. This report describes the initial experiences of older people during the pandemic, with pre-existing baseline information. The 2020 survey did not include several pandemic-specific questions that have emerged as important in the subsequent 12 months, such as vaccine hesitancy and ways of maintaining social contact during periods of lockdown. Therefore, a follow-up survey, conducted in August-December 2021, will capture the mid-term impacts of the pandemic on older New Zealanders.

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Appendices

Appendix A: Classification of homeownership and housing tenure

Table 14: Classification of participant reported tenure in their primary residence based on conceptual understanding of ownership structures.

Owned without a mortgage	Owned by themselves and/or spouse/partner without a mortgage; owned in a family trust; owned themselves and another person ('no mortgage' specified); owned with a reverse/Sentinel mortgage; on business premises owned by respondent; Joint Tenants or Tenants in Common ('no mortgage' specified)
Owned with a mortgage	Owned by themselves and/or spouse/partner with a mortgage; owned themselves and another person ('with mortgage' or mortgage status not specified); Joint Tenants or Tenants in Common ('with mortgage' or mortgage status not specified).
Rented or other arrangement	Owned by family or whanau; private rental; retirement village; license to occupy; housing provided by employer; living with family (ownership not otherwise specified); State, Council or Kaumātua housing; Boarder; house sitting; house truck; rent to own.

Appendix B: Characteristics of informal care-giving situation at 2020 survey

Table 15: Supplementary table summarizing characteristics of informal care giving situation among informal caregivers at 2020 survey for caregivers in cross sectional sample (*n* = 781) and longitudinal (*n* = 596) sub-sample.

Care characteristics	Cross-sectional	Longitudinal
N (%) carers		
Age of primary care recipient (mean, SD)	73.2 (20.0)	73.0 (20.4)
Frequency of care		
% Every day	51.2	52.5
Relationship to carer		
% Spouse, Parent (or in-law)	69.7	70.4
% Living with carer	49.8	50.2
Care provided due to:	.	
% Alzheimer's disease or dementia	16.8	16.8
% Frailty in old age	45.0	45.5
% Cancer	13.5	14.1
% Mental health problem	13.2	14.4
% Respiratory condition	16.9	16.7
% Stroke	11.7	12.3
% Severe arthritis rheumatism	15.4	16.3
% Visual impairment	13.1	13.6
% Intellectual disability or handicap	7.7	8.5
% Other condition	39.8	41.3

Appendix C: Descriptive statistics for the longitudinal sub-sample at 2020 survey

Descriptive statistics for the 2020 survey longitudinal respondents overall and for the Māori subsample are reported in **Table 9**. Overall *n* = 3478 older adults and *n* = 1136 older adults in the Māori sub-sample provided longitudinal data at 2020 survey. Around 33% of (unweighted) longitudinal survey respondents identified as having a Māori ethnic identity.

Table 16: Descriptive statistics for longitudinal participants responding to the 2020 survey.

	Overall respondents	**Māori respondents**
Ethnicity[a]		
%European	94.5	73.6
%Māori	11.6	100
%Pacific	2.6	4.9
%Asian	2.4	3.4
%other	12.2	9.8
%not reported	0.0	0.0
Age (m, SD)	68.0 (7.4)	68.0 (7.8)
Gender		
%Female	53.0	52.2
Highest qualification		
%No quals	13.3	25.5
%Secondary School	21.0	23.4
%Postsecondary/trade	39.2	31.9
%Tertiary quals	26.5	19.1
%not reported	0.0	0.1
In paid employment		
%Yes	48.5	49.8
%No	50.7	48.7
%not reported	0.8	1.4
Housing tenure		
%Owned w/o a mortgage	66.5	53.1
%Owned with a mortgage	19.3	19.7
%Rented or other	12.7	25.4
%not reported	1.4	1.9
Provided informal care		
%Yes	17.5	18.4
%No	80.6	79.6
%not reported	1.9	2.0
Location		
%Urban	54.0	48.5
%Rural	46.0	51.5
%unknown	0.0	0.0
Outcomes 2020		
Physical health (m, SD)	46.3 (10.5)	43.1 (11.3)
Mental health (m, SD)	50.0 (9.9)	48.4 (10.3)
Depression symptoms (m, SD)	6.1 (4.7)	6.9 (5.0)
%Depressed	21.1	28.7
%missing	1.4	1.4
Loneliness (m, SD)	1.6 (1.7)	1.6 (1.6)
%Lonely	40.2	42.2
%missing	1.7	1.9

Note. Weighted descriptive statistics for longitudinal respondents to the 2020 Health, Work and Retirement study overall (*n* = 3478) and for the Māori sub-sample (*n* = 1136). Summary statistics weighted for survey design and response characteristics; at 2020 survey *n* = 34 missing physical and mental health scores; *n* = 50 missing depression score; *n* = 62 missing loneliness score and; *n* = 84 were missing an ELSI-SF score. [a]Totals are greater than 100% as participants could identify as having more than one ethnicity.

Appendix D: Linear and quadratic Latent Growth Curve Models of outcomes over time 2014-2020

Table 17: Descriptive statistics for observed outcomes 2014-2020 among longitudinal participants responding to the 2020 survey.

Outcome	**2014**	**2016**	**2018**	**2020**
Physical health				
n observations	2162	2917	3243	3444
Physical Score (*mean sd*)	47.4 (9.3)	47.9 (9.7)	46.9 (10.2)	46.4 (10.5)
Mental functioning				
n observations (*mean sd*)	2162	2917	3243	3444
Mental Score	50.2 (9.7)	50.8 (9.2)	49.9 (9.8)	49.9 (9.9)
Depression symptoms				
n observations	2156	2918	3241	3428
Depression symptoms (*mean sd*)	5.7 (4.5)	5.6 (4.6)	6.1 (4.9)	6.1 (4.7)
%Depressed	17.7	17.4	21.4	21.5
Loneliness				
n observations	2191	2921	3237	3416
Loneliness score (*mean sd*)	1.8 (1.7)	1.6 (1.6)	1.5 (1.7)	1.5 (1.7)
%Lonely	49.0	45.6	41.2	41.1

Note. Summary statistics weighted for survey design and response characteristics; % indicates proportion of valid (non-missing) responses.

Physical health

Unconditional latent growth curve models were estimated to describe changes in physical health among older adults in the longitudinal sample over time. Model fit indices (**Table 18**) indicated a model of linear change in physical health displayed good fit to the data, with a small average decline in physical health over time. Inclusion of quadratic term to describe change did not improve the model, and the linear model was retained as the most parsimonious model of the data. A comparison of estimated trajectories from the linear and quadric models is illustrated in **Figure 15** (left panel).

Table 18: Model fit statistics and parameter estimates for linear and quadratic models of change in physical health 2014-2020 in the overall longitudinal sample (n = 3478).

	Linear model		Quadratic model	
	Est. (95% CI)	**p**	**Est. (95% CI)**	**p**
Mean				
Intercept (2020)	46.44 (46.0, 46.89)	<.001	46.3 (45.85, 46.75)	<.001
Linear slope (-3, -2, -1, 0)	-0.57 (-0.70, -0.44)	<.001	-1.19 (-1.58, -0.80)	<.001
Quadratic change			-0.22 (-0.35, -0.10)	.001
Covariance				
Slope-Intercept	7.76 (5.59, 9.94)	<.001	19.88 (6.45, 33.3)	.004
Quadratic-Intercept			2.98 (-0.38, 6.35)	.082
Slope-Quadratic			5.40 (2.01, 8.78)	.002
Variance				
Intercept	84.89 (77.06, 92.71)	<.001	95.04 (81.87, 108.20)	<.001
Linear slope	2.91 (1.91, 3.90)	<.001	22.12 (8.31, 35.94)	.002
Quadratic change			1.63 (0.60, 2.65)	.002
Model fit information				
Chi-square Test of Model Fit	42.7(5)	<.001	22.4(1)	<.001
SSABIC	81117.6		81099.4	
RMSEA (95% CI)	0.047 (0.034, 0.060)	.364	0.079 (0.052, 0.101)	.037
CFI	0.985		0.991	
SRMR	0.030		0.015	

Note. Model intercept indicates outcome estimate at 2020 survey; 95% CI indicates upper and lower values of the 95% confidence interval; p = p value; analysis weighted for survey design and response characteristics.

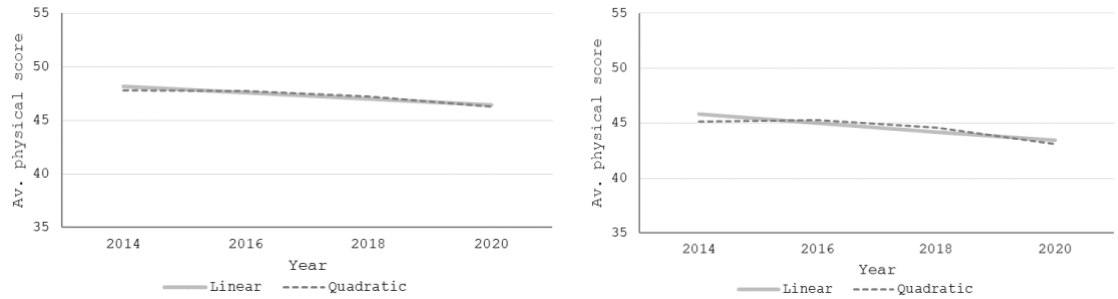

Figure 15: Average linear and quadratic models of change in physical health over time in the overall (Left) and Māori (right) longitudinal samples; axis range 55-35 selected to represent scores up to 1SD below the adult population mean.

A linear model of physical health over time provided a good fit to data provided by older Māori (**Table 19**), indicating a small average decline in physical health over time. Inclusion of a quadratic term to describe change proved an inadmissible model of the available data due to a correlation ≥1 between the latent linear and quadratic slope factors. A small non-significant quadratic variance parameter (*est* = -0.89, *p* = 0.442) was fixed to 0 to enable estimation of the quadratic model. This model indicated that a small negative quadratic parameter did not improve the model of change over time, and the linear model was retained as the most parsimonious model of the data. A comparison of estimated trajectories from the linear and quadric models of change for older Māori is illustrated in **Figure 15** (right panel).

Table 19: Model fit statistics and parameter estimates for a linear model of change in physical health 2014-2020 among older Māori (n = 1136).

	Linear model		Quadratic model	
	Est. (95% CI)	**p**	**Est. (95% CI)**	**p**
Mean				
Intercept (2020)	43.43 (42.62, 44.24)	<.001	43.12 (42.30, 43.94)	<.001
Linear slope (-3, -2, -1, 0)	-0.79 (-1.06, -0.52)	<.001	-1.92 (-2.66, -1.18)	<.001
Quadratic change			-0.41 (-0.65, -0.18)	.001
Covariance				
Slope-Intercept	9.88 (4.67, 15.09)	<.001	10.35 (5.14, 15.57)	<.001
Quadratic-Intercept			-	
Slope-Quadratic			-	
Variance				
Intercept	97.21 (84.52, 109.9)	<.001	97.94 (85.23, 110.66)	<.001
Linear slope	4.96 (2.42, 7.51)	<.001	5.21 (2.65, 7.78)	<.001
Quadratic change			0.00[a]	
Model fit information				
Chi-square Test of Model Fit	22.9(5)	<.001	11.9(4)	0.018
SSABIC	24599.2		24587.0	
RMSEA (95% CI)	0.056 (0.034, 0.080)	ns	0.042 (0.015, 0.070)	ns
CFI	0.978		0.990	
SRMR	0.052		0.051	

Note. Model intercept indicates outcome estimate at 2020 survey; 95% CI indicates upper and lower values of the 95% confidence interval; p = p value; ns = p value for RMSEA <0.05.; analysis weighted for survey design and response characteristics; [a] variance fixed to 0.

Mental health

Unconditional latent growth curve models were estimated to describe changes in mental health among older adults in the longitudinal sample over time. Indices of model fit (**Table 20**) indicate that a linear model of change in mental healthdisplayed good fit to the data. This model indicated no change in mental health over time. Inclusion of a quadratic term to describe change proved an inadmissible model of the available data due to a correlation ≥1 between the latent linear and quadratic slope factors. A small non-significant quadratic variance parameter (*est* = 0.50, *p* = 0.459) was fixed to 0 to enable estimation of the quadratic model. A small negative quadratic parameter did not substantially improve the model of change over time, and the linear model was retained as

the most parsimonious model of the data. A comparison of estimated trajectories from the linear and quadric models is illustrated in **Figure 16** (left panel).

Table 20: Model fit statistics and parameter estimates for a linear model of change in mental health2014-2020 (n = 3478).

	Linear model		Quadratic model	
	Est. (95% CI)	**p**	**Est. (95% CI)**	**p**
Mean				
Intercept (2020)	49.92 (49.52, 50.33)	<.001	49.77 (49.34, 50.19)	<.001
Linear slope (-3, -2, -1, 0)	-0.09 (-0.24, 0.06)	.246	-0.62 (-1.06, -0.19)	.005
Quadratic change			-0.19 (-0.33, -0.05)	.009
Covariance				
Slope-Intercept	4.57 (2.05, 7.09)	<.001	4.52 (2.00, 7.04)	<.001
Quadratic-Intercept			-	
Slope-Quadratic			-	
Variance				
Intercept	61.74 (54.01, 69.47)	<.001	61.62 (53.88, 69.36)	<.001
Linear slope	2.92 (1.66, 4.18)	<.001	2.93 (1.67, 4.19)	<.001
Quadratic change			0.00[a]	
Model fit information				
Chi-square Test of Model Fit	19.1(5)	.002	12.9(4)	.012
SSABIC	82424.9		82419.1	
RMSEA (95% CI)	0.028 (0.016, 0.043)	ns	0.025 (0.011, 0.041)	ns
CFI	0.992		0.995	
SRMR	0.043		0.037	

Note. Model intercept indicates outcome estimate at 2020 survey; 95% CI indicates upper and lower values of the 95% confidence interval; p = p value; analysis weighted for survey design and response characteristics; [a] variance fixed to 0.

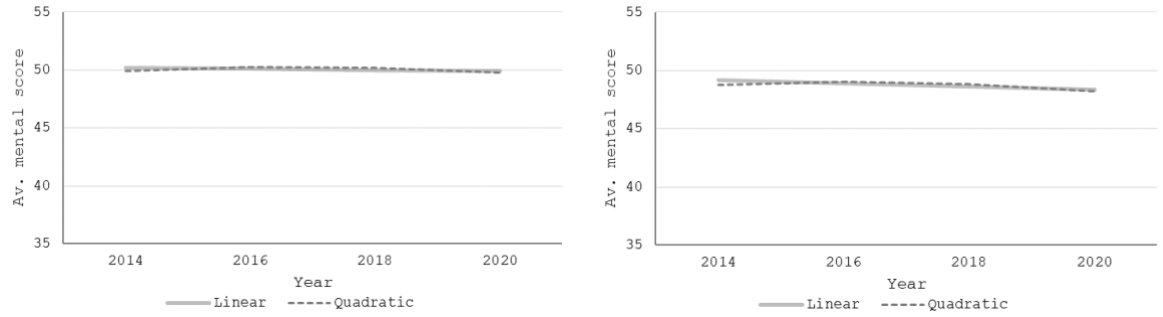

Figure 16: Average linear and quadratic models of change in mental health over time in the overall (Left) and Māori (right) longitudinal samples; axis range 55-35 selected to represent scores up to 1SD below the adult population mean.

A linear model of change in mental health over time also provided the best account of data provided by older Māori (**Table 21**). This model indicates no change in health-related functioning over time. Inclusion of a quadratic parameter did not improve the model of change over time, estimating small non-significant quadratic parameter and no significant variance around this estimate. The linear model was retained as the most parsimonious model of the data. A comparison of estimated trajectories from the linear and quadric models is illustrated in **Figure 16** (right panel).

Table 21: Model fit statistics and parameter estimates for linear and quadratic models of change in mental health2014-2020 among older Māori (n = 1136).

	Linear model		Quadratic model	
	Est. (95% CI)	**p**	**Est. (95% CI)**	**p**
Mean				
Intercept (2020)	48.32 (47.58, 49.05)	<.001	48.22 (47.46, 48.98)	<.001
Linear slope (-3, -2, -1, 0)	-0.28 (-0.62, 0.07)	0.119	-0.80 (-1.56, -0.04)	.038
Quadratic change			-0.21 (-0.47, 0.06)	.124
Covariance				
Slope-Intercept	8.29 (3.7, 12.89)	<.001	15.97 (-13.33, 45.28)	.285
Quadratic-Intercept			1.95 (-5.07, 8.97)	.587
Slope-Quadratic			2.92 (-4.85, 10.68)	.462
Variance				
Intercept	75.29 (63.9, 86.69)	<.001	81.61 (54.44, 108.78)	<.001
Linear slope	6.36 (3.64, 9.09)	<.001	17.14 (-13.73, 48.01)	.276
Quadratic change			0.83 (-1.83, 3.49)	.541
Model fit information				
Chi-square Test of Model Fit	12.5(5)	.028	10.5(1)	.001
SSABIC	24733.0		24744.4	
RMSEA (95% CI)	0.036 (0.011, 0.062)	.783	0.092 (0.047, 0.145)	.059
CFI	0.987		0.984	
SRMR	0.039		0.027	

Note. Model intercept indicates outcome estimate at 2020 survey; 95% CI indicates upper and lower values of the 95% confidence interval; p = p value; analysis weighted for survey design and response characteristics.

Depression symptom frequency

Unconditional latent growth curve models were estimated to describe changes in depression symptom frequency among older adults in the longitudinal sample over time. Indices of model fit (**Table 22**) indicate a linear model of change in depression symptom frequency displayed good fit to the data, indicating a small average increase in depression symptoms over time. Inclusion of a quadratic parameter did not improve the model of overall change among older adults over time, and the linear model was retained as the most parsimonious model of the data. A comparison of estimated trajectories from the linear and quadric models is illustrated in **Figure 17** (left panel).

Table 22: Model fit statistics and parameter estimates for linear and quadratic models of change in depression symptom frequency scores 2014-2020 (n = 3476).

	Linear model		Quadratic model	
	Est. (95% CI)	**p**	**Est. (95% CI)**	**p**
Mean				
Intercept (2020)	6.09 (5.89, 6.29)	< .001	6.09 (5.89, 6.3)	<.001
Linear slope (-3, -2, -1, 0)	0.12 (0.05, 0.18)	< .001	0.20 (0.02, 0.39)	.035
Quadratic change			0.03 (-0.03, 0.10)	.317
Covariance				
Slope-Intercept	1.27 (0.77, 1.77)	<.001	5.73 (2.61, 8.86)	<.001
Quadratic-Intercept			1.06 (0.28, 1.84)	.008
Slope-Quadratic			1.65 (0.87, 2.44)	<.001
Variance				
Intercept	17.32 (15.61, 19.02)	<.001	21.15 (17.98, 24.31)	<.001
Linear slope	0.61 (0.39, 0.84)	<.001	7.24 (4.08, 10.4)	<.001
Quadratic change			0.40 (0.15, 0.64)	.002
Model fit information				
Chi-square Test of Model Fit	34.0(5)	<.001	16.4(1)	<.001
SSABIC	63634.6		63618.5	
RMSEA (95% CI)	0.041 (0.028, 0.054)	ns	0.067 (0.041, 0.097)	ns
CFI	0.989		0.994	
SRMR	0.021		0.014	

Note. Model intercept indicates depression symptom estimates at 2020 survey; 95% CI indicates upper and lower values of the 95% confidence interval; p = p value; overall sample analysis weighted for survey design and response characteristics.

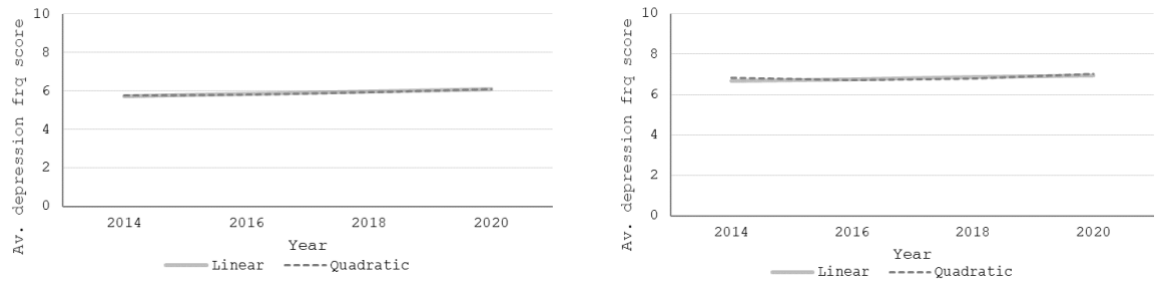

Figure 17: Average linear and quadratic models of change in depression symptom frequency score in the overall (Left) and Māori (right) longitudinal sample; range 0-10 indicated as scores representing sub-clinical scores on the CES-D10 scale.

Indices of model fit indicated a linear model of change to display good fit to data on depression symptom frequency provided by older Māori (**Table 23**). This model indicated no average change in depression symptoms over time. The addition of a quadratic function provided little improvement in model fit, estimating small non-significant quadratic parameter and no significant variance around this estimate in the sample. A comparison of estimated trajectories from the linear and quadratic models is illustrated in **Figure 17** (right panel). The linear model was retained as the most parsimonious model of the data.

Table 23: Model fit statistics and parameter estimates for linear and quadratic models of change in depression symptom frequency scores 2014-2020 among older Māori (n = 1136).

	Linear model		Quadratic model	
	Est. (95% CI)	**p**	**Est. (95% CI)**	**p**
Mean				
Intercept (2020)	6.95 (6.56, 7.35)	<.001	7.02 (6.63, 7.42)	<.001
Linear slope (-3, -2, -1, 0)	0.10 (-0.04, 0.23)	.168	0.33 (-0.06, 0.71)	.099
Quadratic change (9, 4, 1, 0)			0.09 (-0.05, 0.22)	.205
Covariance				
Slope-Intercept	1.22 (0.16, 2.27)	.024	-1.66 (-7.27, 3.96)	.563
Quadratic-Intercept			-0.89 (-2.37, 0.59)	.238
Slope-Quadratic			0.54 (-1.31, 2.39)	.568
Variance				
Intercept	19.4 (16.73, 22.07)	<.001	17.36 (12.36, 22.36)	<.001
Linear slope	0.92 (0.39, 1.44)	.001	1.63 (-5.19, 8.44)	.640
Quadratic change			0.30 (-0.30, 0.89)	.325
Model fit information				
Chi-square Test of Model Fit	14.4(5)	.014	9.3(1)	.002
SSABIC	19406.5		19405.7	
RMSEA (95% CI)	0.041 (0.017, 0.066)	ns	0.086 (0.042, 0.139)	ns
CFI	0.990		0.991	
SRMR	0.047		0.016	

Note. Model intercept indicates depression symptom estimates at 2020 survey; 95% CI indicates upper and lower values of the 95% confidence interval; p = p value; analysis weighted for survey response characteristics.

Loneliness

An unconditional latent growth curve model was estimated to describe changes in experiences of loneliness among older adults in the longitudinal sample over time. Indices of model fit (**Table 24**), indicate that a linear model of change in loneliness displayed very good fit to the data. Parameter estimates indicated a small decrease in loneliness over time. A model including a quadratic term proved an inadmissible model of the available data due to a correlation ≥1 between the latent linear and quadratic slope factors. A small quadratic variance parameter (*est* = 0.03, *p* = 0.070) was fixed to 0 to enable estimation of a quadratic model. This model indicated a small deceleration of the decline in loneliness over time **Figure 18** (left panel). The linear model was retained as the most parsimonious model of the data.

Table 24: Model fit statistics and parameter estimates a model of linear change in loneliness scores among older adults 2014-2020 (n = 3476).

	Linear model		Quadratic model	
	Est. (95% CI)	**p**	**Est. (95% CI)**	**p**
Mean				
Intercept (2020)	1.53 (1.46, 1.60)	<.001	1.56 (1.48, 1.63)	<.001
Linear slope (-3, -2, -1, 0)	-0.12 (-0.14, -0.10)	<.001	-0.02 (-0.09, 0.05)	0.600
Quadratic change (9, 4, 1, 0)			0.04 (0.01, 0.06)	0.002
Covariance				
Slope-Intercept	0.09 (0.03, 0.14)	.003	0.08 (0.03, 0.14)	.003
Quadratic-Intercept			-	
Slope-Quadratic			-	
Variance				
Intercept	2.08 (1.89, 2.27)	<.001	2.08 (1.89, 2.27)	<.001
Linear slope	0.06 (0.03, 0.09)	<.001	0.06 (0.03, 0.09)	<.001
Quadratic change			0.00[a]	
Model fit information				
Chi-square Test of Model Fit	17.8(5)	.003	8.8(4)	0.067
SSABIC	39807.6		39797.2	
RMSEA (95% CI)	0.027 (0.014, 0.041)	ns	0.019 (0.000, 0.035)	ns
CFI	0.995		0.998	
SRMR	0.018		0.015	

Note. Model intercept indicates latent intercept of loneliness at 2020 survey; 95% CI indicates upper and lower values of the 95% confidence interval; p = p value; analysis weighted for survey design and response characteristics; [a] variance fixed to 0.

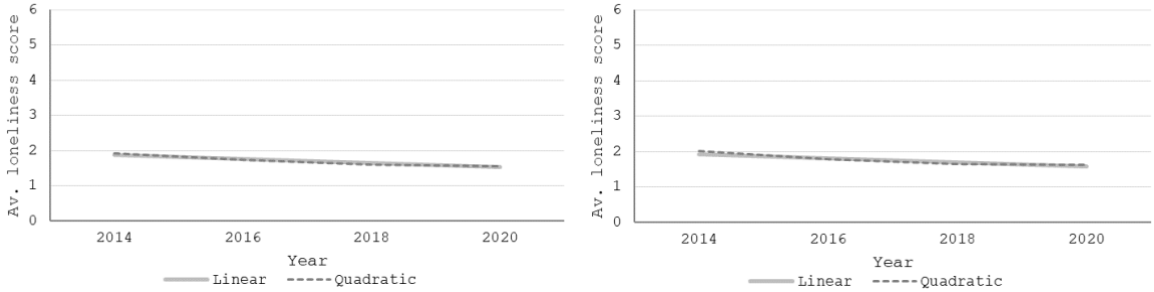

Figure 18: Average linear and quadratic models of change in loneliness scores in the overall (Left) and Māori (right) longitudinal sample.

Indices of model fit indicate a linear model of change to display very good fit to data on loneliness provided by older Māori (**Table 25**). This model indicated a small decrease in loneliness over time. A model including a quadratic term proved an inadmissible model of the available data due to a correlation ≥1 between the latent linear and quadratic slope factors. A small quadratic variance parameter (*est* = -0.00, *p* = 0.939) was fixed to 0 to enable estimation of a quadratic model (**Table 25**). This model indicated a small deceleration of the decline in loneliness over time, with **Figure 18** (right panel). The linear model was retained as the most parsimonious model of the data.

Table 25: Model fit statistics and parameter estimates for a model of linear change in loneliness scores 2014-2020 among older Māori (n = 1136).

	Linear model		Quadratic model	
	Est. (95% CI)	**p**	**Est. (95% CI)**	**p**
Mean				
Intercept (2020)	1.58 (1.47, 1.7)	<.001	1.62 (1.50, 1.74)	<.001
Linear slope (-3, -2, -1, 0)	-0.11 (-0.16, -0.07)	<.001	0.04 (-0.09, 0.16)	.569
Quadratic change (9, 4, 1, 0)			0.06 (0.02, 0.10)	.007
Covariance				
Slope-Intercept	0.08 (-0.02, 0.18)	.125	0.08 (-0.02, 0.17)	.135
Quadratic-Intercept			-	
Slope-Quadratic			-	
Variance				
Intercept	1.75 (1.49, 2.01)	<.001	1.75 (1.49, 2.01)	<.001
Linear slope	0.08 (0.02, 0.15)	0.13	0.08 (0.02, 0.15)	.011
Quadratic change				
Model fit information				
Chi-square Test of Model Fit	11.4(5)	.044	4.7(4)	.320
SSABIC	39807.6		11930.0	
RMSEA (95% CI)	0.034 (0.005, 0.040)	ns	0.012 (0.00, 0.048)	ns
CFI	0.991		0.999	
SRMR	0.028		0.023	

Note. Model intercept indicates latent intercept of loneliness at 2020 survey; 95% CI indicates upper and lower values of the 95% confidence interval; p = p value; overall sample analysis weighted for survey design and response characteristics; [a] variance fixed to 0.