The impact of the COVID-19 Pandemic on Stress, Emotional Well-being, and Coping Strategies of Older Adults in Aotearoa

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Abstract

The COVID-19 pandemic and associated public health measures were recognized to be avenues of stress and adversely impacted emotional well-being. The current study aimed to explore whether the COVID-19 pandemic was perceived as being stressful and whether it impacted the coping strategies (social support, physical activity, alcohol consumption, smoking) and emotional well-being (experience of depression and anxiety) among older adults in Aotearoa. The study also intended to examine whether coping strategies moderated the relationship between stress and emotional well-being. Longitudinal data collected from 3275 participants (M = 68.1 years) as part of the Health, Work, and Retirement study's 2018 and 2020 biennial surveys was utilized. The perception of stress was evaluated through analyzing the subjective responses in 2020 survey, paired T-tests were used to identify changes in coping and emotional well-being and hierarchical regression was utilized for moderation analysis. The results highlighted that older adults perceived COVID-19 as a source of stress; however, it was on the low spectrum. No statistically significant changes were detected among coping strategies and emotional well-being before and after the pandemic. All four coping strategies moderated the relationship between stress and emotional well-being with social support significantly exerting a protective effect even against high-stress levels during the global pandemic. These findings align with the wider literature in suggesting that support from social networks can potentially buffer against the stress. The inclusion of provisions through which social support can be enhanced and maintained during a pandemic might be a valuable addition to the broader policy framework.

Keywords

COVID-19, older adults, mental stress, coping, social support, emotional well-being

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List of Abbreviations

AUDIT-C	Alcohol Use Disorders Identification Test - C
CES-D	Center of Epidemiologic Studies Depression Scale
CNS	Central Nervous System
COVID-19	Coronavirus Disease - 2019
ELSI-SF	Economic Living Standard Index – Short Form
EF	EnhanceFitness
ESCAP	Economic and Social Commission for Asia and Pacific
GAI	Geriatric Anxiety Inventory
HPA axis	Hypothalamic-Pituitary-Adrenal axis
HWR	Health, Well-being and Retirement study
NPI	Non-Pharmaceutical Interventions
PA	Physical Activity
PPE	Personal Protective Equipment
SPS	Social Provision Scale
WHO	World Health Organization
WINZ	Work and Income New Zealand

Chapter 1: COVID-19 and public health measures

Placing COVID-19 in context

In December 2019, an outbreak of respiratory infections characterized by fever, dry cough, pneumonia, and occasional gastrointestinal symptoms was reported in Wuhan, China (Huang et al., 2020). The local epidemiological authorities issued a health alert; however, in the following month, the infection was detected in various cities in China. In 2020, the infection had even spread to other countries, such as Thailand, Japan, Vietnam, the United States, Germany, and Singapore (Wu et al., 2020). The pathogen responsible for the outbreak was later confirmed to be a novel coronavirus named severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2019-nCoV) (Yuki et al., 2020). By February 2020, the Coronavirus Disease-19 (COVID-19) was responsible for 565 deaths globally (Wu et al., 2020). On March 11th 2020, COVID-19 was declared a pandemic and a public health emergency at a global level by the World Health Organization (WHO) (WHO, 2020). Since then, COVID-19 has found a permanent place in our lives and community.

Until now, COVID-19 has been detected in 200 countries around the globe, with reports of approximately 488 million cases and 6.14 million deaths (WHO, 2022; Yuki et al., 2020). These numbers are most likely underestimating the impact of the pandemic as there is a possibility of cases and deaths going undetected in many regions of the world, primarily the developing countries (Mueller et al., 2020). The statistics above show one side of the exceptional strain COVID-19 placed on public health systems worldwide. Alongside managing

a higher number of deaths in unprecedented times, COVID-19 also imposed other practical challenges. These challenges included hospital bed shortages, lack of medical and protective supplies, maintaining strict infection control, and human resources (Billings et al., 2021). As an international health crisis, the COVID-19 pandemic has been documented as world's most prominent in more than a century (WHO, 2022).

COVID-19 and its health impacts

Epidemiological reports have shown that the COVID-19 infection has the potential to impact multiple organ systems, including respiratory (cough, sore throat), musculoskeletal (muscle aches), gastrointestinal (vomiting, diarrhea), and neurologic (headache and brain fog) (Wu et al., 2020). The virus has also been reported to spread rapidly and is highly contagious, with R_0 ranging from 1.5 to 6.7, meaning a single carrier can transmit the virus to anywhere between 1 and 7 people (Sanche et al., 2020).

The trajectory of illness from COVID-19 for majority of the infections involves self-limiting illness with mild symptoms. However, for about 39% of the patients, the trajectory involves mild symptoms initially (~day 7) with the progression to shortness of breath (~day 8), to acute respiratory distress (~day 9), and to mechanical ventilation (~day 10) for about (Huang et al., 2020). Additionally, uncontrolled COVID-19 infection in approximately 14% of the cases has also been reported overstimulate the immune system leading to the production of a cytokine storm resulting in multiorgan damage in some cases (Tay et al., 2020). The COVID-19 infection, thus, exerts an immense toll on an individual's immune system and can lead to long-term adverse health impacts or even death.

As the COVID-19 virus exerts a significant burden on an individual's immune system, several sub-groups in the population have been identified as the vulnerable populations through the available literature. These populations include individuals with comorbid physical health conditions, immunosuppressed individuals and older adults (Economic and Social Comisson for Asia and the Pacific [ESCAP], 2022). Comorbid health conditions such as diabetes have been associated with the development of severe pneumonia following a COVID-19 infection (Bouhanick et al., 2020). Meanwhile, comorbid cardiovascular conditions have been reported to exacerbate the COVID-19 infection and lead to a severe progression of infection (Li et al., 2020). The vulnerable immune system in immunosuppressed individuals has been associated with a higher chance of acquiring COVID-19 infection (Sahu et al., 2020). In regards to older adults, recent global case data has indicated that older adults comprised 14% of positive COVID-19 cases worldwide but 80% of COVID-19-related deaths (UN, 2020). The impact of age on the immune system's ability to respond to infections has been well-documented, with diminishing function of adaptive B and T cells as individuals age (Montecino-Rodriguez et al., 2013). The diminished immune system functionality in older adults can potentially influence the severity of the immune response and lead to older adults being more susceptible to COVID-19 infection (Bajaj et al., 2021).

Public Health Measures combating COVID-19

The COVID-19 virus spreads through both direct and indirect means. The direct mode of transmission includes human-to-human transmission through respiratory droplets carrying a viral load which occurs when an infected individual coughs or sneezes in the close vicinity or through exchange of body fluids/excretions. Meanwhile, an indirect mode of transmission for COVID-19 involves transmission through contaminated objects such as furniture and fixtures (Lotfi et al., 2020).The rising COVID-19 infections placed an immense pressure on

the public health systems worldwide and because there were no pre-existing treatments or vaccines available, breaking the chain of transmission was one of the crucial steps in limiting the spread of the virus. So, one of the critical goals in managing the pandemic for global public health organizations was to limit the spread of the virus among the population (Chisari et al., 2020).

The initial public health response to COVID-19 predominantly relied on non-pharmaceutical interventions (NPIs) to combat the spread of COVID-19 among the communities (Tay et al., 2020). These NPIs were broadly divided into two categories, population-level and individual-level. At the population level, the NPIs included stay-at-home orders (mainly referred to as lockdowns), travel restrictions, working from home, border closures, prohibition of public gatherings, closure of educational and vocational facilities, quarantining of confirmed cases, and rapid contact tracing (Liu et al., 2022). Meanwhile, the NPIs at the individual level included compulsory use of personal protective equipment (PPE) in public places, rigorous hand washing, physical distancing (at least 2 meters), limiting non-essential travel, and reduced participation in outdoor activities (Ayouni et al., 2021). These measures aimed to limit the spread of the virus by identifying and separating the infected cases while also reducing the chances of the virus spreading through the use of personal protective measures.

Effectiveness of COVID-19 public health measures

Research has shown that the public health response employing NPIs to combat the COVID-19 was efficient in reducing viral transmission as well as in limiting the epidemic growth of the virus (Ayouni et al., 2021).

Population-level public health response

Research investigating the contribution of the population-level public health response to COVID-19 has indicated substantial benefits in reducing mortality (Talic et al., 2021). Country-wide lockdowns were reported to assist in slowing down the spread of the COVID-19 virus and were also positively associated with the containment of the virus (Ayouni et al., 2021; Lau et al., 2020; Liu et al., 2022; Tian et al., 2020). Lockdowns also limited the contact between and within the populations and hence, aided in containing the spread of the COVID-19 virus. Additionally, travel bans and border control measures were also reported to be effective in reducing the epidemic growth of the COVID-19 virus among the population and limiting the R_0 of the COVID-19 virus to below one in many countries (Lam et al., 2020). The effectiveness of public health measures was also reported to rely on early implementation, as observed in NZ, when incidence rates of COVID-19 were still low. Isolation measures such as quarantining confirmed cases, both in the community and at the borders, were also been reported to be crucial in reducing the burden of imported cases driving the spread of COVID-19 (Jefferies et al., 2020). In conjunction with isolation, active and rapid contact tracing were also indicated to be crucial in identifying asymptomatic cases and suppressing the transmission of COVID-19 among the populations (Cowling et al., 2020).

Individual-level public health response

Individual-level public health measures during COVID-19 were also reported to aid in reducing the burden of the disease (Talic et al., 2021). A meta-analysis reported that using medical masks protected against the respiratory infection of COVID-19 as it prevented contact with infected respiratory droplets and saliva (Bartoszko et al., 2020; Cheng et al., 2020). Thus, mandatory public health orders to utilize masks during the initial wave of the COVID-19 pandemic potentially assisted in reducing the infection burden. Limiting public gatherings and

using social distancing measure were also shown to limit the spread of COVID-19. As the respiratory droplets carrying the viral load cannot traverse a distance of more than six feet (~2 meters) and persist in the air only for a limited time, social distancing and reduced contact was implied to assist in reducing epidemic growth (Lotfi et al., 2020). Empirical evidence examining the effectiveness of face masks also reported that mask-wearing was associated with a 9.3% reduction in the prevalence of COVID-19 infection and an 11.3% reduction in COVID-19-like symptoms (Abaluck et al., 2022). Hence, it is evident that adopting the NPIs in the absence of a vaccine was potentially beneficial and assisted in limiting the spread of COVID-19 among the population through various avenues.

COVID-19 in context of Aotearoa

Aotearoa's first confirmed case of COVID-19 was reported on February 28th, 2020. The public health response following on was described as going 'hard' and 'early' with the aim of eliminating the transmission of the virus in the community (Ministry of Health, 2020). A four-level Alert Level framework was implemented in the entire country to limit community transmission of the virus. The four different alert levels denoted different levels of risk. The Alert level 1 was the least restrictive, and Alert Level 4 was highly restrictive with enforced lockdowns, no public gatherings, strict adherence to small household 'bubbles', work from home, and closure of education facilities. The combination of the Alert Level response, border closure, and high acceptance of government-issued public health measures, the 'team of 5 million' managed to reduce the relative health burden of the COVID-19 virus (Cumming, 2022; Jefferies et al., 2020). New Zealand's public health response was recognized as one of the best in the world. Despite the successful implementation of the public health response and reduced burden of the disease, the implemented public health measures might have negatively impacted mental and emotional well-being of populations across the globe.

Chapter 2: COVID-19 and its impact on well-being

Impact of public health measures on the well-being of the general population

Although the public health response to combat COVID-19 was employed with the best intentions to contain and reduce the spread of the virus, which it did, it also had significant collateral damage. Many of the public health measures were inherently stressful for the majority of the population and had a negative impact on their physical, mental and emotional well-being. The lockdowns, confinement in houses, lack of social connection, and loss of daily routine potentially induced feelings of anxiety, loss of freedom, and isolation (Ammar et al., 2021; Brooks et al., 2020). Additionally, stressors such as job loss and food insecurity due to public health measures might also have long-term repercussions in terms of mental and emotional well-being, i.e., depression (Officer et al., 2022).

The lockdown measures also had the potential to negatively impact the self-care practices associated with improving mental and emotional well-being, such as social connection and physical activity in the outdoors (Gonza & Burger, 2017; MacKerron & Mourato, 2013). In NZ, the official health advice during the COVID-19 pandemic encouraged the public to stay in their bubbles (consisting of close household contacts) and also deterred physical interaction with others from different bubbles. The closure of public venues such as gyms and only leaving home for short periods of exercise was also part of the public health measures in the initial phase of COVID-19 (Jefferies et al., 2020).

Meanwhile, the activities that individuals mainly engaged in during the lockdowns, such as isolating, not being able to connect with social connections, and engaging in high social

media use, have also been theorized to have a negative impact on the mental and emotional well-being (Lades et al., 2020). The disruption of daily routine, home-schooling children, disruption to sleep schedule, and consuming COVID-19-related health information were also reported to impact well-being negatively (Falvo et al., 2021). It has been hypothesized that the invisible and inescapable threat associated with COVID-19 led many individuals to confront the two most common fears, death and loss of freedom (Farr, 2021). The public health response possibly exacerbated the stress and negative impacts on well-being.

The economic impact of the COVID-19 pandemic has also been hypothesized to negatively impact mental and emotional well-being (Simonse et al., 2022). Literature has indicated that populations of lower socio-economic status were more likely to contract COVID-19 infection in comparison to populations of higher socio-economic status (Sugawara et al., 2022). During the pandemic lockdowns, low income-jobs were also likely to be impacted as they are less likely to be executed from home, leading to income insecurity. Moreover, cross-sectional studies across the US during the initial two months of the pandemic reported that few assets and lower savings among the population were associated with higher odds of depression and anxiety (Ettman et al., 2021). Thus, the COVID-19 pandemic and the resulting public health response potentially had a wider impact on the global population's physical, mental, economic, and emotional well-being of the populations.

Impact of public health measures on the well-being of the older adults

Older adults potentially dealt with a higher burden of the COVID-19 pandemic. In the initial stages of the pandemic, age was recognized as a significant risk factor for COVID-19 infection, as most of the COVID-19-related deaths globally were in adults over the age of 60 (Kasar & Karaman, 2021). Old age was also associated with higher hospitalization rates,

increased need for intensive care, supported breathing through a ventilator, and overall a more severe course of COVID-19 infection (Fang et al., 2020). Hence, globally, the older adult population was considered to be highly vulnerable to COVID-19. Aligning with the above discourse, the older adult population was encouraged to follow the public health guidelines, strictly promoting social distancing, limited access to face-to-face healthcare, adherence to lockdowns, and limiting their everyday movements (Arpino et al., 2021).

The adopted public health measures were also reported to potentially exacerbate isolation and loneliness and disproportionately impact the older adult population (ESCAP, 2022; Verhage et al., 2021). Cross-sectional studies during the pandemic indicated an increase in self-reported depression and anxiety symptoms among the older adult population (Webb & Chen, 2022). Self-reported surveys from China reported that approximately 37.1% of the older adults in the study samples experienced depression and anxiety-like symptoms during the initial wave of the COVID-19 pandemic (Meng et al., 2020a). A study from Indonesia reported that approximately 53.6% of the older adult sample reported experiencing symptoms of depression following the implementation of COVID-19 restrictions (Kurniawidjaja et al., 2022). Another study from Vietnam reported that older adults over the age of 60 years were approximately 20 times more likely to report experience of anxiety symptoms during the pandemic in comparison to those aged between 18-24 years (Nam et al., 2021). Moreover, older females were reported to experience a more significant impact on emotional well-being in terms of depression and anxiety compared to their age-adjusted male counterparts during the pandemic (ESCAP, 2022; Qiu et al., 2020). Anxiety and crisis helplines also corroborated the above findings by reporting an overload in their use in the early weeks of restrictive public health measures (Brülhart et al., 2021).

In addition to the above-mentioned quantitative studies, qualitative studies exploring the first-hand experience of older adults during the COVID-19 pandemic have also been pivotal. Interviews with older adults revealed that adults in Belgium experienced fear associated with catching COVID-19 and were frightened of even stepping outside of their houses. One of the participants (female 79 years old) recounted her experience:

"It is a kind of fear of that insidious stranger…I no longer felt like going out… I only felt good if I stay home" (Falvo et al., 2021, pg. 7).

In addition to the fear of contracting the virus, older adults also expressed fear in terms of being hospitalized and intubated due to the virus. One of the participants (male, 80 years old) in the interview stated:

"I really fear the contagion, the fact of being infected and having to be intubated really freaks me out. Going to intensive care and being intubated, that is something really scary." (Falvo et al., 2021, pg. 9).

This fear of contracting COVID-19 among older adults was also corroborated by quantitative studies. A study from Bangladesh reported that older adults were overwhelmed and fearful of COVID-19. The study utilized Fear of COVID-19 Scale, a seven-item scale developed and validated for the study population. The fear induced by COVID-19 was significant in the sample and was represented by a mean fear score of 19.4 ± 6.1. Moreover, in the sample, living alone and being unemployed was associated with high fear scores (Mistry et al., 2021).

Public health measures such as lockdowns and social distancing have also been speculated to negatively impact older adults' well-being. It has been shown in the literature that the public health measurements encouraging social distancing and isolation were reported to induce or exacerbate loneliness in older adults. These measures were correlated with increased feelings of stress, frustration and to cause difficulties in performing day-to-day tasks (Levkovich & Shinan-Altman, 2021). The perceived disconnect from social connections was also associated with low mood and feelings of anxiety among the older adults (Buenaventura et al., 2020; Falvo et al., 2021). In a Canadian sample, 43.1% of the older adults reported feeling lonely for at least some time following the COVID-19 restrictions. Being a female and living alone was reported to be associated with a greater experience of loneliness during the pandemic (Savage et al., 2021). Additionally, research also highlighted that older adults experienced disrupted sleep (Stanton et al., 2020; J. Wang et al., 2020), weight gain or loss (Arai et al., 2021), poorer quality of life (Cigiloglu et al., 2021), limited access to healthcare services and even avoided presenting to healthcare and emergency services (Lee & You, 2021; Yildirim et al., 2021) during the pandemic.

The discourse used in the media and government policies during the pandemic has also been recognized as an avenue that potentially elicited stress among adults. A content analysis of the policies documenting the COVID-19 pandemic response highlighted that older adults were depicted as victims of pandemic rather than capable, independent, and autonomous decision makers (Naughton et al., 2021). The discourse in media and news highlighted the vulnerability of the older adult population using negative language such as frail, weak, and medically vulnerable (Jen et al., 2021). Qualitative studies conducted during the pandemic highlighted that older adults did not feel vulnerable as per the narrative but were rather stigmatized and felt deprived of their individual identities by grouping them as "an at-risk

population" (Falvo et al., 2021). The media discourses grouping the older adults as a vulnerable population discounted the heterogeneity among the population. The narrative in the media about older adults potentially created more tension and exacerbated the age-related discrimination that older adult experience potentially contributing to distress. Hence, the evidence indicates that older adults potentially experienced a stern side of the COVID-19 pandemic.

Chapter 3: The transactional model of stress and coping

Relationship between stress and coping

Previous evidence, such as from the SARS pandemic in 2003, has indicated that the pandemics can be a source of immense stress. Evidence also indicated that coping strategies might play an important role in alleviating the stress and mitigating the burden of the pandemic on the mental and emotional well-being (Wong et al., 2005). Similar to the previous pandemics, the unprecedented times during the COVID-19 pandemic potentially induced stress for the general population and for older adults, as discussed in the previous chapter. Stress as a psychological phenomenon refers to a state of emotional strain where an individual's psychological and physiological coping abilities outweigh the demands of the situation (Cohen et al., 2016). Stressful situations represent an individual adjusting to the atypical demands associated with the stressor (such as adjusting to the lockdowns during the COVID-19 pandemic). This adjustment to the stress-loaded conditions demands effort and energy from an individual to adapt to unfamiliar situations than usual.

Coping on the other hand, refers to behavioural and cognitive strategies that an individual engages in to deal with or reduce negative emotions associated with a stressor (Finlay et al., 2021). Active coping strategies such as seeking social support, positive re-framing (Chew et al., 2020), and participating in activities (Fu et al., 2020) have been associated with greater adaptation to the stressor and an overall positive effect on emotional well-being (Oker et al., 2022). Passive coping strategies such as substance use, avoidance, and denial, on the other hand, have been reported to aid in avoiding the stressor and have an overall negative impact on emotional well-being (Gurvich et al., 2021). Numerous theories have been

proposed to explain the dynamic relationship between stress, coping, and an individual's emotional well-being. One of these theories, the transactional model of stress and coping, conceptualizes stress and coping as a series of dynamic transactions between the individual and the stressor in their environment (Biggs et al., 2017).

Lazarus and Folkman's transactional model of stress and coping

Lazarus and Folkman's model theorizes response to stress as a dynamic process involving numerous transactions between an individual and a stressor. According to the transactional model, an individual is constantly evaluating a stressor within their environment through multiple organ systems, including but not limited to cognitive, physiological, psychological, and neurological (Walinga, 2014). The experience of stress in the transactional model is predominantly influenced by an individual's subjective appraisal of the stressor. Appraisal refers to an individual's subjective perception of the stressor and, in this model, is placed at the center of the stress and coping response. In simpler terms, the transactional model conceptualizes stress response as a product of multiple transactions between an individual, their coping strategies, and the stressor in their environment (Lazarus & Folkman, 1984). The model is divided into three phases: the initial cognitive appraisal phase, the coping process, and the outcome.

Cognitive Appraisal

According to the transactional model, it is not the stressor that has the importance in the resulting stress response, but rather how an individual perceives the stressor that holds importance. The subjective perception of the stressor is responsible for eliciting the psychological and physical distress that is experienced by an individual (Biggs et al., 2017). The cognitive appraisal elicits emotions associated with the stressor such as fear, anger,

helplessness, therefore, have an impact on the emotional well-being of the individual (Biggs et al., 2017; Lazarus & Folkman, 1984). The appraisal is also influenced by the available psychological, social, and cultural resources for an individual to cope with the stressor. The intensity of the stress response is dependent on the cognitive appraisal *(Biggs et al., 2017)*. The cognitive appraisal stage primarily involves the neurological organ system and involves an individual cognitively categorizing a stressor in their environment as having the potential to be stressful and posing danger to one's well-being or benign (Berjot & Gillet, 2011). The cognitive appraisal process is further divided into two fundamental stages: primary and secondary appraisal.

Primary Appraisal. Lazarus and Folkman defined the primary appraisal as ascribing meaning to the environmental stressor and determining its significance to the individual (Lazarus & Folkman, 1984). The primary appraisal, in other words, is the assessment of what is at stake for an individual, and based on the personal evaluation, leads to the stressor being defined as one of the three possibilities:

- Benign – positive: exerting a positive effect on an individual's well-being
- Irrelevant: having no significance to one's well-being
- Stressful: event signifying harm, threat, or a challenge to an individual's well-being.

According to Lazarus and Folkman (1984), a situation that has the potential to threaten, incur loss, or harm to an individual's well-being is appraised as stressful. These stressful situations then evoke negative emotions such as anxiety, fear, and low mood. This stressful appraisal then initiates a cascade of evaluations that aid in establishing a relational and dynamic relationship between the environmental stressor and the individual through secondary appraisal (Biggs et al., 2017).

Secondary Appraisal. Where the primary appraisal ascribes meaning to the environmental stressor, the secondary appraisal aims to assist the individual in determining their ability to alter or manage both the stressor and the negative emotions associated with it (Biggs et al., 2017; Dewe & Cooper, 2007). Secondary appraisal involves cognitive processing through which an individual takes inventory of their coping resources such as self-efficacy, situational variables (i.e., control), social support availability, and past coping styles. The key elements that differentiate the secondary appraisal from the primary appraisal are that in this stage, an individual evaluates their perceived ability to modify the stress, their ability to manage their emotions towards the stressor, and their expectations of the coping resources (e.g., support from social connections). Hence, the secondary appraisal is multi-dimensional and concentrates on evaluating what can be done once the situation is perceived as stressful and posing a threat to the individual (Dewe & Cooper, 2007; Lazarus & Folkman, 1984). The secondary appraisal stage in the transactional model is influenced by the coping strategies that can potentially be used to resolve or manage the stressor. An important note, in the transactional model, the two appraisals are not sequential or more important than one another, instead the appraisal process is complex and involves "simultaneous interplay between primary and secondary appraisal" (Dewe & Cooper, 2007).

Coping

Following the primary and secondary appraisal of the environmental stressor, coping strategies at an individual's disposal aid in mitigating the stress and negative emotions elicited by the stressor. According to the transactional model, coping is defined as an individual "constantly engaging in cognitive and behavioral modifications to manage external and internal demands of the stressor" (Lazarus and Folman, 1984, p.141). In simpler terms, coping involves

an individual taking purposeful actions aimed at reducing or managing the demands imposed by the stressor. Hence, csoping in the transactional model is conceptualized as process-oriented and very dynamic. Coping strategies have been broadly categorized into two main classifications in the literature, namely, active coping and passive coping strategies.

Active coping strategies involve cognitive and behavioural adjustments following a stressful appraisal. These involve seeking support (information and emotional) from social contacts, engaging in physical activity, and proactive planning during a stressful event (Faulkner et al., 2020; Heffer & Willoughby, 2017; Y. Wu et al., 2020). The engagement in active coping strategies has been associated with reduced risk of anxiety and depression and an overall positive impact on emotional well-being. Two active coping strategies that have been thoroughly researched in the coping literature include social support and physical activity.

Social support includes assistance from family, friends, neighbours, colleagues, and the wider community that an individual relies on during a stressful event (Algorani & Gupta, 2021; Kim et al., 2010). Social support represents a reliable social "fund" that an individual can potentially turn to and rely on during stressful events. The support from social networks can range from informational support and financial support to emotional support (Taylor, 2011; Thoits, 1995). Literature has indicated that social support on its own is partially important; however, it is the subjective perception and belief of the existence of support from social networks, known as perceived social support, that is crucial (Morowati & Tonekaboni, 2007). Perceived social support, here on referred to as social support, has been reported to be positively associated with emotional well-being by promoting positive emotional feelings and buffering against stress (Thoits, 2011). Social support has also been hypothesized to protect against the internalizing symptoms of stress, such as depression, anxiety, and loneliness

(Cavanaugh & Buehler, 2016). Additionally, the presence of social support during adversity and stressful events has also been associated with individuals purposefully taking positive action rather than dwelling on circumstances that cannot be changed (Feeney & Collins, 2015).

Physical activity (PA) as an active coping strategy has also been widely adapted by individuals during stressful situations. The literature has robustly established that engaging in PA during stressful situations is associated with improved mental and emotional well-being (Ai et al., 2021; Bird et al., 2021; Warburton et al., 2006). PA as a coping strategy has been reported to positively impact emotional well-being as it aids in reducing the negative emotions, such as tension, anxiety, and tiredness associated with the stressor (Kim & McKenzie, 2014; Woo et al., 2009). PA also assists in improving self-confidence, and sleep during times of crisis (Callow et al., 2020). Additionally, meta-analyses have reported that PA buffers against the negative impacts of stress and enhances overall well-being (Salmon, 2001).

On the contrary, passive coping strategies have been associated with poorer emotional regulation and an overall negative impact on emotional well-being (Heffer & Willoughby, 2017). Passive coping strategies aid an individual in psychologically disengaging from the stressor in order to mitigate the distress caused by the stressor. Thus, passive coping strategies allow the individual to temporarily escape or avoid the stressor (Little, 2018). The adaptation of passive coping strategies has been associated with higher scores on depression scales and poorer psychological and behavioural adjustment during times of crisis (Brown & Nicassio, 1987). Some examples of these passive coping strategies include alcohol use, smoking, self-isolation and self-criticism. Of these, alcohol use and smoking as passive coping strategies during stressful events have been the focus of research as they have long-term adverse health outcomes associated with them. High levels of stress during times of crisis have been reported

to be positively correlated to increased consumption of alcohol and smoking (Krueger & Chang, 2008; Park & Iacocca, 2014). Alcohol consumption and smoking have been associated with providing momentary relief from stress-related emotions and are, therefore, commonly used to off-load emotions induced by the stressor (Baker & Berenbaum, 2007; Biggs et al., 2017).

Outcome: Emotional Well-being

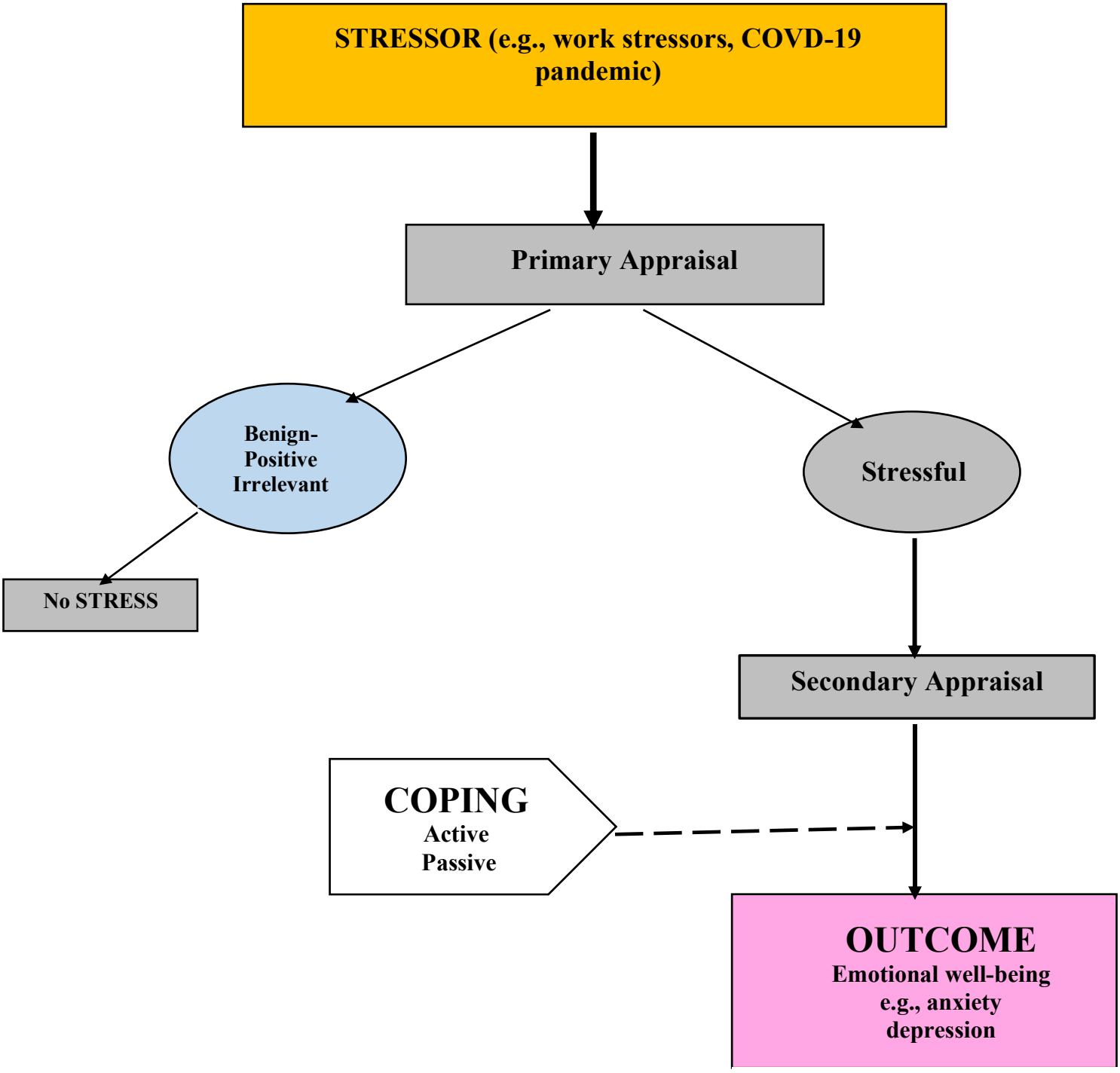
The third and last stage of the transactional model includes the outcome. The outcome can potentially be negative or positive and is highly influenced by both the cognitive appraisal and utilized coping strategies (Walinga, 2014). One outcome that has been widely researched in the coping literature is emotional well-being. Emotional well-being refers to an individual's ability to experience pleasant affect and regulate emotions under a stressful situation (Eaude, 2009). Higher levels of uncertainty, as well as chronic stress, have been reported to have a negative effect on an individual's emotional well-being (Clabaugh et al., 2021). A negative impact on emotional well-being incorporates the experience of symptoms such as low mood, fear, anger, frustration, and anxiety amid a stressful situation (Bose, 2015). In the context of the COVID-19 pandemic, disruption of daily routines, working from home, and implementation of public health measures such as lockdowns and social distancing have the capacity to potentially impact an individual's emotional well-being adversely. Moreover, coping strategies (active or passive) utilized by an individual to manage a stressful situation have also been correlated to have an impact on emotional well-being.

Therefore, in its entirety the transactional model theorizes that a response to stress involves numerous complex transactions between the individual and their environment. These transactions involve an individual subjectively appraising the stressor as either stressful or

irrelevant. A stressful appraisal then initiates cognitive and behavioural response combined with an individual's adopted coping strategies with the aim to alleviate the stressor and minimize the negative impact on emotional well-being. The transactional model of stress and coping is summarized in Figure 1.

Figure 1

The Transactional Model of Stress and Coping



Adapted from Lazarus and Folkman (1984)

Note: This figure demonstrates the transactional model of stress and coping as proposed by Lazarus and Folkman. The model is divided into three main stages: cognitive appraisal (primary and secondary), coping and outcome.

Chapter 4: COVID-19 through the transactional model's lens

Conceptualizing COVID-19 through transactional model's lens

The COVID-19 pandemic was an unanticipated stressor faced by individuals worldwide. The abruptness and untimeliness of the virus meant that individuals and public health organizations were not appropriately equipped to deal with the repercussions of a pandemic initially. Various public health measures were implemented to prevent COVID-19 transmission, but these measures were also inherently stressful and recognized as a source of distress (Falvo et al., 2021). Conceptualizing the pandemic through the lens of the transactional model, the declaration of the COVID-19 virus as a global pandemic had the potential to be perceived as stressful (Jefferies et al., 2020; Meng et al., 2020a). The primary appraisal associated with the COVID-19 pandemic was likely to be stressful and accompanied by feelings such as fear, uncertainty, and threat for many individuals (Falvo et al., 2021; Mertens et al., 2020). The stressors faced during the pandemic, such as using facial coverings, social distancing, and stringent lockdowns, were unfamiliar, and the secondary appraisal might have also been influenced adversely. Moreover, the unfamiliarity and uncertainty of the pandemic also potentially influenced coping strategies and emotional well-being (Patwardhan, 2020). The COVID-19 pandemic, therefore, potentially impacted all three stages of the transactional model, cognitive appraisal, coping, and emotional well-being. The international literature has researched the impact of the pandemic on coping strategies and emotional well-being for the general population and older adults, some of which is discussed below.

COVID-19's impact on coping and emotional well-being

Active coping strategies and emotional well-being

Social support. Social support has been recognized to play a vital role in an individual's coping during a stressful event (Ozbay et al., 2007). As an active coping strategy, social support involves seeking support from family and friends to cope with the demands and uncertainty of the stressor (Klümper & Sürth, 2021). During the COVID-19 pandemic, literature indicated that individuals who perceived COVID-19 as a stressor reached out to their social connections to seek support, in contrast to those who did not perceive COVID-19 as a stressor (Klümper & Sürth, 2021). Research also indicated that the economic stress associated with the pandemic, such as job loss and financial insecurity, was one of the leading motives behind individuals seeking support from their social contacts (Fetzer et al., 2021). Hence, aligning with the transactional model, individuals who appraised COVID-19 as stressful and threatening were more likely to actively reach out to their social connections for support.

Social support has been robustly established to correlate with improved emotional well-being during stressful events (Saltzman et al., 2020). International literature from China (Chen et al., 2021; Li et al., 2021; Liu et al., 2021), Lebanon (Grey et al., 2020), and Iran (Sharif Nia et al., 2021) during the COVID-19 pandemic corroborated this correlation and indicated that social support was associated with the experience of low anxiety and low financial distress during the pandemic. Research during the pandemic also indicated an impact of gender on the perception of social support and well-being. During the COVID-19 pandemic, males with lower social support reported higher levels of depression, anxiety, and stress symptoms compared to age-matched females (Guo et al., 2021).

High perception of social support during the pandemic was also associated with a positive impact on emotional well-being and feelings of reassurance and optimism (Wilson et

al., 2020; Yahya et al., 2022). Moreover, a longitudinal study from the UK during the initial phase of the pandemic evaluated the impact of the various coping strategies on the experience of depression and anxiety symptoms and recovery. The study highlighted that over time, all the individuals experienced a positive impact on emotional well-being. However, individuals who engaged in socially supportive coping strategies experienced a faster improvement in depression and anxiety symptoms during the pandemic (Fluharty et al., 2021).

During the pandemic, the advice from health officials in Aotearoa and majority of other countries recommended having no unnecessary contact with social connections as an avenue to limit the spread of the virus (Jefferies et al., 2020; Klümper & Sürth, 2021). Hence, limited access to support from social connections due to social distancing and lockdowns was hypothesized to impact the perception of social support and emotional well-being adversely. Research during the pandemic showed that isolation from social contacts during the COVID-19 pandemic negatively altered the perception of social support and increased COVID-19-related worries (Szkody et al., 2021). With the focus on older adults, research indicated that lockdowns and social distancing were associated with the experience of worsening symptoms of depression and anxiety in the older population during the pandemic (Robb et al., 2020). Although social connections and encounters were potentially replicated throughs technology during the pandemic, they only partially compensated for the actual social connection. However, the technology further poses challenges for older individuals or groups who either have no access or no experience with technology to utilize it to access social support (Klümper & Sürth, 2021). Nevertheless, none of the literature to our knowledge specially focused on exploring the impact of the COVID-19 pandemic and public health measures on social support of older adults.

In addition to the above, limited access to social connections and support was also associated with increased indulgence in adverse health-related behaviors such as smoking and reduced physical activity (Hawkley & Cacioppo, 2010; Shankar et al., 2011). The lack of social support during times of crisis might encourage individuals to alleviate their stress, worries, and negative emotions through other means, such as smoking and alcohol consumption. The international literature discussed above indicates that the public health measures associated with COVID-19 had the potential to negatively impact social support and emotional well-being.

Physical activity. PA has been well-established as an active coping strategy during stressful life events (Kim & McKenzie, 2014; Thoits, 2011). PA has been defined as engaging in bodily movements produced by skeletal muscles that lead to energy expenditure (WHO, 2020a). In March 2020, lockdowns issuing stay-at-home orders limited the access of individuals to gyms, parks, and the outdoors in general across the globe. Even though public health advice in Aotearoa and other countries promoted access to the outdoors for maintaining physical activity through walks and runs regularly, the anxiety associated with COVID-19 might negatively impact the amount of time spent engaging in PA (Falvo et al., 2021).

International literature extensively explored the impact of the COVID-19 pandemic on adult PA. Research from Italy (Maugeri et al., 2020), the UK (Salman et al., 2021), China (Y. Wang et al., 2020), Australia (Stanton et al., 2020), Spain (Fernández-García et al., 2020), Japan (Yamada et al., 2020), United States (Meyer, Herring, et al., 2020), and Brazil (Nascimento et al., 2021) indicated that PA in adults took a toll following the COVID-19 pandemic. Majority of the research mentioned above utilized quantitative research methods and collected subjective data about the PA of the sample during the pandemic. The overall

consensus from the international research revealed a statistically significant negative impact of the COVID-19 pandemic and public health measures on the PA of adults. Therefore, the evidence indicated that globally, adults engaged in less PA during the pandemic. The closure of exercise facilities such as gyms and group classes as well as the heightened health-related worries during the pandemic were some of the main rationalizations behind the observed reduction in PA (Maugeri et al., 2020; Stanton et al., 2020).

Furthermore, international research also explored whether there was an age difference in the reduction of PA during the pandemic. Maugeri et al. (2020) explored the impact of the pandemic on PA among different age groups in Italy. The results indicated a variable decrease in PA among the different age groups; however, the difference in the reduction of PA was not statistically significant. Salman et al. (2021) also explored the varying impact of the COVID-19 pandemic on the PA of different age groups in the UK. Their results indicated a varying impact of age, with older adults (participants over the age of 85) experiencing a statistically significant reduction in PA following the pandemic compared to younger adults.

Fernández-García et al. (2020) were the only international literature discussed here that specifically explored the impact of the pandemic on the PA of older adults. The authors deviated from the self-reported measures of PA and utilized triaxial accelerometers to objectively quantify the participant's percentage of PA and sedentary time during the pandemic. The results indicated that during the COVID-19 restrictions, older adults spent more time in sedentary behaviors in comparison to before the pandemic. Moreover, during the COVID-19 restrictions, older adults engaged in fewer bouts and shorter duration of PA. Hence, indicating that the pandemic potentially had an adverse impact on PA in older adults.

International literature has also explored the impact of gender on the reduction in PA during the pandemic. Maugeri et al. (2020) reported a statistically significant gender difference among the sample in Italy, with men experiencing a significant negative change in their PA compared to their age-matched females. Their results indicated that males in Italy experienced a more significant decrease in their PA than females during the pandemic. Meanwhile, Wang et al. (2020) also explored the same hypothesis in China and reported an opposite gender effect. In the Chinese sample, females reported a significant decrease in their PA compared to males during the pandemic. Thus, the differential impact of the COVID-19 pandemic on PA based on gender is uncertain.

Furthermore, international literature has also investigated the relationship between the experience of psychological stress, emotional well-being, and the reduction of PA during the pandemic. Stanton et al. (2020) reported that in their study, the participants who experienced a decrease in their PA were also more likely to have perceived COVID-19 as stressful and experienced depression and anxiety symptoms. Salman et al. (2021) also reported that individuals who engaged in less PA during the pandemic also experienced low mood and loneliness. On the contrary, individuals who engaged in PA during the pandemic reported a positive effect on their mood and enhanced physical and emotional well-being (Wright et al., 2021). Moreover, the limitation imposed by the public health measures such as lockdowns and social distancing have also been hypothesized to contribute to the reduction in the observed PA among adults (Salman et al., 2021; Stanton et al., 2020).

Passive Coping strategies and emotional well-being

Alcohol consumption. Alcohol consumption as a passive coping strategy offers an avenue to escape or avoid the stressor to mitigate the stress associated with it (Little, 2018).

Alcohol consumption has been frequently reported by individuals to aid in alleviating stress, even though momentarily. Research has provided evidence for the above claim and indicated an association between alcohol consumption and a reduction in the individuals physiological stress response. Alcohol consumption has also been linked with reducing the toll of emotional memories (Conrod & Stewart, 2002; Stewart et al., 2004). However, alcohol consumption as a coping strategy is recognized as a nonadaptive strategy. Alcohol consumption, especially in excess, has been associated with several adverse health outcomes such as diabetes, cardiovascular disease, cancer, and neuropsychiatric disorders (Eze et al., 2017; Rehm, 2011). Thus, alcohol consumption in stressful situations, such as a global pandemic might be drastically affected, and international statistics have reported an adverse impact of the COVID-19 pandemic on alcohol sales and consumption.

Following the COVID-19 pandemic and the implementation of public health measures, alcohol sales increased by 20 - 40% across different states in the US (Hu et al., 2021). More than 25% of American adults reported binge drinking during the COVID-19 lockdowns, and approximately 38% of the adults indicated stock-piling liquor (Substance Abuse and Mental Health Services Administration, 2020; Hu et al., 2021).

International literature investigated the impact of the COVID-19 pandemic on the alcohol consumption of adults. Studies from Ireland (Reynolds et al., 2021), the UK (Garnett et al., 2021; Niedzwiedz et al., 2021), Australia (Biddle et al., 2020), and the USA (Eastman et al., 2021) all utilized quantitative questionnaires to collect self-report data regarding alcohol consumption during the pandemic. All the studies mentioned above reported a statistically significant increase in adults' alcohol consumption during the COVID-19 pandemic. The increase in alcohol consumption ranged from 26.2% in the UK (Garnett et al., 2021) to

approximately 22% in both Ireland (Reynolds et al., 2021) and Australia (Biddle et al., 2020). Factors associated with increased alcohol consumption were also investigated. Generally, participants reported worrying about household stress, boredom due to confinement, financial stress, being stressed about catching COVID-19, and having a pre-existing anxiety disorder as the main factors behind increased alcohol consumption (Biddle et al., 2020; Garnett et al., 2021; Reynolds et al., 2021).

Additionally, literature has also investigated the association between age and increased consumption of alcohol during the pandemic. Reynolds et al. (2021) reported that in Ireland, a statistically significant increase in the alcohol consumption of younger adults was observed compared to older adults (18 – 45 years) during the pandemic. The study also highlighted that stress due to confinement, working from home, increased tobacco consumption, and an experience of depression symptoms was associated with increased alcohol consumption in the sample. Rao et al. (2021) and Foster et al. (2021) focused solely on older adults (55 – 75 years) and aimed to investigate the changes in their alcohol consumption. Both studies reported an increase in the alcohol consumption of older adults during the pandemic. Furthermore, Rao et al. (2021) also reported that older adults engaged in increased morning drinking during the pandemic and expressed experiencing guilt over their drinking habits. The morning drinking and feelings of guilt have been recognized as indicators of hazardous drinking. Foster et al. (2021) also highlighted that in their sample, older adults endorsed drinking for emotional reasons (i.e., helps me relax) and not practical reasons (i.e., because I do not have to drink and drive) during the pandemic. The above findings suggest that alcohol consumption might have been utilized as a coping strategy to manage the stress caused by the COVID-19 pandemic in older adults.

Smoking. Smoking as a passive coping strategy also provides an avenue to disengage from the stressor and the emotional strain associated with it. The nicotine in cigarettes has been associated with providing an instant sense of relaxation leading to individuals experiencing a reduction in stress and anxiety (Baker et al., 2004). Moreover, smoking has also been acknowledged to assist in managing stress and anxiety in smokers in situations that are perceived as stressful (Lawless et al., 2015). But similar to alcohol consumption, long-term smoking has been associated with adverse health outcomes such as cancer, stroke, lung diseases, and an increased risk of tuberculosis and heart disease (West, 2017). Psychologically stressful events, acute and chronic, have been reported to influence smoking in both current smokers and non-smokers. Thus, chronic stress from a global pandemic might influence smoking and relapse (Slopen et al., 2013).

International research exploring the impact of the COVID-19 pandemic on smoking behavior has indicated significant changes induced by the pandemic and public health measures. Research from the Netherlands (Bommelé et al., 2020), Poland (Sidor & Rzymski, 2020), the UK (Chen, 2020), Lebanon (Al Ghadban et al., 2022), Germany (Koopmann et al., 2021), Brazil (Malta et al., 2021), and USA (Cordon et al., 2021) reported a statistically significant increase in smoking during the COVID-19 pandemic. The increase in smoking ranged from 45.2% in Poland (Sidor & Rzymski, 2020) to approximately 20% in both Germany (Bommelé et al., 2020) and the UK (Chen, 2020) during the pandemic. The factors associated with the increase in smoking included unemployment, financial instability, boredom, and lack of daily routine (Al Ghadban et al., 2022; Sidor & Rzymski, 2020; Vanderbruggen et al., 2020). Qualitative interviews among older adults also indicated that pandemic-related stressors such as the well-being of loved ones and uncertain social life were associated with increased

smoking and reduced motivation to quit (Cordon et al., 2021). Furthermore, psychological factors such as low mood, high anxiety, COVID-19-realted health worries, and depression were significantly associated with increased smoking during the pandemic (Chen, 2020; Malta et al., 2021).

The impact of gender and age on the changes in smoking behavior during the pandemic was also explored in the literature. However, no statistically significant differences due to age and gender were reported indicating that no gender or age group, in particular, exhibited a differential change in smoking behavior during the COVID-19 pandemic (Chen, 2020; Sidor & Rzymski, 2020). Interestingly, an increased frequency of smoking was reported among the individuals who engaged in full-time work before the pandemic (Koyama et al., 2021; Sidor & Rzymski, 2020). Compared to those who were unemployed, individuals who worked full-time reported smoking regularly during the pandemic. Further exploration indicated that working from home and the lack of social connections were associated with the observed increase in smoking behavior among full-time workers (Koyama et al., 2021).

Oversight in the literature

The international literature following the COVID-19 pandemic has highlighted that the pandemic negatively impacted coping (passive and active) and emotional well-being. Aligning with the transactional model, the pandemic and associated public health measures were perceived as stressful for individuals across the globe. This stressful appraisal elicited negative emotions such as fear, threat, anxiety, isolation, and low mood, potentially leading to an adverse impact on emotional well-being. To mitigate the impact on emotional well-being, individuals utilized varying coping strategies. Some individuals might have accessed social support or engaged in physical activity to actively cope with pandemic-related stress. However,

some might have utilized alcohol consumption and smoking to lighten the impact on emotional well-being.

For many adults, including older adults, the pandemic resulted in drastic changes in their routines and capacity to maintain their physical, mental, and emotional well-being (ESCAP, 2022). Nevertheless, there has been an oversight in the literature regarding the impact of the pandemic on the coping and emotional well-being of older adults. In the literature discussed above, only a minority of the studies have exclusively analyzed the impact of the pandemic on older adults. This is in contrast to the risk evaluation, as age was prominently recognized as a risk factor for COVID-19 (Kasar & Karaman, 2021). Older adults were potentially also vulnerable to the psychosocial stressors from the public health measures of COVID-19, i.e., lockdowns and social distancing exacerbating loneliness and low mood. Hence, an exploration of the impact of the COVID-19 pandemic on older adults' coping and emotional well-being is essential.

Furthermore, the research following the pandemic, primarily utilized self-reported cross-sectional research design to investigate the impact of the pandemic on coping strategies and emotional well-being. The cross-sectional research design is beneficial as it provides a snapshot of the exploratory variables (coping strategies and emotional well-being) by collecting data at one point in time. However, one limitation of this research design is that it is challenging to derive causal relationships. So, it is difficult to evaluate whether the pandemic induced the observed changes in coping and emotional well-being or not (Wang & Cheng, 2020). The retrospective data collection in cross-sectional studies has also been reported to be prone to self-report bias. Therefore, it is likely that the true impact of the pandemic on coping strategies and emotional well-being might be over or under-estimated.

Current study

Guided by the above-mentioned oversights, the current study aimed to utilize data from a longitudinal cohort study to explore the impact of COVID-19 on coping strategies and the emotional well-being of older adults in Aotearoa. To my knowledge, this is the first study to have access to older adults coping and emotional well-being data before and after the COVID-19 pandemic and one of the few studies to access the impact on active and passive coping strategies of older adults. The study utilized data collected as a part of the New Zealand Health, Work, and Retirement study to explore the impact of the COVID-19 pandemic on the coping and well-being of older adults. The data utilized in the current study was collected through self-reported surveys at two variable time points, pre-pandemic in 2018 and post-pandemic 2020 (following the initial lockdowns in NZ).

Research aims and hypothesis

The main aim of the current study was to explore whether any stress induced by the COVID-19 pandemic had an impact on the coping strategies and emotional well-being of older adults in NZ. The current study focused on two active (social support and PA) and two passive (alcohol consumption and smoking) coping strategies and scores on depression and anxiety scales for emotional well-being.

Conceptualizing the pandemic through the transactional model of stress and coping, the current research aimed to address the following research questions:

Question (1). Whether the COVID-19 pandemic was perceived as a source of stress by older adults in Aotearoa?

Question (2). Whether there were any statistically significant changes in the coping strategies (active and passive) and emotional well-being (experience of depression or anxiety symptoms) of the older adults in 2020 in comparison to 2018?

Question (3). Whether coping strategies moderated the relationship between stress and emotional well-being (anxiety or depression) of the older adults following the COVID-19 public health. Guided by the empirical support (Yan et al., 2021), the current study also intended to test the following two hypotheses:

Hypothesis 1: Coping strategies will moderate the relationship between stress and the experience of depression symptoms for older adults in 2020. The relationship between perceived stress and depression symptoms will be weaker for those with higher active coping strategies (high social support and PA) during 2020. However, the relationship between perceived stress and depression symptoms will be stronger for those with higher passive coping strategies (high alcohol consumption and regular smoking).

Hypothesis 2: Coping strategies will also moderate the relationship between stress and experience of anxiety symptoms for older adults in 2020. The relationship between perceived stress and anxiety symptoms will be weaker for those with higher active coping strategies (high social support and PA) during 2020. However, the relationship between perceived stress and anxiety symptoms will be stronger for those with higher passive coping strategies (high alcohol consumption and regular smoking) during 2020.

Chapter 5: Methods

Research Design

To explore the impact of COVID-19 on the emotional well-being and coping strategies of older adults, the current study utilized data collected in 2018 (pre-COVID-19) and 2020 (post-COVID-19) as a part of the New Zealand Health, Work, and Retirement (HWR) Study. The HWR is a longitudinal study of aging initiated in 2006 with the aim to collect health, work, retirement, housing, and COVID-19 (from 2020) information from individuals aged 55 years and older in NZ. The data is collected through a self-reported biennial survey that is posted to older adults. The current study utilized data collected as part of the 2018 and 2020 biennial wave of the New Zealand HWR study. The 2018 data collection took place between 1st August – 1st November 2018. The 2020 data collection took place following the relaxation of the first ever COVID-19 lockdown, between 11th June – 17th September 2020. The current study utilized demographic information, as well as responses to the coping-related questions (social support, physical activity, smoking, alcohol) and emotional well-being-related questions (depression and anxiety) collected in 2018 and 2020 to examine the impact of the COVID-19 pandemic on perceived stress, coping strategies and emotional well-being of older adults in NZ.

Procedure

The NZ electoral roll was used as the sampling frame for the HWR study's participant recruitment, as approximately 96.7% of NZ citizens and residents aged 50+ years are enrolled in it (New Zealand Electoral Commission, 2016). The 2018 and 2020 samples include an 'existing' cohort (individuals rolled over from the previous waves of the HWR longitudinal study) and a 'refresh' cohort (individuals newly recruited in the corresponding data collection year to maintain the sample at 55 years or over). In summary, the eligible participants of both cohorts were initially sent an introductory letter informing them about the HWR (and their selection at random from the NZ electoral role for new participants). At this stage, an information sheet, a pen, a survey booklet, a consent form, and a prepaid envelope were also sent. Three weeks following the initial contact, a postcard reminder was sent to thank the participants who had returned the survey, meanwhile encouraging those who had not completed it to do so. After 12 weeks from the initial contact, a second reminder comprising a final reminder letter, information sheet, survey, consent form, and a prepaid envelope was sent to those who had not returned a completed survey (Phillips, 2019, 2021).

All the completed surveys were securely stored, with the data being accessible only to academic researchers. Participant data were recorded and stored in secure SPSS files. The Massey University Human Ethics Committee (MUHEC) approved all the sampling and survey processes.

Participants

As mentioned before, the sample for each wave of the HWR consists of two cohorts, the existing cohort that represents the roll-over participants from the previous wave and the refresh cohort that represents the newly recruited participants in the corresponding year. Māori

individuals were oversampled in all the HWR waves by utilizing the Māori descent indicator on the electoral roll to ensure adequate representation of the older Māori population in the study sample. The inclusion criteria for the existing cohort participants included individuals aged 55 years and over, residing in the general community (not in nursing home, prison, or dependent care), were not excluded from the cohort (deceased, relocated overseas, withdrawn, or hadn't responded since 2014), were citizens or permanent residents who had lived in NZ for 1 year or more and had a NZ postal address. From the existing cohorts, 3366 participants in 2018 and 3480 participants in 2020 returned a completed survey.

The inclusion criteria for the refresh cohort in 2018 and 2020 were similar and included individuals aged between 55 - 65 years, residing in the general community, citizens or permanent residents living in NZ for one year or more and have a NZ postal address. In 2018, 1958 individuals identifying as Māori and 1638 general population individuals were approached for the refresh cohort of the HWR. Of those approached, 291 individuals identifying as Māori and 307 individuals from the general population returned a completed survey leading to a total sample at 2018 data collection of 3964 (Phillips, 2019).

In 2020, 2011 individuals identifying as Māori and 1541 general population individuals were approached for the refresh cohort. Of those approached, 403 individuals identifying as Māori and 468 individuals from general population returned a completed survey leading to the total sample at 2020 data collection being 4351(Phillips, 2021).

For the current study, the participants who responded to both the 2018 and 2020 surveys on the variables of interest (perceived stress from COVID-19, social support, PA, alcohol consumption, smoking, GAI, CES-D) were extracted, yielding a sample size of 3275

participants. Table 1 shows the demographic characteristics of the sample. The mean age in the sample was 68.1 years, with 14.1% of the sample in 55-59 years, 20.3% of the sample in 60-64 years, 27.5% in 65-69 years, 17.8% in 70-74 years and 20.2% of the sample in 75+ years range. Survey responses indicated that 55% of the participants were female and approximately 72% of the participants were married or in a de facto relationship in 2020. Over 56% of the sample had either post-secondary/trade qualifications or a university degree. Approximately 68% of the current sample reported their living standards as good, 15.7% reported it as comfortable, and 16.1% reported it as hard, as characterized by the ELSI-SF.

Table 1

Demographic data from the Wave 7 (2020) of the HWR study (N = 3275)

	N	Valid %	Mean (*SD*)
Age			68.1 (7.5)
55-59	461	14.1	
60-64	666	20.3	
65-69	902	27.5	
70-74	583	17.8	
75+	663	20.2	
Sex			
Female	1826	55.8	
Male	1401	42.8	
Gender Diverse	2	0.10	
Marital Status			
Married or defacto	2351	71.8	
Not married or defacto	881	26.9	
Level of Education			
No Qualifications	621	19.0	
Secondary School	765	23.4	
Post-secondary/ Trade	1102	33.6	
University Degree	750	22.9	
Socioeconomic status (ELSI-sf)			
Hardship	503	16.1	
Comfortable	489	15.7	
Good	2128	68.2	

Note. *N* = number of participants. SD = standard deviation. N total = 3756, Ns will vary due to missing data

Measures

Demographic variables

The demographic variables included in the current analysis were age, gender, marital status, education, relationship status, and socioeconomic status. Age was measured in years at the time of the 2020 data collection. Gender was self-reported by the participants and coded in the range 1-3 (1 = male, 2 = female, and 3 = gender diverse). Education was coded between the range 1-4 (1 = no qualifications, 2 = secondary qualifications, 3 = post-secondary or trade, and 4 = tertiary qualifications). Marital status was recorded as a dichotomous variable (1 = married or in a de facto relationship and 2 = not married or not in de facto relationships).

Socioeconomic status in terms of economic well-being was quantified by administering the Economic Living Standards Index short form (ELSI-SF) as part of the biennial questionnaire. ELSI-SF is a 25-item measure of material wellbeing developed by the Ministry of Social Development to be utilized in NZ (Jensen et al., 2005). ELSI-SF aims to represent an individual's financial aspects of well-being by taking account of personal possessions such as household durables (refrigerator, television), clothing, and access to medical services. Scores on the ELSI-SF range from 0 to 31, with scores ranging from 31-25 interpreted as 'good', 24-17 as 'comfortable', and 16-0 as 'hardship' in living standards. The higher the score on ELSI-SF, the better the living standards (Jensen et al., 2005).

Perceived stress-related measures

Perceived stress. Perceived stress induced by COVID-19 was measured by using two items in the 2020 biennial questionnaire. The two items spanned three domains of health: physical, mental, and economic, and aimed to explore whether participants might have

perceived any of the three domains to be negatively impacted following the COVID-19 pandemic and public health measures. The items asked,

"To what degree would you say the COVID-19 pandemic has had a negative impact on your overall: Physical health, Mental health, and Economic health."

These items were specific to the HWR study, and the responses to the questions spanned a 5-point likert scale ranging from 1*(not at all impacted)* to 5 (*extremely impacted*). These self-reported perceptions of the negative impact of the pandemic were utilized as an indicator of the perceived stress in the corresponding domains of health (now on referred to as physical stress, mental stress, and economic stress) for the purposes of current study.

Coping-related measures

Social Support. Social support was measured using the Social Provision Scale (SPS) (Cutrona & Russell, 1987). SPS is a 24-item scale with six subscales that span six types of support: attachment, social integration, reassurance of worth, sense of reliable alliance, guidance, and opportunity for nurturance, with the overall score providing a measure of perceived social support. All items on SPS are rated on a 4-point likert scale ranging from 1 (*strongly disagree)* to 4 (*strongly agree)*. The negatively worded items, such as *"I feel that I do not have close personal relationships with other people*" were reverse coded, and an overall score was calculated by summing all the items. Cronbach's Alpha for the SPS has been reported to be .915, indicating good reliability (Cutrona & Russell, 1987). A higher total score on SPS is indicative of higher perceived social support.

Physical Activity (PA). PA was measured through one item adapted from the English Longitudinal Study of Ageing (Smith et al., 2015) in the biennial questionnaire. Physical Activity in this item is divided into three categories, namely vigorous (such as swimming and running), moderate (such as dancing and walking at a moderate pace), and low intensity (such as laundry and home repairs). The response options for PA included a 4-point likert scale ranging from *more than once a week (1)* to *hardly ever or never (4)*. For the current analysis, the PA responses for the moderately active category were included in the analysis as the current health guidelines recommend moderate physical activity every day as a universal goal (Yang, 2019). A dummy variable was computed for the regression analysis quantifying the participant's PA. As the PA category 'more than once a week' was most strongly correlated with the emotional well-being measures (Pearson's r = -0.277, -0.131, $p < 0.001$ (depression and anxiety, respectively)), a categorical dummy variable was computed to reflect a high level of PA (more than once a week = 1) and a low level of PA (once a week, hardly ever or never = 0).

Alcohol. Alcohol consumption was screened using the Alcohol Use Disorders Identification Test-Concise (AUDIT-C). AUDIT-C is a brief alcohol screening instrument utilized to identify hazardous drinking among individuals. AUDIT-C consists of three questions that assess the frequency and quantity of alcohol use on a likert scale ranging 0 to 4. The three items on AUDIT-C span both frequency and quantity of alcohol consumption. The total score on AUDIT-C ranges from 0 to 12, with a score of 0 indicating no alcohol use. A score of 4 in men and a score of 3 in women on AUDIT-C indicates problem alcohol use (Bush et al., 1998). In general, the higher the score on AUDIT-C, the more likely that the individual's drinking is affecting their health and safety. The current study utilized the total AUDIT-C scores for analysis.

Smoking. Smoking among the participants was measured with one item, which asked participants, *"If you currently consider yourself a regular smoker, how many do you think you would smoke on an average day?"*. The answers included five options: 1 to 10, 11 to 20, 21 to 30, 31 or more, and not a regular smoker. For the regression analysis, the responses were computed into a dichotomous categorical variable with the response of *not a regular smoker* (0) and all other responses denoted as a *regular smoker* (1).

Emotional well-being measures

Anxiety. Anxiety symptoms were measured using the short form of the Geriatric Anxiety Inventory (GAI - SF). GAI-SF consists of five items aimed at assessing the experience of anxiety symptoms in the past seven days. GAI-SF utilizes a forced choice response format (agree and disagree) for each item and the overall scores ranging from 0 (minimum) to 5 (maximum). A total score is calculated by summating the responses on five items, with a score of three or above reported to be indicative of the experience of anxiety symptoms. Moreover, a score of three or greater has been reported to be 75% sensitive and 87% specific (Byrne & Pachana, 2011). In the current data analysis, the total GAI score was used.

Depression. Depression symptoms were measured using the short form of the Center for Epidemiologic Studies Depression Scale (CES-D). CES-D is exclusively designed to assess the presence of depression symptoms in older adults. The CES-D consists of 10 items evaluating the frequency of depression symptoms in the past seven days on a four-point likert scale with 0 (*rarely or none of the time)* to 3 (*all the time)*. CES-D consists of two negatively worded items, *"I felt hopeful about the future"* and *"I was happy"* which were reverse coded. A total score on CES-D is calculated by summating the responses to the ten items, with higher

scores indicating higher depression symptom frequency (Björgvinsson et al., 2013; Radloff, 1977). For the current study, the total CES-D was used for analysis.

Table 2

Mean and standard deviations of the scales used in the current sample

Scale	*Construct*	*Mean Score*	*Std. Deviation*
SPS	Perceived social support	80.14	9.96
AUDIT-C	Problematic alcohol consumption	3.54	2.27
GAI	Anxiety	0.81	1.40
CES-D	Depression	5.98	4.76

Analyses

All analyses were conducted in IBM SPSS Version 28.0.1.1 (15).

Data Screening and assumption checking

The data were screened for missing values, outliers, normality, linearity, independence of residuals, homoscedasticity, and multicollinearity.

The missing data values for all of the variables were below the acceptable threshold of 5% (Schafer, 1999), so no imputations for missing values were conducted. The normality of the variables was measured using histograms, Q-Q plots, and the Shapiro-Wilks test. All measures were normally distributed on the plots and were significantly non-normally distributed (Shapiro Wilks = .616 - .962, $p<0.001$). Multivariate outliers in the sample were screened by utilizing Cook's distance. The range for Cook's distance in the current sample was between 0.00 – 0.24, which is below the acceptable value of 1. Hence, the outliers were characterized as being non-influential (Cook & Weisberg, 1982).

Multicollinearity in the data was screened by using the VIF values. The VIF values were acceptable and below 10, indicating that the variables did not have a high level of overlap. Therefore, the variables of interest were not centered for the data analysis involving interaction terms. Linearity was assessed by examining the P-P plots, which indicated a straight-line relationship between the predictor variables and outcome variables. The independence of residuals was assessed by using the Durbin-Watson statistic. There were no concerns regarding the residuals being statistically or theoretically linked, and this was confirmed by the Durbin-Watson statistic being close to 2 for each regression model (Durbin – Watson = 2.037) indicating that the residuals were not linked (Pallant, 2020).

Paired T-tests

Paired t-tests tested the null hypothesis that postulated no statistically significant changes in the participant's coping strategies and emotional well-being in 2020 (post-COVID) in comparison to 2018 (pre-COVID). The participant's total scores on SPS, AUDIT-C, PA smoking, GAI, and CES-D were utilized for the paired t-tests.

Hierarchical Multiple Regression

Hierarchical regression was utilized to explore the relationship between stress and emotional well-being and the potential moderating effects of the coping strategies on the relationship between stress and emotional well-being in older adults. Before analyses, the correlation matrix for all of the variables included in the regression models was computed to explore the relationship between the various variables (only demographic variables that significantly contributed to the regression model are shown in the correlation matrix). Following on, two separate hierarchical multiple regression models were conducted with

depression and anxiety as the dependent variables (DV) and the same set of independent variables (IV) in four blocks:

The first block of each model included any demographic variables that significantly bivarietly correlated to the DV (marital status and ELSI-SF for the depression model and age and ELSI-SF for the anxiety model) to control for their effects.

The second block included the addition of physical stress, mental stress, and economic stress variables.

In the third block, the fur coping strategies, social support, PA, alcohol consumption, and smoking were added to the regression model.

In the fourth block, interaction terms were added to test the moderation effect of the coping strategies on perceived stress. Interaction terms were formulated by multiplying each stress variable with each coping variable:

- Physical stress*social support; Mental stress*social support; Economic stress*social support
- Physical stress*PA; Mental stress*PA; Economic stress*PA
- Physical stress*AUDIT-C; Mental stress*AUDIT-C; Economic stress*AUDIT-C
- Physical stress*smoking, Mental stress*smoking; Economic stress*smoking

Unstandardized Beta coefficients with corresponding *p* values were utilized as indicators to assess the contribution of the variables in the model at every step.

The statistical output from the regression model was then used to compute the means required for the graphical display of the significant interaction variables. The excel-based ModGraph-I program was used to plot the interaction terms to visualize the moderation effect (Jose, 2013).

Chapter 6: Results

Question 1: Perceived stress during the COVID-19 lockdown

Participants self-reported data was analyzed to explore whether the COVID-19 pandemic and other public health measures (such as lockdowns) were perceived as a source of stress by the older adults in NZ. Table 3 below shows the means and standard deviations for participant's perception of whether the pandemic negatively impacted three domains of health: physical, mental, and economic.

Table 3

Perception of stress on various domains of health after first COVID-19 lockdown relaxation

To what degree would you say the COVID-19 pandemic has had a negative impact on your overall:	***M***	***SD***
Physical Stress	1.36	.72
Mental Stress	1.57	.84
Economic Stress	1.70	.95

On average, the perceived stress scores following the COVID-19 lockdowns were low in the current sample, as displayed in Table 3. These average scores indicate that the COVID-19 pandemic and lockdowns negatively impacted all three domains of the sample's overall health. However, the mean scores being on the lower spectrum indicate that the perceived negative impact of COVID-19 and the lockdowns were minimal or low.

Question 2: Changes in older adult's coping strategies and emotional well-being between 2018 and 2020

Paired t-tests were conducted to explore whether there were any statistically significant changes in the coping strategies of older adults following the COVID-19 pandemic. In the current sample, no statistically significant difference was detected for changes in social support, alcohol consumption, and physical activity between 2018 and 2020. Additionally, no statistically significant change was also observed in the total scores on depression (CES-D scores) and anxiety (GAI scores) between 2018 and 2020, indicating no change in the emotional well-being before and after the pandemic. Therefore, the evidence failed to reject the null hypothesis that there is no statistically significant change in the three coping strategies and emotional well-being following 2020 compared to 2018.

A statistically significant change in the smoking status was detected in 2020 in comparison to 2018 ($t(1975) = 136.14$, SEM = .013, $p < 0.001$). The mean for smoking status in 2018 in the current sample was 1.89 in comparison to the mean of .11 in 2020, indicating a reduction in smoking levels. Hence, there was evidence to reject the null hypothesis and accept the alternative hypothesis that postulated a statistically significant change in smoking between 2020 and 2018.

Question 3: Relationship between stress and emotional well-being

Pearson's correlations (r) were computed initially to assess the linear relationship between the variables of interest; demographic variables, perceived stress variables, coping strategies, and emotional well-being measures.

The majority of the correlation coefficients, as shown in Table 4, were in the ± .30 - .70 range, indicating moderate correlations between the variables of interest. ELSI-SF was

negatively and moderately related to GAI and CES-D scores. Social support was negatively and moderately correlated to all three domains of stress, and the GAI and CES-D scores. PA was also negatively and weakly correlated to all three domains of stress and the GAI and CES-D scores. Smoking was positively and weakly correlated with the three stress domains. However, smoking was negatively and weakly correlated with GAI scores but positively and weakly correlated with the CES-D scores.

Table 4

Pearson's correlations between the variables of interest included in the multiple regression

	Age	**Gender**	**Marital status**	**ELSI-SF**	**Physical stress**	**Mental stress**	**Economic stress**	**Social Support**	**PA**	**AUDIT-C**	**Smoking**	**GAI**
Gender	-.06**											
Marital status	.09**	.18**										
ELSI-SF	.11**	-.03	-.24**									
Physical stress	-.006	.05*	.10**	-.25**								
Mental stress	-.11**	.11**	.05**	-.24**	.51**							
Economic stress	-.15**	-.03	.008	-.31**	.29**	.33**						
Social Support	-.006	.07**	-.23**	.37**	-.18**	-.18**	-.13**					
PA	-.03	-.006	-.09**	.22**	-.17**	-.07**	-.06**	.21**				
AUDIT-C	-.06**	-.27**	-.08**	.07*	-.04*	-.05**	.004	-.02	.006			
Smoking	-.09**	.02	.15**	-.25**	.09**	.09**	.12**	-.11**	-.13**	.08**		
GAI	-.09**	.07**	.04*	-.28**	.22**	.35**	.16**	-.27*	-.13**	-.03	.11**	
CES-D	-.02	.03	.16**	-.44**	.34**	.43**	.19**	-.48**	-.28**	-.007	.15**	-.55**

*Note. **p<0.001, * p<0.0, GAI = Geriatric Anxiety Inventory Total, CES-D = Center of Epidemiologic studies depression scale total*

Hypothesis 1: Moderating effect of the coping strategies on the relationship between stress and depression

A four-block hierarchical multiple regression was computed to further explore the relationship between stress and depression, and the moderating role of coping strategies in that relationship. Table 5 shows the summary statistics for the hierarchical multiple regression model with depression scores on CES-D scale as the dependent variable.

The model shows that at block one, marital status and ELSI-SF scores contributed significantly to the regression model (F (2, 1753) = 241.08, $p < .001$) and accounted for 21.6% of the variation in CES-D scores.

Each of the three stress variables contributed significantly to the regression equation. The addition of the three stress measures to the model explained an additional 10.7% of the variation in the CES-D scores and, the R^2 was significant (F (3, 1750) = 91.70, $p < .001$).

Introducing the coping strategies in block 3 of the regression model explained an additional 10.4% of the variance, and this change in R^2 was also significant (F (4, 1746) = 79.10 $p < .001$). Only social support and physical activity contributed significantly to the total variance explained.

Finally, the twelve interaction terms to test the moderating effects of the coping strategies on the relationship between stress and depression were added in the last block of the regression model. Of the twelve interaction variables, three interaction variables were significant (Mental stress*PA, Mental stress*AUDIT-C, and Mental stress*Smoking) and further explained 0.7% of the variation in the depression scores, and the change in R^2 was significant (F (11, 1735) = 2.01, $p < .05$).

In total, the hierarchical multiple regression model explained 42.7% of the variance in the depression scores of older adults in the current sample.

Table 5

Summary of Hierarchical Regression Analysis for variables and moderators predicting Depression scores (CES-D)

Predictor Variables	Unstandardized B	Standardized β	R^2	R^2 Change	t	Sig.
Block 1			.21			
Marital Status	1.04	.09			4.29	.000**
ELSI-SF	-.37	-.43			-19.50	.000**
Block 2			.32	.10		
Physical Stress	.612	.09			3.86	.000**
Mental Stress	1.75	.30			13.18	.000**
Economic Stress	-.36	-.07			-3.25	.001**
Block 3			.42	.10		
Social Support	-.16	-.32			15.92	.000**
PA	-.94	-.09			-4.99	.000**
AUDIT-C	.06	.03			1.56	.12
Smoking	-.03	-.002			-.091	.93
Block 4			.42	.007		
Physical Stress * Social Support	.003	.03			.223	.82
Mental Stress * Social Support	-.02	-.24			-1.65	.09
Economic Stress * Social Support	.005	.07			.47	.64
Physical Stress * PA	.17	.03			.55	.58
Mental Stress * PA	.62	.12			2.41	.02*
Economic Stress * PA	-.03	-.006			-1.29	.09
Physical Stress*AUDIT-C						
Mental Stress * AUDIT-C	-.12	-.11			-2.35	.02*
Economic * AUDIT- C	.05	.06			1.16	.25
Physical Stress * Smoking	.63	.17			1.45	.15
Mental Stress * Smoking	-.73	-.25			-1.97	.04*
Economic Stress* Smoking	-.06	-.02			-.19	.85

*Note. Sig.= significance, **p<0 .001, * p<0.05*

Table 6 displays the mean depression scores at varying levels of mental stress for participants with high and low PA. Figure 2 visualizes the relationship between mental stress and CES-D scores as moderated by different PA levels. At each of the three levels of mental stress, individuals who engaged in low PA scored high on the depression scale in comparison to those who engaged in high PA. At low levels of mental stress, engagement in PA is related to lower depression scores. However, at higher levels of mental stress, the depression scores are closer between the two varying groups of PA.

Table 6

Means for depression scores in 2020 for varying levels of mental stress at high and low PA

	Physical Activity (PA)	
	High	**Low**
Low Mental Stress	21.79	23.45
Med Mental Stress	25.91	27.06
High Mental Stress	30.03	30.68

Figure 2

Moderation of the effect of mental stress on Depression by Physical Activity

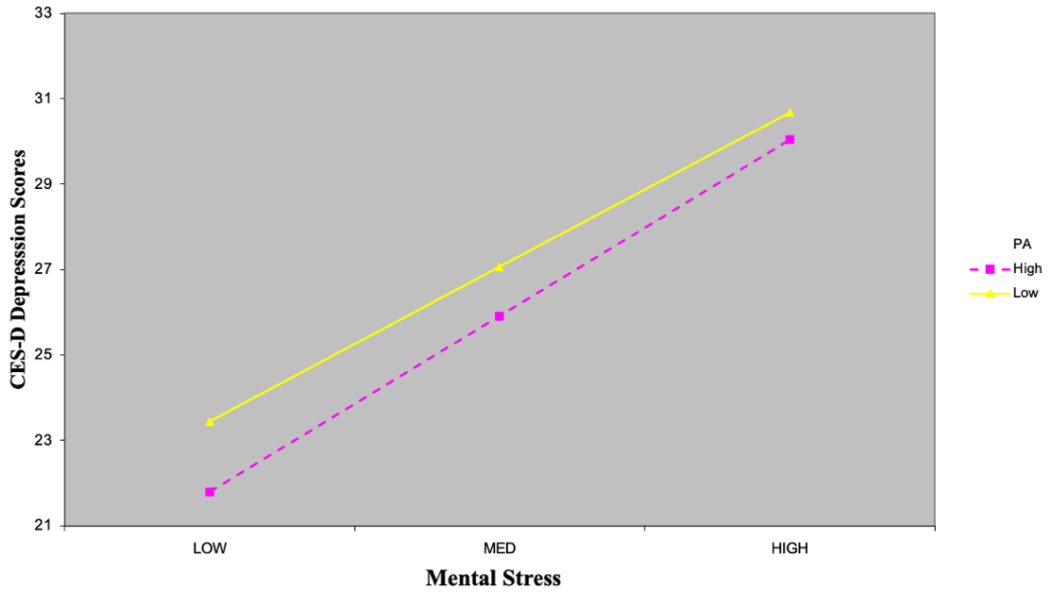


Table 7 shows the mean depression scores at varying levels of mental stress for participants with low, medium, and high AUDIT-C scores. Subsequently, Figure 3 visualizes the relationship between mental stress and depression scores as moderated by alcohol consumption (AUDIT-C scores). At high mental stress levels, the strongest association between mental stress and depression scores was reported by individuals with low alcohol consumption. While depression scores were similar at low levels of mental stress, at high mental stress levels individuals who consumed low alcohol, scored higher on the depression scale than those with medium or high alcohol consumption.

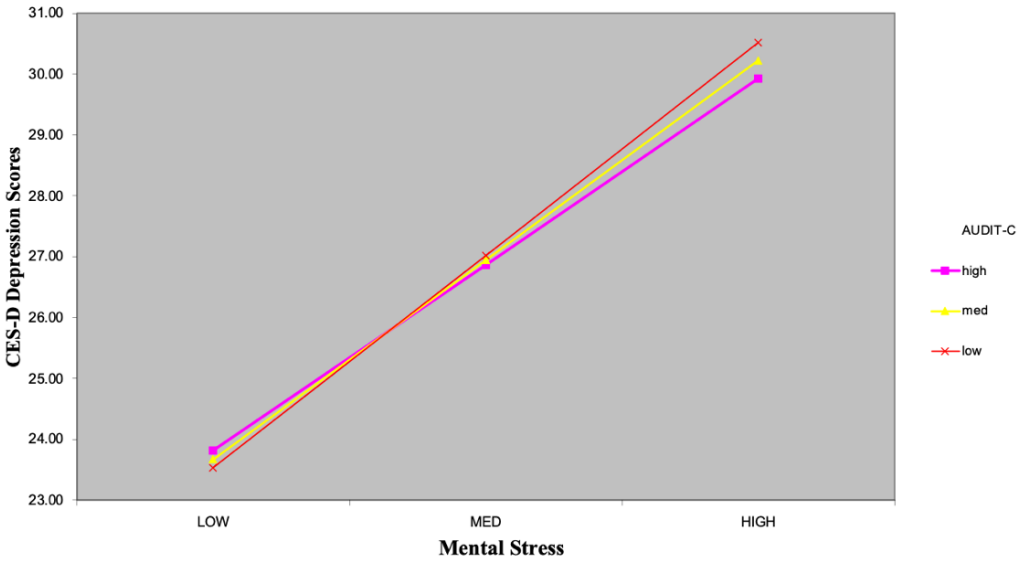
Table 7

Mean depression scores at varying levels of mental stress and AUDIT-C scores

	AUDIT-C Scores		
	Low	**Med**	**High**
Low Mental Stress	23.53	27.02	30.52
Med Mental Stress	23.67	26.94	30.22
High Mental Stress	23.81	26.87	29.93

Figure 3

Moderation of the effect of mental stress on Depression by Alcohol Consumption



Smoking status also moderated the relationship between mental stress and depression in the current sample. Table 8 displays the mean depression scores at varying levels of stress for regular and non-smokers. Figure 4 visualizes the relationship between mental stress and depression scores as moderated by smoking status. As evident from figure 4, at all three levels of mental stress, individuals who were non-smokers scored higher on the depression scale in comparison to individuals who were regular smokers. However, non-smokers were more likely to report even higher levels of depression at higher levels of mental stress.

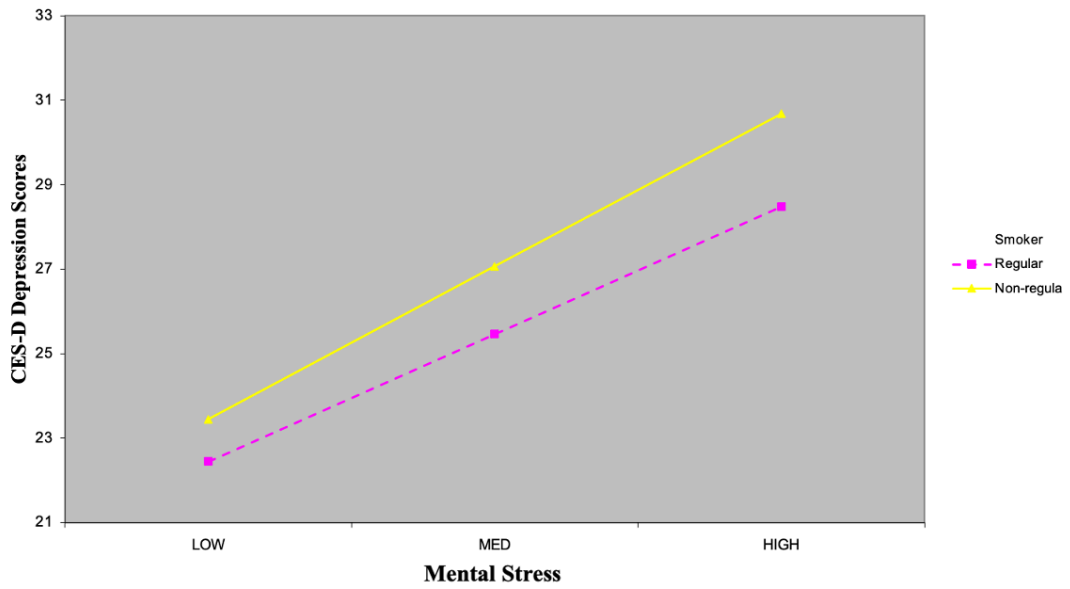
Table 8

Mean depression scores for varying levels of stress and smoking status

	Smoking status	
	Regular	**Non-Regular**
Low Mental Stress	22.44	23.45
Med Mental Stress	25.46	27.06
High Mental Stress	28.47	30.68

Figure 4

Moderation of the effect of mental stress on Depression by Smoking status



Hypothesis 2: Moderating effect of the coping strategies on the relationship between stress and anxiety

Table 9 displays the summary statistics for the hierarchical multiple regression model with anxiety scores on the GAI scale as the dependent variable. The model suggests that at block one, age and ELSI-SF scores contributed significantly to the regression model (F (2, 1746) = 76.59, $p < .001$) and accounted for 8% of the variation in anxiety scores.

The introduction of the three stress measures explained an additional 8.8% of the variance, and the change in R^2 was significant (F (3, 1743) = 61.53, $p < .001$). However, only mental stress contributed significantly to the regression model.

Introducing the four coping strategies in block three of the regression model explained an additional 2.0% of the variance in anxiety scores, and the change in R^2 was significant (F (4, 1739) = 10.77, $p < .001$). At this block, only social support contributed significantly to the total variance explained by the model out of the four coping strategies.

Finally, the twelve interaction terms to test the moderating effects of the coping strategies on the relationship between stress and anxiety scores were added in the last block of the regression model. Only two interaction variables were significant (Mental Stress* AUDIT-C and Mental Stress*Social support) and explained an additional 0.9% of the variance in the anxiety scores, and the change in R^2 was significant (F 11, 1728) = 1.86, $p < .05$).

In summary, the hierarchical regression model explained 18.9% of the variance in the anxiety scores in the current sample.

Table 9

Summary of Hierarchical Regression Analysis for variables and moderators predicting Anxiety Scores (GAI)

Predictor Variables	Unstandardized B	Standardized β	R^2	R^2 Change	*t*	Sig.
Block 1			.080			
Age	-.081	-.075			-11.47	.000**
ELSI-SF	-.068	-.265			-3.23	.000**
Block 2			.166	.088		
Physical Stress	.098	.048			1.89	.058
Mental Stress	.492	.290			11.26	.000**
Economic Stress	-.045	-.030			-1.25	.211
Block 3			.185	.020		
Social support	-.020	-.143			5.98	.000**
PA	-.108	-.037			-1.6	.108
AUDIT-C	-.003	-.005			-.22	.829
Smoking	.104	.021			.915	.360
Block 4			.189	.009		
Physical Stress*Social support	-.001	-.040			-.22	.82
Mental Stress*Social support	-.010	-.450			-2.56	.010*
Economic Stress*Social support	-.001	-.051			-.27	.78
Physical Stress * PA	.079	.042			.73	.47
Mental Stress * PA	.014	.009			.15	.87
Economic Stress * PA	.022	.016			.29	.77
Physical Stress*AUDIT-C						
Mental Stress* AUDIT-C	.041	.132			2.34	.019*
Economic Stress * AUDIT- C	-.011	-.042			-.71	.48
Physical Stress * Smoking	.098	.092			.66	.51
Mental Stress * Smoking	-.121	-.138			.94	.35
Economic Stress * Smoking	-.110	-.142			.96	.34

*Note. **p<0.001, * p<0.0*

Table 10 displays the means computed for the anxiety scores at varying levels of mental stress and social support. Figure 5 displays the relationship between mental stress and anxiety scores as moderated by the different social support levels. The figure shows that in the current sample, the strongest positive association between stress and anxiety scores was detected for individuals who reported low social support in 2020. At each of the three varying levels of mental stress, individuals who reported low social support scored higher on the anxiety scale than those who reported medium or high social support, with differences being greater at high mental stress.

Table 10

Mean anxiety scores at varying levels of mental stress and social support

	Social Support		
	Low	**Med**	**High**
Low Mental Stress	1.94	2.45	2.97
Med Mental Stress	1.85	2.29	2.73
High Mental Stress	1.77	2.13	2.48

Figure 5

Moderation of the effect of mental stress on Anxiety by Social Support

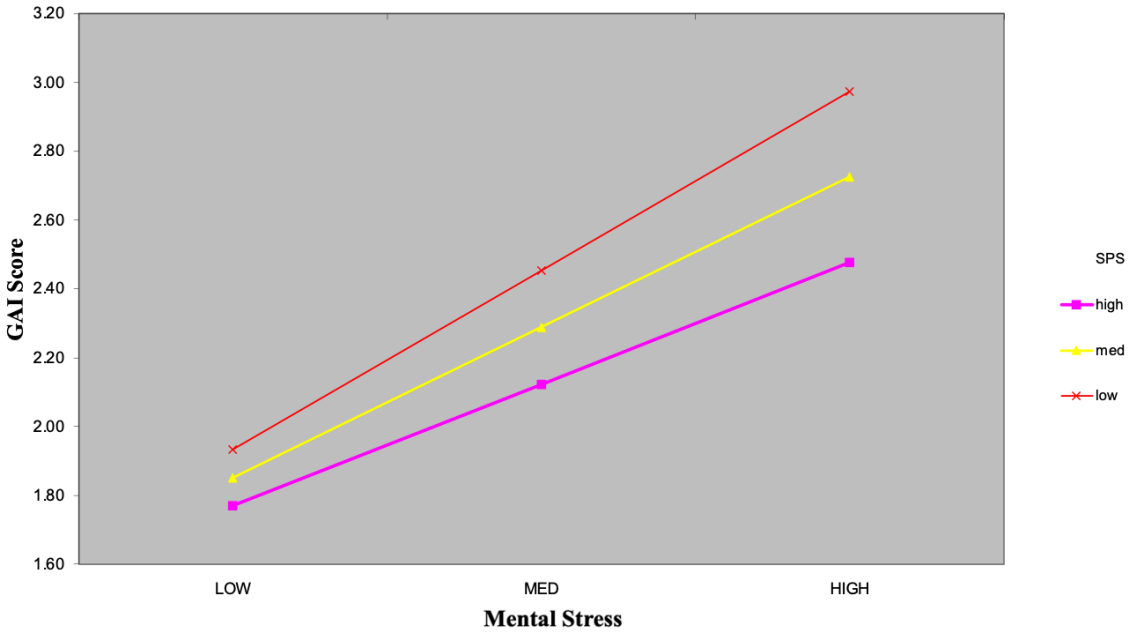


Table 11 shows the mean anxiety scores at varying levels of mental stress and AUDIT-C scores. Figure 6 shows the relationship between mental stress and anxiety as moderated by AUDIT-C scores. At high mental stress, individuals with high alcohol consumption scored higher on the anxiety scale in comparison to those who reported medium or low alcohol consumption. The strongest positive association between mental stress and anxiety was detected for individuals who reported higher levels of alcohol use following the COVID-19 pandemic.

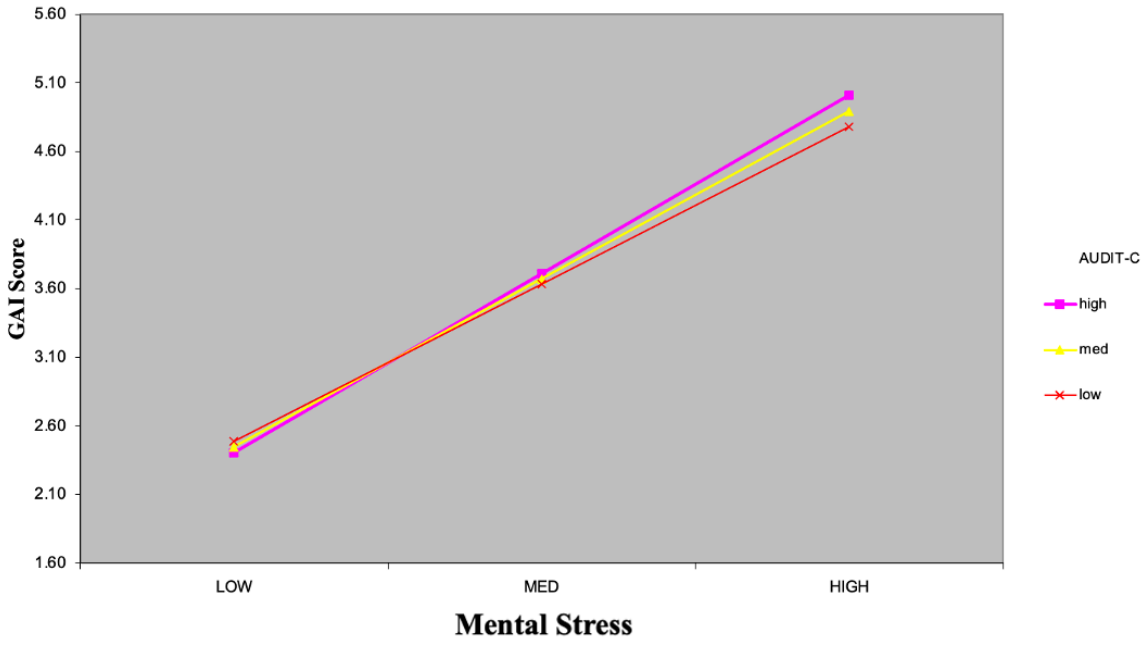
Table 11

Mean anxiety scores at varying levels of mental stress and AUDIT-C scores

	AUDIT-C scores		
	Low	**Med**	**High**
Low Mental Stress	2.49	3.63	4.78
Med Mental Stress	2.45	3.67	4.89
High Mental Stress	2.41	3.71	5.01

Figure 6

Moderation of the effect of Perceived mental stress on Anxiety by Alcohol Consumption



Chapter 7: Discussion

The main aim of the current study was to explore the impact of the COVID-19 pandemic and associated public health measures on the coping strategies and emotional well-being of older adults in Aotearoa. There were three main findings from the current study. Firstly, COVID-19 was perceived to be stressful and negatively impacted older adults' physical, mental, and economic well-being. Secondly, no changes in social support, PA, and alcohol consumption were detected before (2018) and after (2020) the pandemic among older adults. However, a significant reduction in smoking among older adults was detected in 2020 following the COVID-19 pandemic. Lastly, coping strategies moderated the relationship between stress and emotional well-being, with social support being significantly protective against stress in comparison to other coping strategies. These findings highlight the impact of coping strategies, predominantly social support, in mitigating the negative impact of the COVID-19 pandemic on the emotional well-being of older adults. The interpretation of the current study's findings in relation to the existing literature is discussed below.

'Silver linings' influencing the perception of stress during COVID-19

International research has reported mixed results regarding the perception of stress associated with the COVID-19 pandemic among older adults. A proportion of the older adults perceived the pandemic as stressful and feared even stepping outside, whereas a proportion expressed that they disagreed with the vulnerability label (Falvo et al., 2021; Verhage et al., 2021). These mixed results emphasized the heterogeneity among older adults as a group. The present study aimed to evaluate whether the COVID-19 pandemic was perceived as stressful by older adults in Aotearoa. The subjective responses from the 2020 survey regarding the

impact of the pandemic were analyzed. The results indicated that the stress perceived following the COVID-19 pandemic in Aotearoa's older adults was on the lower end of the spectrum among all three domains of well-being. The average response among the sample was that the COVID-19 pandemic negatively impacted their physical, mental, and economic well-being. However, the negative impact was perceived to be on the lower spectrum by older adults. In the multiple regression analysis, the three perceived stress measures significantly explained 10% of the variance in the depression scores and 8.8% of the variance in the anxiety scores. Out of the three perceived stress domains, perceived mental stress was the strongest predictor of emotional well-being, i.e., depression and anxiety scores. Therefore, even though the self-perception of stress induced by COVID-19 was generally low among older adults in NZ, the statistical analysis highlighted a significant impact of perceived stress, especially perceived mental stress, on the emotional well-being of older adults.

One of the potential reasons behind the observed low perception of stress among older adults during the pandemic might be the positive and enjoyable embracement of the initial lockdown. Qualitative studies have highlighted those older adults who were retired, able to work from home or eligible for the wage subsidy, and were able to connect with family and friends recounted their lockdown experience as enjoyable (Stephens & Breheny, 2022). Research from South Africa also corroborated these findings and reported that individuals expressed feeling positive and optimistic during initial lockdowns as the public health measures supported in keeping the fatality rates low and recovery rates high (Greyling et al., 2021).

Additionally, lockdowns providing an opportunity to pause and reflect might have also played a role in alleviating the stress induced by the pandemic. The initial lockdown for around six weeks in NZ provided most individuals with a break from their regular routine and an

opportunity for reflection. Qualitative studies indicated that some participants took the time during the pandemic to reassess and re-evaluate priorities. The lockdowns were expressed to offer affordance of time and allowing for an opportunity to reconnect with oneself, family and friends and reassess what was important (Radka et al., 2022). Thus, the COVID-19 public health measures were potentially perceived as a "blessing in disguise", which might have contributed to the observed result of many older adults not perceiving the pandemic and lockdowns as stressful.

Furthermore, in Aotearoa, the Work and Income New Zealand (WINZ) provided economic assistance through the wage subsidy to assist businesses and employees. This financial assistance might have also been influential in reducing stress during the initial lockdown (Choi et al., 2021; Stephens & Breheny, 2022). The implementation of the wage subsidy entitled the employees to approximately 50% of their median wage during the lockdown (Graham & Ozbilgin, 2021). Even though it did not equate to full income, the wage subsidy scheme might have still provided a sense of job security and financial stability for older adults who were employed. Moreover, the reduction in expenses during the lockdowns due to not commuting to work or not paying for childcare services might have also assisted in reducing the cost-of-living burden (Choi et al., 2021), leading to the individuals perceiving the COVID-19 pandemic and lockdowns as not being economically stressful.

Additionally, in the NZ context, the initial lockdown was associated with eliciting a sense of compassion and solidarity among the wider community (Morgan et al., 2022). The clear daily communication from government officials during the pandemic was acknowledged to promote a sense of being cared for by the government. The discourse of language utilized by the government during the COVID-19 health response was also highlighted to promote a

sense of cohesion in the community. The act of referring to the population as a collective "team of five million" might have played a role in fostering a sense of unity and support, which might have further ameliorated the stress induced by COVID-19 (Stephens & Breheny, 2022).

Conceptualizing through the transactional model, the COVID-19 pandemic and public health measures were recognized to be stressful in the current sample. However, the sense of unity, support, and financial security among the older adults in Aotearoa might have intervened at the primary appraisal stage. At the primary appraisal stage, an individual attributes meaning to stressor in their environment as irrelevant, benign, or stressful (Lazarus & Folkman, 1987). In the current sample, the COVID-19 virus and lockdowns might have been appraised as stressful initially, however, the financial support, sense of unity and affordance of time might have counteracted the initial appraisal leading to the observed low perceived stress. Therefore, the silver linings associated with the COVID-19 public health measures might have played a role in influencing the primary appraisal of the environmental stressors.

No detectable changes in emotional well-being, and the majority of coping strategies

Early empirical evidence suggested a strong negative impact of the pandemic on emotional well-being (Meng et al., 2020b) and coping of older adults (Verhage et al., 2021). Following the above evidence, the current study investigated whether there were any statistically significant changes in coping strategies and emotional well-being of older adults before (2018) and after (2020) the pandemic in Aotearoa. No significant changes in PA, alcohol consumption, social support, and the experience of depression and anxiety symptoms were detected between 2018 and 2020 among older adults. Aligning with the transactional model, as the pandemic was perceived to be negatively impacting the overall well-being of older adults, changes in coping strategies were anticipated. The primary appraisal of the COVID-19

pandemic and lockdowns as stressful, even though on lower spectrum, was anticipated to result in a secondary appraisal that initiated changes in coping strategies to mitigate the negative emotions induced by the stressor. However, in the current sample, no changes in the majority of the coping strategies and emotional well-being measures were detected.

One possible rationalization behind the observed results might be that the primary appraisal of the COVID-19 pandemic as stressful was not sufficiently intense to initiate the downstream cascade that would induce changes in coping strategies. Research has indicated that the intensity of the stressor in an individual's environment has the potential to impact the cognitive appraisal (Biggs et al., 2017; Walinga, 2014). During the initial lockdown in Aotearoa, mandatory lockdowns and working from home provided individuals with an opportunity to connect with family and whānau. The lockdowns provided time that could be spent connecting with family and whānau. The time spent together, described as "enforced togetherness" (Radka et al., 2022), was appraised as a blessing during the initial lockdown. This "enforced togetherness" could have promoted stronger bonds among partners, children, and the wider family (Tam et al., 2021) and impacted the appraisal stage in the transactional model. Therefore, even though, on the surface, the COVID-19 pandemic brought on a drastic change to individuals' daily routines and limited their movements, it also provided opportunities for strengthening and building connections. These connections might have intervened at both the primary and secondary appraisal stage of the transactional model, conveying that the individual has social connections and resources at their disposal to cope with the stress induced by the COVID-19 pandemic (Biggs et al., 2017; Lazarus & Folkman, 1987). Consequently, leading to no changes in coping strategies and emotional well-being of older adults during the pandemic.

Significant reduction in smoking following the COVID-19 pandemic

From the four coping strategies evaluated in the current study, smoking displayed a statistically significant reduction in 2020 following the COVID-19 pandemic. These findings aligned with the wider literature reporting a reduction in vaping and smoking during the COVID-19 pandemic (Denlinger-Apte et al., 2022; Koyama et al., 2021). One theory behind this reduction in smoking has been postulated to be the elimination of the contextual situations such as bars or smoking socially following the pandemic (Denlinger-Apte et al., 2022). Under the strict lockdown conditions in Aotearoa, working from home and restrictions on social gatherings eliminated the social situations where individuals might usually engage in smoking behaviour with others. This decrease in opportunities might have contributed to the observed reduction in smoking. It is also possible that individuals who mainly engaged in social smoking utilized products bought by other individuals. As the lockdowns lessened the interpersonal interactions between individuals who were not a part of an individual's immediate bubble, the lack of opportunity and availability of smoking products might have contributed to the observed reduction in smoking (Giovenco et al., 2021).

Family connections during the COVID-19 pandemic have also been hypothesized to be pivotal in the observed reduction in smoking. The increased time spent at home with children, non-smoking partners, and extended family during the COVID-19 lockdowns might have played a role in encouraging current smokers to reduce smoking. This reduction might also be fueled by the motivation to protect the family from secondhand smoke harm (O'donnell et al., 2021). The concept of "enforced togetherness" mentioned before, might have also aided in smoking reduction. As individuals were spending more time with families, one way to foster strong connections might have been to reduce smoking.

The health-related concerns associated with contracting the COVID-19 virus have also been proposed to play a role in the observed reduction in smoking among current smokers (Al Ghadban et al., 2022). Literature has shown that the beliefs surrounding smoking increasing the risk of contracting the COVID-19 virus have been sighted as one of the main reason current smokers reduced smoking during the pandemic (Brown, 2021). During the initial phase of the COVID-19 pandemic, media coverage implying that smokers experience worse outcomes after contracting COVID-19 compared to non-smokers might have had an impact on smokers' attitudes and emotions towards smoking (Sznitman & Lewis, 2022). A recent online experimental study with smokers reported that conveying information associated with the harms of smoking and COVID-19 elicited negative emotional reactions among smokers (Grummon et al., 2022). The study highlighted that communicating the risk of smoking during the pandemic caused high fear, guilt, and anger. These emotional responses were further associated with higher intentions of quitting and reducing smoking among current smokers (Grummon et al., 2022; Yang et al., 2019).

The observed reduction in smoking as a coping strategy during the pandemic aligns with the transactional model. The evidence from the literature points toward media coverage and dissemination of information associated with smokers' heightened risk to be perceived as stressful and threatening (at least health-wise) by current smokers (Brown, 2021; Grummon et al., 2022). The stressful primary appraisal might have elicited negative emotional reactions associated with a higher risk of infection among smokers. The secondary appraisal might have included smokers taking an inventory of their available resources that might assist in alleviating the stress and negative emotions elicited by the appraisal. The potential strengthening in family connections and media involvement might have been the motivation behind current smokers opting for behavioural changes such as reducing smoking. This reduction in smoking might

further be positively reinforcing as it might be associated with reducing an individual's risk of severe hospitalization and negative health outcome if they contract COVID-19 (Brown, 2021). Therefore, the observed reduction in smoking lends evidence for the transactions between and the stressor in the environment as theorized by the transactional model.

The moderating role of coping strategies

Literature has reported that coping strategies act as moderators in the relationship between stress and emotional well-being (Kim et al., 2010; Lipton, 1994; Singh et al., 2021). Thus, the final aim of the current study was to evaluate the role of coping strategies in the relationship between stress and emotional well-being of older adults during the pandemic. The current study tested the hypothesis that the coping strategies (social support, PA, alcohol consumption, and smoking) study will moderate the relationship between stress and emotional well-being. The hypothesis also intended to test whether the coping strategies moderated the experience of depression and anxiety symptoms differently. The moderation analysis results indicated that the four coping strategies significantly contributed to the hierarchical model predicting emotional well-being. The results, therefore, supported the hypothesis that coping strategies moderate the relationship between stress and emotional well-being. Moreover, the analysis also indicated that different coping strategies moderate emotional well-being (depression and anxiety symptoms) differently. The interpretation of moderation analysis in relation to the wider literature is discussed below.

Social support and anxiety

The results from the moderation analysis indicated that social support moderated the relationship between mental stress and the experience of anxiety symptoms. Higher social support was associated with lower scores on the anxiety scale. Furthermore, at the highest level

of mental stress, the differences in anxiety scores were stronger (refer to Figure 5), and those with the highest level of social support reported the lowest anxiety scores. These results insinuate that social support potentially acts as a protective coping strategy in stressful situations such as a pandemic, to mitigate negative impact on emotional well-being. These results also align with the wider literature conducted during the COVID-19 pandemic. A study conducted among 450 college students in China during the pandemic reported that social support significantly moderated the relationship between COVID-19-related stressors and psychological outcomes (Li et al., 2020). Another study conducted with a sample of 2993 individuals aged 18 to 50+ years also reported a moderating role of social support on the relationship between perceived stress during the COVID-19 pandemic and mental health symptoms (Liu et al., 2021). Other studies have also reported a moderating and protective role of social support on the relationship between stress and emotional well-being during the COVID-19 pandemic (Schierberl Scherr et al., 2021; Szkody et al., 2021). Conceptualizing through the lens of transaction model, social support in a moderating capacity could impact at several stages of the model to exert the observed protective effect.

Social support promotes cognitive reappraisal. Promoting cognitive reappraisal is one of the proposed mechanisms through which social support might exert a moderating effect on the relationship between stress and emotional well-being. Reappraisal refers to the cognitive process through which an individual changes their perception and relationship with the stressor in their environment (Holmstrom, 2015). High social support has been hypothesized to promote cognitive reappraisal through numerous ways. Social support networks as a potential source of information, advice, and guidance during a crisis might promote the reappraisal of the stressor as more controllable and manageable (Pilcher & Bryant, 2016; Szkody et al., 2021). High social support has also been hypothesized to avert an individual from negatively reacting to the

stressor, promoting perception through a positive lens. Social connections also provide a sense of security during stressful times by understanding and meeting an individual's needs and becoming an avenue to increase knowledge and resources to cope with the stressors. Research has also shown that in a high social support context, individuals report a sense of understanding and safety that is further associated with emotional stability and positive re-appraisal (Liao & Weng, 2018; Padhy & Angiel, 2021). As the reappraisal alters the subjective perception (appraisal stage in the transactional model), it might also have a positive impact on the emotional well-being (Holmstrom, 2015). Thus, the availability of informational and emotional support from social connections might promote cognitive reappraisal and aid in alleviating negative emotions associated with the stressor.

Social support promotes group identification. Social support has also been hypothesized to assist in coping with stressful situations by promoting group identification (McKimmie et al., 2020). Group identification refers to an individual's sense of belonging to a particular social or cultural group combined with a sense of commonality with the group members. Group identification has been associated with providing a sense of meaning and security, and in the context of well-being, is reported to predict better health outcomes, quality of life, and meaning of life (Wakefield et al., 2017). Group identification among social support networks promotes the establishment of avenues that an individual provides and receives support during stressful situations. This presence of secure support has been reported to be associated with positive reframing of the stressor and the perception that the situation is manageable. Through the transactional model's lens, group identification within social support can potentially intervene at the secondary appraisal stage of the model. At this stage, effective support can potentially be gained if another member of the group has faced or is facing a similar stressor (Thoits, 1986). Additionally, the reassurance that the support is readily available

among the members of the group might also promote the perception that an individual possesses the required to cope with the stressor (Haslam et al., 2008; Wakefield et al., 2017). Hence, group identification can potentially act as a facilitator through which social support might promote positive reframing of the stressor and a sense of security to cope with the stressor (Van Knippenberg et al., 2007) and positively impact the appraisal and emotional well-being.

Physical activity and depression

Physical Activity (PA) moderated the relationship between scores on the depression scale and stress in the current sample. At all levels of mental stress, individuals who engaged in high PA reported lower scores on the depression scale in comparison to those who engaged in low PA during the pandemic. These results align with broader research undertaken during the COVID-19 pandemic (Callow et al., 2020; Meyer, McDowell, et al., 2020). A study from North America, including 1046 older adults aged 50 and over, reported that older adults who performed moderate to vigorous PA during the pandemic reported lower scores on the geriatric depression scale. Moreover, regression analysis indicated that PA predicted lower depression-like symptoms in older adults (Callow et al., 2020). Another study among 3052 adults in the US reported that a reduction in PA levels following the pandemic was associated with worsening in depression symptoms and an increase in perception of stress (Meyer, McDowell, et al., 2020). The authors reported that engaging in PA is potentially protective against stress and the experience of depression symptoms. However, the results from the current study indicated that the protective effect of PA dissipated at high-stress levels, as the difference in the depression scores, in the context of varying PA, diminished as mental stress levels increased (refer to Figure 2). Hence, it is possible that PA is protective, but it alone will not moderate the experience of depression symptoms at high levels of stress. Nevertheless, some of the literature

exploring how PA exerts the moderation effect on the relationship between stress and emotional well-being is discussed below.

PA enhances self-efficacy. One of the mechanisms through which PA has been postulated to exert protective effect and aid in alleviating symptoms of depression is through the enhancement of self-efficacy. Self-efficacy as a construct is conceptualized as an individual's subjective belief in themselves to successfully execute a plan of action in a stressful situation (Bandura, 1977). The literature has shown that engaging in PA or a structured exercise program positively correlates with enhanced perception of coping and self-efficacy and is also inversely correlated to the experience of depression symptoms (Brown et al., 1992; Kandola et al., 2019). Research exploring the positive effect of PA has suggested that engaging in PA not only improves physical abilities but also provides a sense of mastery of a skill which further enhances self-efficacy. This enhancement in self-efficacy induced by PA has been hypothesized to generalize to the other domains of life and potentially counteract the negative feelings of depression induced by the stressor (Kandola et al., 2019).

Qualitative studies among older adults have reported that engaging in PA provided older adults with a sense of doing something good for themselves. Older adults in this study expressed feeling more positive and a sense of achievement after they engaged in PA. This self-perception was further associated with improved self-efficacy among older adults and correlated with improved mood after engaging in PA (Olsen et al., 2015). An increase in self-efficacy is also related to an individual having greater confidence in their ability to meet the demands of a stressful situation. This increase in self-efficacy has been established in the literature to assist an individual in facing challenging situations better and, therefore, safeguarding against negative stress (Meyer et al., 2022; Netz et al., 2005). Conceptualizing

through the transactional model during the COVID-19 pandemic, the lack of control over the events in their surroundings ranging from work from home, a lack of daily routine, and public health measures might have led to a stressful primary appraisal. It is possible that older adults engaging in PA as an active coping strategy might have experienced enhanced self-efficacy. As the literature has shown, increased self-efficacy in one domain can potentially generalize (Kandola et al., 2019), hence the engagement in PA during the pandemic might potentially have promoted a perception of older adults being able to manage the stressors associated with the pandemic (Meyer et al., 2022).

PA promotes cognitive re-appraisal. PA has also been reported to enhance cognitive functioning and potentially promote cognitive re-appraisal. Previous research has indicated that moderate PA correlates with improved cognitive functioning, specifically cognitive flexibility (Chang & Etnier, 2009). The increase in cognitive functioning and flexibility through engaging in PA has been hypothesized to promote positive reinterpretation of a stressor in an individual's environment (Perchtold-Stefan et al., 2020). Positive reinterpretation refers to the adaptive processes through which an initial stressful appraisal is re-constructed as benign or positive (Garland et al., 2009). Thus, through the lens of the transactional model, engaging in PA can potentially intervene at the cognitive appraisal stage and facilitate the re-appraisal of the stressor in a more positive frame. The cognitive re-appraisal can then further aid in mitigating the negative emotions associated.

Positive reinterpretation also upregulates an individual's ability to experience positive emotions and might promote an overall positive interpretation of the stressor. Positive reinterpretation might lead an individual to weigh the positive and negative aspects through a more positive lens (Riepenhausen et al., 2022). This positive reinterpretation might also aid in

alleviating the emotions associated with a negative initial appraisal. Furthermore, the ability to re-appraise the stressor through a positive lens has also been postulated to promote acceptance of the situation and potentially enhance an optimistic outlook. In the context of COVID-19, positive re-interpretation of pandemic-related stress might involve highlighting the silver linings, such as the affordance of time with family or a break from routine, therefore, re-interpreting the pandemic through a positive lens. So, similar to social support, PA might also intervene at the cognitive appraisal stage of the transactional model and promote positive re-appraisal through potentially enhancing cognitive functioning.

PA promotes emotional regulation. Another means through which PA has been suggested to exert a protective effect is through facilitating emotional regulation. Engaging in PA has been proposed to induce physiological and hormonal changes that can potentially have antidepressant effects (Neta et al., 2019). Research has detected an increase in the secretion of neurotransmitters such as serotonin, dopamine, and norepinephrine in the plasma following PA. This increase in the availability of "happy hormones" is further associated with a reduction in depression symptoms and an overall positive impact on emotional well-being (Craft & Perna, 2004). PA has also been proposed to increase the secretion of endorphins such as β-endorphins. Endorphins have been further correlated with an enhanced sense of well-being and a positive mood (Craft & Perna, 2004). Hence, through the release of neurotransmitters and endorphins, PA can potentially intervene at the outcome stage of the transactional model and promote emotional regulation. Therefore, PA can potentially exert a protective effect against a stressful appraisal through improved self-efficacy, positive re-appraisal, and emotional regulation. However, this protective effect potentially dissipates under highly mentally stressful circumstances.

Smoking and depression

Smoking significantly moderated the relationship between mental stress and depression scores in the current sample. At all levels of mental stress, regular smokers scored lower on the depression scale in comparison to non-regular smokers. However, when mental stress was high, the difference between smokers and non-smokers was stronger, with the smokers reporting low depression scores (refer to Figure 4). These results insinuate that smoking, as a passive coping strategy, might have exerted a protective effect among older adults in Aotearoa while dealing with the stress induced by the COVID-19 pandemic and lockdowns.

Smoking as a passive coping strategy has been cited in the literature to be adapted by individuals to cope with highly stressful situations (Rosario et al., 2011). Smokers have reported that smoking during distressing times provides them with immediate relief through an instantaneous ‘time out’ (Clancy et al., 2013). This short-lasting relief has been correlated with a reduction in negative feelings and a positive change in mood during stressful times among smokers. Longitudinal research during the COVID-19 pandemic in the UK reported that smoking might have been used as a passive coping mechanism to manage the feelings of depression, stress, and social isolation caused by the pandemic among older adults (Gaggero, 2022). These reports align with the results observed in the current study, where smoking was detected to moderate the relationship between stress and emotional well-being positively.

Smoking provides temporary emotional regulation. Smoking has been characterized as an emotion-focused coping strategy in the wider literature as it aids an individual in alleviating the negative emotions elicited by the stressor (Mansouri et al., 2019; Rosario et al., 2011). Emotion-focused coping strategies attempt to reduce negative emotions, such as fear and sadness, without addressing the root cause of the stress (Bazrafshan et al., 2014; Biggs et

al., 2017). One of the theories behind the frequent use of smoking as a coping strategy cited the impact of nicotine on the central nervous system (CNS). The nicotine in cigarettes has been reported to stimulate the release of dopamine in the CNS, which has the potential to reduce negative emotions elicited by the stressor and boost mood (Benowitz, 2009). Moreover, nicotine has also been associated with providing an immediate sense of relaxation following its use (McKee et al., 2011). Therefore, this release of dopamine and promotion of relaxation accompanied by smoking might potentially assist an individual in regulating their emotions, even for a short period of time. These results lend evidence for the transactional model, as smoking might have been used to temporarily mitigate the negative impact of a stressful appraisal by older adults during the pandemic.

Smoking used as a coping strategy in the absence of other strategies. Previous research has suggested that individuals might utilize smoking as a coping strategy during stressful times in the absence of other adaptive coping strategies (Can et al., 2017; Rosario et al., 2011). Individuals who perceive that they lack adaptive coping strategies, such as support from social connections or low self-efficacy, might be likely to use a wide variety of psychoactive substances, including cigarettes, as an avenue for coping. Adaptive coping strategies are crucial on a daily basis to aid in mitigating the negative impact of the stressors (Cohen et al., 2016). However, in the absence of adaptive coping, individuals might rely on or engage in coping strategies that provide momentary relief but are associated with adverse health outcomes in the long term (Clancy et al., 2013). Aligning with the transactional model during the COVID-19 pandemic, as the mandatory lockdowns discouraged individuals from connecting with social contacts from different bubbles, a sense of isolation and loneliness might have been elicited (Stephens & Breheny, 2022). The potential disconnection from social networks among older adults might have negatively impacted their emotional well-being and

potentially encouraged the use of passive coping strategies. This could lead to an individual utilizing smoking as a coping strategy to alleviate the negative emotions induced by the negative secondary appraisal of the stress during the pandemic.

Alcohol consumption and emotional well-being

Alcohol consumption was the only coping strategy that moderated the relationship between both depression and anxiety scores and mental stress among older adults. At high mental stress levels during the COVID-19 pandemic, high alcohol consumption was associated with lower scores on the depression scale (refer to Figure 3) but higher scores on the anxiety scale (refer to Figure 6) in comparison to moderate and low alcohol consumption. The results indicated that alcohol consumption might be protective against the experience of depression symptoms but might also induce anxiety symptoms at high stress levels. Thus, alcohol consumption had contrasting effects on the experience of depression and anxiety symptoms. Previous research has suggested that alcohol as a coping strategy could moderate the relationship between stress, anxiety status and depression symptoms (Cooper et al., 1992; García-Arroyo & Cárdenas Moncayo, 2022).

Alcohol consumption interrupts the appraisal process. Alcohol consumption as a coping strategy has been associated with disrupting theappraisal of a stressor in an individual's environment. Alcohol consumption interferes with the cognitive processes involved in processing information and formulating an appraisal (Sayette, 1999). One hypothesis behind how alcohol consumption disrupts cognitive processing is through the activation of the hypothalamic-pituitary- adrenal axis (HPA). The HPA is a stress-induced hormonal system that aims to assist an individual in mitigating the impact of a stressor and promoting self-regulation (Sayette et al., 2001). The activation of the HPA axis under stressful conditions

stimulates the release of glucocorticoid hormones, especially cortisol, which has been reported to influence an individual's cognitive processing abilities (Stephens & Wand, 2012). Sustained increase in cortisol levels has been reported to lower brain activity and have a negative impact on overall cognitive function (Souza-Talarico et al., 2011). Thus, one of the ways that alcohol might exert its short-term protective effects is by intervening at the cognitive appraisal stage. Through the transactional model's lens, this interference at the appraisal stage might prevent an individual from formulating a stressful appraisal and therefore, hinder the negative impact on the emotional well-being.

Alcohol consumption to regulate emotions. Alcohol as a coping strategy has also been used to respond to a negative emotional state such as fear and helplessness during a stressful time. The main motive behind using alcohol as a coping strategy is associated with minimizing the unpleasant emotions triggered by the stressor (Cooper et al., 2008). Previous research has associated alcohol consumption with the release of β-endorphins and enkephalins in the CNS (Dunbar et al., 2017). These β-endorphins help reduce stress and promote an improved sense of well-being for the short term. Moreover, the β-endorphins release has also been correlated to stimulate dopamine release in the brain which, can further aid in alleviating negative emotions while promoting an overall positive shift in an individual's mood (Ward et al., 2009). Indirectly, the release of β-endorphins has also been recognized to stimulate the release of neurotransmitter GABA in the CNS. GABA release in the CNS has been associated with promoting feelings of relaxation and having a mood-enhancing impact (Olsen & Liang, 2017). Therefore, alcohol consumption as a coping strategy might also intervene at the outcome stage of the transactional model, and through neurochemical changes in the brain, promote emotional regulation; hence, assisting in alleviating the negative emotions produced by the stressor. It is also important to highlight that the above discussed mechanisms through which

alcohol and smoking might exert short-term "protective" effects are only hypotheses and not evidence to promote utilization of alcohol and smoking to cope with stressful situations.

Avenues to enhance social support

Results from this study lend evidence for Lazarus and Folkman's transactional model. The transactions between an individual and the stressor in their environment during the pandemic impacted their emotional well-being and this impact was moderated by varying coping strategies. The evidence from wider literature and the current study suggested that all four coping strategies aid in alleviating the negative impact of stress on the emotional well-being. However, smoking and alcohol consumption as passive coping strategies provide short-term benefits and are associated with well-established negative health impacts over long-term use. This negative impact on health is possibly one of the reasons behind the lack of focus in the literature for these passive coping strategies. On the contrary, social support and PA (to an extent) moderated against the stress induced by the pandemic and promoted a better overall emotional well-being and mental health. Thus, avenues enhancing social support among older adults and the wider population as a coping strategy can potentially be beneficial.

Promoting intergenerational connection

One of the avenues through which social support among older adults can potentially be enhanced is by promoting a social connection between younger and older generations (Suragarn et al., 2021). The rationale behind this approach is based on the exchange of information between the generations facilitating enrichment of social support and connection. In theory, older adults can provide wisdom, values, skills, and affection in the intergenerational connection. Meanwhile, the younger generation can contribute by sharing their skills around technology and reciprocating affection (Annear et al., 2017). This exchange of information and

resources can possibly act as a foundation to enhance the existing social support system but also widen the social support network of older adults. These intergenerational connections can potentially be promoted through events organized by collaborating with schools, universities, charities, and the wider community.

One of these intergenerational programs in the UK, named 'Time After Time', promoted connection among older adults and high school students between 2011 and 2012. The program included one-to-one and group interactions ranging from artistic and creative events such as tea parties, Tai Chi, sharing memories and lunches. The older adults who participated in the program reported that participation enhanced their confidence, self-esteem, social skills and positively impacted their emotional and overall well-being (Teater, 2016). Older adults also expressed that the interactions with the younger generation "*gave them a sense of belonging and opportunity to communicate with everybody from all ages"* (Teater, 2016, pg. 13). Therefore, promoting intergenerational connections can potentially be one of the avenues to enrich and enhance social support among older adults.

Digital Interventions

Intergenerational events to promote social connection are a promising avenue; however, in another socially isolating pandemic, digital interventions that aim to promote social connection and communication might also be helpful. Interventions that promote proficiency in telecommunication, such as videoconferencing and social networking sites, can possibly assist in sustaining and enhancing social support (Welch et al., 2022). The COVID-19 pandemic rapidly shifted a lot of face-to-face interactions to digital platforms, for example, accessing healthcare through telecommunication or keeping in touch with close friends through zoom or skype. Systematic reviews have indicated that the proportion of older adults that utilize digital technology is smaller than that of the younger generation across the globe (Oh et al.,

2021). Therefore, encouraging interventions that aim to reduce the digital barrier among older adults can potentially be beneficial in enhancing social connections. These digital interventions can be combined with the intergenerational approach, where the connection between the generations might be promoted by encouraging the dissemination of skills and knowledge of digital platforms.

Community-based group physical activities

Another avenue that can potentially be explored to enrich social support while also improving overall well-being among older adults involves community-based group physical activities. Older adults have expressed to value physical activity groups as they provide an opportunity to connect with others and make friends (Suragarn et al., 2021). As both PA and social support positively impact overall health and emotional well-being, combining them as an avenue for socialization and enhancing social support among older adults might be beneficial. Investigating this hypothesis, one of the programs in the US named EnhanceFitness (EF) combined a structured exercise program with social connection at the heart of the program for older adults (Chiang et al., 2008; Suragarn et al., 2021). Participants of the EF program highlighted that the program quickly became a main outlet for socializing, meeting peers of the same age, and staying active. The participants also reported that the social support received during the program aided them in adhering to the exercise program and gave them an opportunity to develop a sense of belonging and group cohesion. The EF program has since been established and offered in 177 sites across the whole US (Chiang et al., 2008). Thus, community-based group physical activities might be utilized as an avenue to enrich and enhance social support among older adults.

Significance of the results for the Māori population

All research conducted in Aotearoa is of interest and has significance for Māori, the indigenous people of Aotearoa (National Ethics Advisory Committee [NEAC], 2022). The current study did not control for ethnicity in the analysis; however, Māori participants were oversampled at every wave of HWR's data collection (Phillips, 2019). Thus, the results from this study have significance and can contribute to Māori health outcomes. The results aligned with the Māori worldview and endorsed social connection as important in buffering and alleviating negative emotions during stress. Whanaungatanga, a highly regarded value in Māori culture, aligns with these results and promotes the strengthening of and forming of new relationships among the Māori community (Rameka, 2018). This value has been recognized as a foundation that provides a sense of cohesion and unity during stressful times in the Māori culture. A recent health report focusing on Māori mental wellbeing highlighted that Māori individuals with high social support reported being significantly less likely to experience symptoms of psychological distress. Moreover, strong social networks and the availability of social support among Māori were also reported to correlate positively with secure cultural identity and connectedness (Russell, 2018).

Implementing the above-mentioned programs to enhance social support among older adults could be executed through collaboration with Māori communities. This will also align with the three principles of Te Tiriti of Waitangi. The participation and partnership among the Māori population can potentially be encouraged by involving Māori in developing and implementing programs that promote social connection. As whanaungatanga and social connection are engrained in Māori culture, the partnership might be able to provide insight into how Māori develop and maintain social connections. The protection principle can be incorporated by encouraging and reinforcing the reliance on social connections for support among the Māori iwi/hapū during stressful times.

Strengths and Shortcomings

One of the strengths of the current study was its longitudinal research design. The study utilized data from before (2018) and after (2020) the COVID-19 pandemic and, to the best of my knowledge, is the first study to assess the impact of COVID-19 on the emotional well-being and coping strategies of older adults in Aotearoa. Most of the literature during the pandemic adopted a cross-sectional research design to understand the pandemic's burden at one point in time (Maugeri et al., 2020; Sidor & Rzymski, 2020; Vanderbruggen et al., 2020). However, the longitudinal research design expanded by further exploring the changes in both emotional well-being and coping strategies of older adults following the pandemic. Additionally, the longitudinal design allowed for the exploration of interactions between variables, such as the observed moderating effect of variables coping strategies on mental stress and emotional well-being. This exploration of moderating effects (which will need confirmation in other samples) of coping strategies provides evidence for resources that can potentially be strengthened and utilized to improve well-being and quality of life of older adults.

Another strength of the study was that it focused solely on the experience of older adults following the COVID-19 pandemic. Older adults during the pandemic were recognized as a vulnerable and 'at-risk' population. However, their input and voices were not included at any stage of the pandemic response planning and policy formation (ESCAP, 2022). It was recognized that older adults as a population became highly visible during the pandemic, but their voices, opinions, and concerns did not (Kornfeld-Matte, 2020). Hence, the current study's findings highlight the pandemic's impact on older adults which can potentially aid in initiating

a conversation around proactive planning for future pandemics that places older adults at the center.

The current study also had some shortcomings. The data used for analysis in this study was collected using a structured survey with predominantly close-ended questions. These close-ended questions might have limited an individual's experience of the pandemic and compelled them to fit their experience into the pre-assigned options available (Cheung, 2021). Another limitation of the self-reported data used in this study is the potential influence of emotional response bias. Emotional response bias is a measurement error that occurs when an individual's emotions influence the self-assessment of experience at the time of reporting (Rosenman et al., 2011). For instance, if an individual felt exceptionally happy or angry while completing the survey, their response pattern might be affected. In the current study, the data might have been affected by the emotional state of older adults while completing the survey. The older adults might have over or under-estimated their PA, smoking, alcohol consumption, and perceived stress, possibly not providing accurate data on the impact of the pandemic (Askim & Knardahl, 2021).

The results from the current study cannot be generalized to the wider older adult community of Aotearoa as the sample only included older adults dwelling in the community. The study did not collect data on the pandemic experience of older adults in residential care facilities. Older adults in residential care settings likely experienced a different side of the pandemic, as in Aotearoa, care facilities implemented strict no-visitor policies and suffered multiple outbreaks (Jefferies et al., 2020). Therefore, the lack of connection from family and the harsher burden of the COVID-19 pandemic in residential care facilities might have had a variable impact on the emotional well-being and coping of older adults. Moreover, the results

also might not be generalizable to a geographically varied population of older adults across the globe due to the varying COVID-19 public health responses.

Implications and scope for future research

The results from the current study highlighted the protective role of social support as a coping strategy for older adults during unprecedented and stressful times such as a global pandemic. These results have important implications for future government planning and policy regarding the type of support beneficial for older adults during pandemic responses. The inclusion of provisions through which social support can be enhanced and maintained during the pandemic situation might be a valuable addition to the broader policy framework.

The findings also serve as a foundation for various areas of research that can potentially be explored. Future research could potentially investigate whether educating and disseminating information about the significance of social support might be beneficial. This dissemination of information might help promote and strengthen social networks among not only older adults but all age groups. Thus, applied research educating individuals about the benefits of social support on emotional and overall well-being might be helpful.

Moreover, during the COVID-19 pandemic, digital technology has been indispensable. As an avenue to reduce the transmission of the virus during the pandemic, digital technology provided a means to stay connected with loved ones and health professionals. However, older adults might have received the short end of the stick due to their lack of familiarity and experience with digital technology. Thus, future research can also explore the acceptance of digital technology as an avenue for staying connected and promoting social connection among older adults. Inductive approaches such as qualitative or mixed-method research might be

useful in highlighting the experience of older adults with technology and identifying their needs going forwards.

The investigation of the long-term impact of the pandemic and public health measures might also be useful in the near future. This study analyzed the data obtained immediately after the relaxation of the initial public health restrictions in Aotearoa in 2020. As discussed before, the silver linings of the initial lockdown might have masked the true impact of the pandemic on the emotional well-being and coping of older adults. The current study potentially did not capture the evolving trend in the impact of the COVID-19 pandemic on older adults' emotional well-being and coping. Also, research exploring the long-term impacts of the COVID-19 pandemic has suggested that the experience of isolation and health-related anxiety has the potential to have a long-lasting impact on emotional well-being (Falvo et al., 2021). Future research utilizing similar objective measures of emotional well-being (CES-D and GAI-SF) to explore the long-term impact of COVID-19 public health measures might also be valuable.

Another avenue for future research might involve exploring the role of resilience. As older adults' emotional well-being and coping were the focus of the current study, lived experience and resilience developed during their lifetime might have played a role in navigating the stressful times during the pandemic. The current analysis did not explore the role of resilience. Research has suggested that older adults regulate their emotions constructively in comparison to other age groups, potentially with the help of resilience and coping skills accumulated during their lifespan (Charles, 2010). Future research exploring the role of resilience in the relationship between stress, emotional well-being, and coping might also be beneficial.

Conclusion

Overall, the findings from this study highlighted that the COVID-19 pandemic and associated public health measures negatively impacted the physical, mental, and economic well-being of older adults in Aotearoa. However, it is likely that the 'silver linings' associated with the pandemic aided in mitigating the negative impact on the over well-being. The 'enforced togetherness', the opportunity to pause and reflect, and clear guidance from the government might have played a role in the observed low perception of stress among older adults during the pandemic. Future research evaluating the long-term impact of the COVID-19 pandemic on perceived stress and emotional well-being might be beneficial in planning for potential outbreaks of the new contagious COVID-19 variants.

The results from the current study also aligned with Lazarus and Folkman's transactional model of stress and coping. The low perception of stress and no detectable changes in the emotional well-being of older adults between 2018 and 2020 aligned with the transactional model. As the older adults did not perceive the early stages of the pandemic as threatening or stressful, no downstream changes in their emotional well-being and coping strategies were observed. However, the moderation analysis indicated that coping strategies moderated the relationship between stress and emotional well-being. Of the coping strategies considered, passive coping strategies (alcohol and smoking) aided in temporarily alleviating the stress and negative emotions associated with the pandemic, potentially through intervening at the appraisal or emotional well-being stage.

On the other hand, active coping strategies (social support and PA) also aided in mitigating the stress of the pandemic potentially by promoting cognitive re-appraisal, positive reframing, and self-efficacy. The protective effects of PA possibly dissipated at high-stress levels; however, social support significantly exerted a protective effect even against high-stress

levels during the global pandemic. These findings align with the wider literature in suggesting that support from social networks can potentially buffer against the stress through various means, including but not limited to providing information and emotional support and promoting group identification. Hence, disseminating information and campaigns that highlight the significance of social connections and support might be beneficial for older adults and the wider population in the future.

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