Growing Up in New Zealand

Life during Lockdown

Findings from the *Growing Up in New Zealand* COVID-19 Wellbeing Survey

PART 1: HEALTH AND WELLBEING

MINISTRY OF SOCIAL DEVELOPMENT
TE MANATŪ WHAKAHIATO ORA

Growing Up in New Zealand:

Life during Lockdown: Findings from the GUiNZ COVID-19 Wellbeing Survey

Part 1: Health and Wellbeing

Authors

Natalie Walker
Nandini Dubey
Molly Bergquist
Stephane Janicot
Boyd Swinburn
Carin Napier
Elizabeth Peterson
Rebecca Evans
Sarah Gerritsen
Fiona Langridge
Kane Meissel
Sarah-Jane Paine
Te Kani Kingi
Seini Taufa
Avinesh Pillai
Pat Bullen
Karen Waldie
Ashley Smith
Clare Wall
Susan Morton

September 2021

Suggested Citation: Walker N, Dubey N, Bergquist M, et al. The GUiNZ COVID-19 Wellbeing Survey: Part 1: Health and Wellbeing. Auckland: *Growing up in New Zealand*, 2021.

ISSN: 2253-251X (online)

Contact details: Professor Boyd Swinburn, Acting Research Director, *Growing Up in New Zealand*, PO Box 18288, Auckland 1743, Phone +64 9 373 7599

Further information on *Growing Up in New Zealand* is available at www.growingup.co.nz

This report was produced by the University of Auckland with Crown funding managed by the Ministry of Social Development. www.msd.govt.nz

The cover image and the image on pg 3 were taken by photographer Shona Dey. They are part of her Lockdown Bubble series which documented families in their neighbourhood during the 2020 Level-4 Lockdown.

uniservices
IDEAS TO LIFE RANGAHAUA KIA WHAI HUA

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

Table of Contents

Policy Summary

Summary

In March 2020, the New Zealand Government introduced a four-level COVID-19 alert system, with each level considering the immediate level of risk and outlining the required restrictions that legally had to be followed to minimise the risk of catching and/or spreading COVID-19. As the levels increased, restrictions increased on population movement, travel, and gatherings. The alert levels were Level 1 (Prepare); Level 2 (Reduce); Level 3 (Restrict); and Level 4 (Lockdown).

This policy brief draws on findings from a bespoke online COVID-19 Wellbeing Survey delivered early in the first nationwide lockdown in May 2020 when the country was at COVID-19 Alert Levels 2 and 3 and completed by 2,421 children aged 10-11 years participating in the *Growing Up in New Zealand* longitudinal study. The survey provided the opportunity to: 1) determine the children's experiences during Alert Levels 2 - 4, including their health and mental wellbeing, schooling, connectedness, media use, and nutrition; and 2) ascertain the level of engagement by the cohort in a bespoke online digital data collection process. This report focusses on the health and mental wellbeing outcomes from the survey and compares the findings to when the children were approximately eight years of age.

The report found:

- Overall, 83% of children reported 'very good' to 'excellent' health during COVID-19 Alert Levels 2-3, and approximately 60% had no symptoms associated with depression or anxiety.
- There was an improvement in health (since they were eight) in about a third of children, and a general decline in anxiety over time.
- There was an increase in the number of children reporting symptoms related to depression, compared to when they were eight years of age.
- Clear subgroups of children were disproportionately impacted by the COVID-19 restrictions (both positively and negatively).
- The response rate of 42% was reasonably high for a digital survey of this nature especially given no prior update of digital addresses given the unexpected pandemic.

The observed changes in mental health seen in this cohort of children may be age-related or could be attributable to the impact of the COVID-19 restrictions. These findings highlight the need to prioritise child mental health and wellbeing during the pandemic and provide appropriate support to families/whānau and their children.

Context

Concerns have been raised about the potential impact of the COVID-19 periods of lockdown and restrictions in movement on the health and mental wellbeing of New Zealand children. Children have been identified as a group vulnerable to the psychosocial impacts of the pandemic as they often lack properly developed coping strategies, and emotional reactions may result in them experiencing greater stress and trauma.

The social distancing measures implemented as part of the pandemic response in New Zealand limited access to schools and social interactions between children, separated some children from their families and whānau, restricted access to child protection and other social services and restricted access to usual levels of physical exercise, all of which may have negative impacts on children's physical and mental health. Moreover, children in vulnerable socioeconomic positions and marginalised communities, or children with disabilities may be disproportionately impacted by the pandemic.

To determine the impact of the pandemic on New Zealand children, longitudinal information on child health and wellbeing from before the pandemic needs to be compared to information gathered during, and after the pandemic. The *Growing Up in New Zealand* data used in this report can provide such information. Longitudinal studies involving children during the time of COVID-19 have been undertaken in other countries, however these countries have had a very different journey though the pandemic, compared to New Zealand.

Findings

Overall, 42% (n=2,421) of the 5,756 eligible children completed the COVID-19 Wellbeing Survey. A higher response rate to the survey was observed for girls, and children with older and more educated mothers. A lower response rate was observed for Māori, Pacific, and Asian children, and children living in rural areas. Cross-sectional and longitudinal analyses were undertaken, adjusting for socio-demographics, predictors of depression and anxiety, and co-variates from the COVID-19 Wellbeing Survey. The outcome measure from the eight-year data collection wave (DCW) was also considered as a potential covariate for the cross-sectional multivariate models.

Positive findings around general health

- Approximately eight in every ten children reported they had 'very good' to 'excellent' health at the time of the survey.
- One in three children had an improvement in their health since they were eight years of age.
- Asian children and children with two or more wellbeing and development concerns (e.g., disabilities or learning challenges) when they were eight years of age, were more likely to have an improvement in health over time.

Positive findings around mental health

- Approximately six in every ten children had no clinically significant depressive symptoms or symptoms of anxiety at the time of the survey.
- Compared to European children, there was a decrease in the proportion of Māori and Pacific children with symptoms of depression, from when the children were eight years of age.
- Pacific children had significantly lower anxiety scores at the time of the survey, compared to European children.
- Children with 5-6 regular positive experiences during Alert level 4, had significantly lower mean anxiety scores, compared to children with no or very few regular positive experiences.
- Pacific children, and children who were overweight when they were eight years of age, had a decrease in anxiety from when they were eight to the time of the COVID-19 Wellbeing Survey.

Findings of concern around general health

- Children who were less connected with friends and family outside of the home during Alert Level 4, or at the time of the survey were worried about how much money their family had, or were still undertaking schoolwork at home, were more likely to report poorer health at the time of the survey.
- Children who had obesity when they were eight years of age reported poorer health at the time of the survey, compared to children of normal body size.
- 9% of children had a decline in their reported health.
- Children who were underweight when they were eight years of age were less likely to report an improvement in health over time, compared to children of normal body size.

Findings of concern around mental health

- At the time of the survey, girls, children who were worried about how much money their family had, and children with two or more wellbeing and developmental concerns (e.g., disabilities or learning challenges) when they were eight, were more likely to have higher depression and anxiety scores.
- At the time of the survey, children who woke frequently during the night when they were eight, had higher anxiety scores than children who didn't wake during the night.
- At the time of the survey, children who had a mother with a history of depression were more likely to have higher depression scores.
- Girls, and children who were always or often worried about how much money their family had at the time of the survey, had an increase in depression and anxiety from when they were eight to the time of the COVID-19 Wellbeing Survey.
- Having symptoms of depression and anxiety at eight years of age was strongly predictive of having symptoms of depression and anxiety at time of survey.

Implications

Who was more likely to experience one or more negative changes in their health and wellbeing, from when they were eight years of age to the time of the covid-19 wellbeing survey?

1. Girls
2. Children who had a mother with a history of depression.
3. Children who worried about how much money their family had.
4. Children who had highly educated mothers.

Who was less likely to experience one or more negative changes over time?

1. Children with six or more people in their 'bubble' during Alert Level 4

Despite the limited generalisability of the findings, given two thirds of the cohort did not participate in the survey (particularly Māori, Pacific and Asian children, and children living in rural New Zealand), the report provides much needed information to guide development of appropriate strategies and support for New Zealand children and their whānau, both during and post-pandemic.

To date, New Zealand has been one of the most successful countries in the world to control the pandemic, achieved through a focus on an 'elimination' strategy. However, New Zealanders have still been impacted by the significant economic and social consequences of COVID-19. Although some of the observed findings may be age-related, New Zealand children have not been immune to the impact of the COVID-19 pandemic. Moving forward, child wellbeing and mental health needs to be prioritized, as it remains unknown what the long-term impact of the COVID-19 pandemic will have on children, particularly in those children already showing signs of distress.

Recommendations

1. Acknowledge the observed strength and resilience of children in respect to their health and mental wellbeing, particularly Māori and Pacific children.

2. Provide caregivers with tools and resources to identify early signs of depression and/or anxiety in children, and appropriate pathways for action. For example, offer family-centric services, not just individualised services, as children's mental health may be impacted by wider stressors within the family.

3. Provide children with age-appropriate tools and resources to identify early signs of depression and anxiety, and appropriate pathways for action. Given the strong shift to 'online' education and support because of COVID-19, mobile and virtual mental health support services may be more acceptable and accessible. However, as part of this move it will be important to ensure equitable access to digital technologies for all families with children. Examples of mobile and virtual mental health support services include:

   - The free SPARX youth online evidence-based mental health programme (www.sparx.org.nz), hosted by the University of Auckland, and funded by the Prime Minister's Youth Mental Health Project could be more actively promoted to children and young adults. The programme includes an initial screening for depression and anxiety and a referral pathway for children in immediate need of more active support.

   - Various evidence-based and culturally-tailored mental wellbeing mobile apps designed specifically for children and young people have been reviewed on the New Zealand 'Health Navigator' website (www.healthnavigator.org.nz/), including one that focuses on mental wellbeing during COVID-19.

   - Other New Zealand-specific apps currently being evaluated in clinical trials (and if successful, may be widely accessible in New Zealand) include:

     - 'Whitu': a culturally-appropriate coping skills app providing 'seven ways in seven days' to support the emotional wellbeing of young people during the COVID-19 pandemic, with a focus on depression and anxiety. Development of the app was led by researchers from Psychological Medicine, University of Auckland and co-designed by mental health, e-health, and Māori and Pacific researchers.

     - 'Village': a culturally-appropriate app that aims to reduce youth suicide by encouraging young people to connect with their support networks (referred to as 'buddies') if they are thinking about self-harm and suicide. Development of the app was supported by Auckland Savings Bank, the Starship Foundation, and Datacom, with the app currently being evaluated by Auckland District Health Board.

4. Continue to support families to be financially secure and decrease child poverty, e.g., have (real) living wages and increases to benefits, and improve educational opportunities for young women and mothers.

5. Deliver an education campaign alerting parents/caregivers that their children may significantly worry about money and providing parents/caregivers with strategies for reassuring their children.

6. Investigate what additional resources and support are needed by families with children who have disabilities or learning challenges, to support mental wellbeing should New Zealand move up Alert levels in the future.

7. Investigate how well online teaching environments meet the needs of children who have disabilities or learning challenges during times of Alert Level 3 and 4.

Executive Summary

The purpose of this report is to provide a snapshot of the health and wellbeing of New Zealand children aged 10-11 years during the early period of the COVID-19 pandemic, and the associated lockdown in 2020. The report presents findings from an opportunistic bespoke COVID-19 Wellbeing Survey of 2421 children from the *Growing Up in New Zealand* (GUiNZ) longitudinal cohort study.

The survey was delivered during COVID-19 Alert Levels 2 (Reduce) and 3 (Restrict) in May 2020, with survey questions related to these Alert Levels or the earlier Alert Level 4 (Lockdown). The survey is one of the largest in New Zealand and the world to date, to explore changes in health and wellbeing in 10-11 year old children from before the time of COVID-19 to during COVID-19. Highlights from the report are provided below.

Strength in the face of adversity

The general health of most children was unaffected during COVID-19 Alert Levels 2 and 3 – despite this time bringing significant uncertainty, restrictions in movement, and personal and family stress. Overall, 84% of children reported their current health was 'very good' to 'excellent', compared to 64% at the eight-year data collection wave. Furthermore, 28% of children had an improvement in their health since they were eight years of age, and there was a general decline in symptoms of anxiety. Additionally:

- Having 'very good' to 'excellent' health at eight years of age, strongly predicted having 'very good' to 'excellent' health at the time of the COVID-19 Wellbeing Survey.
- Children of Asian ethnicity, or whose mothers reported their child had two or more concerns about their child's wellbeing and development when they were eight years of age, were more likely to report an improvement in health.
- Māori and Pacific children had a decline in depression over time, compared to European children.
- Children of Pacific ethnicity had a decline in anxiety from when they were eight years of age to the time of the COVID-19 Wellbeing Survey, compared to European children.
- Children who had had five to six regular positive experiences during Alert level 4, experienced a decrease in symptoms of anxiety from when they were eight years of age.
- Children who were overweight at eight years of age had a decline in anxiety over time, compared to normal weight children.
- Being in a bubble during Alert Level 4 (Lockdown) with six or more people was protective of negative health and wellbeing changes over the two DCWs.

COVID-19 Alert Levels 2 and 3 were a challenging time for some children.

For some children life was more difficult during COVID-19 Alert Levels 2 and 3, with poorer physical and/or mental health at the time of the survey compared to the eight-year data collection wave. Current health was 'fair' to 'poor' in 3% of children, 41% of children had clinically significant symptoms of depression, and 33% had symptoms of anxiety.

- Children who had obesity when they were eight years of age; those who felt less connected with friends and family not living with them during Alert Level 4; those who were more worried about how much money their family had at the time of the COVID-19 Wellbeing Survey; or those who were still undertaking schoolwork at home at the time of the survey were more likely to report poor health.

- Girls, children who were more worried about how much money their family had, and children whose mothers reported having two or more concerns about their child's wellbeing and development when they were eight years of age, were more likely to report symptoms of depression or anxiety at the time of the COVID-19 Wellbeing Survey.
- Children were more likely to report symptoms of depression if their mother had a history of depression.
- Children were more likely to report symptoms of anxiety if they woke often during the night when they were eight years of age.

Looking at the data longitudinally, 9% of children had a deterioration in their self-reported health since they were eight years of age, particularly if they were underweight at the eight-year data collection wave. There was also an increase in symptoms of depression over time in the cohort of children. Furthermore:

- Having symptoms related to depression or anxiety when they were eight years of age, strongly predicted the children having symptoms related to depression or anxiety at the time of the COVID-19 Wellbeing Survey.
- At the time of the survey, children who woke frequently during the night when they were eight, had higher anxiety scores than children who didn't wake during the night.
- Girls, and children who were always or often worried about how much money their family had, had an increase in depression and anxiety from when they were eight to the time of the COVID-19 Wellbeing Survey.

Looking ahead

The findings from this report provide a glimpse into the lives of New Zealand children during the early period of the COVID-19 pandemic in New Zealand, highlighting both the positive and negatives short term impacts of the Government COVID-19 restrictions on their wellbeing.

Findings are consistent with what little published research exists on the impact of the pandemic on children. However, the findings are not generalisable to all New Zealand children, given the low survey participation rate (particularly from Māori, Pacific, and Asian children and those living in rural areas which was impacted by not having accurate digital addresses for these groups).

Despite this, the findings provide policy stakeholders with information to help guide development of appropriate strategies and support for New Zealand children and their families should New Zealand move into higher COVID-19 Alert Levels in the future. The scheduled GUiNZ 12-year DCW will be important, as it provides the opportunity to not only verify the report findings but also to assess the longer-term impact of the pandemic on the GUiNZ children.

List of Figures

List of Tables

Glossary

Term	Definition or translation
ANOVA	Analysis of variance
BMI	Body Mass Index
CES-D-10	Center for Epidemiological Studies Depression Scale
COVID-19	The abbreviated name given to a novel infectious coronavirus
DCW	Data Collection Wave
DHB	District Health Board
GLM	Generalized Linear Model
GUiNZ	*Growing Up in New Zealand*
IQR	Inter-quartile range
MBIE	Ministry of Business, Innovation and Employment
MSD	Ministry of Social Development
MSLSS	Multidimensional Students Life Satisfaction Scale
NCEA	National Certificates of Educational Achievement
NZDep2013	New Zealand Index of Deprivation 2013
PHQ-9	Patient Health Questionnaire - 9
PROMIS	Patient Reported Outcomes Measurement Information System
SAP	Statistical Analysis Plan
SD	Standard Deviation
USA	United States of America
WHO	World Health Organization

1. Introduction

COVID-19 is the name given to disease caused by the coronavirus SARS-CoV2, first identified in Wuhan, China in 2019. As a novel virus for which humans have no pre-existing immunity, the world's population is highly susceptible to infection. On the 11th March 2020 the World Health Organization (WHO) declared that COVID-19 had become a pandemic (1). As of the 26th May 2021, the number of confirmed cases of COVID-19 worldwide was 167,492,769 with 3,482,907 deaths (21%) (2). As of August 2020, most cases of COVID-19 globally have been reported in adults over 30 years of age, with only 3.7% of cases under 14 years of age (3).

1.1 COVID-19 in New Zealand

The first case of COVID-19 in New Zealand was identified on the 28th February 2020 (4). The New Zealand Government's response to COVID-19 was fast and effective, with border entry measures immediately implemented. In March 2020, the Government introduced a four-level alert system to "manage and minimise the risk of COVID-19 in New Zealand" (5). Each level considered the immediate level of risk and detailed the required restrictions that legally had to be followed by New Zealanders to minimise the risk of catching and/or spreading COVID-19. A summary of the alert levels is below: (5).

- Alert level 1 (Prepare): No restrictions on movement, domestic travel, or gatherings. All educational facilities, public venues and businesses are open. People are encouraged to maintain records to enable contact tracing.
- Alert level 2 (Reduce): People can mix with friends and family. Educational facilities, business and public venues can open, but with physical distancing. Gatherings of up to 100 people are permitted. Sport and recreation activities are permitted. Inter-regional travel is permitted. Face coverings are required on public transport and aircraft (with some exemptions). People are encouraged to maintain records to enable contact tracing.
- Alert level 3 (Restrict): All people are advised to stay at home in their immediate household unit or 'bubble', but the bubble can include external caregivers, close family, or isolated people. Only essential movement is permitted, but safe recreational activity is allowed in the local area with physical distancing. Children should be schooled at home, but educational facilities can open with limited capacity. Public venues are closed. Businesses can open provided they have no physical interaction with customers. Gatherings of up to ten people are permitted but only for certain events. Inter-regional travel is restricted. People are encouraged to maintain records to enable contact tracing.
- Alert level 4 (Lockdown): All people are advised to stay at home in their immediate household 'bubble', except for essential movement, although safe recreational activity is permitted in the local area with physical distancing. All educational facilities, public venues and all businesses must close, except essential services. Gatherings are cancelled and travel is significantly restricted. People are encouraged to maintain records to enable contact tracing.

At 11:59pm on the 25th March 2020, in response to a rapid increase in the number of COVID-19 cases in the country, New Zealand moved into Alert Level 4. This lockdown continued until 11:59pm on the 27th April 2021, whereupon the whole country was dropped back to Alert Level 3. At 11:59pm on the 13th May 2020, New Zealand dropped back to Alert Level 2. The COVID-19 Wellbeing Survey discussed in this report was delivered between the 8th - 24th May 2020.

On the 7th April 2020, the Ministry of Health confirmed that the New Zealand Government would utilise an 'elimination' pandemic strategy, with the goal to eliminate COVID-19 in New Zealand (or reduce numbers to a very low target range) until the availability of a vaccine or effective treatment (6). Furthermore, the Government activated the first three stages of its six-phase pandemic strategy, namely Plan For It (planning and preparedness); Keep It Out (border management); and Stamp It Out (cluster control).

Throughout the pandemic strategy there was an explicit focus on prioritising equity at all levels of the COVID-19 response. This focus recognised the potential for COVID-19 to exacerbate pre-existing health inequities and create new health inequities, with an awareness that the elimination strategy control measures would disproportionately impact Māori and Pacific peoples and those experiencing socioeconomic hardship.

As of the 24th May 2020, there had been 1505 confirmed or probable cases of COVID-19 in New Zealand and 21 COVID-19 related deaths (4). Just over a third of cases (38%) were in people entering New Zealand, or airline crew, having acquired COVID-19 overseas or during the journey to New Zealand, or in people who were exposed to international returnees (i.e., 62% were community acquired cases, which was why New Zealand was at a high Alert Level at this time). Approximately half of all cases (54%, N=808) at this time had been in those aged between 20-49 years, with 10% (N=157) of cases aged 0-19 years (4). The majority (over 70%) of confirmed or probable cases of COVID-19 were European. Overall, 49% (N=733) of all cases had been reported in the Auckland, Waitemata, Counties Manukau and Waikato District Health Board (DHB) regions (4).

1.2 The impact of COVID-19 on the health and wellbeing of children

As shown above, children (including infants) can contract COVID-19, but international evidence indicates the severity of acute COVID-19 infection tends to be milder compared to adults (although there are cases that have required hospitalisation, and deaths have been recorded) (7-8). Internationally, concerns have been raised about the secondary negative impacts of COVID-19 on child health and wellbeing (9-10). In addition to the physical health threat of COVID-19 itself, the pandemic and its associated control measures have limited children's access to their friends, extended family and schools, separated children from their families and whānau, and restricted access to child protection and other social services (9). These factors have the potential to negatively impact the mental health of children (10).

Finding from two studies (one cross-sectional: N=1784 (11); one a case-control study: N=252 (12) suggest social distancing or quarantine measures associated with COVID-19 may be associated with an increase in children's depression symptoms (11), feelings of sadness, fear, nervousness, annoyance and anxiety-related insomnia (12). These findings are supported by a 2013 mixed-method study (N=398 parents) exploring the psychosocial responses of parents and their children to previous pandemic disasters (13). The study found children placed in isolation and quarantine had a higher risk of developing acute stress disorder, adjustment disorder, grief or post-traumatic stress disorder related to these experiences, compared to children not quarantined (13).

Lifestyle changes, psychosocial stress due to home confinement, loss of income, and the mental health impacts of quarantine during a pandemic have the potential to create a vicious circle (14), with decreased opportunity for children to engage in health and wellbeing promoting behaviours.

International literature about the impact of COVID-19 on child health and wellbeing may have limited applicability to New Zealand, due to the differing severity of the pandemic in New Zealand, the early strong COVID-19 control measures implemented by Government, and New Zealand's socio-demographic context. It is therefore important to look at New Zealand specific information on this topic.

1.3 The impact of Alert Level 4 (Lockdown) on New Zealand children

Few New Zealand studies have asked children and young people about the impact of COVID-19, particularly Alert Level 4 (Lockdown) on their health and wellbeing. These studies are summarised below:

- Youthline undertook an online survey (15) (advertised via Facebook between the 11th – 24th April 2020) of 976 New Zealanders of all ages, of whom 0.2% were under 12 years of age, and 24.8% were aged 12-18 years. The survey found that young people aged 12-18 years were more likely to report that the COVID-19 lockdown had an impact on their mental health, than participants aged ≥25 years. No further data for children/youth under 18 years of age were presented in the Youthline report. Instead, this age group was incorporated under the category "young people <25 years."
- The Ministry of Health undertook a survey, in conjunction with CBG Health Research Limited, of New Zealanders aged ≥15 years who were previous participants in the New Zealand Health Survey and had consented to being recontacted for future research (16). A stratified, multi-stage sampling design was used to select participants. Data were collected via a 10-15 minute phone interview, using Computer Assisted Telephone Interviewing, between 30th March 2020 and the 27th September 2020. Approximately 300 people were interviewed each day. Survey questions focused on the impact of COVID-19 on "health and wellbeing, understanding and compliance of the Alert Level rules" and participants' financial situation in the past week. Weekly reports were published from the survey, but findings were not presented by age group, so no specific results are available for young people. For the week ending 26th April 2020, 77% of respondents felt their wellbeing was the same as usual or better than usual. Between the 5th and 26th April 2020, 11-13% of respondents experienced symptoms related to depression (measured using the adapted version of the Patient Health Questionnaire-2) or anxiety (measured using the Generalised Anxiety Disorder-2 questionnaire) in the past week. However, no information was available about whether these people had had symptoms related to depression prior to the lockdown. Between 34-38% of respondents reported feelings of loneliness and isolation "at least a little of the time" during the above lockdown period – again, no information was available about whether these people had had feelings of loneliness and isolation prior to the lockdown.
- On the 19th May 2020, when New Zealand was at Alert Level 2, the Office of the Children's Commissioner launched a national online survey of children and young people aged 8-18 years (17). The survey focussed on current wellbeing (i.e., at Alert level

2), and experiences during Alert Levels 3 and 4. Data were collected over a three-week period, with 1402 respondents (1373 respondents were recruited via 24 schools, and 29 via youth organisations). The sample was predominately European (70%), and approximately 22% were aged 10-11 years of age. Findings from the survey were not presented according to key demographic factors. The survey found many positive effects of being under Alert Levels 3 and 4 for this population, such as more free-time, opportunities for new activities, and independence. However, for some children and young people, significant challenges were experienced "broadening and deepening some already difficult living situations and existing inequities."

Although the above cross-sectional studies provide some information on the impact of COVID-19 on health and wellbeing in children and young people in New Zealand, the findings presented are not very detailed or specific. Furthermore, their design means they are unable to establish any causal relationship between COVID-19 Alert Levels and health and wellbeing in the children. Such a research question is better answered using a longitudinal cohort study design, where health and wellbeing data from before COVID-19 can be compared to health and wellbeing data during the COVID-19 pandemic. New Zealand has such a cohort study — the *Growing Up in New Zealand* (GUiNZ) longitudinal cohort study.

This report aims to address the knowledge gap for New Zealand children by presenting data exploring the impact of the COVID-19 lockdown on the health and wellbeing of children (aged 10-11 years) who had been part of the GUiNZ longitudinal cohort study since they were born (2008-2010).

1.4 Overview of *Growing up in New Zealand*

The GUiNZ longitudinal cohort study recruited a cohort of births via their 6822 pregnant mothers who were living within the Auckland, Counties Manukau, or Waikato DHB regions during pregnancy and who were due to have their babies between 25th April 2009 and 25th March 2010. The subsequent child cohort consisted of 6853 children, whose birth parameters closely aligned to all New Zealand births in 2007 – 2010 (18).

Since its inception, five main data collection waves (DCW) have been completed face-to-face in the home with the GUiNZ cohort (antenatal) and when the children were approximately nine months, 24 months, 54 months, and eight years of age. Between the main face-to-face DCWs, age-specific data has been collected from caregivers, via online electronic questionnaires and telephone interviews.

A sixth in-home DCW was planned for 2020, when the children were approximately 11 years of age. However, the COVID-19 pandemic meant the scheduled pre-engagement exercise (where participants are contacted as part of routine cohort retention and engagement activities) and the 11-year DCW were delayed until 2021. The pandemic (and associated lockdowns) did highlight the importance of having in place contingency processes for GUiNZ to potentially engage with the cohort digitally as a primary data collection mode, should face-to-face meetings not be possible. Furthermore, in the future a digital online questionnaire may become routinely used for each DCW. It was also recognised that understanding wellbeing trajectories for the cohort over time would ideally need to capture wellbeing at the time of COVID-19. With these factors in mind, a brief opportunistic online survey (referred henceforth as the 'COVID-19 Wellbeing Survey') was designed and delivered to the cohort.

1.5 Aims of the COVID-19 Wellbeing Survey

The purpose of the COVID-19 Wellbeing Survey was two-fold. First, the survey provided the opportunity to capture the acute impact of COVID-19 on child wellbeing, with the aim to:

1. Understand the attitudes and feelings of children about schoolwork during Alert Level 4, and their thoughts about returning to school.
2. Understand whether children had access to, and use of, devices during Alert Level 4, and the amount of time they spent on these devices.
3. Determine how engaged children were with activities involving family and friends during Alert Level 4.
4. Determine whether children had any changes in eating behaviours and attitudes toward food during Alert Level 4.
5. Understand what the children liked, or did not like, about Alert Level 4.
6. Understand what the children worried about and were most excited about during Alert Level 4 (Lockdown).
7. Understand how Alert Level 4 impacted the children's general health and mental wellbeing, particularly:
    - Whether this impact differed according to demographic variables, and other variables of interest.
    - Whether their general health and mental wellbeing had changed from when they were eight years of age.

The survey also provided the opportunity to see how well a child-centred digital engagement process would connect with existing GUiNZ parent-based digital contacts for cohort members, noting that primary contacts for families were residential address-based up until this timepoint.

1.6 The focus of this report

The objectives of this report are to present the findings from the COVID-19 Wellbeing Survey relevant to general health and mental wellbeing (Aim 7). Separate publications focus on school satisfaction, media/screen time and connectedness (Aims 1-3), eating behaviours and attitudes toward food (Aim 4), and qualitative analysis of free text fields (Aims 5 and 6).

2. Methods

This section provides a brief overview of the methods and data analysis plan used in this study. A full methods section can be found in Appendix A, detailing the study design, ethics approval, data collection process, and survey measures.

2.1 Study design

A cross-sectional survey design was utilised. Children were eligible if: the person who had completed the "Mother Questionnaire" at the most recent DCW. the child had taken part in had not withdrawn from the GUiNZ study prior to May 2020; this person had a contact email address; and the child was living in New Zealand at the time of survey distribution. Children whose caregivers had requested that all communications be in Te Reo Māori were ineligible for the survey (n=11), as translation of the survey was unfortunately not possible given time constraints.

2.2 Data collection

Email invitations to participate in the survey were generated from the Qualtrics® digital platform and sent to the person who had completed the "Mother questionnaire" at the most recent DCW the child had taken part in (and had not withdrawn prior to May 2020 and had a contact email address). The invitation included an individualised link to the survey, which directed them to a web-based online survey accessible on all devices (computer, tablet, phone). The front page of the survey described the purpose of the questionnaire and gave children the opportunity to accept or decline to participate. Children could complete the survey independently or receive help from a family member if required. To increase compliance with survey completion, a general media campaign promoting the survey to GUiNZ participants was run whilst the survey was live. While koha are typically offered to participants as part of main data collection waves, this was not possible for the COVID-19 Wellbeing Survey.

2.3 Survey questions

The COVID-19 Wellbeing Survey consisted of 46 questions in total (see Appendices A and B). Questions were not compulsory, and children could progress to the next section of the questionnaire if they wished to skip any section. The questionnaire asked children about their household 'bubbles', feelings, experiences, activities, home and family life, school, current health, media and screen time, connectedness, depressive and anxiety symptoms, and food and drink. This report focuses on the questions about current health and mental wellbeing.

2.4 Data analyses

Analyses were undertaken using R (version 4.0 and 4.0.2), R studio and Excel (version 2002 and 2016). All statistical analyses and resulting code for this report have been peer reviewed by an independent member of the GUiNZ Biostatistics team (not involved in the COVID-19 Wellbeing Survey).

Standard summary statistics are used to report survey responses across questions pertaining to current health, depression, and anxiety, according to potential predictors of these outcomes (See Appendix A for further detail).

A strength of having a longitudinal dataset is the ability to undertake analyses that consider the contribution of early-life experiences for life during COVID-19. Where possible we have approached the longitudinal analyses with the aim of comparing similar measures across time and identifying earlier experiences that are predictive of health, depression, and anxiety during COVID-19.

The following sets of covariates have been considered simultaneously for each multivariate model:

- Socio-demographics (gender, prioritized ethnicity, socio-economic deprivation, maternal education, maternal age, and rurality)
- Predictors of depression and anxiety in children (body size, number of hours of sleep per night, number of times child usually wakes in the night, number of adverse events experienced, maternal depression and oncerns about child health).
- Covariates from the COVID-19 Wellbeing Survey (number of people and essential workers in the bubble, number of regular positive events, connectedness during lockdown, school attendance and material wellbeing concerns)

In addition, the outcome measure at eight years has also been considered as a potential covariate for the cross-sectional multivariate models.

3. Findings

3.1 Survey respondents

In total, 5756 GUiNZ children were deemed eligible to participate in the COVID-19 Wellbeing Survey. The survey went live on the 8th May 2020. At that time New Zealand was at Alert Level 3, 12 days after stepping down from Alert Level 4. It was originally planned for the live link to remain open for seven days. However, a small number of children declined to participate when they had not meant to do so. Their parents contacted the study team and asked for the children to be re-issued a survey link, which extended the period of data collection.

The survey was closed on the 24th May 2020 when New Zealand was at Alert Level 2. Overall, 2421 children completed the COVID-19 Wellbeing Survey giving a response rate of 42%, with 70% of the children completing the survey during Alert Level 3, and 30% completing the survey during Alert level 2 (Figure 1).

Some response bias was identified for the COVID-19 Wellbeing Survey (Appendix C). Specifically, a lower response rate was observed for Māori, Pasifika, and Asian children and those living in rural areas. A higher response rate was observed for girls, and children who had older (›40 years) and more educated mothers (i.e., ≥ Bachelor's degree).

Further detail about the response bias can be found in an additional report on data from the GUiNZ COVID-19 Wellbeing Survey which focused on household bubble size, school satisfaction, connectedness, activities and experiences, media use and screen time (19).

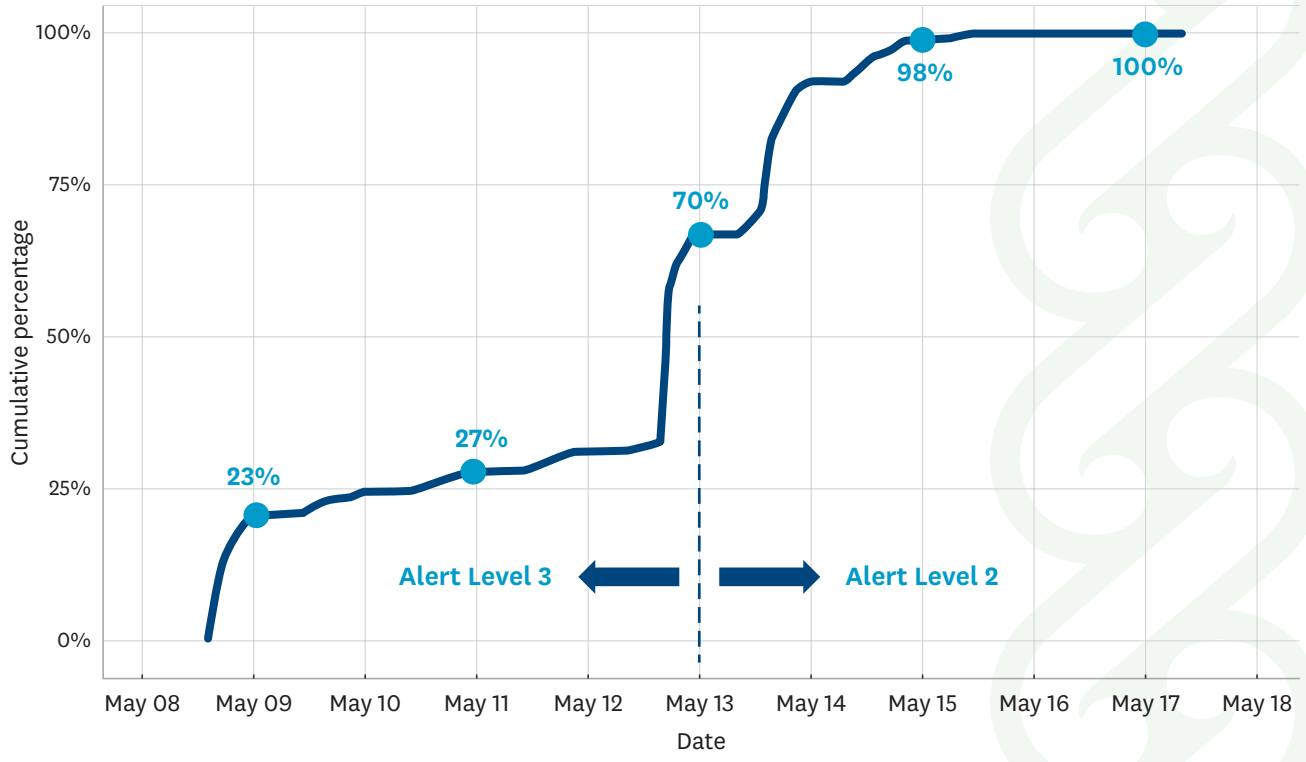


Figure 1: Recruitment summary

3.2 Participant characteristics

Demographic characteristics of the COVID-19 Wellbeing Survey population are detailed in Appendix D. Almost all (99%) participating children were aged 10-11 years, with an equal proportion of boys and girls. The majority (85%) of participating children were living in an urban area, with a higher proportion of children living in areas of low and medium socioeconomic deprivation (38% and 37% respectively, compared to 21% living in areas of high socioeconomic deprivation).

Ethnicity data in Figure 2 and Appendix D are presented using prioritised ethnicity and total response ethnicity. Of the Pacific group (total response), the following ethnicities were represented:

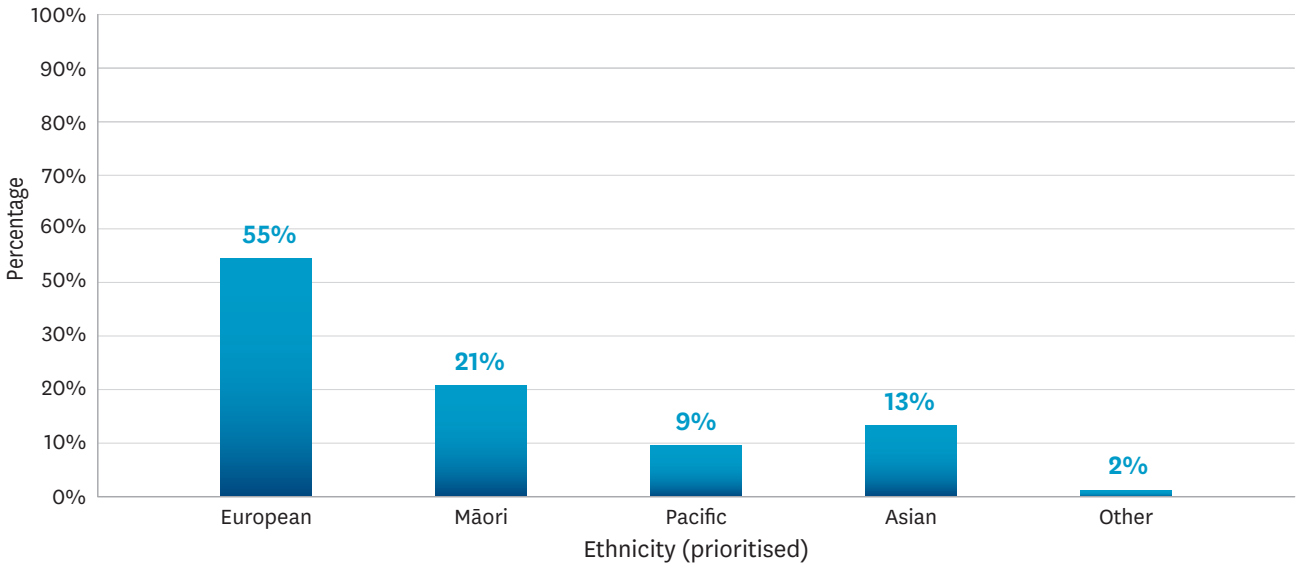
- Samoan: 53% (n=169)
- Tongan: 26% (n=83)
- Cook Island Māori: 22% (n=71)
- Niuean: 12% (n=38)
- Fijian: 6% (n=18)
- Other: <1%

Of the Asian group (total response), the following ethnicities were represented:

- Chinese: 30% (n=102)
- Indian: 29% (n=99)
- Filipino: 10% (n=33)
- Other: 34% (n=116)

The 'Other' category represents ethnicities with less than 10% of children from each population (e.g., Sri Lankan, Korean, Japanese, Cambodian, Vietnamese, etc).

Variables explored as potential predictors of depression and anxiety, and other covariates of interest for the COVID-19 Wellbeing Survey population, are summarised in Appendices E and F, respectively.



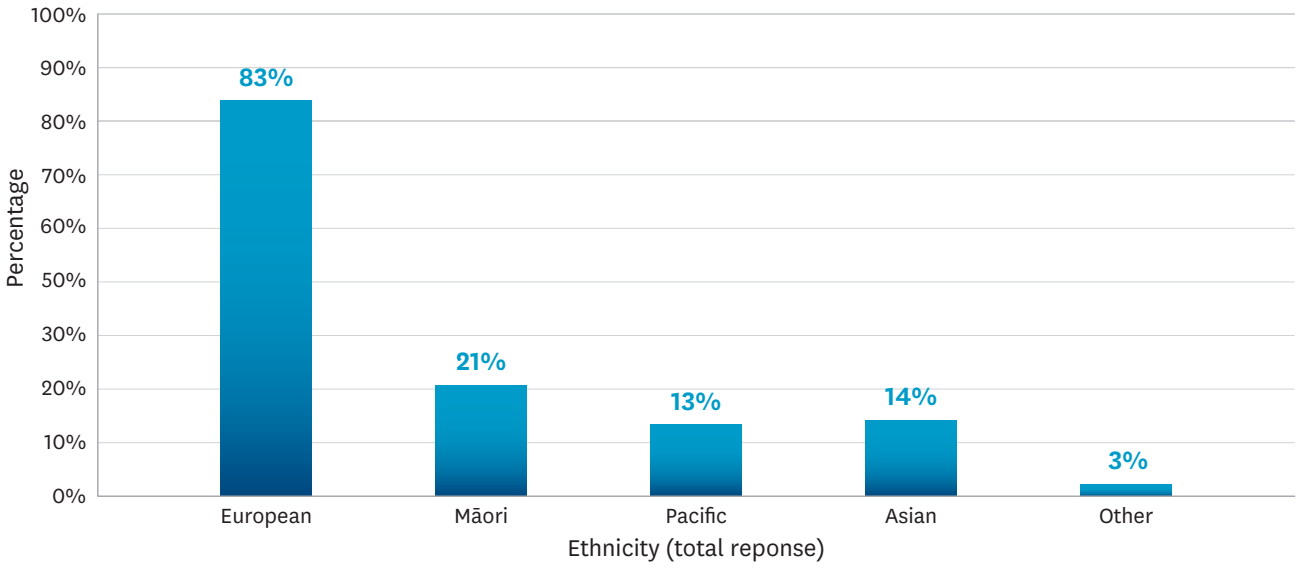


Figure 2: Ethnicity of respondents

3.3 Cross-sectional analysis of the COVID-19 Wellbeing Survey

This section presents the cross-sectional analysis of the COVID-19 Wellbeing Survey general health, depression, and anxiety outcomes, according to various demographic and other variables of interest (some predictive variables are sourced from previous DCWs). Given the response rate to the survey, it is not appropriate to extrapolate these findings to the whole GUiNZ cohort, or all New Zealand children of this age. Therefore, these findings should be considered exploratory only.

3.3.1 Health status

KEY FINDINGS AROUND THE CHILDREN'S SELF-REPORTED HEALTH STATUS WERE:

- Most children (83%) reported 'very good' or 'excellent' health.
- Children with obesity when they were eight years of age had poorer health at the time of the survey, compared to children of normal body size.
- Children who were less connected to friends and family during Alert Level 4 were more likely to report poorer health status, compared to children who were more connected.
- Children who were always or often worried about how much money their family had, or didn't know how they felt, were more likely to report poorer health status compared to children who didn't think about it at all.
- Children who were still undertaking schoolwork at home at the time of the survey (during Alert Levels 2 and 3) were more likely to report poorer health, compared to children who had returned to school.

Health status refers to the self-reported 'current' health of the child, which means findings relate to health status during Alert Levels 2 and 3 (the period during which the survey was delivered). The options provided for reporting current health were: Excellent; Very good; Good; Fair; and Poor. The term 'health' was not defined, so some children may have interpreted this word to mean physical health, mental health, or both.

Of the 2421 children who undertook the survey, 94% (n=2257) completed the question about their current health. Most (83%, n=1884) children reported that their current health status was 'excellent' or 'very good' (Figure 3). Less than 3% (n=62) of children reported their health as 'fair' or 'poor'.

No association was observed between the following variables and current health status:

- The child's sex, ethnicity, level of socioeconomic deprivation, or whether they lived in an urban or rural area.
- The mother's age, level of education, or whether they had had one or more episodes of depression.
- Whether the mother had any concerns about their child's wellbeing and development when the child was eight years of age.
- The mother's report of the number of hours their child typically slept per night, and the frequency of their waking during the night, when the child was eight years of age.
- The number of adverse life events the children had experienced by the time they were eight years of age.
- The number of people in the child's bubble during Alert Level 4, or the number of essential workers in the child's bubble.
- The number of positive events experienced by the child during Alert Level 4.

However, significant associations were observed between four variables of interest (body size, connectedness, material wellbeing, and school attendance) and current health status, with these associations summarised in the sections below.

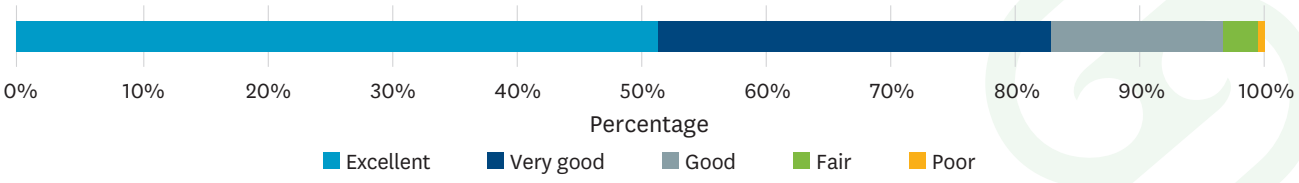


Figure 3: How children felt about their current health

3.3.1.1 Body size and current health status

Of the 2421 children who completed the survey, 94% (n=2284) had information available from the eight-year DCW regarding their body size. There was a significant association between body size and health status (Figure 4, Chi-squared P<0.001).

Regression analysis identified that children with obesity (as determined at the eight-year DCW) reported significantly poorer health compared to children of normal body size (Table 1).

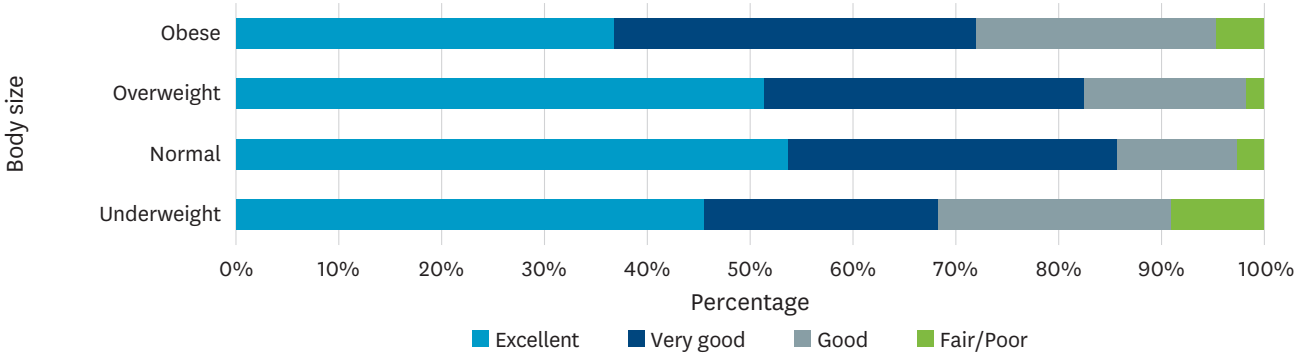


Figure 4: Current health status, by body size at eight years of age

Table 1: Impact of body size at eight years of age on current health status

		Current health			
		n	Odds ratio	95% confidence intervals	P value
Body Size	Normal	1343	Ref	-	-
	Underweight	19	0.44	0.18 to 1.09	0.074
	Overweight	354	0.97	0.78 to 1.22	0.784
	Obese	177	0.52	0.38 to 0.71	<0.001

3.3.1.2 Connectedness to friends and family and current health status

Previous research from the GUiNZ cohort study has identified that family connectedness plays a key role in supporting the health and wellbeing of families and children (20). For this reason, connectedness questions were asked in the COVID-19 Wellbeing Survey, and relate to the Lockdown period (i.e., Alert level 4). Responses to this set of questions were available from 93% of the children (i.e., 2242 of the 2421 children who undertook the survey).

The level of connectedness of the children (i.e., face-to-face, telephone or online) with friends or family not living with them during Alert Level 4 was high, with 85% (n=1914) of children categorised as 'moderately' or 'more connected' (Figure 5). However, 5% (n=113) of children were relatively disconnected with friends and family during the lockdown period (Figure 5).

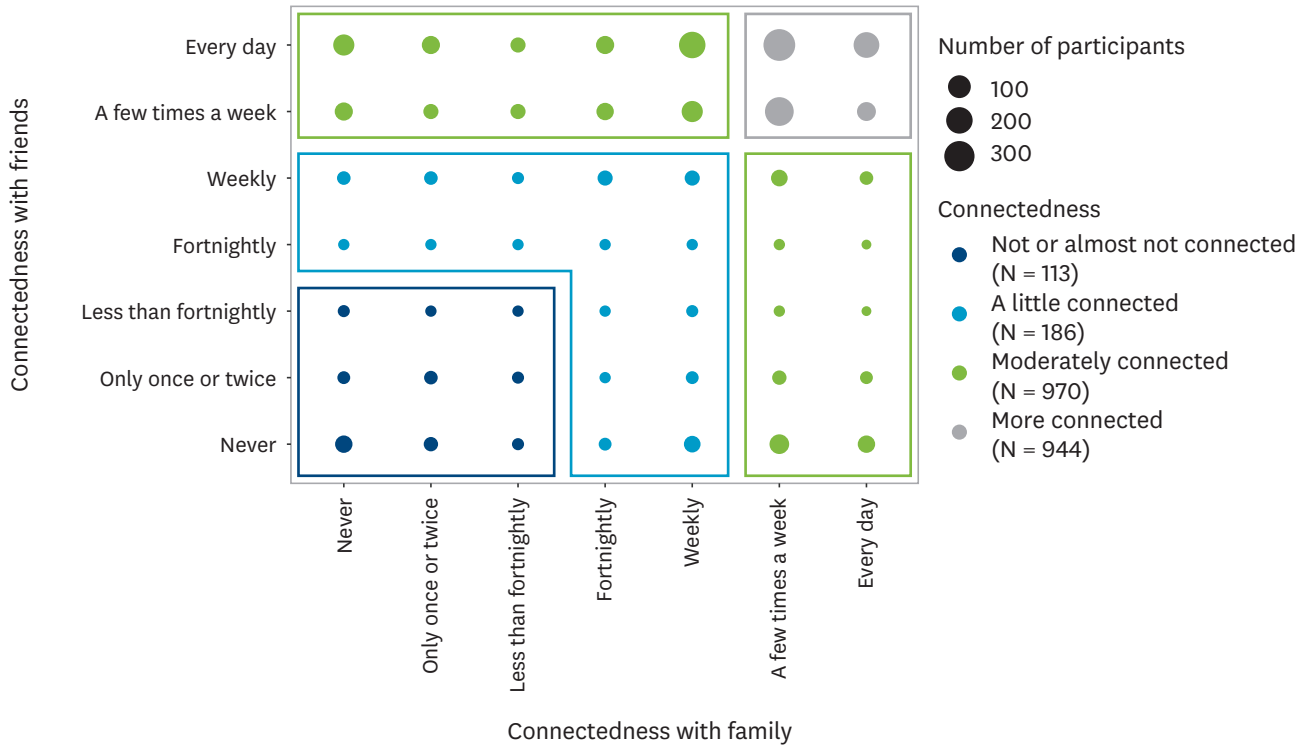


Figure 5: Degree of connectedness in the children

There was a significant positive association between the degree of connectedness and the health status of the child (Figure 6, Chi-squared P<0.001).

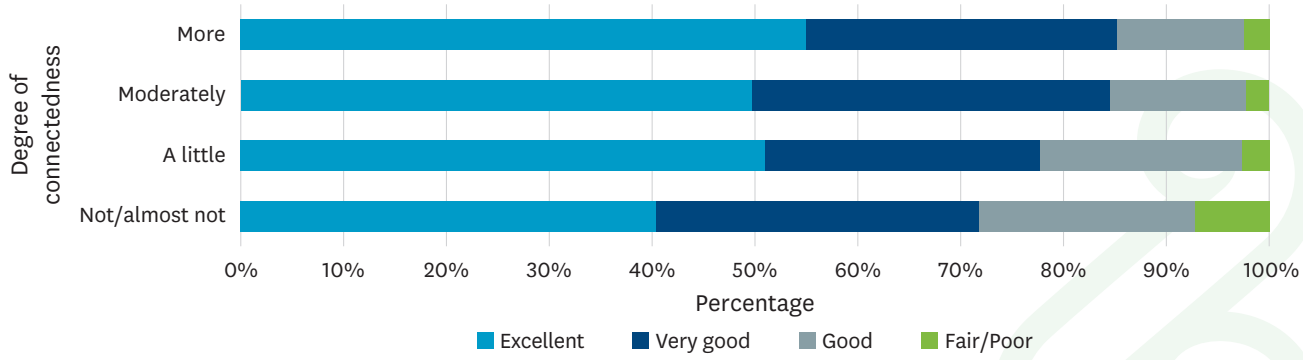


Figure 6: Current health status, by degree of connectedness

Regression analysis found that children who were less connected to friends and family during Lockdown had poorer self-reported health (Table 2).

Table 2: Impact of connectedness on current health status

		Current health			
		n	Odds ratio	95% confidence intervals	P value
Degree of connectedness	More connected	831	Ref	-	-
	Moderately connected	830	0.77	0.64 to 0.94	0.008
	A little connected	153	0.74	0.52 to 1.04	0.081
	Not or almost not connected	79	0.62	0.40 to 0.97	0.035

3.3.1.3 Concerns around material wellbeing, and current health status

Different measures of household material wellbeing exist, utilising various measures of income, wealth and consumption, with poor material wellbeing strongly linked to poor child health (21-22). For example, the Child Wellbeing & Poverty Reduction Group at the New Zealand Department of the Prime Minister and Cabinet define good material wellbeing as 'having the basics and "a little bit more"'. The group have developed a 24 item Material Wellbeing Index as a measure of the proportion of children who are living in households who meet the threshold of good material wellbeing (23).

In the COVID-19 Wellbeing Survey only a single material wellbeing question was used, given the need to keep the survey short. This question asked how often the children worried about how much money their family had, with 94% (2268/2421) of children responding to the question. A significant association was observed between current health status and how often children worried about how much money their family had (Figure 7, Chi-squared $p<0.001$). A higher frequency of worrying was associated with a lower proportion of children reporting 'Excellent' current health.

Regression analysis found that children who 'always' or 'sometimes/often' worried about how much money their family had, or didn't know how they felt, were more likely to report poorer health status, compared to children that didn't think about it at all (Table 3).

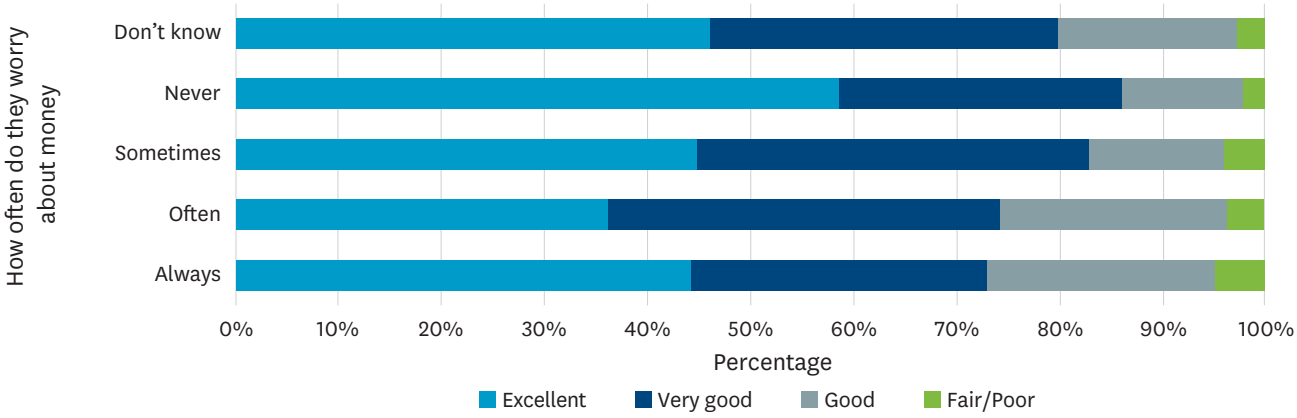


Figure 7: Current health status, by material wellbeing concerns

Table 3: Impact of material wellbeing concerns on current health status

		Current health			
		n	Odds ratio	95% confidence intervals	P value
How often the child worries about how much money the family has	Don't think about it at all	991	Ref	-	-
	Sometimes/Often	651	0.58	0.48 to 0.70	<0.001
	Always	66	0.54	0.33 to 0.87	0.011
	Don't know	185	0.56	0.42 to 0.77	<0.001

3.3.1.4 School attendance, and current health

Of the 2421 children who undertook the survey, 93% (n=2259) completed the questions related to school attendance. A total of 76 (3%) children had returned to school at the time the COVID-19 Wellbeing Survey was undertaken.

At Level 3, these children likely had parents who were considered essential workers by the Government, and so the children could attend school but with restricted movement and mixing. At Alert Level 2 educational facilities could open, but with physical distancing measures in place.

There was a significant association between school attendance and current health status (Figure 8, Chi-squared p=0.009).

Children who were still undertaking schoolwork at home in their bubble were significantly more likely to report poorer health, compared to children who had returned to school (OR=0.53, 95% CI 0.30-0.91, p=0.024).

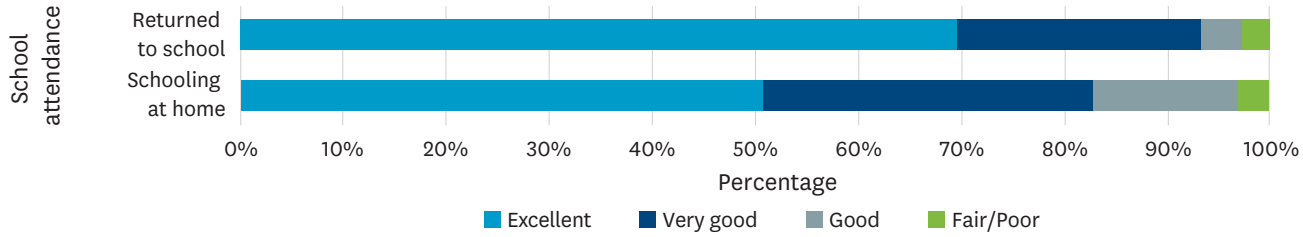


Figure 8: Current health status, by school attendance

3.3.2 Depression

KEY FINDINGS AROUND SYMPTOMS OF DEPRESSION IN CHILDREN WERE:

- Girls had higher mean depression scores than boys.
- Children with two or more wellbeing and developmental concerns when they were eight years old, had higher mean depression scores, compared to children with no such concerns.
- More regular positive experiences for children during Alert level 4 was associated with lower mean depression scores.
- Children whose mothers had had one or more maternal depression events had higher mean depression scores, compared to children with mothers who had no history of depression.
- Children who were always or often worried about how much money their family had, or didn't know how they felt, had higher mean depression scores compared to children who didn't think about it at all.

The average age of onset of major depressive disorders is typically between the ages of 11 and 14. However, as mentioned in sections 1.2 and 1.3, there is emerging evidence that the COVID-19 pandemic is having a significant impact on the mental wellbeing of children (10-12, 15). For these reasons, children in the COVID-19 Wellbeing Survey were asked about symptoms related to depression.

Of the 2421 children who undertook the survey, 90% (n=2178) completed questions on the short form (24) of the CES-DC-10 for measuring depression (25). The questions asked about the 'past seven days', so findings relate to depression symptoms during Alert Levels 2 and 3 given the period of survey delivery. The total scores were right skewed (mean=9.0, SD=5.0; median=8.0, inter-quartile range [IQR]=5-12).

No association was observed between the following variables and depression:

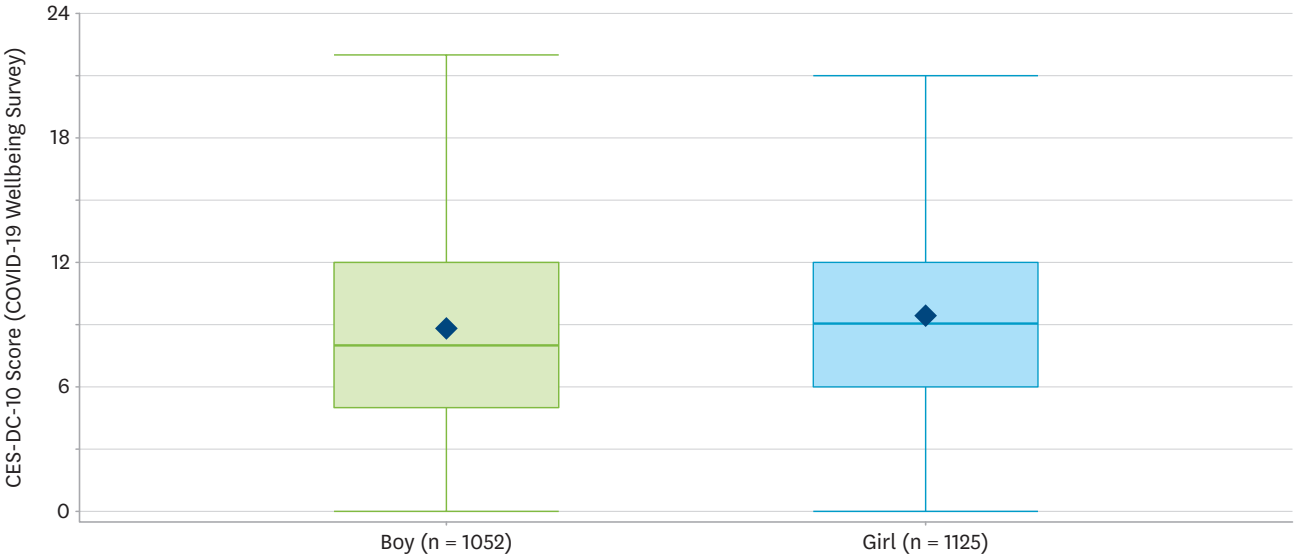
- The child's ethnicity, level of socioeconomic deprivation, whether they lived in an urban or rural area, or their body size when they were eight years of age.
- The mother's age or level of education.
- The mother's report of the number of hours their child typically slept per night, and the frequency of their waking during the night, when the child was eight years of age.
- The number of adverse life events the children had experienced by the time they were eight years of age.
- The number of people in the child's bubble during Alert Level 4, or the number of essential workers in the child's bubble.
- The degree of connectedness for the child during Alert Level 4.
- The child's attendance at school during Alert Levels 2 and 3.

However, significant associations were observed between five variables of interest (sex, mother's concern about their child's wellbeing and development, number of positive child experiences during Alert Level 4, maternal depression, and material wellbeing concerns) and symptoms of depression, with these associations summarised in the sections below.

3.3.2.1 Child's sex, and symptoms of depression

International research indicates a clear sex difference for depression in children and young adults, with 12 year old girls almost two and half times more likely to have a diagnosis of major depression and depression symptoms, than boys (26).

In the COVID-19 Wellbeing Survey, the same sex difference was apparent (Figure 9, p=0.035). Regression analysis identified that the mean CES-DC-10 score was 0.65 points higher in girls, compared to boys (estimate=0.84, 95% CI 0.40-1.27, p<0.001).

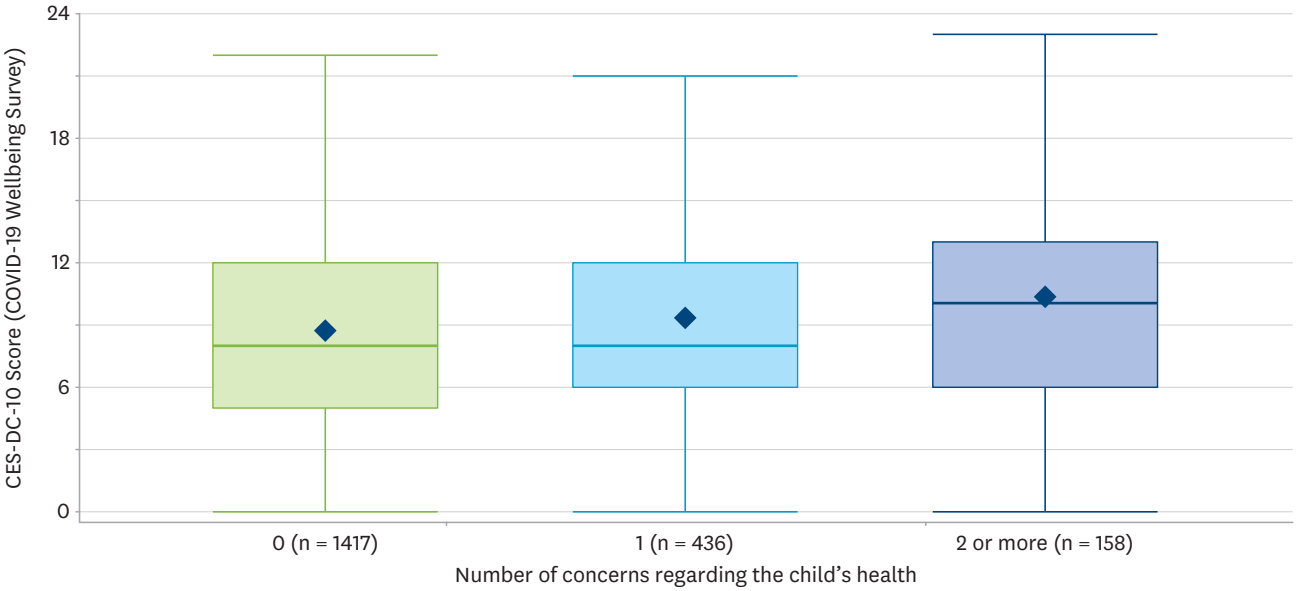


The middle line represents the median value, the diamond the mean, the ends of the box represent the 25th and 75th percentile, and the ends of each whisker indicate the range. A higher score is indicative of a greater risk of depression.

Figure 9: Boxplot of depression score, by sex

3.3.2.2 Mother's concern about their child's wellbeing and development, and symptoms of depression in children

Depression in children may depend on whether a child has a disability or not (27-28), or whether they have learning disabilities (29). A significant association was observed between the number of wellbeing and developmental concerns the mother had for their child when they were eight years of age and mean depression scores in the COVID-19 Wellbeing Survey (Figure 10, p=0.002). Mean CES-DC-10 scores were higher among those who had a higher number of concerns, particularly for children with vision concerns (p=0.018), behavioural or Autistic Spectrum Disorders (p<0.001), or other concerns (p<0.001).



The middle line represents the median value, the diamond the mean, the ends of the box represent the 25th and 75th percentile, and the ends of each whisker indicate the range. A higher score is indicative of a greater risk of depression.

Figure 10: Boxplot of depression score, by number of wellbeing and developmental concerns raised at eight years of age

Regression analysis identified significantly higher mean depression scores in children with two or more wellbeing and development concerns, with the mean CES-DC-10 score one point higher compared to children with no concerns (Table 4).

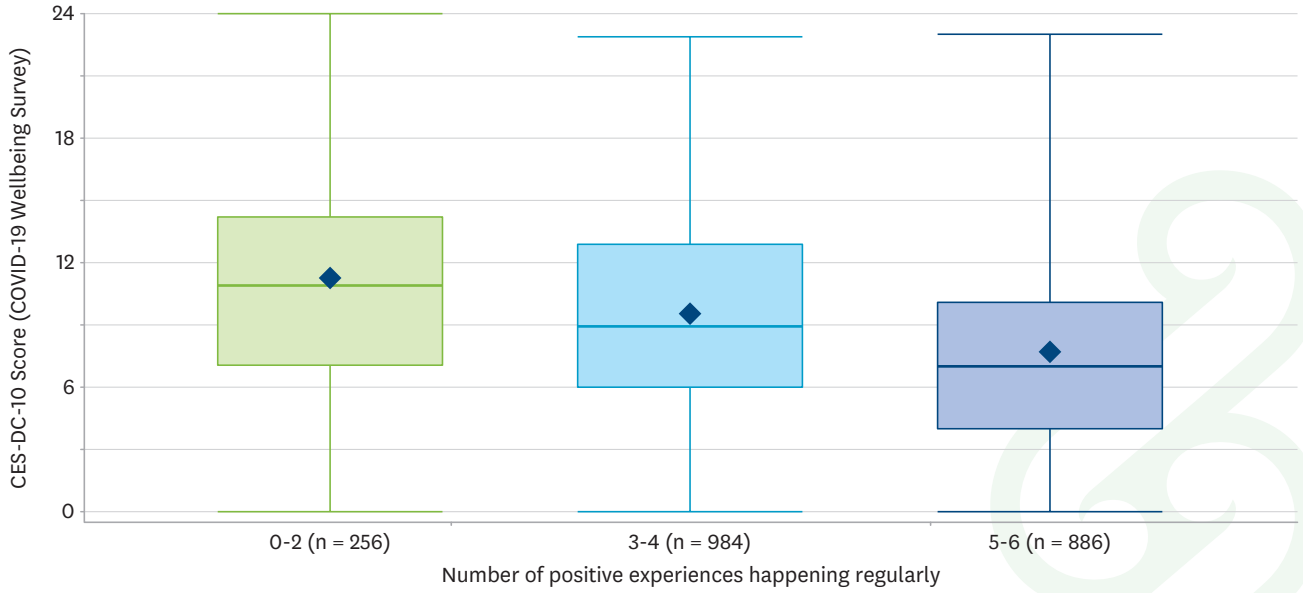
Table 4: Impact of number of wellbeing and development concerns raised at eight years of age, on depression scores.

		Mean CES-DC-DC score			
		n	Odds ratio	95% confidence intervals	P value
Number of wellbeing and development concerns	None	1245	Ref	-	-
	One	380	0.33	-0.20 to 0.86	0.225
	Two or more	130	1.02	0.16 to 1.87	0.020

3.3.2.3 Number of positive childhood experiences, and symptoms of depression in children

Positive childhood experiences have been demonstrated to provide protective effects during times of heightened risk (30). For this reason, the COVID-19 Wellbeing Survey included seven questions related to different aspects of resilience during Alert Level 4: family support, community participation, school connection, contact with friends, feelings of safety, family cohesion, and having someone to share their feelings with.

A significant association was observed between the number of regular (i.e., answering 'often' or 'always' to the questions) positive childhood experiences at Alert Level 4 and the mean depression scores in the COVID-19 Wellbeing Survey (Figure 11, p<0.001).



The middle line represents the median value, the diamond the mean, the ends of the box represent the 25th and 75th percentile, and the ends of each whisker indicate the range. A higher score is indicative of a greater risk of depression.

Figure 11: Boxplot of depression score, by number of regular positive childhood experiences during Alert Level 4

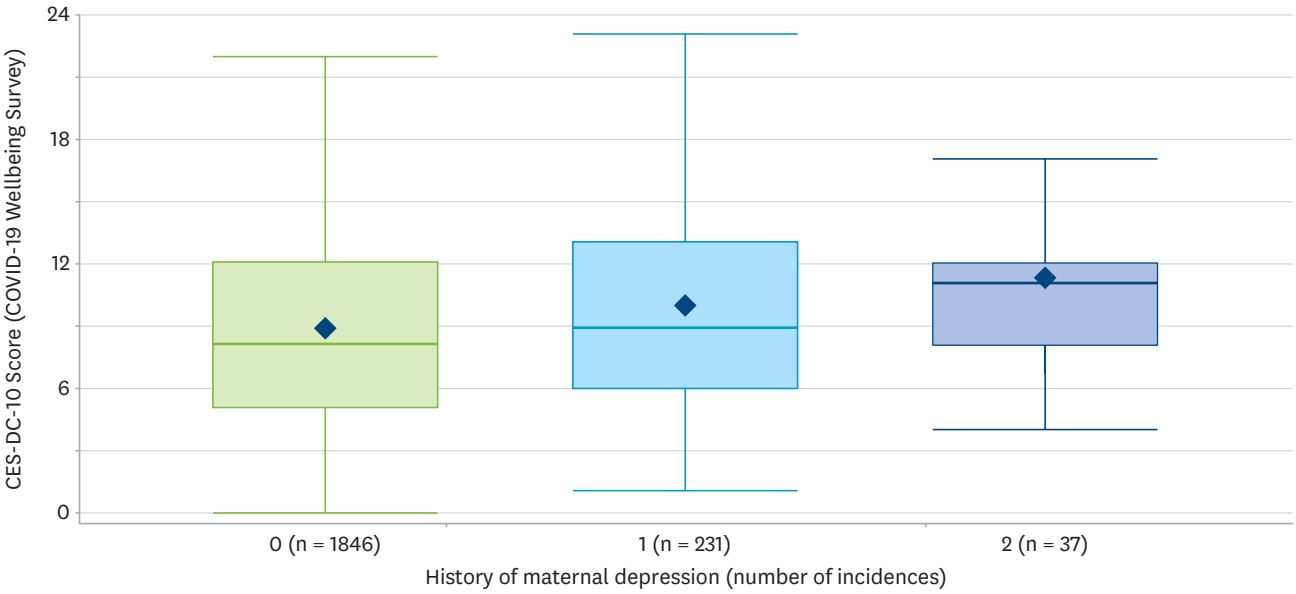
Table 5: Impact of number of positive childhood experiences during Alert level 4, on depression scores

		Mean CES-DC-DC score			
		n	Odds ratio	95% confidence intervals	P value
Number of regular positive experiences during Alert level 4	0-2	203	Ref	-	-
	3-4	818	-1.43	-2.14 to -0.72	<0.001
	5-6	734	-2.94	-3.67 to -2.21	<0.001

3.3.2.4 Maternal depression and symptoms of depression in children

Maternal mental health is a known predictor of depression in children (31). This association was also observed in the COVID-19 Wellbeing Survey, with a significant association seen between a maternal history of depression events and the mean depression scores of children (Figure 12, p<0.001)

Regression analysis identified that children whose mothers had had one or more maternal depression events had a mean CES-DC-10 score one point higher, than children who had mothers with no history of maternal depression (estimate=0.97, 95% CI 0.30-1.64, p=0.005).

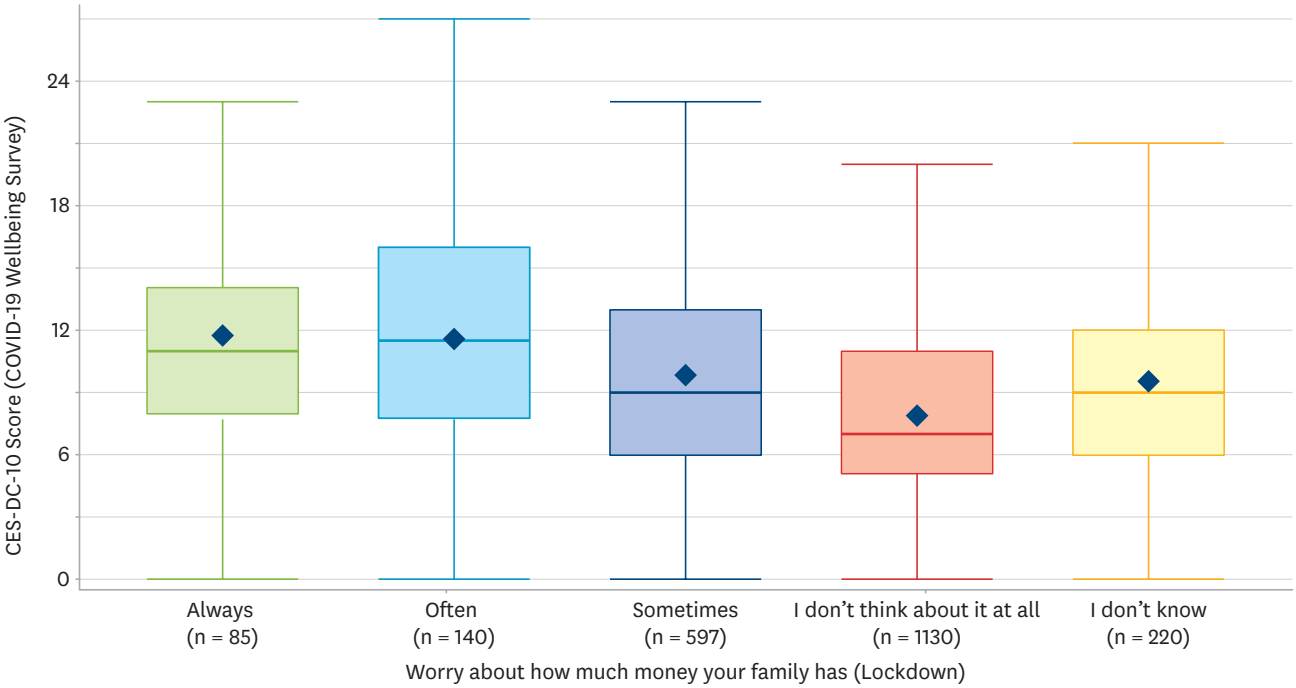


The middle line represents the median value, the diamond the mean, the ends of the box represent the 25th and 75th percentile, and the ends of each whisker indicate the range. A higher score is indicative of a greater risk of depression.

Figure 12: Boxplot of depression score, by number of maternal depression events

3.3.2.5 Material wellbeing concerns and symptoms of depression in children

As mentioned earlier in the report, poor material wellbeing is strongly linked to poor child health, including poor mental health (21-22). There was a significant association between mean depression scores and how often children worried about how much money their family had (Figure 13, p<0.001).



The middle line represents the median value, the diamond the mean, the ends of the box represent the 25th and 75th percentile, and the ends of each whisker indicate the range. A higher score is indicative of a greater risk of depression.

Figure 13: Boxplot of depression score, by material wellbeing concerns

Regression analysis found children who were always, often or sometimes worried about how much money their family had, or didn't know how they felt, were significantly more likely to have higher depression scores, compared to children that didn't think about it at all (Table 6). For example, children who always worried about how much money their family had had a mean CES-DC-10 score 3.07 points higher than children who didn't think about money at all.

Table 6: Impact of material wellbeing concerns on depression scores

		Mean CES-DC-DC score			
		n	Odds ratio	95% confidence intervals	P value
How often the child worries about how much money the family has	Don't think about it at all	928	Ref	-	-
	Don't know	162	1.33	0.56 to 2.10	<0.001
	Sometimes	489	1.66	1.15 to 2.17	<0.001
	Often	114	3.02	2.12 to 3.92	<0.001
	Always	62	3.07	1.87 to 4.27	<0.001

3.3.3 Anxiety

KEY FINDINGS AROUND SYMPTOMS OF ANXIETY IN CHILDREN WERE:

- Pasifika children had significantly lower anxiety scores, compared to European children.
- Girls had higher mean anxiety scores than boys.
- Children with two or more wellbeing and developmental concerns when they were eight years old, had higher mean anxiety scores, compared to children with no such concerns.
- Children who woke frequently during the night (when they were eight) had higher anxiety scores than children who didn't wake during the night.
- Children with five to six regular positive experiences during Alert level 4, had significantly lower mean anxiety scores, compared to children with no or very few regular positive experiences.
- Children who were always or often worried about how much money their family had, or didn't know how they felt, had significantly higher mean anxiety scores.

Overall, 90% (2177/2421) of the children in the survey completed questions on the anxiety scale. The question set asked about the 'past seven days', so findings relate to anxiety symptoms during Alert Level 2 and 3 given the date of delivery of the survey.

The total scores for the PROMIS Pediatric Anxiety symptoms scale32 were right skewed (mean=45.7, SD=10.0; median=45.0, IQR=37-52).

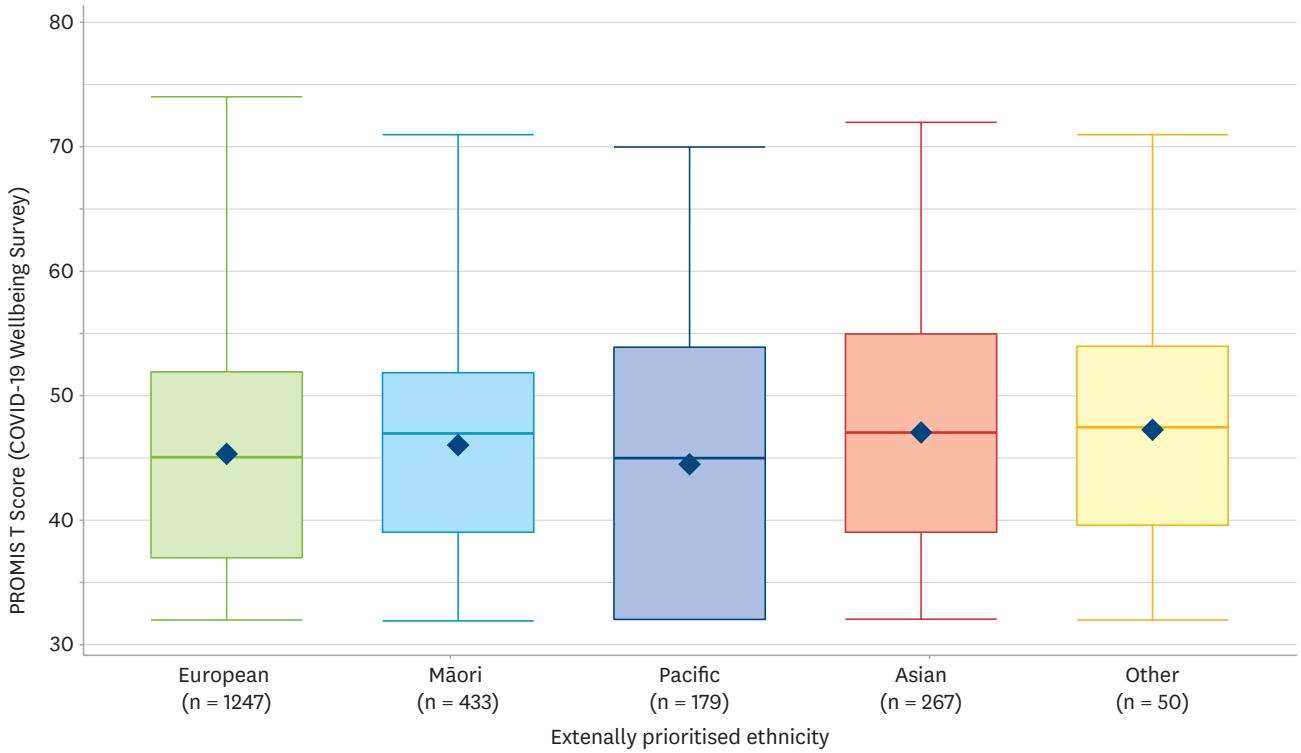
No association was observed between anxiety and:

- The child's level of socioeconomic deprivation, whether they lived in an urban or rural area, or their body size when they were eight years of age.
- The mother's age, level of education, or episodes of maternal depression.
- The mother's report of the number of hours their child typically slept per night when the child was eight years of age.
- The number of adverse life events the children had experienced by the time they were eight years of age.
- The number of people in the child's bubble during Alert Level 4, or the number of essential workers in the child's bubble.
- The degree of connectedness for the child during Alert Level 4.
- The child's attendance at school during Alert Levels 2 and 3.

However, significant associations were observed between six variables of interest (ethnicity, sex, mother's concern about their child's wellbeing and development, positive child experiences during Lockdown, frequency of night waking, and material wellbeing) and anxiety, with these associations summarised in the sections below.

3.3.3.1 Ethnicity, and symptoms of anxiety in children

Mean anxiety score at the time of the COVID-19 Wellbeing Survey, by ethnicity (prioritised), is shown in Figure 14. Regression analysis identified that Pacific children had a significantly lower risk of anxiety at the time of the COVID-19 Wellbeing Survey, with the average PROMIS score 2.2 points lower than seen in European children (Table 7).



The middle line represents the median value, the diamond the mean, the ends of the box represent the 25th and 75th percentile, and the ends of each whisker indicate the range. A higher score is indicative of a greater risk of anxiety.

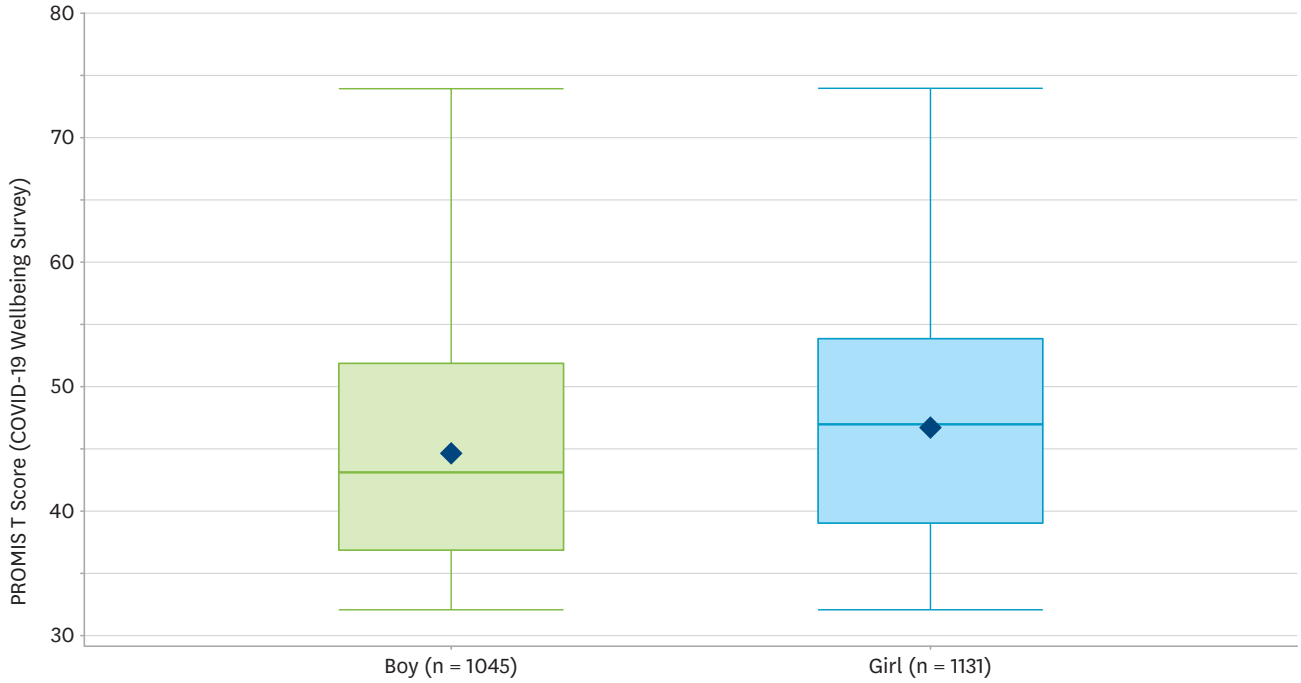
Figure 14: Boxplot of anxiety score, by ethnicity

Table 7: Ethnicity and anxiety scores

		Mean CES-DC-DC score			
		n	Odds ratio	95% confidence intervals	P value
Ethnicity (Prioritised)	European	1069	Ref	-	-
	Māori	346	-0.58	-1.76 to 0.59	0.331
	Pacific	114	-2.19	-4.03 to -0.36	0.019
	Asian	195	0.85	-0.61 to 2.30	0.254
	Other	39	0.52	-2.47 to 3.52	0.732

3.3.3.2 Child's sex, and symptoms of anxiety

There was a significant association between the child's sex and mean anxiety scores at the time of the COVID-19 Wellbeing Survey (Figure 15, $p<0.001$). Regression analysis identified that girls were significantly more likely to have a higher mean anxiety score, with the average PROMIS score two points higher than seen for boys (estimate=1.98, 95% CI 0.90-2.86, $p<0.001$).

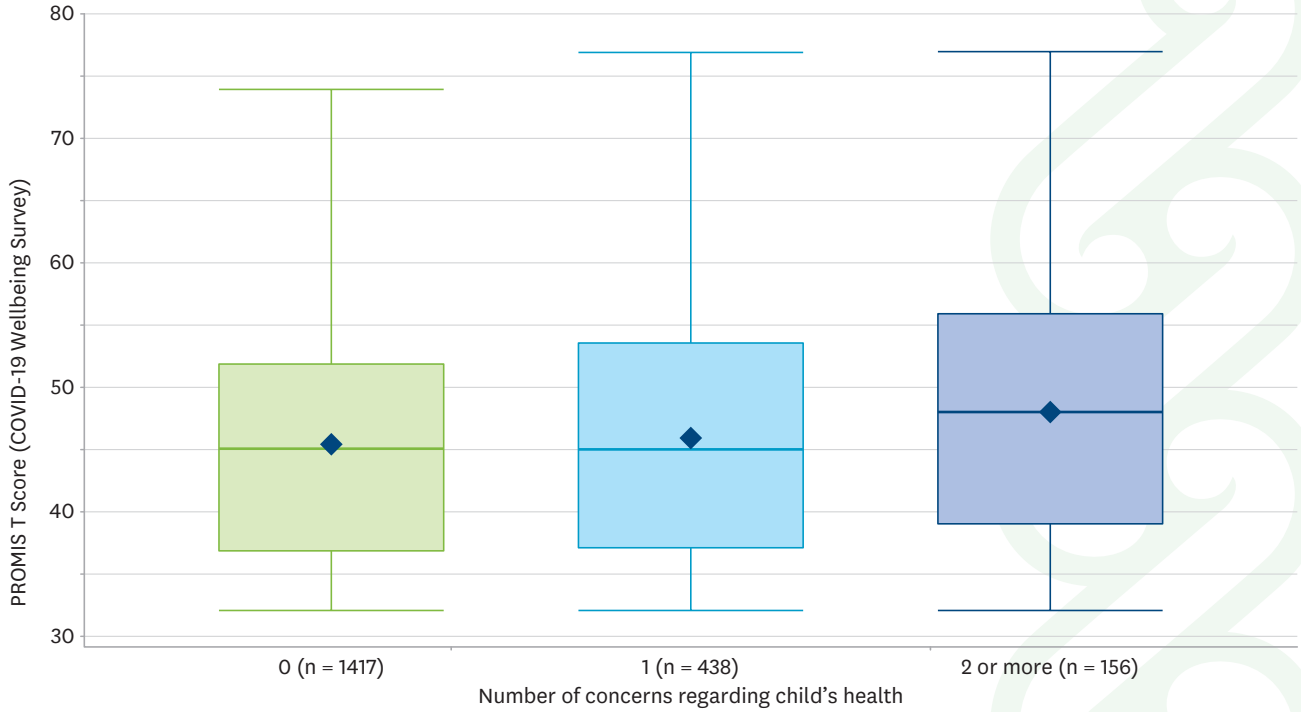


The middle line represents the median value, the diamond the mean, the ends of the box represent the 25th and 75th percentile, and the ends of each whisker indicate the range. A higher score is indicative of a greater risk of depression.

Figure 15: Boxplot of anxiety score by sex

3.3.3.3 Mother's concern about their child's wellbeing and development, and symptoms of anxiety

Anxiety in children may depend on whether a child has a disability or not (27-28), or whether they have learning disabilities (29). The COVID-19 Wellbeing Survey found a significant association between the number of wellbeing and developmental concerns the mother had for their child (when measured at the eight-year DCW) and the mean anxiety scores in the COVID-19 Wellbeing Survey (Figure 16, p=0.008). Mean anxiety scores were higher among those who had a higher number of concerns, particularly for children with behavioural or Autistic Spectrum Disorders (p=0.035), movement, mobility or physical concerns (p=0.014), or other concerns (p=0.017).



The middle line represents the median value, the diamond the mean, the ends of the box represent the 25th and 75th percentile, and the ends of each whisker indicate the range. A higher score is indicative of a greater risk of anxiety.

Figure 16: Boxplot of anxiety score by number of wellbeing and development concerns raised at eight years of age

Regression analysis identified that children with two or more wellbeing and development concerns had significantly higher mean anxiety scores, with the average PROMIS score almost two points higher than children with no concerns (Table 8).

Table 8: Impact of number of wellbeing and development concerns raised at eight years of age on anxiety scores

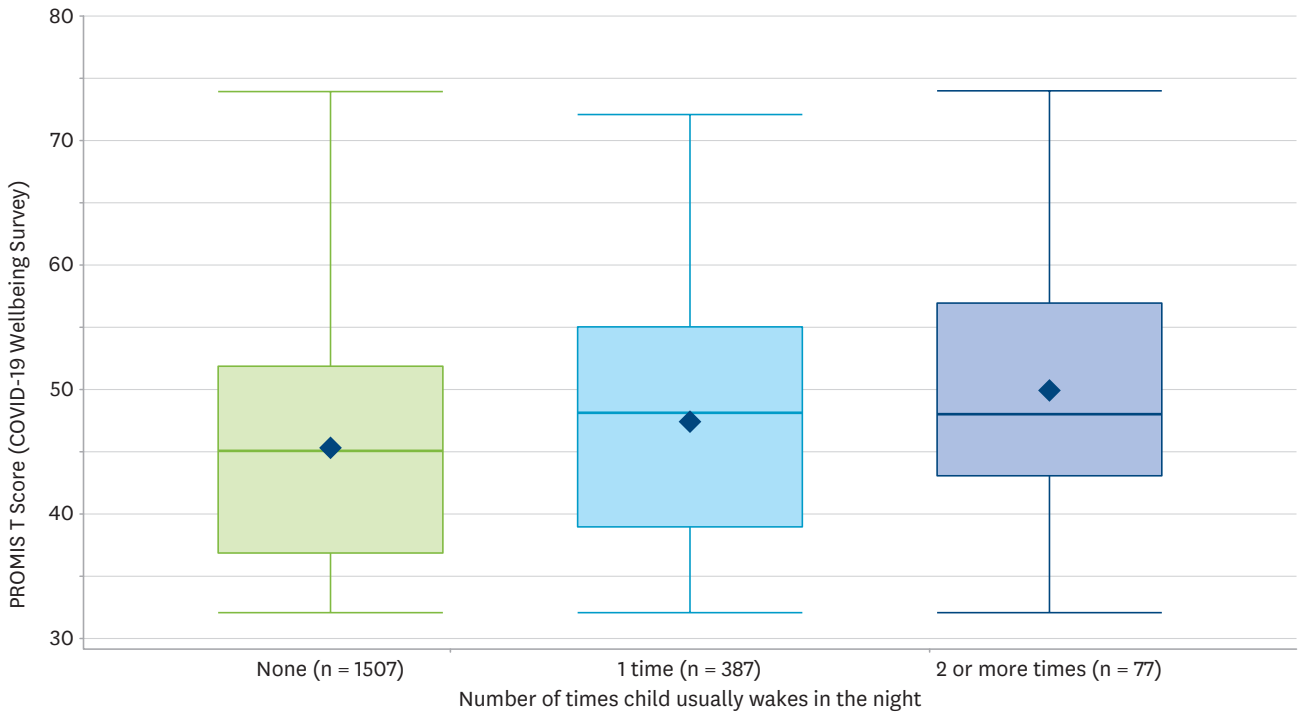
		Mean PROMIS score			
		n	Estimate	95% confidence intervals	P value
Number of mother's concerns	No concerns	1248	Ref	-	-
	One concern	384	0.66	-0.42 to 1.73	0.230
	≥2 concerns	131	1.84	0.11 to 3.58	0.037

3.3.3.4 Frequency of night waking, and symptoms of anxiety in children

The transition into early adolescence is a period where there are significant changes in hormone levels and emotional and cognitive processing – factors which can influence the various dimensions of sleep and anxiety (33-34).

There was a significant association between frequency of night waking in the child at eight years of age, and and mean anxiety scores in the COVID-19 Wellbeing Survey (Figure 17, $p<0.001$). A higher frequency of night-time waking was associated with higher mean anxiety scores.

Regression analysis found children who woke during the night were significantly more likely to have higher anxiety scores, compared to children that didn't wake during the night (Table 9). For example, children who were waking two or more times during the night when they were eight years of age, had an mean PROMIS score three and a half points higher than children who didn't wake during the night.



The middle line represents the median value, the diamond the mean, the ends of the box represent the 25th and 75th percentile, and the ends of each whisker indicate the range. A higher score is indicative of a greater risk of anxiety.

Figure 17: Boxplot of anxiety score, by frequency of night waking at eight years of age

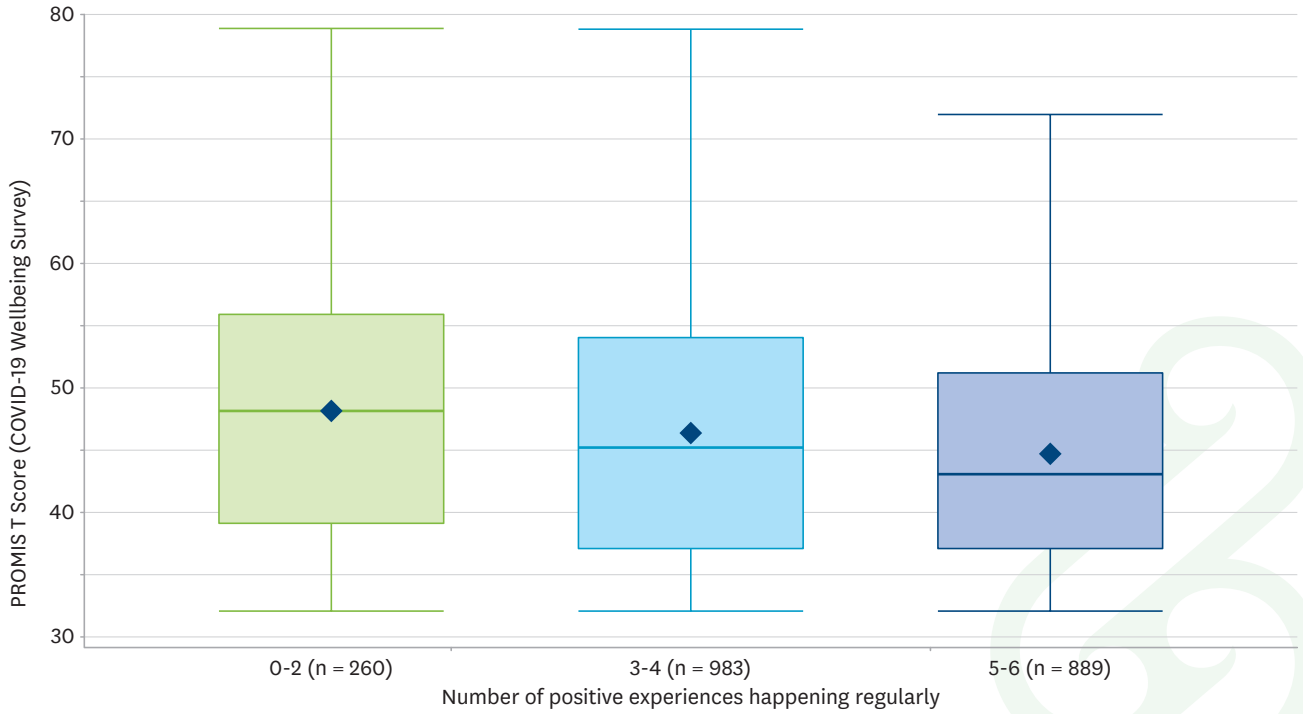
Table 9: Impact of frequency of night waking at eight years of age, on anxiety scores

		Mean PROMIS score			
		n	Estimate	95% confidence intervals	P value
Frequency of night walking at age 8	Never	1364	Ref	-	-
	Once	336	1.16	0.03 to 2.29	0.045
	Two or more times	63	3.47	1.06 to 5.88	0.005

3.3.3.5 Number of positive childhood experiences, and symptoms of anxiety in children

As mentioned earlier, positive experiences during times of heightened risk (e.g., a strong and nurturing family environment that reinforces feelings of safety) have been demonstrated to have a positive impact on children (30). A significant association was observed between the number of positive childhood experiences during Alert level 4 and the mean anxiety scores in the COVID-19 Wellbeing Survey (Figure 18, $p<0.001$).

Regression analysis found that children who had five to six regular positive experiences during Alert Level 4 had a mean PROMIS score almost two points lower than children who had only 0-2 regular positive experiences (Table 10).



The middle line represents the median value, the diamond the mean, the ends of the box represent the 25th and 75th percentile, and the ends of each whisker indicate the range. A higher score is indicative of a greater risk of anxiety.

Figure 18: Boxplot of anxiety score, by the number of regular positive childhood experiences during Alert level 4

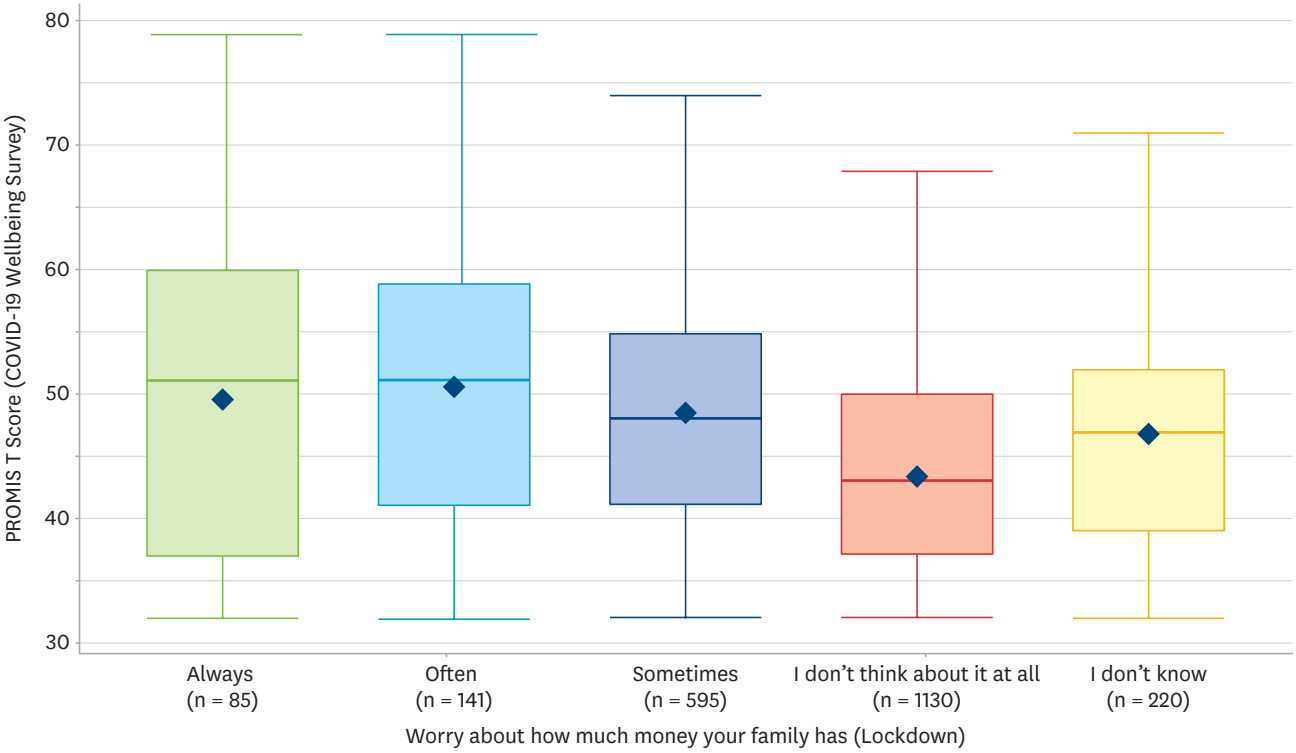
Table 10: Impact of number of positive experiences during Alert Level 4 on anxiety scores

		Mean PROMIS score			
		n	Estimate	95% confidence intervals	P value
Number of positive events	0-2 events	209	Ref	-	-
	3-4 events	819	-0.88	-2.30 to 0.55	0.230
	5-6 events	735	-1.79	-3.25 to -0.33	0.017

3.3.3.6 Material wellbeing, and symptoms of anxiety in children

As mentioned earlier in the report, poor material wellbeing is strongly linked to poor child health, including poor mental health (22-23). There was a significant association between material wellbeing and mean anxiety scores in children at the time of the COVID-19 Wellbeing Survey (Figure 19, p<0.001).

Regression analysis found the more frequently children worried about how much money their family had, the higher their anxiety scores were, compared to children that didn't worry (Table 11). For example, children who often worried about how much money their family had had a mean PROMIS score 6.08 points higher than the children who didn't worry about money at all.



The middle line represents the median value, the diamond the mean, the ends of the box represent the 25th and 75th percentile, and the ends of each whisker indicate the range. A higher score is indicative of a greater risk of anxiety.

Figure 19: Boxplot of anxiety score, by material wellbeing concerns

Table 11: Impact of material wellbeing concerns on anxiety scores

		Mean PROMIS score			
		n	Estimate	95% confidence intervals	P value
How often the child worries about how much money the family has	Don't think about it at all	933	Ref	-	-
	Sometimes	487	4.21	3.18 to 5.25	<0.001
	Often	116	6.08	4.25 to 7.90	<0.001
	Always	62	5.93	3.48 to 8.38	<0.001
	Don't know	165	2.89	1.33 to 4.45	<0.001

3.4 Longitudinal analysis of the COVID-19 Wellbeing Survey

This section presents the longitudinal analysis of the COVID-19 Wellbeing Survey general health, depression, and anxiety outcomes, according to various demographic and other variables of interest. Questions asked in the COVID-19 Wellbeing Survey are compared to the same questions asked at the eight year DCW, to determine changes over time.

Given the response rate to the survey, it is not appropriate to extrapolate these findings to the whole GUiNZ cohort, or all New Zealand children of this age. Therefore, these findings should be considered exploratory only. However, the upcoming GUiNZ 12-year DCW will be important as it will enable the findings presented in this section to be further explored in the full cohort, as the longer term impact of COVID-19 is a key focus in the upcoming DCW.

3.4.1 Health status during COVID-19, compared to before COVID-19

KEY FINDINGS AROUND CHANGES IN HEALTH STATUS OVER TIME WERE:

- About a third of children had an improvement in health, from when they were eight years old to the time of the COVID-19 Wellbeing Survey, and one in ten children reported a decline in their health.
- Children of Asian ethnicity were more likely to report an improvement in health status over time, compared to European children.
- Children with two or more wellbeing and developmental concerns when they were eight years old were more likely to have an improvement in health over time, compared to children with no wellbeing and development concerns.
- Children who were underweight when they were eight years of age were less likely to report an improvement in health status over time, compared to children of normal body size.

An important question to explore was whether the COVID-19 pandemic and the associated Government restrictions impacted how children felt about their health. To investigate this question the data were compared longitudinally, looking at children who answered this question in both the eight-year DCW and the COVID-19 Wellbeing Survey.

Exploring how children in each category transitioned over time, it's clear that for some children there was little change in health status between the two surveys. However, movement in health state over time was also observed, with many children transitioning into more positive health states, whilst a smaller proportion of children moved into a more negative health state (Table 12).

Logistic regression analysis identified that children with 'very good' or 'excellent' health at the eight-year DCW, were two to three times more likely to have 'very good' or 'excellent' health at the time of the COVID-19 Wellbeing Survey, compared to children with 'Fair/Poor' health at the eight-year DCW (Table 13).

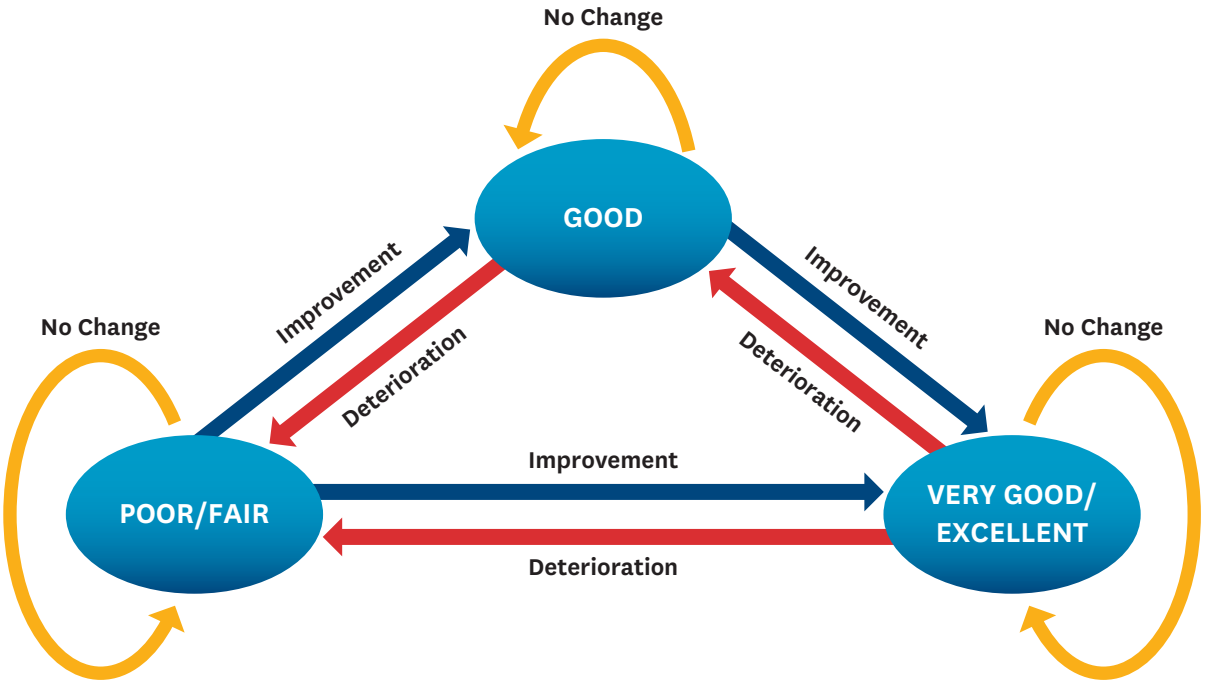
Table 12: Child health at the eight-year DCW, as a predictor of health during Alert Levels 2 and 3

		Child health in the COVID-19 Wellbeing Survey			
		Excellent	Very Good	Good	Fair to Poor
Child health at the eight-year DCW	Excellent	367 (64%)	151 (26%)	48 (8%)	<10
	Very Good	413 (51%)	287 (36%)	85 (11%)	19 (2%)
	Good	278 (43%)	215 (33%)	131 (20%)	24 (4%)
	Fair to Poor	42 (37%)	36 (32%)	28 (25%)	<10

Table 13: Child's health status across two data collection waves

		Child health in the COVID-19 Wellbeing Survey			
		n	Estimate	95% confidence intervals	P value
Child health at the eight-year DCW	Excellent	100	Ref	-	-
	Very Good	570	1.25	0.84 to 1.88	0.276
	Good	711	1.88	1.26 to 2.81	0.002
	Fair to Poor	512	2.76	1.82 to 4.19	<0.001

Another way to look at health change over time is to consider categorisation into the following three groups: deterioration in health, no change in health, improvement in health, as outlined below:



Most children (91%) had an improvement or no change in their health over the two surveys (Figure 20).

No association was observed between the following variables and change in health status:

- The child's sex, level of socioeconomic deprivation, or whether they lived in an urban or rural area.
- The mother's age, level of education, or whether they had had one or more episodes of depression.
- The mother's report of the number of hours their child typically slept per night.
- The number of adverse life events the children had experienced by the time they were eight years of age.
- The child's degree of connectedness with friends and family during Alert Level 4, the number of people in the child's bubble during Alert Level 4, or the number of essential workers in the child's bubble.
- School attendance during Alert Level 2 and 3
- The number of positive events experienced by the child during Alert Level 4.

However, three variables (ethnicity, mother's concerns about the wellbeing and development of their child, and body size) were associated with change in health status. These associations are summarised below.

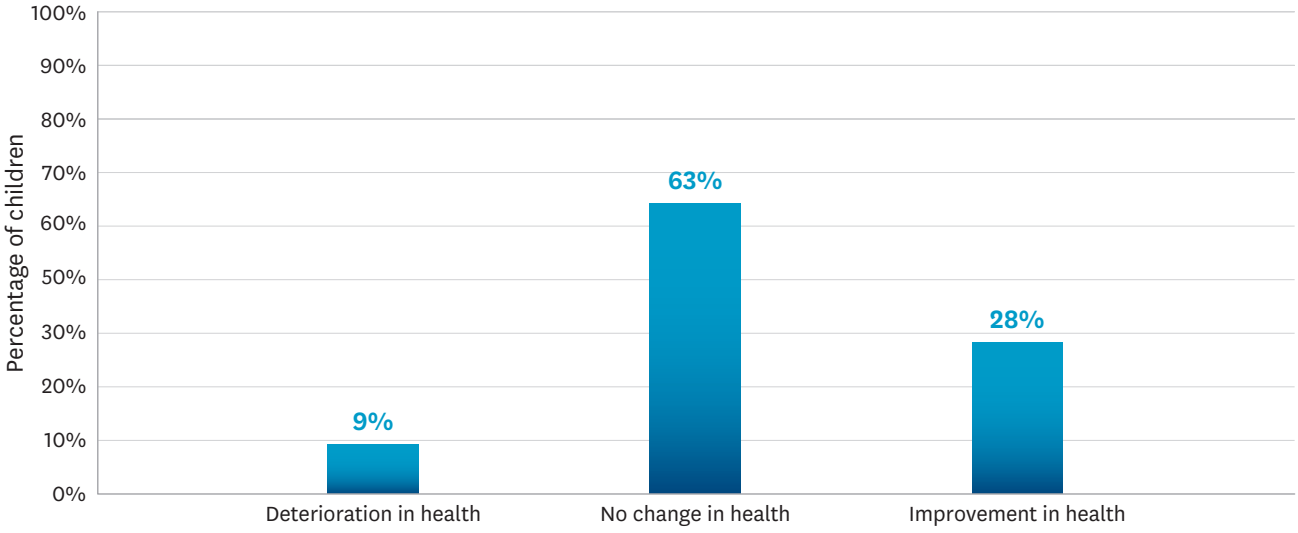


Figure 20: Change in health status over time

3.4.1.1 Ethnicity, and change in health status over time.

A significant association between ethnicity (prioritised) and change in health status was observed (Figure 21, Chi-squared p=0.003).

Regression analysis identified children of Asian ethnicity were significantly more likely to report an improvement in health status over time, compared to European children (Table 14).

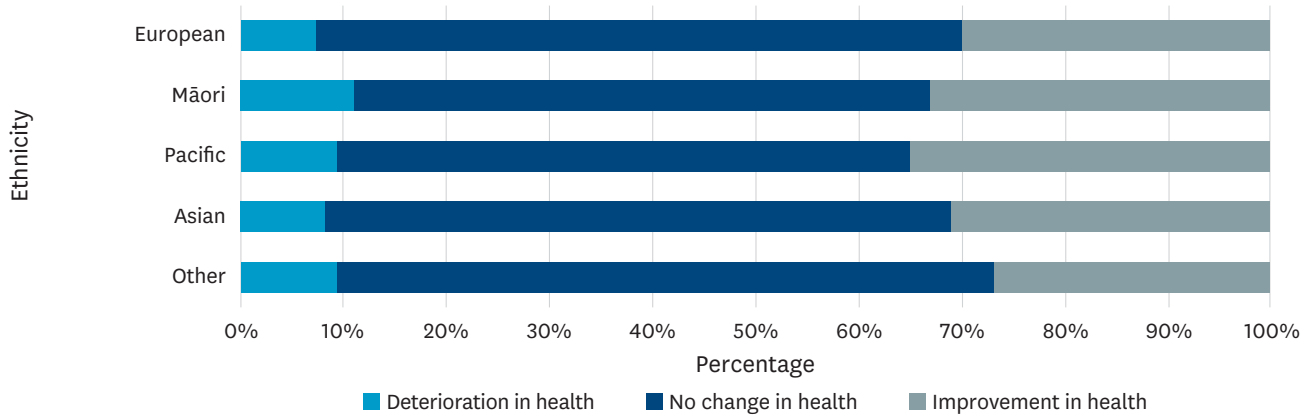


Figure 21: Change in health status over time by ethnicity

Table 14: Ethnicity and change in health status over time

		Change in Health Status			
		n	Odds ratio	95% confidence intervals	P value
Ethnicity (Prioritised)	European	1175	Ref	-	-
	Māori	377	1.04	0.81 to 1.33	0.753
	Pacific	125	1.41	0.96 to 2.06	0.082
	Asian	224	1.49	1.11 to 2.00	0.009
	Other	44	1.21	0.67 to 2.21	0.551

3.4.1.2 Mothers' concerns about their child's wellbeing and development and change in health status over time

An association was observed between the number of concerns mothers had about their child's wellbeing and development and a change in children's health status (Figure 22, Chi-squared p=0.007), particularly learning concerns (Chi-squared p=0.002).

Regression analysis found children with two or more wellbeing and development concerns were more likely to have an improvement in health, compared to children with no wellbeing and development concerns (Table 15).

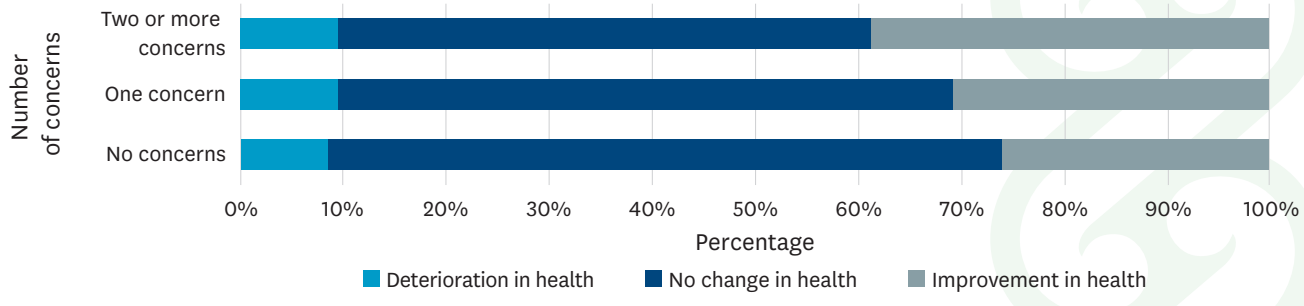


Figure 22: Mothers' concerns about their child's wellbeing and development and change in health status over time

Table 15: Impact of number of wellbeing and development concerns raised at eight years of age on change in health status over time

		Change in Health Status			
		n	Odds ratio	95% confidence intervals	P value
Number of wellbeing and development concerns	None	1377	Ref	-	-
	One	423	1.17	0.94 to 1.47	0.163
	Two or more	145	1.65	1.16 to 2.35	0.005

3.4.1.3 Body size, and change in health status

A significant association was observed between body size at eight years of age, and a change in children's health status over time (Figure 23, Chi-squared p=0.012).

Regression analysis found children who were underweight were significantly less likely to have an improvement in health state over time (Table 16).

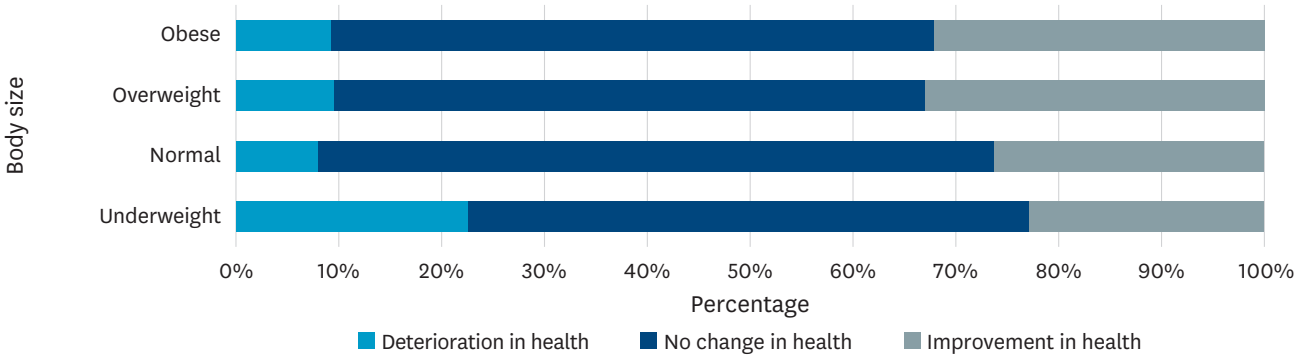


Figure 23: Change in health status over time by body size at eight years of age

Table 16: Impact of body size at eight years of age on change in health status over time

		Change in Health Status			
		n	Odds ratio	95% confidence intervals	P value
Body size	Normal	1396	Ref	-	-
	Underweight	20	0.38	0.15 to 0.99	0.048
	Overweight	361	1.25	0.98 to 1.59	0.068
	Obese	168	1.08	0.77 to 1.52	0.639

3.4.2 Depression symptoms during COVID-19, compared to before COVID-19.

A key question to explore is whether the COVID-19 pandemic and the associated Government restrictions, increased feelings of depression in this cohort of children, compared to before the pandemic (i.e., when they were eight years of age).

KEY FINDINGS AROUND CHANGES IN SYMPTOMS OF DEPRESSION OVER TIME WERE:

- Approximately 60% of children had no clinically significant symptoms of depression at the time of the COVID-19 Wellbeing Survey, compared to approximately 70% without clinically significant symptoms of depression when the children were eight years of age.
- There was an increase over time in the number of children experiencing symptoms of depression, particularly in:
  - Girls
  - Children who were always or often worried about how much money their family had or didn't know how they felt.
- The following groups of children experienced a decrease over time in the symptoms of depression:
  - Māori and Pacific children.
  - Children who had three of more positive experiences during Lockdown.
  - Children who were less connected with friends and family during Lockdown.

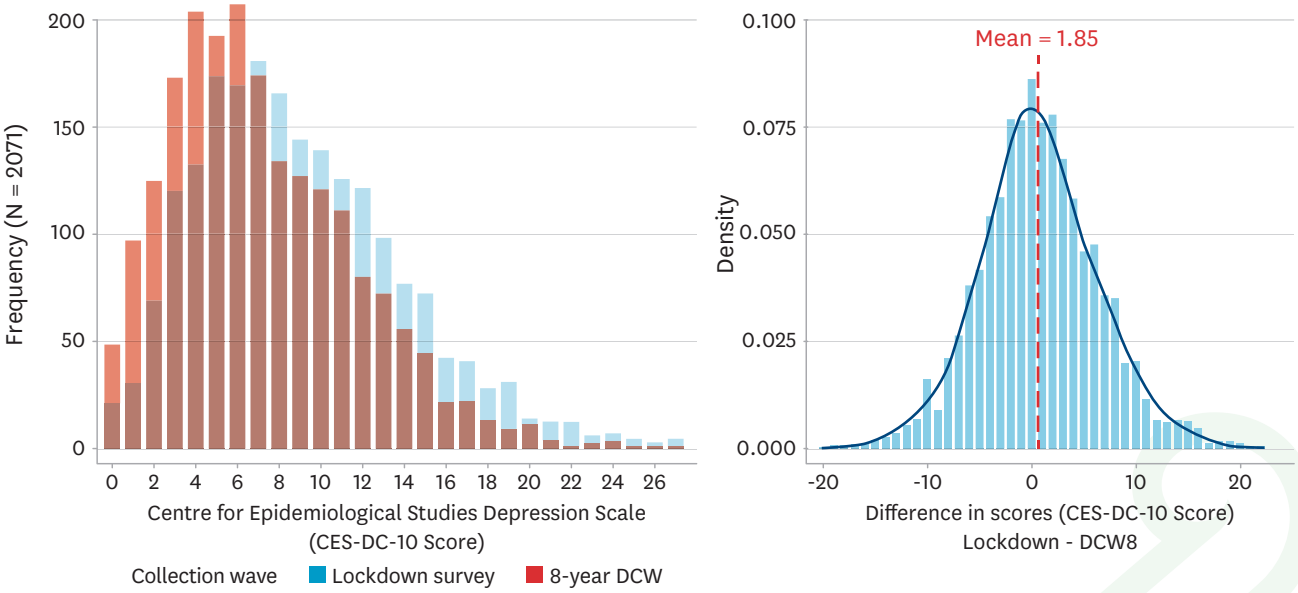


Figure 24: Distribution of depression scores across two data collection waves

3.4.2.1 Depression scores as continuous data

Looking at the depression scores longitudinally, the distribution of depression scores shifted to the right in those children who completed both the eight-year DCW and the COVID-19 Wellbeing Survey (Figure 24). This shift indicates an increase over time in the number of children experiencing symptoms associated with depression.

Mean scores for the CES-DC-10 scale increased over the two data collection waves (eight-year DCW: mean=7.18, SD=4.44, median=6; compared to COVID-19 Wellbeing Survey: mean=9.04, SD=4.96, median=8 respectively, t test $p<0.001$).

Linear regression analysis identified that having symptoms associated with depression at the eight-year DCW was predictive of having symptoms associated with depression at the time of the COVID-19 Wellbeing Survey (estimate=0.21, 95% CI=0.16-0.26, $p<0.001$). Subgroups for which there was a significant change included:

- Girls: A greater increase in depression scores over time was observed for girls, compared to boys (estimate=1.20, 95% CI 0.66 – 1.74, $p<0.001$).
- Māori and Pasifika children: A significant decrease in depression scores over time was observed for these children, compared to European children (Table 17).
- Children who had three of more positive experiences during Alert Level 4: A decrease in depression scores over time was observed for these children, compared to children who had less than three positive experiences (Table 18).
- Children who worried about how much money their family had: A greater increase in depression scores over time was observed for these children, compared to children who didn't worry about money (Table 19).

Table 17: Ethnicity and depression scores over time

		Mean CES-DC-10 Score			
		n	Estimate	95% confidence intervals	P value
Ethnicity (Prioritised)	European	1106	Ref	-	-
	Māori	354	-0.99	-1.73 to -0.25	0.009
	Pacific	115	-1.50	-2.66 to -0.33	0.012
	Asian	219	-0.63	-1.48 to 0.23	0.150
	Other	39	-1.04	-2.90 to 0.81	0.270

Table 18: Impact of number of positive childhood experiences during Alert Level 4 on depression scores over time

		Mean CES-DC-10 Score			
		n	Estimate	95% confidence intervals	P value
Number of regular positive events	0-2 events	219	Ref	-	-
	3-4 events	839	-1.40	-2.28 to -0.53	0.002
	5-6 events	775	-2.11	-3.01 to -1.21	<0.001

Table 19: Impact of material wellbeing concerns on depression scores over time

		Mean CES-DC-10 Score			
		n	Estimate	95% confidence intervals	P value
How often the child worries about how much money the family has	Don't think about it at all	973	Ref	-	-
	Don't know	179	1.28	0.36 to 2.21	0.007
	Sometimes	501	1.25	0.62 to 1.88	<0.001
	Often	115	2.29	1.16 to 3.42	<0.001
	Always	65	2.14	0.67 to 3.61	0.004

Children who were less connected with friends and family during Alert Level 4, also had a decrease in depression scores over time, compared to children who were more connected (Table 20). This finding appears counter-intuitive but can be explained by the fact that the least connected children had a higher mean depression score at the eight-year DCW (mean=8.6), compared to the most connected children (mean=6.9).

The mean depression score increased over time in the most connected children (from 6.9 to 8.8 at the time of the COVID-19 Wellbeing Survey) but declined for those who were not or almost not connected (from 8.6 to 8.5 at the time of the COVID-19 Wellbeing Survey). This finding suggests that the mental health of children who were highly connected was impacted more by Alert Level 4.

Table 20: Impact of connectedness during Lockdown on depression scores over time

		Change in Health Status			
		n	Estimate	95% confidence intervals	P value
Degree of connectedness	More connected	788	Ref	-	-
	Moderately connected	821	0.24	-0.33 to 0.81	0.412
	A little connected	149	-0.62	-1.65 to 0.42	0.242
	Not or almost not connected	75	-1.67	-3.09 to -0.25	0.021

Sensitivity analysis, where item DS5 ("I felt like something good was going to happen") of the CES-DC 10 scale was removed to increase the robustness of the scale at both DCWs, had no impact on the overall findings.

3.4.2.2 Depression scores as categorical data

The CES-DC-10 scores can also be looked at categorically, i.e., where a score <10 suggests no significant depressive symptoms and a score ≥10 suggests clinically significant depressive symptoms (Table 21). Overall, 59% of children in the COVID-19 Wellbeing Survey scored below 10, compared to 72% of children at the eight-year DCW. Some children did not change the category they were in over time, that is:

- Almost two-thirds of children with a CES-DC-10 score < 10 at the eight-year DCW where in the same category at the time of the COVID-19 Wellbeing Survey.
- Approximately a half of children with a CES-DC-10 score ≥ 10 at the eight-year DCW where still in the same category at the time of the COVID-19 Wellbeing Survey.

However, 37% of children had a decline in mental health over time, transitioning from a low CES-DC-10 score at the eight-year DCW into a state of having clinically significant depressive symptoms (i.e., CES-DC-10 scores ≥ 10) at the time of the COVID-19 Survey.

Almost half of the children had an improvement in their mental health, transitioning from a high CES-DC 10 score (suggestive of clinically significant depressive symptoms) at the eight-year DCW into a better mental state at the time of the COVID-19 Wellbeing Survey.

Table 21: Change in depression scores across two data collection waves

		Depression scores in the COVID-19 Wellbeing Survey	
		CES-DC 10 score < 10 n (%)	CES-DC 10 score ≥ 10 n (%)
Depression scores at the eight-year DCW	CES-DC 10 score: <10	945 (63.4%)	546 (36.6%)
	CES-DC 10 score: ≥10	271 (46.7%)	309 (53.3%)

3.4.3 Anxiety symptoms during COVID-19, compared to before COVID-19

Another key question to explore is whether the COVID-19 pandemic and the associated Government restrictions, increased feelings of anxiety in this cohort of children, compared to before the pandemic (i.e., when they were eight years of age).

KEY FINDINGS AROUND CHANGES IN SYMPTOMS OF ANXIETY OVER TIME WERE:

- Approximately 70% of children had no clinically significant symptoms of anxiety, compared to approximately 60% when the children were eight.
- There was a decrease over time in the number of children experiencing symptoms associated with anxiety, particularly in:
  - Pacific children.
  - Children who were overweight when they were eight years of age.
- The following groups of children experienced an increase over time in the symptoms associated with anxiety:
  - Girls.
  - Children who were always or often worried about how much money their family had or didn't know how they felt.

3.4.3.1 Anxiety scores as continuous data

Looking at the data longitudinally, the distribution of anxiety scores shifted to the left in those children who completed both the eight-year DCW and the COVID-19 Wellbeing Survey (Figure 25). This shift indicates a decrease over time in the proportion of children experiencing symptoms associated with anxiety.

Mean PROMIS scores at the two data collection waves declined over time (eight-year DCW: mean=48.18, SD=9.70, median 48; compared to COVID-19 Wellbeing Survey: mean=45.73, SD=10.01, median 45 respectively, t test $p<0.001$). Linear regression analysis identified that having symptoms associated with anxiety at the eight-year DCW was predictive of having symptoms associated with anxiety at the time of the COVID-19 Wellbeing Survey (estimate=0.26, 95% CI=0.21-0.31, $p<0.001$). Subgroups where there was a significant change in anxiety scores over time included:

- **Girls**: Anxiety scores increased over time, compared to boys (estimate=1.55, 95% CI 0.50 – 2.60, p=0.004).
- **Pacific children**: Anxiety scores decreased by three points over time, compared to European children (Table 22).
- **Children who worried about how much money their family had**: Anxiety scores increased by three to four points over time, compared to children who didn't worry about money (Table 23).
- **Children who were overweight**: Anxiety scores decreased by one and half points over time, compared to children of normal body weight (Table 24).

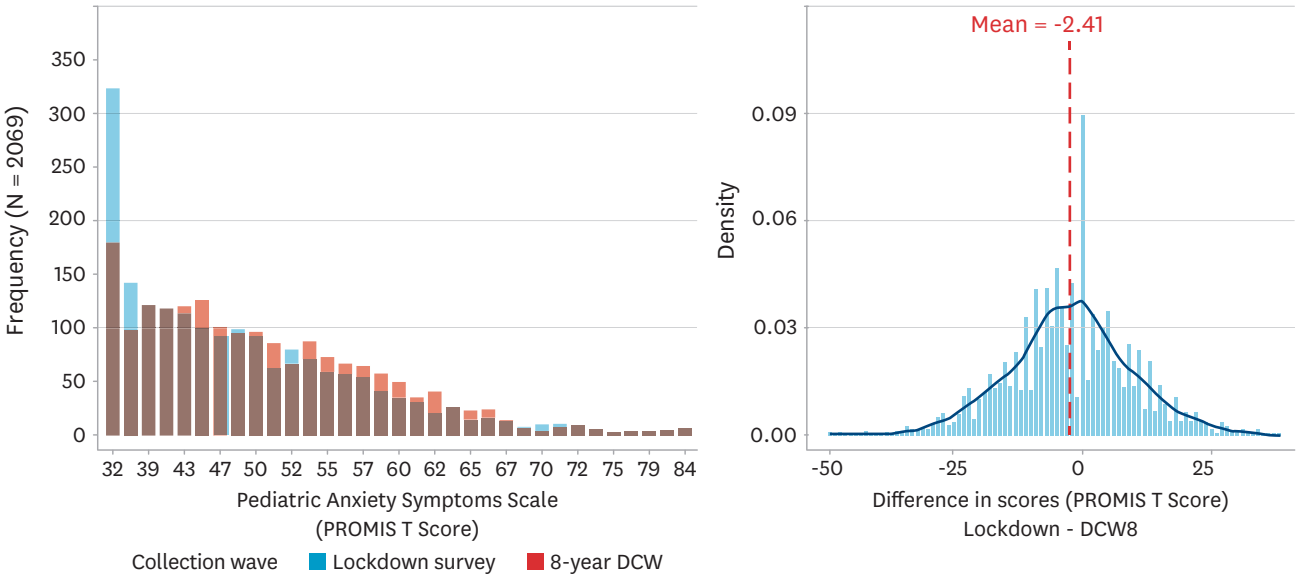


Figure 25: Distribution of anxiety scores across two data collection waves

Table 22: Ethnicity and anxiety scores over time

		Mean PROMIS scores			
		n	Estimate	95% confidence intervals	P value
Ethnicity (Prioritised)	European	1138	Ref	-	-
	Māori	364	-0.93	-2.39 to 0.53	0.210
	Pacific	124	-3.27	-5.55 to -0.99	0.005
	Asian	220	0.81	-0.89 to 2.50	0.349
	Other	44	-2.66	-6.15 to 0.83	0.135

Table 23: Impact of material wellbeing concerns on anxiety scores over time

		Mean PROMIS scores			
		n	Estimate	95% confidence intervals	P value
How often the child worries about how much money the family has	Don't think about it at all	1001	Ref	-	-
	Don't know	182	3.31	1.48 to 5.14	<0.001
	Sometimes	519	3.18	1.95 to 4.41	<0.001
	Often	123	3.81	1.63 to 5.99	<0.001
	Always	65	3.16	0.24 to 6.08	0.034

Table 24: Impact of body size at eight years of age on anxiety scores over time

		Mean PROMIS scores			
		n	Estimate	95% confidence intervals	P value
Body size	Normal	1355	Ref	-	-
	Underweight	21	-2.48	-7.48 to -2.52	0.331
	Overweight	347	-1.50	-2.88 to -0.12	0.033
	Obese	167	-0.92	-2.86 to 1.02	0.353

3.4.3.2 Anxiety scores as categorical data

The PROMIS scores can also be looked at categorically, i.e., where scores ≤50 indicate no anxiety, scores of 51-55 indicate 'mild' symptoms of anxiety, scores of 56-65 indicate 'moderate' symptoms of anxiety, and scores ≥66 indicate 'severe' symptoms of anxiety.

Using these categories, more than half of the children in both the eight-year DCW and the COVID-19 Wellbeing Survey had no symptoms of anxiety (Figure 26). The proportion of children with symptoms associated with anxiety decreased between the two data collection waves, with severe anxiety reported by less than 5% of children.

Some children did not change the anxiety category they were in between the two data collection waves (Table 25). For example,

- 76% of children with no symptoms of anxiety at the eight-year DCW still had no symptoms of anxiety at the time of the COVID-19 Wellbeing Survey.
- 25% of children with moderate anxiety at the eight-year DCW still had moderate anxiety at the time of the COVID-19 Wellbeing Survey.

However, other children had an increase in anxiety symptoms over time, while others had a decline (Table 25). For example,

- 10% of children with no symptoms of anxiety at the eight-year DCW had moderate anxiety at the time of the COVID-19 Wellbeing Survey.
- 53% of children with severe anxiety at the eight-year DCW had no symptoms of anxiety at the time of the COVID-19 Wellbeing Survey.

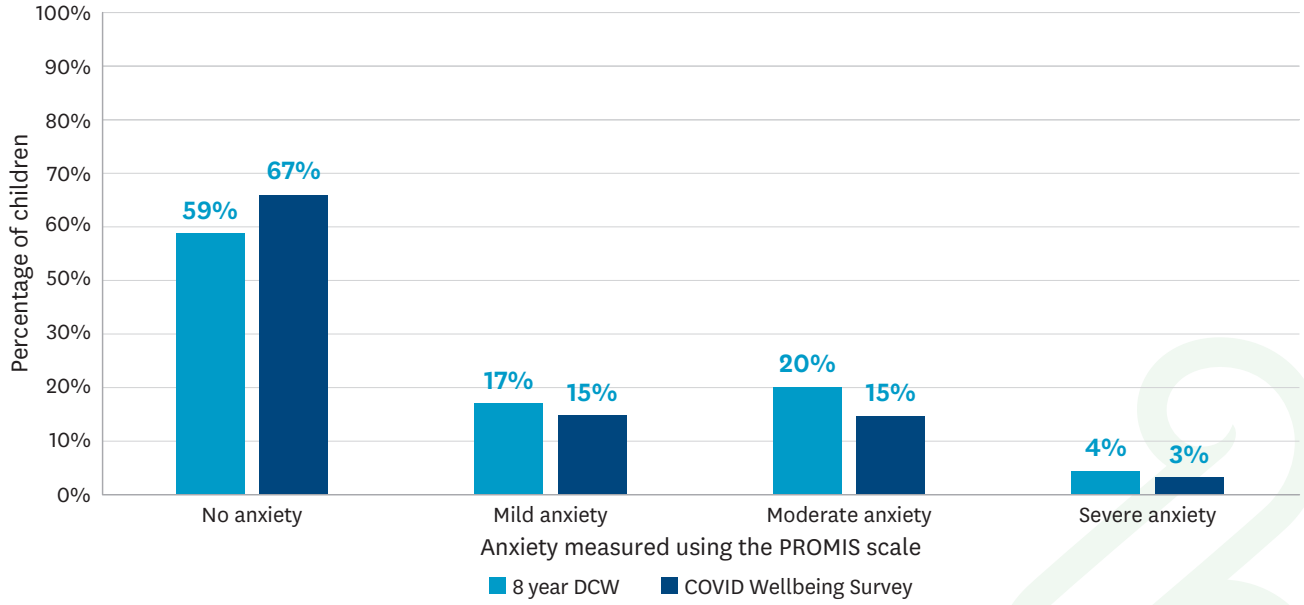


Figure 26: Child anxiety levels across the two data collection waves

Table 25: Change in anxiety scores across two data collection waves

		Anxiety at the time of the COVID-19 Wellbeing Survey			
		No anxiety n (%)	Mild anxiety n (%)	Moderate anxiety n (%)	Severe anxiety n (%)
Anxiety at the time of the eight-year DCW	No anxiety	922 (75.7%)	143 (11.7%)	126 (10.3%)	27 (2.2%)
	Mild anxiety	230 (63.9%)	62 (17.2%)	57 (15.8%)	11 (3.1%)
	Moderate anxiety	185 (47.2%)	92 (22.3%)	105 (25.4%)	21 (5.1%)
	Severe anxiety	41 (52.6%)	11 (14.1%)	21 (26.9%)	<10

3.4.4 Children most at risk of poor health and wellbeing

KEY FINDINGS:

- The following children were most at risk of having one or more negative changes in health and wellbeing over the two DCWs.
  - Girls.
  - Children with mothers who had one or more episodes of depression.
  - Children who were always or often worried about how much money their family had or didn't know how they felt.
  - Children who had highly educated mothers.
- However, children who had six or more people in their bubble during Alert level 4 were less likely to report one or more negative changes over the two DCWs.

Based on findings presented in this report, there is a group of children who have had negative changes in their health and wellbeing outcomes from the eight-year DCW to the time of the COVID-19 Wellbeing Survey. Some children have only had one negative change (e.g., an increase in symptoms of depression), some have had two (e.g., an increase in symptoms of depression and anxiety), while 70 children (5%) have experienced three negative changes, i.e., an increase in symptoms associated with depression and anxiety, plus a deterioration in their health (Figure 27).

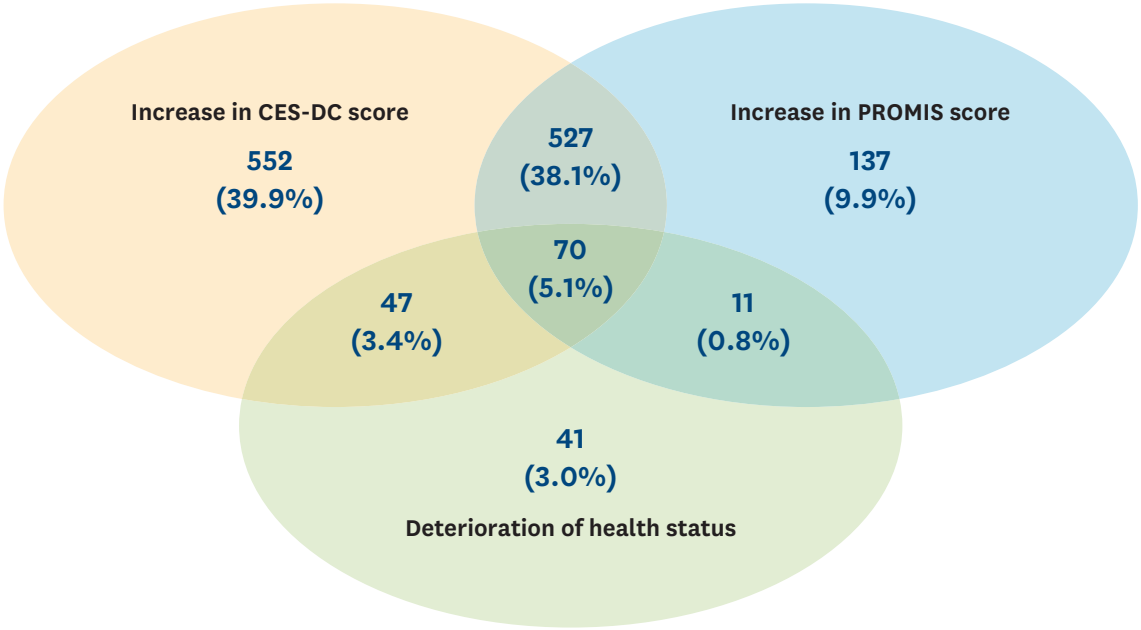


Figure 27: Children with one or more negative health and wellbeing changes over time

The children who were significantly more likely to report a higher number of negative changes over the two DCWs were (Figure 28, Table 26):

- Girls.
- Children whose mother had a history of depression.
- Children who worried about how much money their family had.
- Children who had mothers with a bachelor's degree or higher.

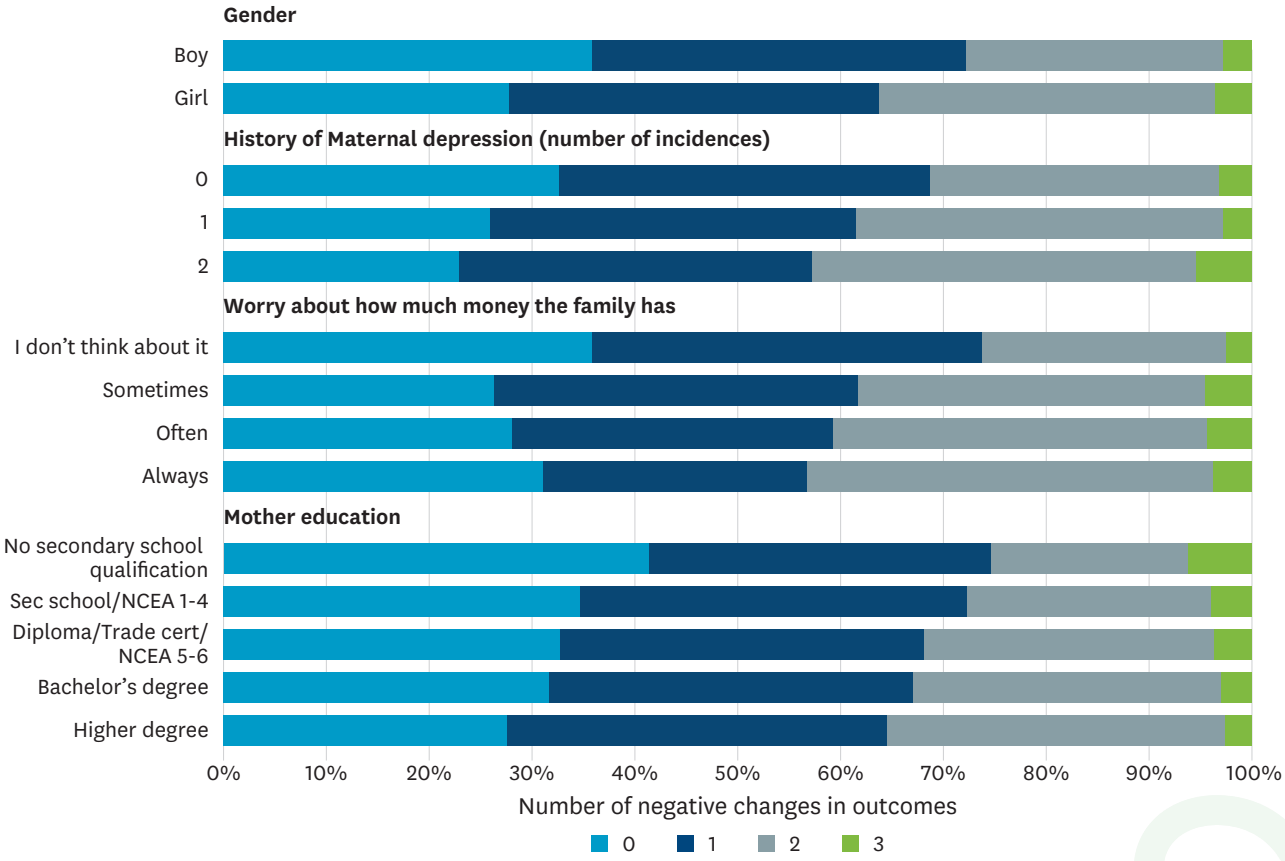


Figure28: Children at risk of having one or more negative health and wellbeing changes over time

Table 26: Children most at risk of poor health and wellbeing changes over time

		Negative health and wellbeing outcomes			
		n	Odds ratio	95% confidence intervals	P value
Sex	Boy	936	Ref	-	-
	Girl	1019	1.42	1.20 to 1.67	<0.001
Episodes of maternal depression	0	1712	Ref	-	-
	1 or 2	243	1.42	1.11 to 1.82	0.006
How often the child worries about how much money the family has	Don't think about it at all	1032	Ref	-	-
	Don't know	188	1.65	1.24 to 2.20	<0.001
	Sometimes/Often	664	1.67	1.39 to 2.00	<0.001
	Always	71	1.76	1.11 to 2.79	0.016
Mother's education	No secondary schooling	58	Ref	-	-
	Secondary school/ NCEA 1-4	322	1.46	0.86 to 2.49	0.163
	Diploma/Trade Cert/NCEA 5-6	491	1.58	0.94 to 2.66	0.083
	Bachelor's degree	612	1.69	1.01 to 2.84	0.046
	Higher degree	472	1.96	1.17 to 3.32	0.011

3.4.4.1 The protective effect of bubble size

Children participating in the COVID-19 Wellbeing Survey were asked to provide information about their bubbles during Alert Level 4. Most children (90%, n=2065) reported having between three and six people in their bubble, including themselves (Figure 29). Pasifika and Māori children were, on average, more likely to have a greater number of people in their bubble.

Children who had six or more people in their bubble during Alert Level 4 were significantly less likely to report one or more negative changes over the two DCWs, compared to children who had 2-3 people in their bubble (Table 27).

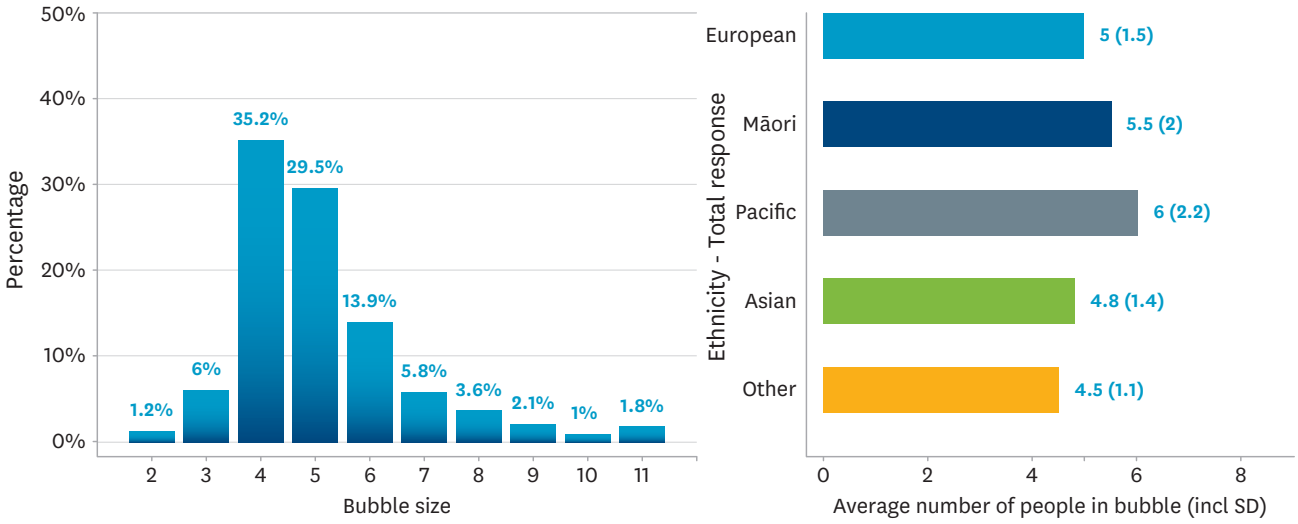


Figure 29: Bubble size during Alert Level 4

Table 27: The protective effect of bubble size on health and wellbeing

		Change in Health Status			
		n	Estimate	95% confidence intervals	P value
Number of people in the child's bubble	2 or 3 people	138	Ref	-	-
	4 or 5 people	1282	0.82	0.59 to 1.13	0.216
	6 or more people	535	0.67	0.47 to 0.95	0.023

4. Discussion

This study aimed to explore the impact of government-mandated COVID-19 restrictions on the health and mental wellbeing of children in the GUiNZ longitudinal cohort study, and whether this impact differed by specific demographic variables or had changed since the last DCW (undertaken when the children were eight years of age).

The survey was delivered during Alert Levels 2 and 3, with survey questions pertaining to that time-period, or to Alert Level 4. A total of 2421 children participated in the survey, representing 42% of the invited GUiNZ cohort.

4.1 Strength in togetherness

- Overall, most children who completed the survey reported their current health was 'very good' to 'excellent', and approximately 60% of children had no clinically significant symptoms of depression or anxiety.
- One in three children had an improvement in their health since they were eight years of age and there was a general decline in the number of children with symptoms of anxiety, particularly in Pasifika children and children who were overweight.
- There was also an observed decline in symptoms of depression in Māori and Pasifika children over the two time periods.
- Being in a bubble during Alert level 4 (Lockdown) with six or more people was protective of negative health and wellbeing changes over the two DCWs.

BEST THINGS ABOUT LOCKDOWN

"Reading, eating healthy stuff, bonding with my family."

4.2 Alert Levels 2-4 were very challenging for some children

- Having obesity, being less connected with friends and family outside of the home, worrying about how much money the family had, and still undertaking schoolwork at home were predictive of poorer health at the time of the survey.
- Children who were underweight were more likely to report a decline in health from when they were eight years of age.
- There was also a group of children that had one or more negative changes in their health and mental wellbeing over time. This combination of negative changes was more likely to be seen in girls, children who had a mother with a history of depression, children who worried about how much money their family had, and children who had well educated mothers.

WORST THING ABOUT LOCKDOWN

"Feeling like I'm eating too much, parents not having money, arguing with parents"

4.3 Could the observed changes in depression and anxiety be age-related?

The observed changes in depression (increasing over time) and anxiety (decreasing over time) in this cohort of children may be age-related.

The prevalence of depression and anxiety is known to increase with age, with the average age of onset of major depressive disorders occurring between 11 to 14 years of age (35). Thus any increase in depression symptoms between eight and 11 years of age may represent children manifesting their first symptoms of a depressive disorder, particularly in children where there is a family history of depression (31).

Anxiety disorders tend to present during early childhood, with a gradual increase in prevalence with age and clear sex differences in prevalence (35) (i.e., higher in girls, but with no difference by sex in age of onset) (36).

Furthermore, certain anxiety disorders are more common in early childhood (e.g., separation anxiety, social anxiety, and specific phobias), but can resolve with time (36-37).

The observed increase in depression, and decrease in anxiety, may therefore reflect the known prevalence trends of these disorders in childhood.

Despite the above, it's important to remember that the survey had low participation by Māori, Pacific, and Asian children, and children living in rural areas of New Zealand. Children who did not participate in the survey may have been those experiencing the social and environmental stressors (such as poverty, bullying, etc) known to be determinants of depression and anxiety.

WORST THING ABOUT LOCKDOWN

"My mum has to go to work and people might make my mum get sick and I will be sad"

4.4 The security of the 'bubble'

Previous research has shown a higher prevalence of depression and anxiety in New Zealand Māori and Pacific children, compared to other ethnic groups (38), and a higher prevalence of depression and anxiety in children who were overweight or with obesity, compared to children who are normal weight (39). However, the COVID-19 Wellbeing Survey found the opposite, with a significant reduction in depression for Māori and Pacific children, and a significant reduction in anxiety for Pacific children and children who were overweight.

There are several possible explanations for these findings. First, the average size of each household 'bubble' at the time of the survey (not including the child) was bigger for Pacific and Māori children, than for European children. Māori and Pacific peoples tend to be strongly connected to their culture and to others socially (40), so one could postulate that being around more people in the family unit/bubble meant there were more people around to assist with household tasks, look after the children, and offer the children a sense of security and connection, thereby helping to reduce symptoms of depression and anxiety. A review on anxiety and depression in Pacific youth found strong family connections and faith were protective factors for depression and anxiety (41). Furthermore, for Pacific youth, particularly Samoan youth, the cultural concept of 'le va' ("an interconnecting space that connects people together, nurturing positive relationships between them") (41) appears protective of mental health. As mentioned earlier, it's important to note that the survey had low participation by Māori and Pacific children, and non-engaged children may have been those experiencing social and environmental stressors that can impact mental wellbeing.

Second, bullying is a known risk factor for depression and anxiety (42), and high rates of bullying have previously been noted in Pacific children in the GUiNZ study (compared with European children) (43). Furthermore, bullying is also higher in children who are overweight or obese (42). It's therefore possible that being at home during COVID-19 Alert Level 3 meant children were not exposed to bullying at school, potentially resulting in less depression and anxiety.

BEST THINGS ABOUT LOCKDOWN

"Spending time with grandparents after we combined bubbles."

4.5 Some children worry a lot about money

A significant finding from the COVID-19 Wellbeing Survey was that children who worried about how much money the family had reported poorer health and more symptoms of depression and anxiety at the time of the survey, compared to when they were eight. These findings may be explained by the children reflecting the emotional change within the family environment due to the significant economic and social impact Alert Levels 3 and 4 had on many New Zealand families. For example, a New Zealand survey (N=3000) undertaken during Alert Level 4 found 34% of households were experiencing significant financial difficulty, 10% had missed a rent or mortgage payment, and 41% of survey respondents were feeling anxious about their financial situation (44). Another New Zealand survey undertaken during this period (N=2002) focused on the impact of work status, job and income loss, and work-family conflict on family functioning and wellbeing during lockdown (45).

Approximately half of working parents reported an increase in family demands, despite "work time demands among those who continued working remaining unchanged". Such work-family conflict was associated with more partner conflict, less supportive partners, a decline in parental role satisfaction, more negative emotions, and less positive emotions.

WORST THING ABOUT LOCKDOWN

"I sometimes get worried that we will run out of money and have to sell our home."

4.6 Support children with well-being and developmental concerns

Another subgroup of interest in the COVID-19 Wellbeing Survey were children whose mothers reported well-being and developmental concerns for them at the eight-year DCW. This group of children had better health but were more likely to have depression and anxiety at

the time of the COVID-19 Wellbeing Survey, compared to when they were eight. Similar findings were reported in a cross-sectional study (N=64) of Polish youth and young adults with development disorders, which found that family stresses because of COVID-19 lockdowns predicted the severity of depression in girls (46). It's therefore possible that because these children had wellbeing and developmental concerns their family paid close attention to their health needs, particularly during high stress times. However, as mentioned above, many children were exposed to family stress because of COVID-19 related financial and work-life challenges (35) (including families who had children with wellbeing and developmental concerns). Symptoms of depression and anxiety in this higher-needs population of children may reflect this exposure.

WHAT IT'S LIKE IN LOCKDOWN

"All the children with disabilities shouldn't be forgotten. I have autism and I want to make sure those families are getting help to"

4.7 Comparison with other COVID-19 studies undertaken in children

The finding in the COVID-19 Wellbeing Survey that the majority of children rated themselves as having 'good' to 'excellent' health is aligned with the findings from an audit from Starship Children's Hospital in Auckland, which found the lowest number of child trauma admissions in the past five years during Alert Level 4 (47). Restriction of population movement during Alert Levels 3 and 4 meant less traffic on the roads, less activity out of the home environment, and closer supervision of children given caregivers were not away from home, thereby reducing the risk of physical harm.

International research supports the finding that for some children their health deteriorated during the time of COVID-19 related restrictions (48-49). Reasons for a decline in health are likely multifaceted, and can include becoming unwell with COVID-19 (at the time of the COVID-19 Wellbeing Survey, 157 COVID-19 cases in New Zealand were children aged 0-19 years) (4), a pre-existing health condition becoming worse, or increased food insecurity (potentially related to COVID-19 related job losses for caregivers and associated financial insecurity) (35) resulting in poorer nutrition and poorer health in children who are underweight (50).

Certainly in New Zealand there is evidence that the COVID-19 lockdowns have exacerbated the existing food insecurity problem, with an increase in the distribution of food parcels and Special Needs Grants issued for food by the Ministry of Social Development (51). Emerging international research also indicates many children had an increase in unhealthy food practices (such as eating more unhealthy food, and/or eating more frequently), and an increase in sedentary behaviour, during periods of COVID-19 related confinement, with resulting weight gain (50). Research also suggests unhealthy food consumption may have a depressive effect (52).

A decline in health could also be related to experiencing violence and/or abuse through spending a longer time in a home environment with pre-existing family vulnerabilities (e.g., family dysfunction, economic hardship, poor mental health, alcohol dependence, etc) and/or new family stresses (e.g., COVID-19 related job losses, financial insecurity, increased alcohol consumption, etc). Certainly, both nationally and internationally there have been reports of adults increasing their alcohol consumption during periods of lockdown (53-54), and people experiencing family violence during periods of lockdown (53, 55-56).

Relatively little published information is available on the trajectory of mental health in children and young people from before to during the COVID-19 pandemic. Information that does exist is broadly consistent with that observed in the GUiNZ COVID-19 Wellbeing Survey, and is summarised below:

- A study of 248 children (aged 13-16 years, 82% Caucasian, 79% mid to high socioeconomic status) from an urban area in New South Wales, Australia found a significant increase in both depression and anxiety symptoms from the 12 months leading up to lockdown (i.e., 2019), and two months into a lockdown (5-14th May 2020) (57) Key predictors for poor mental health included being female, having COVID-19 related worries, decreased life satisfaction, experiencing online learning difficulties, and increased conflict with parents. Factors that were protective of poor mental health included feeling socially connected during the lockdown period and adhering to the Government orders to stay at home.
- A study of 1339 children (aged 9-18 years) from 12 longitudinal studies (10 from the USA, one from the Netherlands, and one from Peru) found a significant increase in depression, but not anxiety, symptoms from before the COVID-19 pandemic to during the first six months of the pandemic (58). A greater decline in mental health was observed for multiracial children, and those children under more strict 'lockdown' restrictions.
- A study of 168 children (aged 8-12 years) in England found a significant increase in depression, but not anxiety, symptoms from before the COVID-19 lockdown to during the Lockdown (59).

Longitudinal studies from the UK (60-61) and Canada (62) have also observed a decline in the mental health in adults, from before the COVID-19 pandemic to during the pandemic.

5. Strengths and Limitations

5.1 Study strengths

This survey is the first in New Zealand, and one of the largest in the world, to explore the impact of COVID-19 on the health and wellbeing of children aged 10-11 years of age, in comparison to their health and wellbeing before COVID-19.

The prospective longitudinal design of the study provides a temporal framework to assess causality, with adjustment for known confounders, as well as the ability to calibrate the findings to the baseline generalisable cohort (despite the lower response rate). Previous New Zealand research on the health and wellbeing of children at the time of the pandemic has been cross-sectional in design and therefore unable to attribute any causal relationship to the pandemic.

Given the longitudinal design, comprehensive data were available for many variables of interest from previous DCWs, meaning recall bias was minimised. The timing of the survey meant the acute impact of COVID-19 Alert Levels 3 and 4 was captured, with information on the long-term impact of COVID-19 on the GUiNZ children and families/whānau to be determined in future DCWs.

The survey strongly reflects the views of girls, and children who had older (>40 years) and more educated mothers (i.e., ≥ Bachelor's degree), given the higher participation rate of these groups in the survey.

The survey is also the first time an online DCW has been utilised with children in the GUiNZ cohort, with the 42% response rate considered high for a digital survey of this nature (63). Furthermore, most children completed all questions in the survey. The response rate applies to children who were able to engage in the survey if their parental primary contact agreed and provided the children with access to a connected device. Once the children are ≥16 years of age, parental consent will no longer be required, and so response rates to any future digital surveys may increase (particularly given this cohort of children are 'digital natives', having grown-up in a highly connected world). The response rate and lessons learnt from delivering this survey online provides valuable information to inform strategies for contingency planning should future DCWs require electronic data capture (e.g., if future COVID-19 lockdowns prohibit face-to-face data capture for the upcoming 12-year DCW).

5.2 Study limitations

The study had several limitations that should be considered when interpreting the findings. These limitations relate to four areas: generalisability, reporting bias, the validity of the depression and anxiety instruments, and multiple tests of significance.

- **Generalisability**: Five aspects of the study limit the generalisability of the survey findings to the greater survey cohort, and New Zealand children of this age in general. First, 11 children were excluded from participating in the survey because their caregivers had requested that all communications to the children be in Te Reo Māori, limiting the generalisability of the survey findings to this subgroup of children. Unfortunately, the GUiNZ team did not have the resources during Alert Level 4 to provide a translated survey within the limited time available to launch the survey. As an important sub-group of the Māori cohort, the GUiNZ team did not want to offend these families by sending them an English-only survey and risk having the families withdraw from the cohort study. The team therefore made the difficult decision to not invite these children to complete the COVID-19 Wellbeing Survey. Second, almost two thirds of the

cohort did not participate in the survey, with under-representation from Māori, Pacific, and Asian children, and children living in rural areas of New Zealand. Based on the eight-year DCW, the study team were aware that valid contact details were unavailable for some families for the COVID-19 Wellbeing Survey. However, given the opportunistic nature of this survey there was no time and resources available to address this issue. The team made the decision to continue with the survey, whilst acknowledging that the sample would not be representative. Third, it was anticipated that some non-response would be due to digital inequity, that is a lack of access to devices to access the internet to complete the online survey, or lack of access to, or consistent access to, the internet. Fourth, the children were unfamiliar with the Qualtrics survey platform, which proved challenging for some children (e.g., the survey links expired after a certain time). Finally, some children in the COVID-19 Wellbeing Survey, and in the eight-year DCW, did not answer all survey questions, although the degree of non-response was very low indicating that in general the cohort children were willing and able to participate in a primary digital data collection process.

- **Reporting bias**: Various issues may have introduced reporting bias into the study. First, face-to-face interviews were used for the eight-year DCW, compared to a remote, self-completed online survey for the COVID-19 Wellbeing Survey. This difference in data collection method may have impacted the quality and reliability of results and may have led to differential attrition within population subgroups not seen in the overall response rates. Second, how the children interpreted the meaning of the phrase 'current health' is unknown. Some may have interpreted the word to mean physical health, mental health, or both in the definition. Third, survey questions in the COVID-19 Wellbeing Survey, and all previous DCWs, were not compulsory to complete, so certain questions have more missing data than others. Missing data for the variables presented in this report ranged from 0.3% to 10.1%. Fourth, data are self-reported and therefore subject to some degree of bias. For example, more objective measures of general health, depression and anxiety may not align with the self-reported measures, and some questions may be impacted by social desirability bias. Finally, some linked variables from the eight-year DCW may have changed over time, and thus may not be the same at the time of the COVID-19 Wellbeing Survey, for example, socioeconomic deprivation, rurality, and number of adverse life events experienced by the child.
- **Validity of the depression and anxiety instruments**: The instrument used to measure depression (and the score cut-off of ≥10) has not been validated in children aged 10-11 years, although it has been validated in youth aged 13-17 years (64-66). The internal consistency of the depression score was also not reliable for the COVID-19 Wellbeing Survey cohort, although it was for the eight-year DCW. Similarly, the instrument used to measure anxiety has not been validated in a New Zealand population, and the score cut-offs have not been validated in children aged 10-11 years. For the above reasons, the results of the depression and anxiety analyses are suggestive-only and require validation.
- **Multiple tests of significance**: Multiple tests of significance were undertaken, increasing the risk of type 1 error, that is finding a significant relationship where none exists.

6. Future Directions

This survey was administered rapidly and opportunistically during the time of an unexpected global pandemic and an associated brief acute lockdown period. The advantage of the survey was that it utilised an existing cohort of children with well-characterised demographic, health, and wellbeing information. The intent of the survey was to capture a snapshot of life during this high stress time, through the eyes of the children themselves and provide a measure of wellbeing that could augment the longitudinal wellbeing trajectory information.

It will be important that future GUiNZ DCWs continue to assess the on-going and long-term impact of the COVID-19 pandemic on the health and wellbeing of children in New Zealand.

Acknowledgements

GUiNZ is indebted to the continued commitment of all the child and family participants in the study. Fitting an ongoing involvement with GUiNZ into your busy lives is a significant undertaking; we acknowledge your trust and recognise our responsibility to safeguard the time, honesty, and information you have shared with us.

The authors of this report are members of the GUiNZ team: the Foundation Director (Professor Susan Morton), Named Investigators (Professor Clare Wall, Professor Karen Waldie, Associate Professor Elizabeth Peterson, Dr Kane Meissel, Dr Pat Bullen), Associate Professor Natalie Walker, Nandini Dubey (Medical Student), Senior Research Fellows (Dr Sarah Gerritsen, Dr Carin Napier), Research Fellows (Dr Fiona Langridge, Dr Rebecca Evans), Research Assistants (Molly Bergquist, Ashley Smith), Biostatisticians (Avinesh Pillai, Stephane Janicot), Pacific Theme Lead (Dr Seini Taufa), Māori Theme Leads (Dr Sarah-Jane Paine and Professor Te Kani Kingi) and Research Director (Professor Boyd Swinburn). The authors acknowledge that the content of this report is informed by experts in the specific research domains and themes for GUiNZ, and feedback from the Ministry of Social Development and Ministry of Education. Further information regarding the expert advisory team and study design is available on our website: www.growingup.co.nz

This report would not be possible without the efforts of all those involved in the wider GUiNZ team to get the survey out into field. We acknowledge specifically: Annette Gohns (General Manager), Rina Prasad (Lead Data Manager), Anushree Kedia (Data Manager), Cherie Lovell (Field Operations Manager), and Saraid Black and Kirsty Jones (Communications Managers), Amelia Willems (Research Delivery Manager), and Davanti Consulting Limited.

We thank the key funders of GUiNZ who not only contribute to the study's sustainability but help to ensure that the information from our families contributes evidence to inform the policy environment in New Zealand. We thank the initial funders of GUiNZ, in particular the Ministry of Social Development, supported by the Health Research Council of New Zealand and the University of Auckland. Many Government agencies contribute to the ongoing sustainability and utility of GUiNZ. We acknowledge and thank the Ministry of Social Development for management of the Crown funding of GUiNZ and acknowledge further funding and support received from the Ministries of Health and Education, as well as Te Puni Kōkiri, the Ministries of Justice and Business, Innovation and Employment, the Ministry for Pacific Peoples, the Ministry for Women, the Departments of Corrections and Labour, the New Zealand Police, Sport New Zealand and the Office of the Health and Disability Commissioner. We also acknowledge the support of the Office of the Children's Commissioner, Housing New Zealand, the Office of Ethnic Communities, Statistics New Zealand, and the Treasury.

Finally, GUiNZ acknowledges the ongoing support and advice provided by the University of Auckland and Auckland UniServices Limited, as well as the advisory and governance groups of the study including all Named Investigators, the Steering Group, Policy Forum, our Expert Scientific Advisory Group, our Kaitiaki Group, our Pasifika Advisory Group, and our Data Access Committee.

Further information about the GUiNZ team, governance and design of this longitudinal study is available on our website: https://www.growingup.co.nz/

References

1. World Health Organization. Coronavirus disease 2019 (COVID-19) Situation Report - 51. 2020. World Health Organization, Geneva
2. World Health Organization. WHO Coronavirus (COVID-19) Dashboard. World Health Organization, Geneva. https://covid19.who.int/
3. World Health Organization. Coronavirus disease 2019 (COVID-19) Situation Report - 198. August 2020. World Health Organization, Geneva
4. Ministry of Health. COVID-19: Case demographics. Ministry of Health, Wellington. https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-data-and-statistics/covid-19-case-demographics
5. Ministry of Health. COVID-19: Current Cases. Ministry of Health, Wellington. https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-data-and-statistics/covid-19-current-cases
6. Baker M, Wilson N, Anglemyer A. Successful Elimination of Covid-19 Transmission in New Zealand. New England Journal of Medicine, 2020; 383 (8).
7. Götzinger F, Santiago-García B, Noguera-Julián A, et al. COVID-19 in children and adolescents in Europe: a multinational, multicentre cohort study. Lancet Child & Adolescent Health, 2020; 4 (9):653-61.
8. Swann OV, Holden KA, Turtle L, et al. Clinical characteristics of children and young people admitted to hospital with COVID-19 in the United Kingdom: prospective multi-centre observational cohort study. British Medical Journal, 2020; 370. m3249. doi: 10.1136/bmj.m3249
9. Fore HH. A wake-up call: COVID-19 and its impact on children's health and wellbeing. Lancet Global Health, 2020;(20):19–20.
10. Liu JJ, Bao Y, Huang X, Shi J, Lu L. Mental health considerations for children quarantined because of COVID-19. Lancet Child & Adolescent Health, 2020 May;4(5):347–9.
11. Xie X, Xue Q, Zhou Y, Zhu K, Liu Q, Zhang J, et al. Mental Health Status among Children in Home Confinement during the Coronavirus Disease 2019 Outbreak in Hubei Province, China. JAMA Pediatrics, 2020;7:1–3.
12. Saurabh K, Ranjan S. Compliance and Psychological Impact of Quarantine in Children and Adolescents due to COVID-19 Pandemic. Indian Journal of Pediatrics, 2020; 87(7):532-6.
13. Sprang G, Silman M. Posttraumatic stress disorder in parents and youth after health-related disasters. Disaster Medicine and Public Health Preparedness, 2013; 7(1): 105–10.
14. Wang G, Zhang Y, Zhao J, Zhang J, Jiang F. Mitigate the effects of home confinement on children during the COVID-19 outbreak. Lancet, 2020;395(10228):945–7.
15. Youthline COVID-19 Research: Report of Results. 2020. https://www.youthline.co.nz/surveyresults.html
16. Ministry of Health, COVID-19 Health and Wellbeing Survey. Ministry of Health, Wellington https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-resources-and-tools/covid-19-health-and-wellbeing-survey
17. Office of the Children's Commissioner. Life in Lockdown: Children and young people's views on the nationwide COVID-19 level 3 and 4 lockdown between March and May 2020. Office of the Children's Commissioner, Wellington, November 2020. ISBN 978-0-473-54970-1
18. Morton SMB, Ramke J, Kinloch J, et al. *Growing Up in New Zealand* cohort alignment with all New Zealand births. Australian and New Zealand Journal of Public Health, 2015;39(1):82–7.
19. Bergquist-O'Sullivan M, et al. GUiNZ COVID-19 Wellbeing Survey: Part 2: Education. Ministry of Education, Wellington 2021.

20. Jose PE, Stuart J, Pryor J, Ja N. The influences of social connectedness on behaviour in young children: A longitudinal investigation using GUiNZ data. Ministry of Social Development. August 2019.

21. Ministry of Social Development. Rapid Evidence Review: The impact of poverty on life course outcomes for children, and the likely effect of increasing the adequacy of welfare benefits. Ministry of Social Development, Wellington. December 2018.

22. Statistics New Zealand. Measuring child poverty: Material hardship. Statistics New Zealand, Wellington, 2019. https://www.stats.govt.nz/methods/measuring-child-poverty-material-hardship.

23. Child Wellbeing & Poverty Reduction Group. Material Wellbeing. Child Wellbeing & Poverty Reduction Group, Department of the Prime Minister and Cabinet, Wellington 2021.

24. Andresen EM, Malmgren JA, Carter WB, Patrick DL. Screening for Depression in Well Older Adults: Evaluation of a Short Form of the CES-D. American Journal of Preventive Medicine, 1994 Mar;10(2):77–84.

25. Bradley KL, Bagnell AL, Brannen CL. Factorial Validity of the Center for Epidemiological Studies Depression 10 in Adolescents. Issues in Mental Health Nursing, 2010 May 7;31(6):408–12

26. Salk RH, Hyde JS, Abramson LY. Gender differences in depression in representative national samples: Meta-analyses of diagnoses and symptoms. Psychological Bulletin, 2017; 143(8), 783–822.

27. Mammarella IC, Ghisi M, Bomba M, et al. Anxiety and depression in children with nonverbal learning disabilities, reading disabilities, or typical development. Journal of Learning Disabilities. 2016; 49(2):130-9.

28. Whitney DG, Shapiro DN, Peterson MD, Warschausky SA. Factors associated with depression and anxiety in children with intellectual disabilities. Journal of Intellectual Disability Research, 2019; 63: 408–17.

29. Livingston EM, Siegel LS, Ribary U. Developmental dyslexia: emotional impact and consequences. Australian Journal of Learning Difficulties, 2018; 23:2, 107-35.

30. Sanders J, Munford R, Thimasarn-Anwar T, Liebenberg L. Validation of the Child and Youth Resilience Measure (CYRM-28) on a sample of at-risk New Zealand youth. Research on Social Work Practice, 2017; 27(7):827-40.

31. Spence SH, Najman JM, Bor W, O'Callaghan MJ, Williams GM. Maternal anxiety and depression, poverty and marital relationship factors during early childhood as predictors of anxiety and depressive symptoms in adolescence. Journal of Child Psychology and Psychiatry, 2002; 43: 457-69.

32. Irwin DE, Stucky B, Langer MM, et al. An item response analysis of the pediatric PROMIS anxiety and depressive symptoms scales. Quality of Life Research. 2010 May 7;19(4):595–607.

33. Goldstone A, Javitz HS, Claudatos SA, et al. Sleep Disturbance Predicts Depression Symptoms in Early Adolescence: Initial Findings from the Adolescent Brain Cognitive Development Study. Journal of Adolescent Health, 2020; 66(5): 567-74,

34. McMakin DL, Alfano CA. Sleep and anxiety in late childhood and early adolescence. Current Opinion in Psychiatry, 2015; 28(6): 483-9.

35. Merikangas KR, Nakamura EF, Kessler RC. Epidemiology of mental disorders in children and adolescents. Dialogues of Clinical Neuroscience, 2009;11(1):7–20.

36. Merikangas KR., Avenevoli S. Epidemiology of mood and anxiety disorders in children and adolescents. In: Tsaung MT, Tohen M, eds. Textbook in Psychiatric Epidemiology, 2nd Edition. New York, NY: Wiley- Liss, 2002:657–704.

37. Masi G, Mucci M, Millepiedi S. Separation Anxiety Disorder in Children and Adolescents. CNS Drugs, 2001;15(2):93–104

38. Fleming T, Tiatia-Seath J, Peiris-John R, Sutcliffe K, Archer D, Bavin L, Crengle S, Clark T. (2020). Youth19 Rangatahi Smart Survey, Initial Findings: Hauora Hinengaro / Emotional and Mental Health. The Youth19 Research Group, The University of Auckland and Victoria University of Wellington, New Zealand.

39. Rankin J, Matthews L, Cobley S, et al. Psychological consequences of childhood obesity: psychiatric comorbidity and prevention. Adolescent Health, Medicine and Therapeutics, 2016; 7: 125-46.

40. Kukutai T, Prickett K, Atatoa-Carr P, Rata A. Poipoia te kākano kia puawai. Family structure, family change and the wellbeing of tamariki Māori. Ministry of Social Development, July 2020

41. Tucker-Masters L, Tiatia-Seath J. Reviewing the literature on anxiety and depression in Pacific youth: a fresh perspective. New Zealand Medical Student Journal, 2017; 25: 24-8.

42. Thompson I, Hong JS, Lee M, Prys NA, Morgan JT, Udo-Inyang I. A review of the empirical research on weight-based bullying and peer victimisation published between 2006 and 2016. Educational Review, 2020; 72 (1): 88-110.

43. Morton S, Walker C, Gerritsen S, et al. *Growing Up in New Zealand*: a longitudinal study of New Zealand children and their families. Now we are eight. Auckland. *Growing Up in New Zealand*, August 2020.

44. Galicki C. Impact of COVID-19 on financial wellbeing: Key findings from a national survey. Commission for Financial Capability, May 2020

45. Prickett KC, Fletcher M, Chapple S, Doan N, Smith C. (2020). Life in lockdown: The economic and social effect of lockdown during Alert Level 4 in New Zealand. Wellington, New Zealand: Victoria University of Wellington.

46. Michal G, Lukasz K. Symptoms of anxiety and depression in students with developmental disabilities during COVID-19 lockdown in Poland. Frontiers in Psychiatry, 2021; 12: 319

47. Hamill JK, Sawyer MC. Reductions of childhood trauma during COVID-19 Level 4 lockdown in New Zealand. Australian and New Zealand Journal of Surgery, 2020; 90 (7-8): 1242-3.

48. Patrick SW, Henkhaus LE, Zickafoose JS, et al. Well-being of parents and children during thee COVID-19 pandemic: a national survey. Pediatrics, 2020; 146(4): e2020016824.

49. United Nations. Policy Brief: The impact of COVID-19 on children. United Nations. 15th April 2020.

50. Zemrani, B., Gehri, M., Masserey, E. et al. A hidden side of the COVID-19 pandemic in children: the double burden of undernutrition and overnutrition. International Journal of Equity Health, 2021; 20, 44.

51. Child Poverty Action Group. Aoteaora, Land of the long wide bare cupboard. Part 6: Food Insecurity in New Zealand. Child Poverty Action Group, June 2020.

52. Kulkarni AA, Swinburn BA, Utter J. Associations between diet quality and mental health in socially disadvantaged New Zealand adolescents. European Journal of Clinical Nutrition, 2015; 69:79-83.

53. Every-Palmer S, Jenkins M, Gendall P, et al. Psychological distress, anxiety, family violence, suicidality, and wellbeing in New Zealand during the COVID-19 lockdown: A cross-sectional study. PLoS ONE, 2020; 15(11): e0241658.

54. Sallie SN, Ritou V, Bowden-Jones H, et al. Assessing International Alcohol Consumption Patterns During Isolation from the COVID-19 Pandemic Using an Online Survey: Highlighting Negative Emotionality Mechanisms. British Medical Journal Open, 2020; doi: 10.1136/bmjopen-2020-044276

55. Bradbury-Jones C, Isham L. The pandemic paradox: The consequences of COVID-19 on domestic violence. Journal of Clinical Nursing, 2020; 29 (13-14): 2047-9

56. Perez-Vincent SM, Carreras E, Gibbons MA, Murphy TE, Rossi MA. COVID-19 lockdowns and domestic violence: evidence from two studies in Argentina. Inter-American Development Bank. July 2020.

57. Magson NR, Freeman JYA, Rapee RM, et al. Risk and Protective Factors for Prospective Changes in Adolescent Mental Health during the COVID-19 Pandemic. Journal of Youth and Adolescents, 2021; 50: 44–57.

58. Barendse M, Flannery JE, Cavanagh C, et al. Longitudinal Change in Adolescent Depression and Anxiety Symptoms from Before to During the COVID-19 Pandemic: A Collaborative of 12 Samples from 3 Countries. PsyArXiv, 2021. February 3. doi:10.31234/osf.io/hn7us.

59. Bignardi G, Dalmaijer ES, Anwyl-Irvine AL, et al. Longitudinal increases in childhood depression symptoms during the COVID-19 lockdown. Archives of Disease in Childhood, 2020. doi: 10.1136/archdischild-2020-320372

60. Kwong ASF, Pearson RM, Adams MJ, et al. Mental health before and during the COVID-19 pandemic in two longitudinal UK population cohorts. British Journal of Psychiatry, 2020 Nov 24:1-10.

61. Daly M, Sutin A, Robinson E. Longitudinal changes in mental health and the COVID-19 pandemic: Evidence from the UK Household Longitudinal Study. Psychological Medicine, 2020; 1-10.

62. Racine N, Hetherington E, McArthur BA, et al. Maternal depressive and anxiety symptoms before and during the COVID-19 pandemic in Canada: a longitudinal analysis. The Lancet Psychiatry, 2021; 8 (5): 405-15.

63. Blumenberg C, Barros AJD. Response rate differences between web and alternative data collection methods for public health research: a systematic review of the literature. International Journal of Public Health, 2018; 63: 765-73.

64. Bradley KL, Bagnell AL, Brannen CL. Factorial Validity of the Center for Epidemiological Studies Depression 10 in Adolescents. Issues in Mental Health Nursing, 2010; 31:6, 408-12.

65. Cartierre N, Coulon N, Demerval R. Analyse confirmatoire de la version courte de la Center for epidemiological studies of depression scale (CES-D10) chez les adolescents. L'Encephale, 2011;37:273–7.

66. Kilburn, K., Prencipe, L., Hjelm, L. et al. Examination of performance of the Center for Epidemiologic Studies Depression Scale Short Form 10 among African youth in poor, rural households. BMC Psychiatry, 2018; 18: 201.

67. Huebner ES, Gilman R. An Introduction to the Multidimensional Students' Life Satisfaction Scale. Social Indicators Research, 2002;60(1):115–22.

68. Rowe EW, Kim S, Baker JA, Kamphaus RW, Horne AM. Student personal perception of classroom climate: Exploratory and confirmatory factor analyses. Educational and Psychological Measurement. 2010;70(5):858–79.

69. DeWalt DA, Gross HE, Gipson DS, et al. PROMIS pediatric self-report scales distinguish subgroups of children within and across six common pediatric chronic health conditions. Quality of Life Research, 2015;24(9):2195–208.

70. Northwestern University. PROMIS Reference Populations. 2020 Jul 10. p. 1–7.

71. PROMIS Score Cut Points. Northwestern University. Available from: https://www.healthmeasures.net/score-and-interpret/interpret-scores/promis/promis-score-cut-points

72. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. British Journal of Psychiatry, 1987; 150: 782-86.

73. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. Journal of General Internal Medicine, 2001 Sep 16(9):606-13.

74. McKay MT, Cannon, M, Chambers D. et al. Childhood trauma and adult mental disorder: A systematic review and meta-analysis of longitudinal cohort studies. Acta Psychiatrica Scandinavica, 2021; 143: 189-205.

75. de Onis M, Onyango AW, Borghi E, Siyam A, Nishida C, Siekmann J. Development of a WHO growth reference for school-aged children and adolescents. Bulletin of the World Health Organization, 2007; 85(9): 660-7

APPENDICES

APPENDIX A: Additional detail related to the study methods.

This appendix describes the study design, data collection process, and survey questions in more detail than in the main body of the report.

Study design

An electronic survey (the COVID-19 Wellbeing Survey) was designed and distributed to all eligible children in the GUiNZ cohort via an emailed link to their parent's email address (the parent was identified as the person who had completed the "Mother questionnaire" at the most recent DCW the child had taken part in). Children were deemed eligible if their parent had not withdrawn from the GUiNZ study prior to May 2020, the primary caregiver had a contact email address, and the cohort child was living in New Zealand at the time of survey distribution. Children who solely communicated in Te Reo Māori (n=11) were ineligible for the survey, as translation of the questionnaire was unfortunately not possible given time constraints associated with the need to distribute the survey during the lockdown period. Additional data have been sourced from previous GUiNZ DCWs to contribute additional demographic variables and variables that enable longitudinal analyses.

Ethics approval

Ethical approval for the survey was obtained from the Northern B Health and Disability Ethics Committee on the 29th April 2020 under the expedited COVID-19 related research pathway (NTY/08/06/055 AM15).

Data collection

The survey was designed in-house by members of the GUiNZ research team, and the Ministry of Business, Innovation and Employment (MBIE)-funded 'Our Voices' research team. The Qualtrics® digital platform was used for the survey, as it met the security and storage requirements of the University of Auckland. Davanti Consulting Limited were engaged to assist with getting the survey prepared in the platform, and to develop an engaging interface for the children completing the survey. GUiNZ had an existing relationship with Davanti via the 'Our Voices' research project. The data collection process was undertaken in collaboration with the GUiNZ research team. The GUiNZ data management team was responsible for integrating the data into the GUiNZ data management system, after receiving the export files from Davanti.

The survey was also emailed to the GUiNZ pilot group - 'Leading Light: Rōpū Pīata'. This group normally experience the data collection measures before the GUiNZ cohort and provide feedback to guide data collection strategies. However, in this instance, given the time pressure to get the survey into field during the lockdown period, the Leading Light group were engaged at the same time as the main cohort, with a focus on trialling the electronic connections and digital responses from this group. Results from this group were excluded from the main analyses given significant differences in key demographic variables from the main cohort (e.g., being 6-15 months older, and challenges in comparing consistent outcomes for this group over time).

Summary of survey questions

The survey consisted of 46 questions (Appendix B). Questions were not compulsory. The following information was collected in the survey (note: although findings for only certain questions are provided in this report, all survey questions are presented in this section for context).

- **Age**: in years (Questions 3-4 in the survey). Other demographic variables were available from previous GUiNZ DCWs.

- **COVID-19 'Bubbles'**: (Questions 5-14 in the survey). The term 'bubble' is used to describe a household unit which is self-isolating. During the COVID-19 Level 4 (Lockdown) people in New Zealand were instructed to stay at home only with those in their bubble and restrict contact with other bubbles. Questions asked: How many people were living in the household at the time of the survey; How many bubbles the child was in at the beginning of lockdown and if more than one, how often they moved between bubbles (Every day; Every week; Less often); Who was in each bubble (their relationship with the child, their age, whether they lived with the child before lockdown; whether they looked after the child, and whether they had to leave the bubble to work somewhere else).
- **Positive childhood experiences**: (Question 15 in the survey). Children were asked how often during lockdown they had: Felt able to talk to someone about their feelings; Felt their family supported them in this time; Participated in community activities within their bubble; Felt connected to school/ kura; Felt able to keep in touch with friends; Felt safe and protected in their home; and Felt worried about how people in their home were getting on. Each statement had six options for answering (Never; Almost never; Sometimes; Often; Always; I don't know). These seven questions were adapted from the Positive Childhood Experiences Score, but the wording was changed slightly to suit 10-11 year olds (the original scale was used for 18 year olds). The Positive Childhood Experiences Score was adapted from four subscales included in the validated "Child and Youth Resilience Measure–28".
- **Material wellbeing**: (Question 16 in the survey). Children were asked how often they worried about how much money their family had, with six options available for answering (Always; Often; Sometimes; I never think about it all; I don't know).
- **Family, play and safety**: (Question 17 in the survey). Children were also asked about how much they agreed with the following statements: My parents (or the people who look after me) listen to me; We have a good time together as a family; In my bubble there are enough places to play or to have a good time; and I feel safe when I am out and about in the area I live in. Each statement had six options for answering (I do not agree; Agree a little bit; Agree somewhat; Agree a lot; Agree totally; I don't know).
- **School satisfaction**: (Questions 18-20 in the survey). Children who were currently still doing schoolwork at home in their bubble were asked how often the following statements were true: I look forward to doing school-work in my bubble; I like school work in my bubble; School work in my bubble is interesting; I wish I didn't have to do schoolwork while in my bubble; There are many things about school in my bubble that I like; I enjoy the school activities I do in my bubble; I am looking forward to going back to how school was before we had lockdown; I am worried about missing out on my usual schoolwork while we are in lockdown. Children who had gone back to school were asked the same questions but were asked to reflect back to the time when they were still doing schoolwork at home in their bubble (questions were framed in the past tense).

  The questions were derived from the Multidimensional Students Life Satisfaction Scale (MSLSS) (67), specifically the six items with the highest factor loadings from the originally 8-item MSLSS, as identified by Rowe et al (68). Each statement had five options for answering (0= Never; 1= Sometimes; 2 = Often; 3 = Almost always; I don't know). People who answered "I don't know" were assigned a 'data missing' status for the statement. A school satisfaction score was then derived for each participant by summing the responses for each item (after reverse coding of negatively worded questions) then dividing by the total number of questions. Higher scores are associated with higher school satisfaction, and the scores are used as a continuous scale with no defined cut-off.
- **Current health**: (Question 21 in the survey). Children were asked how their health was right now, with five options provided for answering (Excellent; Very good; Good; Fair; Poor). The same question was asked in eight-year DCW.
- **Current media use**: (Questions 22-27 in the survey). Children were asked about their current access to the internet, and whether they had access to a device during lockdown (including types of devices, whether these devices had access to a camera, and what activities they used these devices for). Children were also asked whether they currently belonged to, or used, any social media sites.
- **Connectedness**: (Questions 28-33 in the survey). Children were asked whether they had any contact with friends outside of their family, or family not living with them, during lockdown, and if so what type of contact and how frequent this contact was (Everyday; A few times a week; Weekly; Fortnightly; Less than fortnightly; Only once or twice).
- **Screen time:** (Questions 34-35 in the survey). Children were asked about their screen time during lockdown, on a school day and the weekends (defined as hours per day spent on screens, including schoolwork).
- **Depression**: (Question 36 in the survey). The validated 10-item short form (24) of the Center for Epidemiological Studies Depression Scale (CES-D-10) (22) was used to determine depressive symptoms

in the past seven days. Each question had a 4-point Likert scale for answering (0 = Not at all; 1 = A little; 2 = Some; 3 = A lot). A total score was then calculated by summing the score of all items, after reverse coding of the two positive affect statements ('I felt like something good was going to happen' and 'I was happy'). Total scores can range between 0 and 30, with higher total scores indicating a greater risk of depressive symptoms (scores of ≥10 are indicative of clinically significant depressive symptoms) (25). The same question set was asked in eight-year DCW.

- **Anxiety**: (Question 37 in the survey). The validated 10-item short form of the PROMIS Pediatric Anxiety Symptoms Scale (32) was used to determine anxiety in the past seven days. This question set was also asked in the eight-year DCW. Each item was scored on a 5-point Likert scale (0 = Never; 1 = Almost Never; 2 = Sometimes; 3 = Often; 4 = Almost always). A total score was calculated by summing the score of all items. The total score was then translated to a T-score, using a score translation table that had been generated based on item-response theory. The standardised T-score has a mean score of 50 (Standard Deviation [SD]=10) for the reference population, derived from the 'general population' (based on the 2000 General USA census) and a clinical sample of chronically ill children (69-70) Scores >50 therefore lie above the reference population mean, and scores <50 are below the reference population mean. Interpretation of the T scores was based on the 'Interpreting PROMIS T scores' diagram (71). Scores of 51-55 indicate 'mild' symptoms of anxiety. Scores of 56-65 indicate 'moderate' symptoms of anxiety. Scores ≥66 indicate 'severe' symptoms of anxiety. The same question set was asked in eight-year DCW.
- **Activities during lockdown**: (Question 38 in the survey). Children were asked how often they did the following activities with the people in their bubble during the lockdown: Reading books together; Watching television/movies together; Talking about feelings or issues; Singing a song, playing music, or doing some other musical activity; Drawing a picture or doing another art/craft activity; Homework and/or school work or talking about homework or school work; Outdoor sporting activities together; Baking or cooking together; Doing chores or housework together; Eating a meal together. Each question had six options for answering (Never/ Almost never; Once a week; Several times a week; Once a day; Several times a day; I don't know).
- **Food and drink during lockdown**: (Questions 39-41 in the survey). Children were asked which of the following statements were true about the food and drinks they had during the lockdown: I eat more food than before; I eat more often during the day than before (more meals and snacks); I eat more fruit than before; I eat more vegetables than before; I eat more potato chips, chocolate, biscuits, cake or lollies than before; I drink more fizzy drink than before; I drink more water than before; I eat a greater variety (different types) of food than before. Each statement had six options for answering (I do not agree; Agree a little bit; Agree somewhat; Agree a lot; Totally agree; I don't know). Two additional questions were asked around what the child liked most about the food in their bubble, and what foods they missed most in their bubble. Both questions had a free text option for answering.
- **Feelings during lockdown**: (Questions 42-46 in the survey). The last questions of the survey asked what the child felt had been the best thing for them about being in lockdown, plus what had been the hardest, and what they had most worried about. The child was also asked what they were most excited for/about when lockdown was over. Finally, the child was asked if there was anything else they wanted to share with other people about what it was like to be in lockdown for them. All five questions had a free text option for answering.

Variables of interest

All analyses in this report relate to current health and mental wellbeing (depression and anxiety), with the data looked at cross-sectionally and longitudinally according to demographic variables and other variables of interest.

Linked demographic variables

Additional data were sourced from previous GUiNZ DCWs to contribute additional demographic variables to the cross-sectional and/or longitudinal analyses.

- **Sex**: Boy or girl as assigned at birth, based on data from the 6-week DCW.
- **Age**: Although the child's age was asked in the survey, the quality of the data was not high. Age was therefore calculated using the child's date of birth (as recorded at the 6-week DCW), and the date each child participated in the the COVID-19 Wellbeing Survey (as per the date stamp within the online survey).
- **Child's ethnicity**: was as reported by the mother at the 54-month DCW. Missing values of ethnicity at the 54-month DCW were replaced by the child's ethnicity reported by the mother at the 9-month DCW. Ethnicity was externally prioritised based on StatsNew Zealand Level 1 ethnicity groupings in the following order of priority: Māori, Pacific, Asia, Middle Eastern/Latin American/African, Other or European, if used as an explanatory variable. 'Total response' ethnicity was also coded based on StatsNew Zealand Level 1 ethnicity groupings (Māori, Pacific, European, Asian, Other).

- **Socioeconomic deprivation**: was based on the New ZealandDep2013 index of socioeconomic deprivation, which was populated by data from the eight-year DCW. Participants were grouped into one of four categories: Low deprivation (1-3); Medium deprivation (4-7), High deprivation (8-10); Missing.
- **Rurality**: was calculated using the residential address from the eight-year DCW for mothers and grouped as: Urban; Rural; Missing (coded using the 2013 set of meshblock boundaries defined by Statistics New Zealand).

Linked predictors of child wellbeing and/or mental health

- **Maternal age**: was calculated using the mother's date of birth (as reported at the antenatal DCW), and the date each child participated in the the COVID-19 Wellbeing Survey (as per the date stamp within the online survey). Adjusted analysis used maternal age as a categorical variable grouped as one of seven categories: ≤30 years; 31-35 years; 36-40 years; 41-45 years; 46-50 years; >50 years; Missing.
- **Maternal education**: was calculated using the mother's report of their education level at the Antenatal DCW. Participants were grouped into one of the six categories: No secondary school qualifications; secondary school/ NCEA 1-4; Diploma/Trade Certificate/NCEA 5-6; Bachelor's degree; Higher degree; Missing.
- **Maternal mental health**: Maternal mental health is a known predictor of depression in children (31). The number of episodes of maternal depression were based on data from the 9-month DCW (where depression was measured using the Edinburgh depression scale, with a score ≥12 indicating a depressive event) (72), and the eight-year DCW (where maternal mental health was measured using the Patient Health Questionnaire 9, with a score >14 indicating a depressive event) (73).
- **Adverse child experiences**: Adverse life events are defined as negative experiences or trauma that a child may have while growing up, such as death of a close family member or friend, divorce or separation of parents, conflict between parents, experience of a natural disaster, serious physical illness or injury, moving house or country, etc. Such experiences are a predictor of depression in children (74). The number of adverse life events experienced by the child was based on the mother's self-report of such events at the eight-year DCW.
- **Persistent sleep problems**: Changes in hormone levels and emotional and cognitive processing during early adolescence can impact sleep duration and quality, subsequently impacting mental health (33-34). Persistent sleep problems were measured in two ways in the GUiNZ database, based on data from the eight-year DCW, namely: 1) Mother's report of the 'number of hours their child typically sleeps per night' (grouped as: ≤8 hours; 9 hours; 10 hours; ≥ 11 hours); and 2) frequency of night-time waking (none, once, two or more times).
- **Body size**: Being overweight or obese in childhood can predict depression and anxiety in later life.39 For this reason the depression and anxiety outcomes in the COVID-19 Wellbeing Survey were adjusted for body size, based on the WHO Body Mass Index (BMI) age and sex-specific z-scores (75), for data from the eight-year DCW (based on a normalised transformation or a smoothed version of the reference data). Respondents were grouped as: Underweight; Normal weight; Overweight; Obese.
- **Child disability**: Depression and anxiety in children may depend on whether a child has a disability or not (27-28). There are various measures of disability used in the GUiNZ DCWs. For this report the question asked of mothers at the eight-year DCW was used, specifically mothers were asked if they had areas of concern about their child's wellbeing and development, in relation to vision, hearing, speech, growth/development, behaviour etc. Based on these data children were grouped in two ways, depending on the analysis to be undertaken and numbers available:
  - Number of concerns regarding the child's health: 0; 1; 2 or more; Did not respond; Missing.
  - No concerns; Vision concerns; Hearing/Speech concerns; Behavioural/Autistic Spectrum Disorders; Learning difficulties; Movement/ Mobility/Physical concerns; Other; Missing.
- **Depression**: was based on the data from the CES-D-10 (24-25), collected from children in the eight-year DCW.
- **Anxiety**: was based on data from the PROMIS Pediatric Anxiety symptoms scale (32), collected from children in the eight-year DCW.
- **Current health**: was based on current health data collected from children in the eight-year DCW. The question was worded the same as in the COVID-19 Wellbeing Survey, and had the same choices for answering.

Other variables of interest from the COVID-19 Wellbeing Survey

Connectedness, bubble size (and if the bubble included essential workers), number of regular positive childhood experiences during Lockdown ('regular' defined as answering 'often' or 'always' to the questions), and whether the child had returned

to school at the time of the survey (possible if their caregivers were essential workers) were also explored, as these variables may predict health and mental wellbeing. Essential workers included medical professionals, residential facility staff, border security, some education staff, building/construction workers, and those working in primary industries.

A variable of 'connectedness during lockdown' was developed, and categorised as below:

- Not or almost not connected: The child responded that they connected with both friends and family fortnightly or less.
- A little connected: The child responded that they connected with either friends or family only one or twice or less than fortnightly.
- Moderately connected: The child responded that they connected with either friends or family a few times a week or more.
- More connected: The child responded that they connected with both friends and family a few times a week or more each.

Data analyses

Prior to analysis, data cleaning was undertaken, response bias was assessed, and scales were checked for reliability. Analyses were undertaken using R (version 4.0 and 4.0.2), R studio and Excel (version 2002 and 2016).

Response rate

Overall response rates for the survey sample were compared to the cohort invited to undertake the survey, and included response rates by sex, ethnicity, socioeconomic deprivation, rurality, maternal age, and mother education.

Cross-sectional analyses

Standard summary statistics were used to report on demographic variables, predictors of depression and anxiety, current health, depression, and anxiety. The current health status outcomes of 'Fair' and 'Poor' were collapsed into one category (Fair/Poor) to ensure adequate numbers were present in categories for analysis. Bar charts and/or box and whisker plots are used to show current health status, CES-DC and PROMIS scales by key variables. One-way ANOVA was used to establish the effect of the potential covariates on the continuous outcomes. Chi-squared tests were used to examine the relationship between the potential covariates and the categorical/ordinal outcomes.

Multivariate regression models were used to identify the determinants of current health and the CES-DC and PROMIS scales from the COVID-19 Wellbeing Survey. The aims of these models were to:

- Identify the socio-demographic subgroups who were the most at-risk of depression/ anxiety and quantify the average impact of thesecharacteristics on the outcomes.
- Quantify the average effect of the main predictors of depression and anxiety in children on the outcomes from the COVID-19 Wellbeing Survey. These variables were also used as control variables.

The outcome value at the eight-year DCW was also considered as a potential covariate for the multivariate models.

Longitudinal analyses

Comparisons were made among participants having available outcome data at both the eight-year DCW and the COVID-19 Wellbeing Survey. Density plots were produced to show the distribution of current health status, and the CES-DC and PROMIS scales, at the eight-year DCW and the COVID-19 Wellbeing Survey. Only children who had complete data for current health status, and the CES-DC and PROMIS scales, in both the eight-year DCW and the COVID-19 Wellbeing Survey were used in the longitudinal analysis of current health status. A multivariate regression model was used to identify the determinants of the changes in current health and the CES-DC and PROMIS scales over time.

The aim of this model was to identify profiles or subgroups of children for whom significant changes in outcomes occurred between the eight-year DCW and the COVID-19 Wellbeing Survey. For the ordinal current health outcome, change over time was measured by the transitions from the eight-year DCW to the COVID-19 Wellbeing Survey. For the continuous CES-DC and PROMIS scales, changes over time were measured by the difference in scales between the eight-year DCW and the COVID-19 Wellbeing Survey. Sensitivity analyses were undertaken for the CES-DC scale, first using all 10 items and then removing item DS5 ("I felt like something good was going to happen") to increase the robustness of the scale at both DCWs (i.e., the eight-year DCW and COVID-19 Wellbeing Survey).

APPENDIX B: Survey questionnaire

Child Questionnaire

Growing Up in New Zealand
University of Auckland
Email: contact@growingup.co.nz
www.growingup.co.nz

NOTE: The question numbers below are as they appear in the online survey but are not visible to the children.

Introduction

Welcome to this *Growing Up in New Zealand* special survey to find out more about your experience of the Covid-19 "lockdown".

You have been a part of *Growing Up in New Zealand* since you were born and that means you're in a special position to help us understand what it is like for New Zealand children to be living through these strange times.

By helping us with this survey, you're speaking on behalf of lots of New Zealand children. You're making a real difference and your voice and experience can help decision-makers to improve lives for all Kiwi children and families now and in the coming months.

The survey is short and easy. We're going to ask you some questions about the past few weeks when we've all had to stay at home in our "bubbles" to help stop the spread of Covid-19.

Lots of people have called this "lockdown" or "Level 4". Your "bubble" is the people you've been sharing your home or homes with over this time.

In this survey, there are no right or wrong answers. We want to hear what you think and feel. All of your answers will be kept private. We will ask for your name, but this will not be kept with the information you provide. You might want to ask an older family member to help you fill in the survey. It's totally fine to do this. Please start the survey and pick the answer that best fits with how you think or feel. We want to know what matters to you.

You can skip any questions you don't want to answer by clicking on the NEXT button.

Q1 Are you happy to take part in this special *Growing Up in New Zealand* survey? You can say yes or no.

Select the option below.

- ◯ Yes
- ◯ No → Go to END OF QUESTIONS and to the Closing statement

Q2 What is your full name?

Q3 When is your birthday?

(Day) (Month)

Q4 How old are you today in years?

Q5 How many people are living in the house you are in right now?

Number of children – including you (aged less than 18)

Number of adults (18 or over)

Total

Q6 At the beginning of lockdown (in level 4) did you have more than one bubble?

- ◯ Yes
- ◯ No

Q7 **If yes, At the beginning of lockdown (in level 4), how many bubbles did you have?**

Q8 **If yes, During the highest level of lockdown (level 4), approximately how often did you move between bubbles?**

- ◯ Every day
- ◯ Every week
- ◯ Less often

Tell us about the people in your bubble

Q9 **Type the names of the other people in your level 4 bubble (don't include yourself)** (Choose up to 10)	**Q10** **Who they are to you? (e.g. mum, dad, aunty, brother etc.)**	**Q11** **How old are they? – if you know (if you are not sure you can guess)**	**Q12** **Tick the box if they lived with you before the level 4 lockdown?**	**Q13** **Did they have to leave the house to go to work somewhere else during level 4 lockdown?** (You can choose more than one. It is okay if you don't select one)	**Q14** **Who has looked after you in lockdown?** (You can choose more than one. It is okay if you don't select anyone)

My family and local neighbourhood

Q15 **How often during lockdown have you:** (Choose the best one for each line)	Never	Almost never	Sometimes	Often	Always	I Don't know
Felt able to talk to someone about your feelings	◯	◯	◯	◯	◯	◯
Felt your family supported you in this time	◯	◯	◯	◯	◯	◯
Participated in community activities within your bubble (e.g. teddy bear hunt, Easter egg hunt, online church/mosque activities etc, online arts or cultural events e.g ballet, theatre, Waiata)	◯	◯	◯	◯	◯	◯
Felt connected to school/kura	◯	◯	◯	◯	◯	◯
Felt able to keep in touch with friends	◯	◯	◯	◯	◯	◯
Felt safe and protected in your home	◯	◯	◯	◯	◯	◯
Felt worried about how people in your home were getting on	◯	◯	◯	◯	◯	◯

Q16 How often do you worry about how much money your family has?

(Choose the answer that is closest too how you feel)

- ◯ Always
- ◯ Often
- ◯ Sometimes
- ◯ I don't think about it at all
- ◯ I don't know

Q17 How much do you agree with the following? (Choose one for each line)	I do NOT agree	Agree a little bit	Agree somewhat	Agree a lot	Totally agree	I don't know
My parents (or the people who look after me) listen to me	◯	◯	◯	◯	◯	◯
We have a good time together as a family	◯	◯	◯	◯	◯	◯
In my bubble there are enough places to play or to have a good time	◯	◯	◯	◯	◯	◯
I feel safe when I am out and about in the area I live in	◯	◯	◯	◯	◯	◯

Q18 Tell us if you have gone back to school already or are still at home in your bubble?

- ◯ 18.1 I am still doing school work at home in my bubble
- ◯ 18.2 I have gone back to school

Q19 If 18.1, How often are the following statements true? (Choose one for each line)	Never	Sometimes	Often	Almost always	I don't know
I look forward to doing school work in my bubble	◯	◯	◯	◯	◯
I like school work in my bubble	◯	◯	◯	◯	◯
School work in my bubble is interesting	◯	◯	◯	◯	◯
I wish I didn't have to do school work while in my bubble	◯	◯	◯	◯	◯
There are many things about school in my bubble that I like	◯	◯	◯	◯	◯
I enjoy the school activities I do in my bubble	◯	◯	◯	◯	◯
I am looking forward to going back to how school was before we had lockdown	◯	◯	◯	◯	◯
I am worried about missing out on my usual school work while we are in lockdown	◯	◯	◯	◯	◯

Q20 If 18.2, when you were doing school in your bubble, how often were the following statements true? (Choose one for each line)	Never	Sometimes	Often	Almost always	I don't know
I looked forward to doing school work in my bubble	◯	◯	◯	◯	◯
I liked school work in my bubble	◯	◯	◯	◯	◯
School work in my bubble was interesting	◯	◯	◯	◯	◯
I wished I didn't have to do school work while in my bubble	◯	◯	◯	◯	◯
There were many things about school in my bubble that I liked	◯	◯	◯	◯	◯
I enjoyed the school activities I did in my bubble	◯	◯	◯	◯	◯
I looked forward to going back to how school was before we had lockdown	◯	◯	◯	◯	◯
I was worried about missing out on my usual school work while we were in lockdown	◯	◯	◯	◯	◯

Media use

Q22 Do you have internet at home?

(Tick one only)

- ◯ Yes
- ◯ No (go to next section)
- ◯ I don't know

Q23 Do you have a device that you can use during lockdown?

- ◯ Yes
- ◯ No

Q24 What device have you been using during lockdown?

(you can choose more than one)

- ◯ Tablet (e.g. an iPad)
- ◯ Laptop or Computer
- ◯ TV
- ◯ Smartphone (e.g. an iPhone or a Samsung Galaxy)
- ◯ Gaming console (e.g. Xbox, PSP or Playstation)
- ◯ Music player (e.g. iPod)
- ◯ Kindle or other eReader
- ◯ Smart watch (e.g. fitbit)
- ◯ A virtual reality headset
- ◯ Something else (list here):

_____

- ◯ I don't know

Q25 Do any of your devices have a camera? (pull through answers from previous questions)

Child will select from the list pulled through from previous question and tick if the device has a camera

Q26 Do you belong or use any sites listed below?

(Select as many as you use)

- ◯ None
- ◯ Facebook
- ◯ Messenger
- ◯ Houseparty
- ◯ Reddit
- ◯ Tik Tok
- ◯ Instagram
- ◯ Snapchat
- ◯ Twitter
- ◯ WhatsApp
- ◯ YouTube
- ◯ Hangouts
- ◯ Something else? List them here:

_____

_____

_____

_____

Q21 **How would you say your health is right now?** (Choose one only)	Excellent	Very good	Good	Fair	Poor
	◯	◯	◯	◯	◯

Q27 **During lockdown, how often have you been doing the following things using a screen-based device?** (Choose the best one for each line)	Every day	Several times a week	About once a week	About once a month	Hardly ever / never	I don't know
School work and homework	◯	◯	◯	◯	◯	◯
Making phone calls or video calls e.g. Skype/ Facetime	◯	◯	◯	◯	◯	◯
Sending and receiving emails	◯	◯	◯	◯	◯	◯
Using social media (e.g. TikTok, Snapchat)	◯	◯	◯	◯	◯	◯
Instant messaging (e.g. WhatsApp, iMessage, Facebook Messenger, text message, chat)	◯	◯	◯	◯	◯	◯
Listening to music on your device	◯	◯	◯	◯	◯	◯
Taking photos	◯	◯	◯	◯	◯	◯
Watching TV or movies or videos (e.g. Netflix, Lightbox, TVNew Zealand On Demand, YouTube and music videos)	◯	◯	◯	◯	◯	◯
Playing games - on your own on your device	◯	◯	◯	◯	◯	◯
Playing games – with your family/bubble members/friends on a device	◯	◯	◯	◯	◯	◯
Searching the internet (e.g. Google)	◯	◯	◯	◯	◯	◯
Creating digital art (art using a computer)	◯	◯	◯	◯	◯	◯
Making or editing a film or video	◯	◯	◯	◯	◯	◯
Making new music, songs or sound recordings	◯	◯	◯	◯	◯	◯
Writing a story or poem	◯	◯	◯	◯	◯	◯
Coding/ programming	◯	◯	◯	◯	◯	◯
Trading or buying stuff on your device (not as part of a game)	◯	◯	◯	◯	◯	◯
Other activity using a screen-based device (Type here)	◯	◯	◯	◯	◯	◯

Q28 Have you had any contact (face-to-face, telephone or online) with your friends outside your family during lockdown?

- ◯ Yes
- ◯ No

Q29 If yes - how have you been in contact with friends?
(You can select as many as you need)

- ◯ Telephone
- ◯ Texting, chatting
- ◯ Facetime/Zoom other videoconferencing,
- ◯ Online platforms such as Google Classrooms/ Seesaw
- ◯ Apps such as WhatsApp/HouseParty
- ◯ Online Games
- ◯ In person (even if with physical distancing)
- ◯ Letters
- ◯ Other (type here)

Q30 How often have you connected with your friends during lockdown?
(Answer for each of platforms identified above)

- ◯ Everyday
- ◯ A few times a week
- ◯ Weekly
- ◯ Fortnightly,
- ◯ Less than fortnightly
- ◯ Only once or twice

Q31 Earlier we asked you about contact with friends. Now we would like to know about contact with extended family not living with you. Have you had any contact (face-to-face, telephone or online) with extended family members / whānau not living with you (e.g. grandparents, aunts, uncles, cousins etc) during lockdown?

- ◯ Yes
- ◯ No

Q32 If yes - how have you been in contact with family not living with you?
(You can select as many as you need)

- ◯ Telephone
- ◯ Texting, chatting
- ◯ Facetime/Zoom other videoconferencing,
- ◯ Online platforms such as Google Classrooms/ Seesaw
- ◯ Apps such as WhatsApp/HouseParty
- ◯ Online Games
- ◯ In person (even if with physical distancing)
- ◯ Letters
- ◯ Other (type here)

Q33 How often have you connected with your family not living with you during lockdown?
(Answer for each of the platforms identified above)

- ◯ Everyday
- ◯ A few times a week
- ◯ Weekly
- ◯ Fortnightly
- ◯ Less than fortnightly
- ◯ Only once or twice

Q34 During lock down, on a school day (Monday - Friday), about how many hours a day are you spending on screens (including schoolwork)?

- ◯ 0 hours
- ◯ Up to 1 hour
- ◯ Between 1 and 2 hours
- ◯ Between 2 and 3 hours
- ◯ Between 3 and 4 hours
- ◯ Between 4 and 5 hours
- ◯ Between 5 and 6 hours
- ◯ Between 6 and 7 hours
- ◯ Between 7 and 8 hours
- ◯ Between 8 and 9 hours
- ◯ More than 10 hours (if so how many to the nearest hour?)

Q35 During lock down, on a weekend day (Saturday-Sunday), about how many hours a day are you spending on screens (including schoolwork)?

- ◯ 0 hours
- ◯ Up to 1 hour
- ◯ Between 1 and 2 hours
- ◯ Between 2 and 3 hours
- ◯ Between 3 and 4 hours
- ◯ Between 4 and 5 hours
- ◯ Between 5 and 6 hours
- ◯ Between 6 and 7 hours
- ◯ Between 7 and 8 hours
- ◯ Between 8 and 9 hours
- ◯ More than 10 hours (if so how many to the nearest hour?)

Depression (heading not included in digital survey)

Q36 Below is a list of the ways you might feel or behave. Please pick how much you have felt or acted this way during the past week. (Choose one for each line)	Not At All	A Little	Some	A Lot
I was bothered by things that usually don't bother me	◯	◯	◯	◯
I felt like I couldn't pay attention to what I was doing	◯	◯	◯	◯
I felt down and unhappy	◯	◯	◯	◯
I felt like I was too tired to do things	◯	◯	◯	◯
I felt like something good was going to happen	◯	◯	◯	◯
I felt scared.	◯	◯	◯	◯
I didn't sleep as well as I usually sleep	◯	◯	◯	◯
I was happy	◯	◯	◯	◯
I felt lonely, like I didn't have any friends	◯	◯	◯	◯
It was hard to get started doing things	◯	◯	◯	◯

Anxiety (heading not included in digital survey)

Q37 **This set of questions also asks you how you have been thinking, feeling, or acting. For each item, please select the answer that seems most true for you during the past week. Remember there are no right or wrong answers, just answer how you have been feeling recently.** (Choose one for each line)	Never	Almost Never	Sometimes	Often	Almost always
I felt scared	◯	◯	◯	◯	◯
I worried about what could happen to me	◯	◯	◯	◯	◯
I felt worried	◯	◯	◯	◯	◯
I felt like something awful might happen	◯	◯	◯	◯	◯
I worried when I went to bed at night	◯	◯	◯	◯	◯
I feel nervous	◯	◯	◯	◯	◯
I worried when I was at home	◯	◯	◯	◯	◯
I got scared really easily	◯	◯	◯	◯	◯
I was afraid that I would make mistakes	◯	◯	◯	◯	◯
I thought about scary things	◯	◯	◯	◯	◯

Activities

Q38 How often do you do the following activities with the people in your bubble during the lockdown? (Choose one for each line)	Never/ almost never	Once a week	Several times a week	Once a day	Several times a day	I don't know
Reading books together in my bubble	◯	◯	◯	◯	◯	◯
Watching TV/movies together in my bubble	◯	◯	◯	◯	◯	◯
Talking about feelings, or issues in my bubble	◯	◯	◯	◯	◯	◯
Singing a song, playing music, or doing some other musical activity in my bubble	◯	◯	◯	◯	◯	◯
Drawing a picture or doing another art/ craft activity in my bubble	◯	◯	◯	◯	◯	◯
Homework and/ or school work or talking about homework or school work in my bubble	◯	◯	◯	◯	◯	◯
Outdoor sporty activities together (e.g. passing a ball, going for a walk, bike-riding, scootering) in my bubble	◯	◯	◯	◯	◯	◯
Baking or cooking together in my bubble	◯	◯	◯	◯	◯	◯
Doing chores or housework together in my bubble	◯	◯	◯	◯	◯	◯
Eating a meal together in my bubble	◯	◯	◯	◯	◯	◯

Q39 How true are the following statements about the food and drinks you have been having during the lockdown. If you think you eat the same as before select I do NOT agree (Choose one for each line)	I do NOT agree	Agree a little bit	Agree somewhat	Agree a lot	Totally agree	I don't know
I eat more food than before	◯	◯	◯	◯	◯	◯
I eat more often during the day than before (more meals and snacks)	◯	◯	◯	◯	◯	◯
I eat more fruit than before	◯	◯	◯	◯	◯	◯
I eat more vegetables than before	◯	◯	◯	◯	◯	◯
I eat more potato chips, chocolate, biscuits, cake or lollies	◯	◯	◯	◯	◯	◯
I drink more fizzy drink than before	◯	◯	◯	◯	◯	◯
I drink more water than before	◯	◯	◯	◯	◯	◯
I eat a greater variety (different types) of food than before	◯	◯	◯	◯	◯	◯

Q40 What did you like most about the food in your bubble?

Type your answer below

Q41 What foods did you miss most in your bubble?

Type your answer below

Tell us more about how you have felt in the last few weeks

Q42 What have been the best things for you about being in lockdown?

Type your answer below

Q43 What have been the hardest things for you about being in lockdown?

Type your answer below

Q44 What has worried you most about being in lockdown?

Type your answer below

Q45 What are you most excited for/ about when lockdown is over?

Type your answer below

Q46 Is there anything else you want other people to know about what it's like to be in lockdown for you?

Type your answer below

APPENDIX C: Survey response rate

	Eligible cohort	Participated in survey	Response rate	Logistic model	
	N	n	%	Odds Ratio	P-value
Total	5756	2421	42.1	-	
SEX					
Boy	2964	1200	40.5	1	Ref
Girl	2784	1220	43.8	1.15	0.024
Missing	<10	<10	-		
ETHNICITY (prioritised)					
European	2599	1339	51.5	1	Ref
Māori	1390	498	35.8	0.76	<0.001
Pacific	738	213	28.9	0.70	0.002
Asian	867	315	36.3	0.69	<0.001
Other	131	55	42.0	0.98	0.917
Missing	31	<10	-	-	-
SOCIOECONOMIC DEPRIVATION					
Low (1-3)	1800	919	51.1	1	Ref
Medium (4-7)	1899	890	46.9	1.01	0.939
High (8-10)	1345	517	38.4	1.01	0.950
Missing	712	95	13.3	-	-
RURALITY					
Urban	4445	2058	46.3	1	Ref
Rural	599	268	44.7	0.828	0.047
Missing	712	95	13.3	-	-
MOTHER AGE					
≤ 30 years	159	34	21.4	1	Ref
31 - 35 years	700	188	26.9	1.34	0.226
36 - 40 years	1298	459	35.4	1.56	0.061
41 - 45 years	1873	891	47.6	1.94	0.005
46 - 50 years	1381	685	49.6	2.12	0.002
>50 years	343	163	47.5	1.94	0.01
Missing	<10	<10	-	-	-
MOTHER EDUCATION					
No secondary school qualification	319	95	29.8	1	Ref
Secondary school/NCEA 1–4	1277	423	33.1	1.03	0.85
Diploma/Trade Cert/NCEA 5–6	1762	632	35.9	1.11	0.518
Bachelor's degree	1419	717	50.5	1.69	0.002
Higher degree	961	547	56.9	1.99	<0.001
Missing	18	<10	-	-	-

APPENDIX D: Demographic variables

	Participated in the survey (N=2421)	
	N	n
SEX		
Boy	1200	50%
Girl	1220	50%
Missing	<10	-
ETHNICITY (prioritised)		
European	1339	55%
Māori	498	21%
Pacific	213	9%
Asian	315	13%
Other	55	2%
Missing	<10	-
ETHNICITY (total response)		
European	2017	83%
Māori	498	21%
Pacific	317	13%
Asian	343	14%
Other	64	3%
Missing	<10	-
SOCIOECONOMIC DEPRIVATION		
Low (1-3)	919	38%
Medium (4-7)	890	37%
High (8-10)	517	21%
Missing	95	4%
RURALITY		
Urban	2058	85%
Rural	268	11%
Missing	95	4%
MOTHER AGE		
≤ 30 years	34	1%
31 - 35 years	188	8%
36 - 40 years	459	19%
41 - 45 years	891	37%
46 - 50 years	685	28%
>50 years	163	7%
Missing	<10	-
MOTHER EDUCATION		
No secondary school qualification	95	4%
Secondary school/NCEA 1–4	423	17%
Diploma/Trade Cert/NCEA 5–6	632	26%
Bachelor's degree	717	30%
Higher degree	547	23%
Missing	<10	-

APPENDIX E: Potential predictors of depression and anxiety

	Participated in the survey (N=2421)	
	N	n
BODY SIZE		
Underweight	22	1%
Normal	1609	67%
Overweight	427	18%
Obese	226	9%
Missing	137	6%
MEAN HOURS OF SLEEP		
≤ 8 hours	199	8%
9 hours	417	17%
10 hours	1117	46%
≥ 11 hours	424	18%
Don't know	90	4%
Missing	174	7%
FREQUENCY OF NIGHT WAKING		
None	1642	68%
Once	433	18%
≥ 2 times	86	4%
Don't know	86	4%
Missing	174	7%
FREQUENCY OF EARLY ADVERSE CHILD EXPERIENCES		
No events	371	15%
One event	798	29%
Two events	574	24%
Three events	315	13%
≥ Four events	215	9%
Don't know	10	<1%
Missing	228	9%
FREQUENCY OF MATERNAL DEPRESSION		
No events	2047	8%
One event	259	11%
Two events	44	2%
Missing	71	3%

APPENDIX F: Other variables of interest to health and mental wellbeing

	Participated in the survey (N=2421)	
	N	n
CONNECTEDNESS		
Not connected	113	5%
A little connected	186	8%
Moderately connected	970	40%
More connected	944	39%
Missing	208	9%
WORRIED ABOUT HOW MUCH MONEY THE FAMILY HAS		
Always	86	4%
Often	144	6%
Sometimes	630	26%
I don't think about it	1170	48%
I don't know	238	10%
Missing	153	6%
SCHOOL ATTENDANCE		
Doing schoolwork at home	2183	90%
Returned to school	76	3%
Missing	162	7%
MOTHERS CONCERNS REGARDING CHILD HEALTH		
Vision	219	9%
Hearing/Speech	176	7%
Behavioural/Autistic Spectrum	182	8%
Learning	163	7%
Movement/Mobility/Physical	57	2%
Other	80	3%
No concerns	1546	64%
NUMBER OF CONCERNS REGARDING CHILD HEALTH		
None	1546	64%
One	478	20%
Two or more	181	8%
Did not respond	44	2%
Missing	172	7%
NUMBER OF PEOPLE IN THE CHILD'S BUBBLE AT LOCKDOWN		
2 or 3	164	7%
4 or 5	1476	61%
6 or more	643	27%
Missing	138	6%
NUMBER OF ESSENTIAL WORKERS IN THE CHILD'S BUBBLE DURING LOCKDOWN		
None	1352	56%
One	668	28%
Two or more	263	11%
Missing	138	6%
NUMBER OF REGULAR POSITIVE CHILDHOOD EXPERIENCES DURING LOCKDOWN		
0 - 2	276	11%
3 – 4	1026	42%
5 - 6	920	38%
Missing	199	8%

www.growingup.co.nz

www.auckland.ac.nz

www.uniservices.co.nz

www.msd.govt.nz

Growing Up in New Zealand

MINISTRY OF SOCIAL DEVELOPMENT
TE MANATŪ WHAKAHIATO ORA

uniservices
IDEAS TO LIFE RANGAHAUA KIA WHAI HUA

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

Growing Up in New Zealand is a University of Auckland study, managed by UniServices and funded by the New Zealand government.