Growing Up in New Zealand

Data User Guide
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UNIVERSITY OF AUCKLAND
Waipapa Taumata Rau
NEW ZEALAND

MEDICAL AND HEALTH SCIENCES
SCHOOL OF POPULATION HEALTH

Contents

Data use disclaimer

While all care and diligence has been used in processing, analysing, and extracting our research data and data dictionaries, we give no warranty it is error free. We recommend that users exercise their own skill and care with respect to their use of the data/ information and carefully evaluate the accuracy, currency, completeness, and relevance of the data for their purposes.

All scales and tools have been used/adapted or developed according to the published literature (see Tools and instruments used in the Data Collection Waves (Table 3), and technical documentation Appendix A – Technical documentation and references in Appendix B – Selected publications that have utilised established tools and scales). For proper usage of these tools/scales please refer to the pertinent documentation within this guide. Note that improper use of these tools will result in erroneous/ incorrect output.

For further guidance or to provide feedback on specific issues, or to seek further assistance about utilizing the datasets please contact dataaccess@growingup.co.nz.

Suggested citation:

Growing Up in New Zealand. (2024) *Data User Guide*: May 2024. Auckland: *Growing Up in New Zealand*. The University of Auckland. Available from: www.growingup.co.nz

For further information, please contact researchgrowingup@auckland.ac.nz

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1. Purpose of document

This document provides a data user reference guide for researchers interested in using anonymised *Growing Up in New Zealand* (*GUiNZ*) datasets. Datasets now include information collected from before the cohort children were born up to and including when they were approximately 8 years old.

This document provides: a brief background to the *Growing Up in New Zealand* study; information about the available research datasets; information regarding data collection processes; a summary of processes to prepare the research datasets and the structure and content of these; information about utilising the longitudinal research datasets; how to apply for data access and expectations regarding dataset use.

Research data available for release have been anonymised to protect participant privacy and to comply with participant consents. These datasets are termed the Research Datasets (see Section 3 for further information on the available datasets and anonymisation process).

Note this reference document is designed to be read and used in conjunction with:

- the Questionnaires used to collect information at Data Collection Waves (DCWs)
- data dictionaries for each component of each of the DCWs
- the 'Before We Are Born' (Report 1) which outlines the conceptual framework of the study and the domains/themes that underpin the design of the questionnaires.
- the descriptive "Now We Are" reports and snapshot series available on the website growingup.co.nz
- contextual reference documents, reports and papers listed in Section 10 and available at growingup.co.nz

These documents are also presented and discussed at data access workshops held for all potential data users and data access applicants in close proximity in time to when these documents are initially released. These workshops are recorded and made available online at growingup.co.nz. All potential users are strongly encouraged to attend or familiarise themselves with these resources and the workshop materials to assist them with making applications to use datasets.

The overarching aim of providing these documents is to enable potential data users to access sufficient information to enable them to apply to use the *Growing Up in New Zealand* datasets for bona fide research projects. Should further information be required please contact the Growing Up team directly via dataaccess@growingup.co.nz

2. Background to the study

Growing Up in New Zealand is a child-focused longitudinal study that provides an up-to-date, population-relevant picture of what it is like to be a child *Growing Up in New Zealand* in the 21st century. At baseline 6853 children and their families were recruited into this study, during the cohort mothers' pregnancy.

The overarching study aim is to provide a more complete picture of the pathways that lead to successful and equitable child wellbeing development in the context of growing up in the contemporary New Zealand environment.

Growing Up in New Zealand is explicitly designed to follow children from before birth until they are young adults to understand "what works" for children and families and to consider pathways of development across multiple domains of influence. For further information on study design and sample collection see the IJE cohort profile, recruitment and retention paper and also the calibration protocol technical paper (all available at growingup.co.nz)

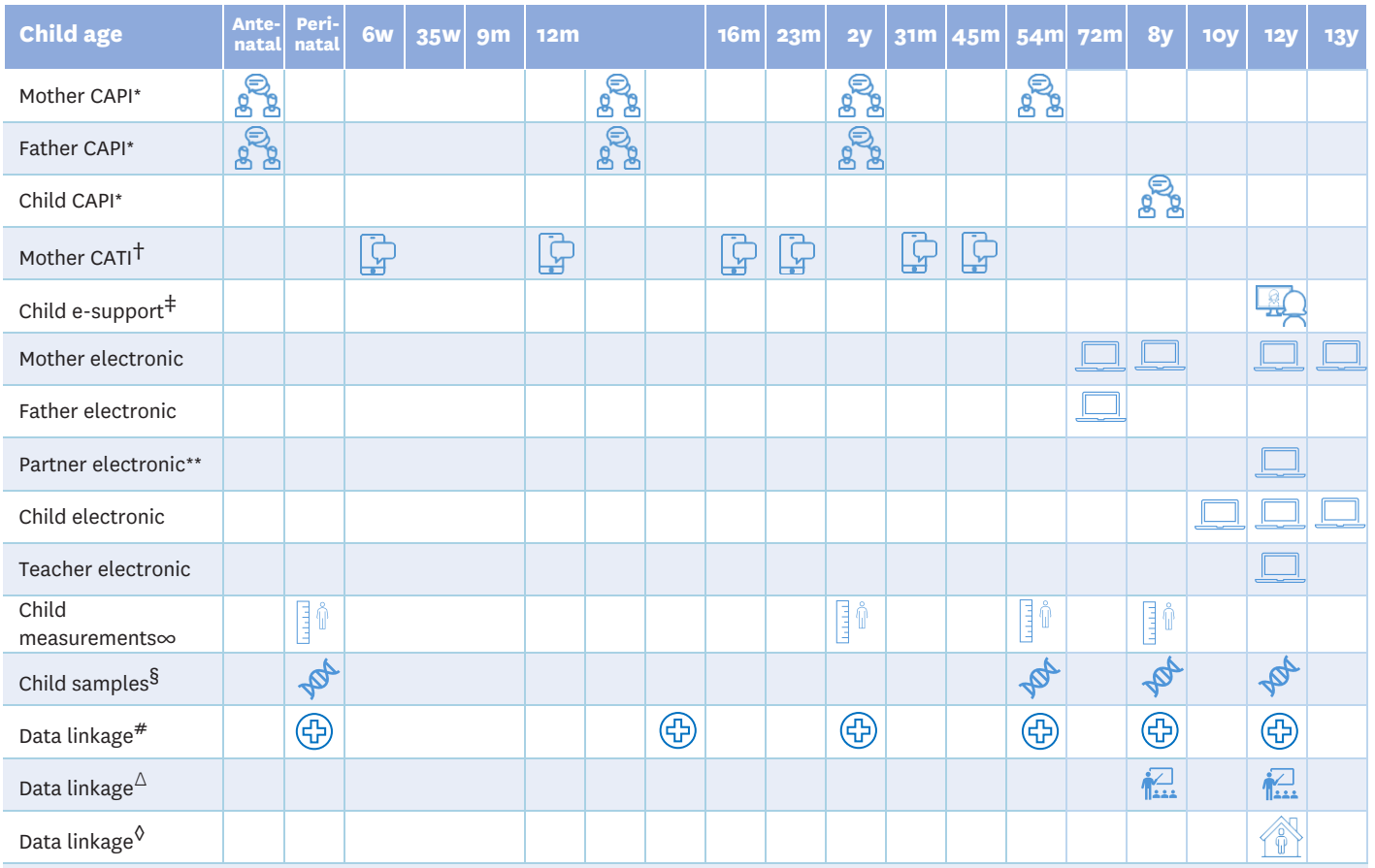
3. Modes and Timing of the Data Collection Waves

Each Data Collection Wave (DCW) of *Growing Up in New Zealand* seeks information across six inter- connected domains. Each cross-sectional DCW is planned accordingly to collect a balanced set of age- appropriate information across the inter-connected domains, in the context of the overarching longitudinal research objectives, whilst also aiming to collect information with policy relevance.

Attention is also given to ensuring that the tools employed to collect domain-specific information takes due account of the unique New Zealand population and environmental context (see Table 3 for further details).

3.1. Timelines

The study was commissioned by the New Zealand government in 2004 and commenced in 2008 with the recruitment of 6822 pregnant mothers who had an expected due date between March 2009 and May 2010. A cohort of 6853 children were born into the study. Longitudinal information has been collected from participating children and their families at several time points and from multiple sources (child, mother, partner, child proxy, child observation and teacher) and via different collection methods including face to face interviews, telephone interviews, online questionnaires and data linkage. An overview of the data collection modes can be found in Figure 1.



* CAPI computer assisted personal interview

† CATI computer assisted telephone interview

‡ E-support via Zoom

** Mother's partner – not necessarily the child's father

∞ Child's height, weight and waist circumference

§ Child biological samples - throat, nose and elbow swab and/or saliva

Child's routine health records

Δ Child's education records

◊ Linkage of child's home address to environmental records

Note: The 72M and 13Y electronic data collection with partners was funded by the Ministry of Business, Innovation and Employment.

Figure 1: Overview of the longitudinal collection in GUiNZ

3.2. Face-to-face interviews (CAPI)

Computer Assisted Personal Interviews (CAPI) were undertaken by trained interviewers, most often in the child's home, at several time points including:

- The antenatal DCW0 with the pregnant mother (most often in the last trimester of her pregnancy) and with her partner (almost always the stated biological father)
- The 9-month DCW1 with the child's mother and her partner
- The 2-year DCW2 with the child's mother and her partner, which also involved direct observations, developmental and anthropometric assessments of the children at two years of age; and

- The 4-year (pre-school) DCW5 with the child's mother, which included direct observations, developmental and anthropometric assessments and biological samples from the children at four years of age.
- The 8-year DCW8 with the child, which included direct observations, developmental and anthropometric assessments and biological samples from the children at eight years of age.

3.3. Telephone interviews (CATI)

Brief Computer Assisted Telephone Interviews (CATI) were undertaken by trained staff with the child's mother (or equivalent) to allow for age-appropriate developmental information to be collected and to assist with cohort retention. These phone calls occurred at several time points including when the children were:

- 6 weeks old
- 35 weeks old
- 16 months old
- 23 months old
- 31 months old
- 45 months old

3.4. Online questionnaires

Self-complete online questionnaires were used at the following ages:

- 72 months old to the child's mother as a single questionnaire.
- 8 years old – a child proxy and mother questionnaire completed by the child's mother.
- 11 years old (Covid-19 questionnaire) self-completed by child
- 12-year-old:
    - Mother (M): Information about the *GUiNZ* child's mother and the mother's household
    - Partner (P): Information about partner of *GUiNZ* child's mother & their household
    - Child Proxy Mother (Cm): Information about the *GUiNZ* child provided by their mother
    - Child Proxy Partner (Cp): Information about the *GUiNZ* child provided by mother's partner
    - Child Activities Questionnaire (Co): Information about the *GUiNZ* child provided by the child

- Child Questionnaire (C): Information about the *GUiNZ* child provided by the child
- Teacher Questionnaire (T): Information about the *GUiNZ* child provided by the teacher.

- 13 years old (extreme weather event): a self-reported child questionnaire and a mother questionnaire including child proxy information.

3.5. Self-completion paper-based diary

Completion of a Time Use Diary (TUD) as part of DCW8 required the participant to record every activity performed on the specified days. The 8-year time-use diaries were completed over two days, one day during the week and one day during the weekend. Participants were asked either to complete the diary as they are performing activities throughout the day, or to recall their activities at regular intervals during the day or at the end of the day.

3.6. Virtual interviews

Virtual interviews were undertaken using Zoom. During the scheduling call an appointment was made to connect with the Mother/Child via Zoom. A secure link with passcode was sent to the Mother's email. Once on the Zoom call, the meeting room was locked, and screen-sharing enabled. The field Interviewer posted the link to the Mother's consent in chat and the consent process was completed with the Mother and Child assent with the Child providing opportunity to ask, and have answered, any questions the participants had. When the consent process was complete, the Zoom chat function was disabled. Once the child began answering their questionnaire screen-sharing was optional however the Interviewer explained they would remain available on the call to answer any questions the child had. For a small number of participants who could not engage via Zoom, consent was discussed via telephone, the secure link to the consent document emailed, consent signed by the mother and uploaded electronically through the submit button.

3.6.1. The 12-year child questionnaire, including consent with the mother.

The 12Y DCW was initially planned as a hybrid data collection model. The primary mode of data collection from the children was planned to be a face-to-face interview in the children's homes (including an electronic self-complete component, biological sampling and anthropometric measurements conducted with the interviewer present). This was planned to be augmented with electronic questionnaires for the children's parent/s, their teachers, and parental consents to extend linkage to routine administrative datasets. Due to COVID-19 restrictions during the DCW a fully online data collection mode was implemented. The cohort families had the option to connect with the field interviewer via Zoom for assistance to complete the questionnaires (noting parental and teacher questionnaires were always planned to be virtual/remote).

3.7. Data linkage

Parental consent for data linkage has been sought at strategic times during the longitudinal DCWs to enable self-reported information to be supplemented by information from routine health data in particular. After obtaining consent further resources and time are required to undertake linkages and create derived variables with utility for all users. Once completed these derived variables, and the associated technical documentation are made available in the research datasets (see Appendix A – Technical documentation).

4. Preparation of the research datasets

Once the field data collection is complete the raw information and observational data are extracted, data is cleaned and collated, and operational only data is removed. The raw research data are initially formatted as an internal working dataset. Research datasets are produced according to guidelines that protect participantprivacy (satisfying safe data in the international Five Safes framework) and in compliance with participant consentfor data use.

Research Datasets are datasets made available to bona fide data users for approved research projects in accordance with the *Growing Up in New Zealand* Data Access Protocol. Research datasets do not contain any identifying information. Identifying Information is defined as personal information (see the Privacy Act 1993) and includes data collected about a person from which the identity of that person or a member of his or her family could reasonably be ascertained.

The data have been anonymised without compromising the value of the information for research purposes.

Details regarding the variables available in the research datasets are available in the Data Dictionaries for each component of each completed DCW.

Table 1. Summary of Growing Up in New Zealand data releases to date (May 2024)

Data Collection Wave	Contact Point	Temporal Coverage***	Mother information	Partner information	Child information
DCW0	Antenatal	March 2009 – April 2010	✓	✓	
DCW1	Perinatal	N/A			✓ *
	6 weeks (CATI)	June 2009 - July 2010	✓		✓
	35 weeks (CATI)	January 2010 – December 2010	✓		✓
	9 months	January 2010 – December 2010	✓	✓	✓ **
DCW2	16 months (CATI)	July 2010 - May 2012	✓		✓
	23 months (CATI)	March 2011 - August 2012	✓		✓
	2 years	March 2011 – September 2012	✓	✓	✓

Data Collection Wave	Contact Point	Temporal Coverage***	Mother information	Partner information	Child information
DCW3	31 months (CATI)	November 2011 – February 2013	✓		✓
DCW4	45 months	February 2013 – February 2014	✓		✓
DCW5	54 months (CATI)	October 2013 – March 2015	✓		✓
DCW6	72 months	August 2015 – May 2016	✓		
DCW8	8 years	July 2017 – January 2019	✓		✓
DCW11 (Covid)	10 years	May 2020			✓
DCW12	12 years	September 2021 – October 2022	✓	✓	✓
DCW13EW	13 years	August 2023 – September 2023	✓		✓

* Derived after linkage to perinatal health records.

** Includes derived variables following linkage to heath records in first year of life. See Appendix A – Technical documentation for information on linkage to National Immunisation Register and National Minimum Dataset.

*** Sourced from the research datasets from each DCW.

4.1. Kaitiaki Principles and Processes

At its initiation, the Growing Up in New Zealand Kaitiaki principles were developed to provide a framework for ensuring Māori rights and aspirations for research and policy development are upheld as part of the study in response to Māori and Te Tiriti o Waitangi. The Kaitiaki principles inform the Growing Up in New Zealand Data Access Policy through the provision of a definition of good kaitiakitanga (guardianship) which includes the requirement that data are analysed, interpreted, reported and published in culturally appropriate ways. It is essential that data users become familiar with these principles and, when applying for data access, they should describe the actions that they will take to uphold these principles as a data user. The following article describes the development and operationalisation of the Kaitiaki principles and highlights important opportunities that Māori values and philosophies bring to longitudinal research in Aotearoa New Zealand.

Sarah-Jane Paine, Denise Neumann, Fiona Langridge, Aysha Peters & Te Kani Kingi (2022): Kaitiakitanga – principles for protecting and promoting tamariki and rangatahi wellbeing in Growing Up in New Zealand, Journal of the Royal Society of New Zealand, DOI: 10.1080/03036758.2022.2066142

These principles guide the data collection, cleaning and analysis of all GUiNZ activities and are fundamental to the operational procedures that guide the study.

4.2. Consent Process

The consent form for participants stated:

"I understand that the research team will keep my involvement in this study confidential, and that nomaterial that could identify me will be used in any reports on this study."

The Participant Information Sheet that accompanied this Consent Form stated:

"The information about your child and family is completely confidential. No information that could identifyyou or your child will be used in any reports on this study."

4.3. Protecting participant anonymity and Data anonymisation

One of the most important principles of the Growing Up in New Zealand study is that the data made available are anonymised. This protects the privacy of participants and enables the collection of sensitive data because confidentiality is assured.

Growing Up in New Zealand adopts and completes the anonymisation process in the context of international best practice and aligned to the Five Safes framework as it is applied to this context (see Data Access Protocol). GUiNZ does not use any perturbative techniques that reduce and distort original data structures and the distribution of data values.

The anonymisation process removes all direct identifiers and other identifying information that is determinedto be highly disclosive (highly sensitive) and with a very high likelihood of breaching the confidentiality and/or privacy of individual participants.

Data has only been redacted or transformed/treated if the following criteria were met:

- Direct participant identifiers
- Highly disclosive content, or
- Categories with cell counts less than five cases of the entire dataset.

The transformation applied to variables is detailed in the Data dictionaries, with treatments defined as raw (**unchanged**), derived, categorised, or re-classified. Each type of variable transformation is defined as follows:

- Derived variables: A new variable that has been generated from one or more raw pieces of information collected, using a numerical computation or mathematical formula or composite score.
- Categorised variables: Highly sensitive raw variables with categories containing low cell counts (<5) have been collapsed into the most proximal category (either top or bottom-coding).
- Re-classified variables: Variables resulting from multiple response questions exhibiting low cell counts (<5) or mapping low level raw data information to the high-level classification and external standards such as ethnicity or language classifications from Statistics New Zealand.

Note: When we have used the term derived in reference to variables, please note that this definition of derivation is interchangeable, depending on the context. Some of the variables from DCWo have been both derived and subsequently top/bottom coded due to extremely low cell counts. For example, a variable for the length of living in the current home was defined as 'derived and categorised' in DCWoP.

Furthermore, the following data items have also been incorporated into the research datasets having been derived from information collected and stored separately from the research data along with the participant nominal information:

- Geolocation information: Such as New Zealand Deprivation, District Health Board of domicile and Urban-rural location.
- Country of residence: Growing Up in New Zealand engages with families and children who move overseas and collects country of residence to conduct interviews. Where a child and/ or their mother are living outside New Zealand the specific country information is collapsed into "Other country" to protect anonymity.

The guiding principles that have been adopted to create the Research Datasets are summarised in Table 5 below:

Table 2. Data anonymisation principles applied to research datasets

Variable Type	Principle applied
Highly sensitive raw information	Data are presented as derived, categorised or re-classified. These transformed variables still provide the necessary information to undertake analyses
Categorical variables with low cell count	Low cell counts categories have been categorised
Continuous variables with low frequencies at the lower or the upper extremes	Low frequency extremes distributions have been categorised
Multiple-response variables with low frequencies	Responses with low frequencies (≤5) have been combined to create a new response variable
Date-specific variables	Dates have been converted to the day, month or year
Free text variables	Free text is not released (suppressed). However, if free text has been classified and categorised, then it will be released.

5. Specific Reference publications

It is expected that all researchers interested in using the *Growing Up in New Zealand* datasets will be familiar with the key background documents describing the study in more detail (available at www.growingup.co.nz).

IJE *Growing Up in New Zealand* Cohort profile

This journal article describes in detail the cohort design and set up of the study. It is the foundational document for referencing the study.

Morton, S. M. B., Atatoa Carr, P., Grant, C. C., Robinson, E. M., Bandara, D. K., Bird, A., Ivory, V. C., Kingi, T. K., Liang, R., Marks, E. J., Perese, L. M., Peterson, E. R., Pryor, J. E., Reese, E., Schmidt, J. M., Waldie, K. E., Wall, C. (2012). Cohort Profile: Growing Up in New Zealand. International Journal of Epidemiology 42(1): 65-75. DOI: 10.1093/ije/dyr206

Report 1: Before we are born

This is the first report released and describes the research objectives, conceptual framework and domains which have guided the questionnaire design throughout the course of the study. The findings focus solely on the antenatal data, outlining mother and partner experiences antenatally and describes the cohort in detail.

Morton, S. M. B., Atatoa Carr, P. E., Bandara, D. K., Grant, C. C., Ivory, V. C., Kingi, T. R., Liang, R., Perese, L. M., Peterson, E., Pryor, J. E., Reese, E., Robinson, E. M., Schmidt, J. M., Waldie, K. E. (2010). Growing Up in New Zealand: A longitudinal study of New Zealand children and their families. Report 1: Before We Are Born. Auckland, Growing Up in New Zealand. ISBN: 978-0-473-17889-5 (electronic), ISBN: 978-0-473-17974-8 (print).

Report 2: Now we are born

Now we are born describes the cross-sectional data from the first nine months of our cohort children's lives and the longitudinal changes from antenatal to nine months.

Morton, S. M. B., Atatoa Carr, P., Grant, C. C., Lee, A., Bandara, D. K., Mohal, J., Kinloch, J., Schmidt, J., Hedges, M., Ivory, V., Kingi, T. K., Liang, R., Perese, L., Peterson, E., Pryor, J., Reese, E., Robinson, E., Waldie, K., Wall, C. (2012). Growing Up in New Zealand: A longitudinal study of New Zealand children and their families. Report 2: Now We Are Born. Auckland, University of Auckland. ISSN: 2253-251X (Online), ISSN: 2253-2501 (Print)

Growing Up in New Zealand Recruitment and Retention paper

This paper lays out the methods and techniques used to recruit the largest cohort of participants in a longitudinal study ever undertaken in New Zealand. It also discusses the retention methods used in the study and our success rates over time.

Morton, S. M. B., Atatoa Carr, P., Grant, C. C., Robinson, E. R., Bird, A. and Waayer, D. (2012). How do you recruit and retain a pre-birth cohort? Lessons learnt from Growing Up in New Zealand. Evaluation and the Health Professions. DOI: 10.1177/0163278712462717.

Alignment of cohort with Population of Interest (all current births)

The comparability of Growing Up in New Zealand births to all the births across New Zealand has also been compared and contrasted.

Morton, S. M. B., Ramke, J., Kinloch, J., Grant, C. C., Atatoa Carr, P., Leeson, H., Lee, A. C. and Robinson, E. (2014). Growing Up in New Zealand cohort alignment with all New Zealand births. Australian and New Zealand Journal of Public Health. DOI: 10.1111/1753-6405.12220

Report 3: Now We Are Two: Describing our first 1000 days

This report provides insight into the physical health and development, emotional and behavioural well-being, and cognitive development of New Zealand two-year-olds. The report also depicts changes in the children's home environment, childcare arrangements and socioeconomic situation over the first two years of their lives.

Morton, S.M.B., Atatoa Carr, P.E., Grant, C.C., Berry, S.D., Bandara, D.K., Mohal, J., Tricker, P. J., Ivory, V.C., Kingi, T.R., Liang, R., Perese, L.M., Peterson, E., Pryor, J.E., Reese, E., Waldie, K.E. and Wall, C.R. (2014). Growing Up in New Zealand: A longitudinal study of New Zealand children and their families. Now we are Two: Describing our first 1000 days. Auckland: Growing Up in New Zealand. ISSN: 2253-251X (Online), ISSN: 2253-2501 (Print)

Report 4: Vulnerability Report 1: Exploring the Definition of Vulnerability for Children in their First 1000 Days

This report evaluates how commonly New Zealand children experience twelve family and environmental risk factors that have previously been shown to increase the chances that children will have poor developmental outcomes.

Morton, S. M. B., Atatoa Carr, P. E., Grant, C. C., Berry, S. D., Marks, E. J., Chen, X. M-H., Lee, A. C. 2014. Growing Up in New Zealand: A longitudinal study of New Zealand children and their families. Vulnerability Report 1: Exploring the Definition of Vulnerability for Children in their First 1000 Days. Auckland: Growing Up in New Zealand. ISSN: 2253-251X (Online), ISSN: 2253-2501 (Print)

Report 5. Residential Mobility Report 1: Moving house in the first 1000 days. Auckland: *Growing Up in New Zealand*.

This report focusses on the residential mobility of the cohort families during the first two years of their children's lives.

Morton, S. M. B., Atatoa Carr, P. E., Berry, S. D., Grant, C. C., Bandara, D.K., Mohal, J., Tricker, P. J. 2014. Growing Up in New Zealand: A longitudinal study of New Zealand children and their families. Residential Mobility Report 1: Moving house in the first 1000 days. Auckland: Growing Up in New Zealand. ISSN: 2253-251X (Online), ISSN: 2253-2501 (Print)

Report 6. *Growing Up in New Zealand*: Vulnerability Report 2: Transitions in exposure to vulnerability in the first 1000 days of life

This report on vulnerability is based on the information gathered in the first thousand days of the Growing Up in New Zealand longitudinal study. This is the second in an evolving series of reports on vulnerability and resilience.

Morton, S. M. B., Atatoa Carr, P. E., Grant, C. C., Berry, S. D., Mohal, J., Pillai, A. 2015. Growing Up in New Zealand: A longitudinal study of New Zealand children and their families. Vulnerability Report 2: Transitions in exposure to

vulnerability in the first 1000 days of life. Auckland: Growing Up in New Zealand. ISSN: 2253-251X (Online), ISSN: 2253-2501 (Print)

Report 7. *Growing Up in New Zealand*: Now We Are Four: Describing the preschool years

Now We Are Four: Describing the preschool years" continues the "Now We Are" series of reports, building on the findings from the "Before We Are Born", "Now We Are Born" and "Now We Are Two" reports. The information in this report draws on a number of data collection waves which capture key transitions for the children between the ages of two and four years. Importantly, it provides a view of how the current generation of preschool children is faring as they prepare to enter formal schooling.

Morton, S.M.B, Grant, C.C., Berry, S.D., Walker, C.G., Corkin, M., Ly, K., de Castro, T.G., Atatoa Carr, P.E., Bandara, D.K., Mohal, J., Bird, A., Underwood, L., Fa'alili-Fidow, J., 2017. Growing Up in New Zealand: A longitudinal study of New Zealand children and their families. Now We Are Four: Describing the preschool years. Auckland: Growing Up in New Zealand. ISSN: 2253-251X (Online), ISSN: 2253-2501 (Print)

Report 8. *Growing Up in New Zealand*: Transition to school

This report is based on the first six of those years. We also learn about their parents and the households and neighbourhoods in which they are growing up.

Morton, S.M.B., Grant, C.C., Walker, C.G., Berry, S.D., Meissel, K., Ly, K., Marks, E.J., Underwood, L., Fa'alili-Fidow, J., Wilson, S., Pillai, A., Kim, H. 2018. Growing Up in New Zealand: A longitudinal study of New Zealand children and their families. Transition to school. Auckland: Growing Up in New Zealand. ISSN: 2253- 251X (Online), ISSN: 2253-2501 (Print)

Report 9. Now We Are Eight: Life in middle childhood

Now We Are Eight: Life in middle childhood continues the "Now We Are" series of reports, building on the findings from the "Before We Are Born", "Now We Are Born", "Now We Are Two" and "Now We Are Four" reports. The information in this report primarily describes findings from the information collected at the 8-year data collection wave. It also provides a section which aligns the findings with the Child and Youth Wellbeing Framework.

Morton, S.M.B., Walker, C.G., Gerritsen, S., Smith, A., Cha, J., Bird, A., Bullen, P., Atatoa Carr, P., Chen, R., Exeter, D.J., Fa'alili-Fidow, J., Fenaughty, J., Grant, C. Kim, H., Kingi, T.K., Lai, H., Langridge, F., Marks, E.J., Meissel, K., Napier, C., Paine, S., Peterson, E.R., Pillai, A., Reese, E., Underwood, L., Waldie, K.E, Wall, C. 2020 . Growing Up in New Zealand: A longitudinal study of New Zealand children and their families. Now We Are Eight: Life in middle childhood. Auckland: Growing Up in New Zealand. ISSN: 2253-251X (Online), ISSN: 2253-2501 (Print)

Report 10. COVID wellbeing

This report details findings from the online COVID-19 Wellbeing Survey delivered in May 2020, at which time, Aotearoa New Zealand was experiencing strict COVID-19 pandemic restrictions. 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.

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.

Report 11: COVID education

This report details findings from the online COVID-19 Wellbeing Survey delivered in May 2020, at which time, Aotearoa New Zealand was experiencing strict COVID-19 pandemic restrictions. Findings related to children's reports of their household 'bubbles', school, family, social connectedness, and activities during lockdown are reported.

Meissel, K., Bergquist, M., Kumarich, J., Napier, C., Peterson, E.R., Smith, A., Walker, N., Bullen, P., Dubey, N., Fenaughty, J., Gerritsen, S., Janicot, S., Langridge, F., Paine, S-J., Pillai, A., Swinburn, B., Taufa, S., Wall, C., Morton, S.M.B. The Growing Up in New Zealand COVID-19 Wellbeing Survey: Part 2: Education. Auckland: Growing Up in New Zealand, 2021

Kaitiakitanga Principles

The Growing Up in New Zealand study is guided by the kaitiakitanga principles (guardianship). The following article describes these principles and the actions taken to uphold these.

Sarah-Jane Paine, Denise Neumann, Fiona Langridge, Aysha Peters & Te Kani Kingi (2022): Kaitiakitanga – principles for protecting and promoting tamariki and rangatahi wellbeing in Growing Up in New Zealand, Journal of the Royal Society of New Zealand, DOI: 10.1080/03036758.2022.2066142

NWA12 reports

This latest report (*NWA12*) from *Growing Up in New Zealand* shares insights and findings from when the young people in the study are at the start of adolescence - a time of rapid social, emotional, and physical development. The report is presented in a series of nine snapshots which topics are relevant to the health and wellbeing of young people.

NWA12: Introduction to the *Growing Up in New Zealand* 12-Year Data Collection Wave

The aim of this document is to provide a summary of the 12-year Data Collection Wave (DCW) that occurred between September 2021 and July 2022, during which the *Growing Up in New Zealand* (*GUiNZ*) cohort of young people (mean age = 12.30 years, standard deviation = 0.27 years) completed their own questionnaires.

Napier, C., Yao, E., Prasad, R., Kedia, A., Fenton, D., Black, S., Pillai, A., Morton, S.M.B., Paine, S.J. 2023. Now We Are 12: Introduction to the *Growing Up in New Zealand* 12-Year Data Collection Wave. Auckland: *Growing Up in New Zealand*. Available from: www.growingup.co.nz

NWA12: *Methods*

This *NWA12* methods report outlines the process that was used to engage with key government agencies in the development of topics for the *NWA12* series. It also details the overarching approach that was used to analyse the

12-year data, both on its own (cross-sectional analysis) but, importantly, also in relation to earlier data collection waves (longitudinal analysis).

Paine, S.J., Gerritsen, S., Napier, C., Pillai, A., Prickett, K., Atatoa Carr, P., Yao, E., Fenaughty, J., Morton, S.M.B. 2023. Now We Are 12: Methods. Auckland: *Growing Up in New Zealand*. Available from: www.growingup.co.nz

NWA12 Snapshot 1: *Ethnic and Gender Identity at 12 Years Old*

In this topic, we will for the first time highlight how the young people of the *Growing Up in New Zealand* study themselves describe their ethnic and gender identity and present young peoples' sense of cultural connectedness and belonging to their ethnic group(s).

Neumann, D., Yao, E., Fenaughty, J., Liang, R., Kingi, T.K., Taufa, S., Atatoa Carr, P., Paine, S.J. 2023. Now We Are 12: Ethnic and Gender Identity. Snapshot 1. Auckland: *Growing Up in New Zealand*. Available from: www.growingup.co.nz

NWA12 Snapshot 2: *Material Hardship*

Snapshot 2 examined the material circumstances of young people in the cohort at age 12, as well as over time, from birth through to early adolescence.

Grant, M., Prickett, K. C., Morton, S. M. B., Miller, S., Pillai, A., Paine, S-J. 2023. Now We Are 12: Material Hardship. Snapshot 2. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz

NWA12 Snapshot 3: *Food Insecurity*

This report examines the proportions of the *Growing Up in New Zealand* cohort that lived in households experiencing food insecurity. We focused on change in household food security status between 8- and 12-years of age, and receipt of government support for families with food insecurity, including school food programmes.

Gerritsen, S., Park, A., Wall, C., Napier, C., Exeter, D., Paine SJ. 2023. Now We Are Twelve: Food Insecurity. Snapshot 3. Auckland: *Growing Up in New Zealand*. Available from: www.growingup.co.nz

NWA12 Snapshot 4: *Housing and Homelessness*

This report examined the housing conditions, residential mobility and severe housing deprivation experience of the *Growing Up in New Zealand* cohort between ages 8 and 12.

Lai, H., Prickett, K., Renker-Darby, A., Paine, S.J., Atatoa Carr, P. 2023. Now We Are 12: Housing and Homelessness. Snapshot 4. Auckland: *Growing Up in New Zealand*. Available from: www.growingup.co.nz

NWA12 Snapshot 5: *School Engagement*

Snapshot 5 provides an overview of young people's school engagement at age 12 and identifies key factors associated with engagement. It also reports on how emotional engagement has changed over time, considering young person reports of emotional engagement at age 8, at age 10 (at the start of the pandemic) and at age 12.

Tait, J., Grant, M., Meissel, K., Bullen, P., Peterson, E.R., Fenaughty, J., Miller, S., Paine, S-J. 2023. Now We Are 12: School Engagement of the *Growing Up in New Zealand* cohort. Snapshot 5. Auckland: *Growing Up in New Zealand*. Available from: www.growingup.co.nz

NWA12 Snapshot 6: *Experiences of the COVID-19 pandemic and young people's wellbeing*

Snapshot 6 describes data collected from the cohort when the young people were 12 years old. The 12-year DCW asked young people about their worries and fears due to COVID-19. In this snapshot we explore who was most worried about the COVID-19 pandemic and how this relates to young people's wellbeing.

Walker C.G, Fletcher B.D, Cha, J.E., Waldie, K.E., Morton, S.M.B., Peterson, E.R., Bullen, P., Prickett, K., Meissel, K., Fenaughty, J., Paine, S.J. 2023. Now We Are 12: Experiences of the COVID-19 pandemic and young people's wellbeing. Snapshot 6. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz

NWA12 Snapshot 7: *Young people's experiences of depression and anxiety symptoms*

Snapshot 7 describes data collected from the cohort when the young people were 12 years old. It explores young people's doctor diagnosed depression and/or anxiety and their engagement with mental health services, as reported by their mother. It also explores how depression and anxiety symptoms may be different for three key demographic groups (gender, ethnicity, and deprivation). Additionally, in this snapshot we examine changes in depression and anxiety symptoms over time from 8 to 12 years old and factors that may influence these outcomes. Fletcher, B.D., Walker, C., Cha, J.E., Neumann, D., Paine S.J., Park A., Fenaughty, J., Bird, A.L., Waldie, K.E. 2023. Now We Are 12: Young people's experiences of depression and anxiety symptoms. Snapshot 7. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz

NWA12 Snapshot 8: Disability: *The impact of disability on young people and their family*

Snapshot 8 provides looks at disability using a combination of parent and young person viewpoints that provides a deeper understanding at both the individual and family level.

Marks, E.J., Tait, J., Miller, S., Liang, R., Bullen, P., Fenaughty, J., Grant, C.C. and Paine, S-J. 2023. Now We Are 12: The Impact of Disability on Young People and Their Family. Snapshot 8. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz

NWA12 Snapshot 9: *Relationships with parents, peers and special adults*

Snapshot 9 describes young people's experiences of their relationships with their parents, peers and non-parental special adults. These three types of relationships are central relationships that together influence adolescent wellbeing. Examining these is important for understanding relational ties beyond the nuclear family, particularly for Māori where the concept of whānau encompasses a wider familial and non-familial system of connectedness and a collective responsibility for children.

Evans, R. J., Bird, A., Bullen, P., Fenaughty, J., Renker-Darby, A., Crosby, K., Grant, M., Miller, S. and Paine, S-J. 2023. Now We Are 12: Young People's Relationships at Twelve Years of Age. Snapshot 9. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz

NWA12: *Structural disadvantage and rangatahi Māori mental wellbeing*

This topic paper investigates how structural disadvantage is shaped across childhood and early adolescence for rangatahi Māori and how these longitudinal experiences of structural disadvantage are associated with rangatahi Māori mental wellbeing. The paper further explores if a stronger cultural connectedness is associated with better mental wellbeing and whether it can buffer the impacts of structural disadvantage for rangatahi Māori mental health.

Paine S-J., Neumann D., Yao E. 2023. Now We Are 12: Structural disadvantage and rangatahi Māori mental wellbeing. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz

Further Growing Up in New Zealand publications which may be of use are available online at (www.growingup.co.nz).

The processes around data release and technical documents provided align with similar contemporary longitudinal studies overseas (such as Growing Up in Ireland - www.growingup.gov.ie, Growing Up in Australia - growingupinaustralia.gov.au, Millennium Cohort Study (UK) - cls.ucl.ac.uk, and Growing Up in Scotland - growingupinscotland.org.uk).

6. Data Access

6.1. The Data Access Protocol

The Data Access Protocol is a key document that sets out how the data from Growing Up in New Zealand can be accessed. All researchers using the Growing Up in New Zealand research datasets must be familiar with the Data Access Protocol which is available on the study website (growingup.co.nz). The Data Access Protocol outlines:

- The principles that govern data access.
- The process by which researchers may apply for data access.
- The provisions that are used to safeguard the privacy of study participants and their families.
- The provisions that are used to ensure the long-term sustainability of the study.
- The role and function of the Data Access Committee that will oversee the operation of the protocol.
- The provisions that are used to guide authorship decisions and publication of papers produced under the protocol.

6.2. The Data Access Committee

The role of the *Growing Up in New Zealand* Data Access Committee (DAC) is to facilitate the provision of appropriate access to data collected in the study by approved researchers under Data Access Protocol. As such, research datasets cannot be used without the prior approval of the Data Access Committee.

The Data Access Committee is made up of representatives from Growing Up in New Zealand; the Growing Up in New Zealand Kaitiaki Group; the University of Auckland; UniServices Ltd; Ministry of Social Development; Ministry of Health; Statistics NZ; and Ministry of Education.

6.3. Process of applying for access to the research datasets

The intention of Growing Up in New Zealand is to ensure that the robust and contemporary information collected about New Zealand children within the longitudinal datasets will be well utilised to inform policy and research. To comply with the Growing Up in New Zealand Data Access Protocol, data access applicants must be bona fide researcher/s associated with a university, crown agency, research institute or other equivalent organisation in New Zealand or overseas.

Everyone who wants to use Growing Up in New Zealand data needs to make a formal Data Access Application. The process is outlined in Figure 2. For additional detail refer to the Data Access Protocol.

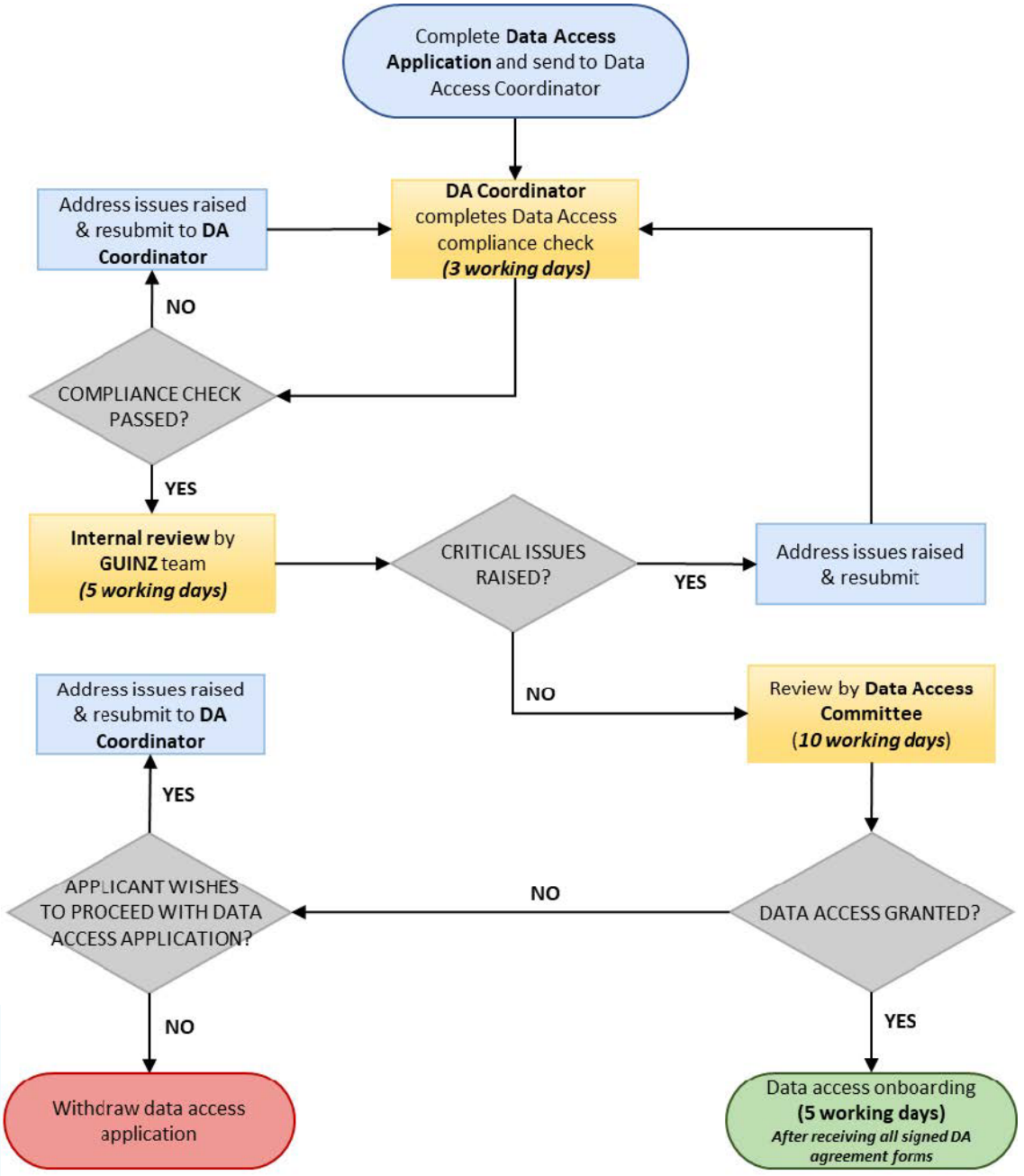


Figure 2: Process of Applying for Data Access

1. Check that the research proposal meets GUiNZ criteria for use

View key resources available on the www.growingup.co.nz website including:

- Data Access Protocol
- Data access workshops
- Data User Guides, Data Dictionaries, and Questionnaires'

2. Submit a Data Access Application

Queries on the data access process are welcome. Contact the Data Access Co-ordinator at dataaccess@growingup.co.nz . Once you have completed the Data Access Application form, sign it and send it to our Data Access Co-ordinator. The application will include:

- Project start and end date
- A summary of the research proposal
- Background context for the research
- Research aims and objectives
- Research methodology
- Details of the research data sets and data variables required
- An outline of your commitment to Growing Up in New Zealand's Kaitiaki principle
- Details of the dissemination plan
- Details of all team members

3. Data Access Review

The GUiNZ team will review the application. This initial review is to determine whether:

- The *Growing Up in New Zealand* datasets can answer the research question
- The research proposal reflects Growing Up in New Zealand principles, including the ownership, Kaitiaki, privacy and protection of value principles.

4. The Data Access Committee reviews the application.

The Committee reviews data access applications and aims to facilitate appropriate access to data for approved researchers in accordance with the Data Access Protocol.

The committee will provide a written decision outlining whether the application has been accepted or declined.

5. Sign the Data Access Agreement

Once the application has been approved, the researcher will sign a Data Access Agreement. For a copy of the Data Access Agreement contact the Data Access Co-ordinator at dataaccess@growingup.co.nz

6. Onboarding to the Research Datasets

Once the agreement has been signed and returned, the researcher will be onboarded to the research datasets via the Secure Data Access Platform. The platform is highly secure and can be used from any computer with internet access.

7. Data Output release

The analyses are completed, the team can request data to be released from the Secure Data Access Platform. The output checking process can take up to 4 working days. Output request are to be submitted to the Data Access Team at dataaccess@growingup.co.nz.

8. Amend your Data Access Application

Any changes required to the project will be reviewed by the Data Access Committee by submitting an Amendment Form. These changes include:

- Extension to the project end date
- Changes to project team members
- Adding new datasets to the project

9. Publication

The Data Access Committee will monitor compliance with the Data Access Protocol and review the dissemination of all manuscripts, abstracts and other outputs in the public domain which relate to your Data Access Application. Before research can be published, data users are required to inform Growing Up in New Zealand through submitting and Application to Publish Form.

The Committee will inform you within 10 working days whether it has been approved for publication. The Data Access Coordinator will provide any feedback of changes needed. Once the publication has been approved, it can be submitted for publication.

6.4. Data access agreements

The Researcher will not, directly or indirectly, disclose or permit to be disclosed to any person the Dataset and/or any results obtained from use of the Dataset except in accordance with the Dissemination Plan.

The Researcher will have and maintain security arrangements to safeguard the Dataset from unauthorised access that adhere to industry-accepted "best practices" for information of the same level of sensitivity. The Researcher will ensure that access to the Dataset is limited to them under this Agreement to access the Dataset. Only the Researcher(s) listed in this agreement are permitted to access the Dataset.

7. Data use disclaimer

While all care and diligence has been used in processing, analysing, and extracting our research data and data dictionaries, we give no guarantee that it is error free. We recommend that users exercise their own skill and care with respect to their use of the data/ information and carefully evaluate the accuracy, currency, completeness, and relevance of the data for their purposes.

All scales and tools have been used/adapted or developed according to the published literature (see Tools and instruments used in the Data Collection Waves (Table 3), technical documentation contained in Appendix A –

Technical documentation, and references in Appendix B – Selected publications that have utilised established tools and scales). For correct usage of these tools/scales please refer to the documentation contained within this guide. Note that improper use of these tools will result in erroneous/incorrect output.

For further guidance or to provide feedback on specific issues, or to seek further assistance about utilizing the datasets please contact dataaccess@growingup.co.nz.

8. Expectations of Data Users

In all processes, *Growing Up in New Zealand* must therefore ensure that all researchers adhere to these statements and keeping data anonymous must be balanced with providing data for robust, contemporary, population relevant analyses. For this reason, the use of all datasets must ensure that:

- Involvement in the study is kept confidential and individual participants cannot be identified.
- All access to the *Growing Up in New Zealand* data is driven by the requirements set out in the *Growing Up in New Zealand* Data Access Protocol; and
- All access to the *Growing Up in New Zealand* data is overseen by the Data Access Committee.

8.1. Publication Expectations

- All manuscripts must be sent to the GUiNZ Data Access Committee (DAC) prior to submission.
- Please use the correct references for the Growing Up in New Zealand study.
- Presentation of results should be according to the terms of the user agreement.
- Off-prints of published articles should be sent to the Data Access Coordinator as soon as the lead author receives them.
- Please note that GUiNZ is not responsible for the content in publications by external researchers.
- Publications are considered to be any work made available to the public in a distributed fashion, including but not limited to journal articles, conference proceedings, book chapters, reports, and articles distributed through a website.
- Where appropriate, we encourage media coverage of GUiNZ papers to raise the study's profile and to show study families that the study is producing interesting and valuable findings. However, you must obtain approval from the GUiNZ communications advisor (the University of Auckland) before distributing a press release or giving press interviews or comments.

8.1.1. Abstract

It is an expectation that Growing Up in New Zealand is mentioned in the Abstract text and the Key Words of all publications to make it visible in an online academic search.

8.1.2. Methodology

Methodology should be accurately described the Growing Up in New Zealand processes. All publications referring to GUiNZ methodologies or data must cite the following background and methodology papers:

- Morton SMB, Atatoa Carr PE, Bandara DK, Grant CC, Ivory VC, Kingi TR, Liang R, Perese LM, Peterson E, Pryor JE, Reese E, Robinson EM, Schmidt JM, Waldie KE, 2010. Growing Up in New Zealand: A longitudinal study of New Zealand children and their families. Report 1: Before we are born. Auckland: University of Auckland.
- Morton SM, Atatoa Carr PE, Grant CC, Robinson EM, Bandara DK, Bird A, Ivory VC, Kingi TK, Liang R, Marks EJ, Perese LM, Peterson ER, Pryor JE, Reese E, Schmidt JM, Waldie KE, Wall C. 2012. Cohort Profile: Growing Up in New Zealand. Int J Epidemiol 2013; 42(1): 65-75.
- Morton SMB, Ramke J, Kinloch J, Grant CC, Atatoa Carr P, Leeson H et al. Growing Up in New Zealand cohort alignment with all New Zealand births. Aust N Z J Public Health 2015 Feb;39(1):82-87.

8.1.3. Acknowledgements

Publications must acknowledge the families who participated in the study and the GUiNZ team for their role in collecting and collating the data. The following text is suggested for inclusion in the acknowledgements section of all publications that use GUiNZ data:

> "We are extremely grateful to all the families who participated in GUiNZ and created such a valuable database. We would also like to thank the whole GUiNZ team."

9. Additional considerations when planning data analysis

Every effort is made to ensure the quality and accuracy of the *Growing Up in New Zealand* datasets and related documentation. It is however important to acknowledge the evolving complexity of the datasets available, which will increase over time, and the iterative nature of longitudinal datasets. Consequently, before carrying out any analyses it is essential that researchers familiarise themselves with some key issues. These can be broadly described as two types of issue: data preparation and exploratory data analysis.

9.1. Data preparation

In preparing the data for analysis the following points should be considered.

- Reverse coding – Before creating composite scores from the sum or mean of individual variables, check the wording of the item in the questionnaire and its 'polarity' in comparison with other variables in the composite. For example, in the 9-month Mother dataset, items 1 and 10 of the Edinburgh Postnatal Depression Scale are worded positively while the rest of the items are worded negatively (as is standard for the tool). Values for these variables will need to be reversed before adding the 10 scale items.

- Re-coding - Are the values of the variables coded appropriately for your needs? For example, in the 9-month Mother dataset, the Edinburgh Postnatal Depression Scale items (EDI1_m9M to EDI10_m9M) are coded 1 to 4. However, the original scale is coded 0 to 3. Failure to recode the values would lead to inflated scores.

- Up-coding - The majority of our questions are closed in format thus much of our coding and data checking is done during the interview. However, where there are open ended questions, the data have to be reviewed and where relevant coded into separate categorical variables after the interview. Other questions had pre-defined coding frames but "Other – please specify" options were available to the participant which also required post interview up-coding. The newly coded responses for both additional codes and variables appear in the dataset, but all text from the original responses have been removed to protect the respondent's identity. No new code was created for texts in the "No additional code created" category for the 12-year datasets. This was due to texts not having enough information, or there were too few counts in the category to create an extra code.

9.2. Missing data

Note data may be missing for a variety of potential reasons and the implications of this need to be considered:

- Genuine missing data – participant did not answer the question, in this case the cell in the dataset will be blank (frequencies of genuine missingness are provided in the Data dictionaries available at www.growingup.co.nz) and detailed further in the data profiles on the secure AWS platform.

- **Refused/Don't know** – participant refused to answer or gave "Don't know" as a response. Usually, these responses are coded 98 or 99 (or in some cases 9). Statistical packages will not automatically recognise that these values indicate missing data.

- **Skipped data/Routing** – these data are missing by design because not all participants are asked to answer all items in a questionnaire. That is, participants might 'skip' items depending on their prior responses (routing applied in the questionnaires). In these cases, the cell in the dataset will be blank and responses will appear to be missing.

- Missed DCW – when datasets are combined some participants may not have completed some DCWS and therefor may have incomplete data.

9.3. Exploratory data analysis

Suggested further considerations prior to analysis include:

- Missing data – are there any patterns to the missing data? This includes bias (genuine missing data and Refused/ Don't know data
- Checking for normality (continuous/scale variables) – can scale data be analysed using parametric tests, and what is the distribution of that data?
- Transforming scale variables into categorical variables – are there known cut-offs that can be used to transform scale data into categories or does the distribution of scores suggest that this would be appropriate?
- Checking the distribution (nominal and ordinal/ categorical variables) – is there such uneven distributionacross responses that the variable cannot be meaningfully included in statistical analyses?
- Collapsing categorical variables – would it make sense to collapse nominal or scale data into fewer categories (based on the literature or based on the distribution of responses)?

9.4. Participant information

All research datasets available contain only de-identified data (non-identifiable data only). Alongside all research datasets, appropriate documentation is also made available (data dictionaries, data profiles, the user guide). The ID keys in the research datasets allow all datasets to be merged (see Section 10.5).

9.5. Merging datasets

As with any relational datasets, a detailed understanding of the research question and data is required to integrate and extract the information of interest. The Growing Up in New Zealand datasets have been designed to enable the user to merge information from multiple datasets, using the most straight-forward data linking principles. The way in which data are merged will depend on the research question and planned analyses.

Merging allows the user to integrate information from multiple datasets. In this context, you can create cross sectional (within a DCW) or longitudinal (between DCWs) data suitable for analysis. Figure 1 depicts how the Growing Up in New Zealand datasets within and between waves are able to be merged using the identification keys. Identification keys provide the relationships between the datasets (see Figure 3).

- Child to Child relationships: This is either a one to zero or one to one relationship, which means that a particular IDN_CHILD in (for example) DCW2C would correspond to one (the same child) or no child (if the child did not complete that particular DCW) in DCW1C. It should be noted here that DCW0_IDN is

an identification table created retrospectively in DCW0 so that antenatal mother and partner information can be merged.

- Child to Mother/Partner relationships: Child datasets contain multiple births, in which case parental data may be repeated if a child-focused merge is undertaken (one mother/partner to many children relationship).
- Mother to Partner relationships: Mother and partner identification keys for all data collection points within a wave are provided in each of the child datasets allowing a cross sectional merge. Then longitudinal (between DCWs) data can be merged using IDN_CHILD.

As the child is the focus of the study, IDN_CHILD is the primary merging key; remaining constant over time while mothers and partners, and their corresponding keys, may change between DCWs or even within them (as mothers and partners may change over time).

There is a dataset available, DCW0_IDN, which contains child ID (IDN_CHILD), mother ID (IDN_AM), and partner ID (IDN_AP). This will enable the efficient linking of antenatal datasets with other datasets.

Please note that the DCW6 dataset contains mother only information. To facilitate merging with other datasets the child ID (IDN_CHILD) has been included as well (see Figure 1).

The resulting dataset after merging two or more datasets will always depend on the involved datasets and their relationships. As a result, the number of cases (among other characteristics) in a merged dataset will need careful checking and may not necessarily line up with the number of cases in the original datasets.

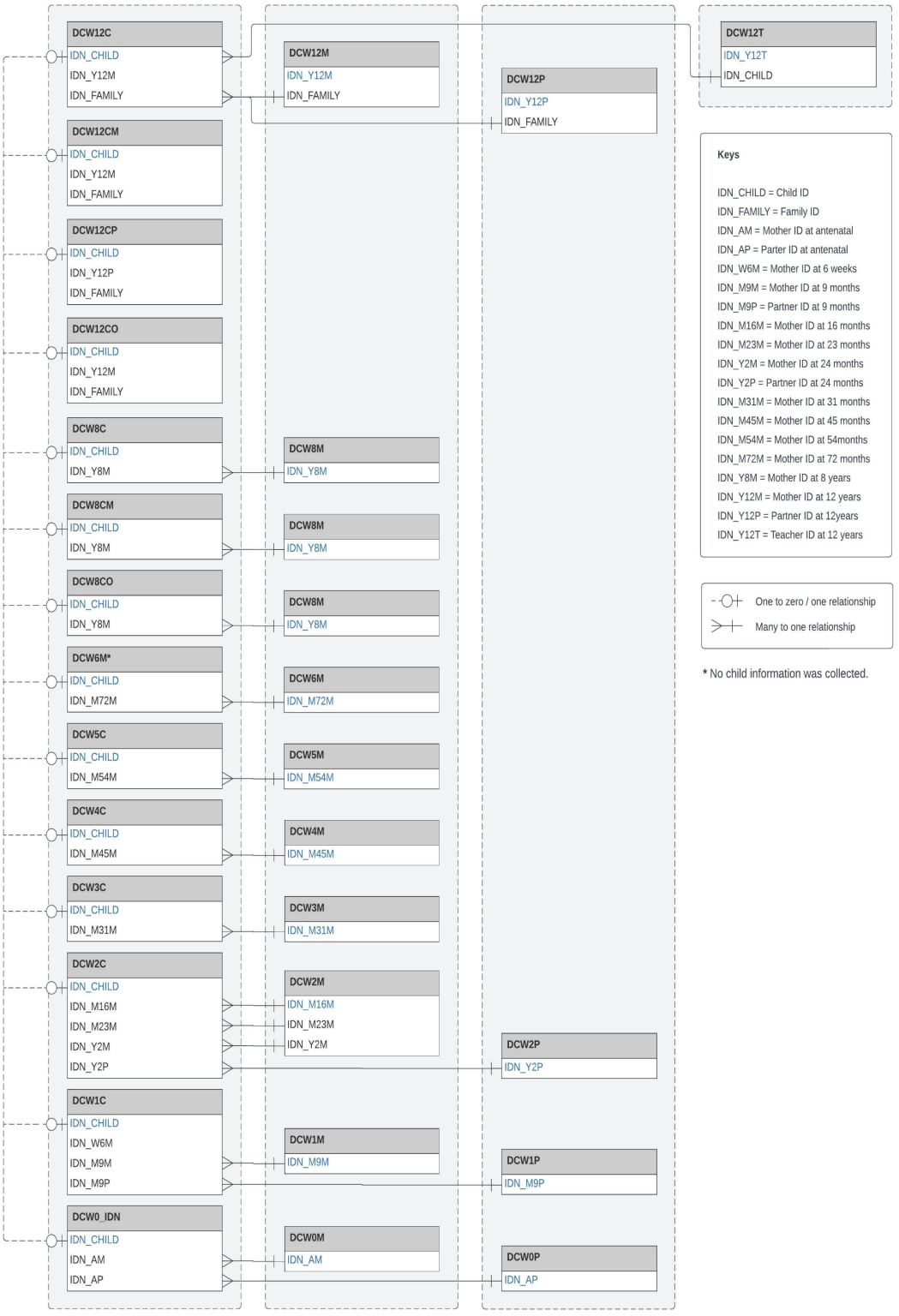


Figure 3. Growing Up in New Zealand relational datasets

10. Structure and content of the datasets

The *Growing Up in New Zealand* research datasets include information collected from main cohort children from singleton and twin pregnancies from antenatal mothers.

At each DCW all attempts possible were made to gather information from all cohort children. However, numbers completed vary across waves and it should not be assumed that denominators are constant or that skips are always the same individuals. Failure to complete may be due to death, opt-out or skips at any wave. "Skipped" refers to when a participant does not complete a particular data collection point but remains in the study and can be re-contacted and/ or re- engage at a later DCW.

Study informant 'Mother' in antenatal wave is the child's biological mother. However, mother can and does change between waves for some children (may be the primary guardian of the child and not the child's biological mother). This will be reflected in a change in the mother ID between waves. Similarly, information was also collected from the study informant 'partner', partners of the pregnant mothers. Partners can also change between waves. At the 2-year DCW (DCW2) and 54M DCW (DCW5), the interviewer was also an informant to gather observational data.

For each DCW (excluding the antenatal DCW), there are separate research datasets for the cohort child (data from child observation and measurements by the interviewer and questions asked about the child to the child proxy),the mother and the partner. From DCW8 there is an additional child dataset which contains the information collected from the child questionnaire (self-report). These separate files within a wave also combine data collected at different time points. The list below provides the content within each DCW.

10.1. Antenatal Data Collection Wave (DCW0):

Includes information collected during the antenatal period from the mothers of the cohort children (DCW0M: antenatal mother dataset), as well as information collected from the partners of the pregnant mothers (DCW0P: antenatal partner dataset). This information was collected during the first *Growing Up in New Zealand* antenatal DCW in 2009 and 2010.

The antenatal DCW served three key purposes:

- It collected baseline information about the parents, the family, the pregnancy, and the wider environment from before the time of the child's birth.
- It described the foundations for the future longitudinal data collections planned for the *Growing Up in New Zealand* cohort.
- It was a critical part of the engagement of the parents of the cohort children to allow their child's development to be followed from before birth to their early adult life.

10.2. Data Collection Wave – The First Year (DCW1):

Includes information collected from before birth and through the first nine months of the cohort children's development and focuses on the children themselves as the key participants in the longitudinal study. It contains multidisciplinary information about the children from their birth untilthey are nine months old, as well as information from the children's mothers and their partners collected at the same time. Data collection took place at several times during this period including:

- Perinatal data linkage – linkage to routine pregnancy, delivery, and neonatal records to provide birth specific information.
- 6-week telephone interview which collected specific information about birth and the first few weeks of development.
- 35-week telephone interview which updated contact and household details for the children.
- 9-month face-to-face interviews with mothers and partners independently. This data collection was largely undertaken when the cohort children were within one month of being nine months old.

10.3. Data Collection Wave – The Second Year (DCW2):

This includes information collected through the second year of the cohort children's lives. These have been collected at multiple data collection points and have been collated in multiple datasets:

- 16-month telephone interview collected information about last 14 weeks of pregnancy, birth and the first few weeks of development
- 23-month telephone interview focused specifically on child's eating habits, household, and transportation
- 2-year face-to-face interviews with mothers and partners independently. These comprehensive interviews collected parental and child information that is significant in the second year of a child. The interviewer also gathered observational information on the cohort child such as child's interactions through play, parent-child interaction, child's weight/ height measurements and information on the household/ dwelling.

These datasets from the DCW2 were combined to create the mother, child, and partner datasets.

10.4. Data Collection Wave – 31M (DCW3):

DCW3 includes information from a telephone interview only. The 31-month telephone interview collected information about the study child including information on household internet access, use of early child education, child health including breastfeeding and language development. Included in this call was also an update of the household information to determine aspects of crowding.

10.5. Data Collection Wave – 45M (DCW4):

This DCW includes information from a telephone interview. The 45-month telephone interview collected information about the study child including an update on internet access, use of early child education and breastfeeding status. Also included was informationpertaining to child's media use, food behaviours and allergies, oral hygiene, sleep and toilet training,languages spoken and language development. Mother's income and employment status were also updated as was the household information.

10.6. Data Collection Wave – 54M (DCW5):

Includes information from a face-to-face interview with mother and study child/children. These comprehensive interviews collected mother and child information that is significant for the pre-school period of life. The interviewer also gathered observational information on the cohort household/ dwelling and study child. Study child information included observation of child's interactions through play, parent-child interaction, and child's weight/ height and waist measurements.

10.7. Data Collection Wave – 72M (DCW6):

DCW 6 includes information from mothers in the study when their children were approximately 6 years of age. It was aimed at learning more about parents' and children's experiences with the move from early childhood education into primary schooling. The DCW6 dataset contains a range of information about transition to school, including age of starting school, type of school, reasons for deciding to choose school and how the study's mothers and their children feel about school. It also includes some household data such as residential mobility since the child was 4.5 years old. DCW6 was the first to use a self-complete online questionnaire.

It should be noted that the number of mothers that completed this questionnaire were less than the previous data collection waves. There is a potential for bias present due to the mothers that did not respond to the online questionnaire, and all users will need to take this into consideration in any cross-sectional or longitudinal analyses. There is a possibility and expectation that some missing data from DCW6 will be able to be filled in or imputed post completion of the face-to face 8 years DCW (in field 2017- 2019). In the DCW6 dataset Child ID is included to facilitate merging with other datasets. Please note that where twins are present in this dataset, the data for mothers will be [row] replicated. For more information on the 72M DCW please see the Transition to School Report.

10.8. Data Collection Wave – 8-Year (DCW8):

The 8-year DCW represents the fifth major face-to-face data collection wave (DCW) undertaken with the *Growing Up in New Zealand* (*GUiNZ*) cohort. DCW8 was designed to collect key developmental and contextual information from contemporary New Zealand children during middle childhood.

The 8-year DCW was the first time the Growing Up in New Zealand cohort children completed their own questionnaire. Hence, for the first time in the study we have information collected directly from the children themselves (denoted C in the dataset nomenclature rather than CP=child proxy or CO=Child observations).

Face to face interviews were conducted in the children's homes between July 2017 and January 2019 when the children were close to eight years old (mean age = 8.6 years). Prior to the 8- year DCW, 282 children had either been formally opted out of the study by their parents or had died in early life (14 children died during the first six years of the study). The total eligible child cohort for the 8- year DCW was 6571 of the 6853 children originally recruited into the Growing Up in New Zealand study (96% of the baseline child cohort). In total, 81% (n=5556) of the eligible cohort (which necessarily excluded children who had died or children whose parents had opted them out of the study prior to this wave) participated in the 8-year DCW.

It is important to be aware of potential attrition bias due to the demographics of those who completed the 8-year data collection wave. See section 1.3 for further details regarding completion and attrition bias for this wave. The key design components of DCW8 focused on the children's cognitive and psycho-social development, as well as information about education – including adjustment to and interaction with formal education.

The 8-year DCW included:

- A pre-call household grid (information also used to arrange the in-home interview/interviewee)
- A mother questionnaire (completed electronically)
- A child proxy questionnaire (completed electronically by child's mother)
- A face-to-face child questionnaire (interviewer administered in the home)
- Mother-child interactive task (audio recording in the home)
- Child measurements and observations (in the home) including anthropometry, accelerometery, time use diary, biological samples,parent-child interaction, NIH toolbox and sticker game.

The 8-year interviews with the cohort were undertaken in two distinct phases necessitated by funding availability at the time. The first 12 months of the DCW (from July 2017 to June 2018) initially sought to engage with a subset of the main cohort. As this field collection was undertaken, additional support was being sought to engage the full cohort. In May of 2018, it became possible to invite the full main cohort to participate in this DCW. The second phase of the DCW was in field from June 2018 to January 2019 seeking to engage two-thirds of the eligible cohort. This necessitated a greater interview completion rate (per week) in order to engage the cohort children as close as was feasible to 8 years of age, and to achieve comparability of the information being collected across the full cohort. As a result, a greater number of interviews were completed in the second half of the DCW compared to the initial DCW period.

One implication of the two phases of data collection is that many of the children eligible for contact in Phase two of the DCW were already approaching nine years of age by the time this phase began. As a result of the extended data collection period and the initial subset stratification, the age range for the 8- year data collection was significantly wider than in previous DCWs. However, most children were still eight years old at the time of their interview. In particular:

- Age range at the time of the child interview ranged from 7.9 years to 9.75 years of age.
- The mean age at interview was 8.6 years of age.
- The interquartile range of age at interview was 8.2 to 8.9 years of age.

Differences in child age, though small overall, may have confounded some relationships seen between socio-demographic characteristics and child outcomes in particular. The age difference however is less important in middle childhood than it would have been in earlier DCWs, when each month of development is important for the likelihood of children reaching developmental milestones. Child age is provided (in months) in the 8-year Child and Mother datasets to enable any impact to be explored according to the research question of interest.

A summary of these components is provided in the 'Now We Are 8' report in Chapter 2. This information should be read in conjunction with accessing the questionnaires and data dictionaries, available on the website (www.growingup.co.nz).

10.9. Data Collection Wave – 11-Year (DCW11Covid):

An online COVID Wellbeing Survey was delivered between the 8th – 24th May 2020 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 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 previously residential address-based. Information on the level of engagement by cohort children in an online survey is important to know for future data collection exercises where face-to-face data collection is not possible or preferred. The survey also provided the opportunity to determine the children's experiences during Alert Levels 2–4, including their health and mental wellbeing, schooling, connectedness, media use, and nutrition; and compare findings to information collected from previous DCWs. The COVID Wellbeing Survey was the first time the *Growing Up in New Zealand* cohort children completed their own questionnaire online.

This survey was completed by less than half of the children in the full cohort and therefore potential biases need to be recognised as a limitation when using this dataset. A separate Data User Guide was created for this DCW, see the Covid-19 Data User Guide available at https://www.growingup.co.nz/available-data.

10.10. Data Collection Wave – 12-Year (DCW12):

DCW12 represents the sixth major face-to-face data collection wave (DCW) undertaken with the *Growing Up in New Zealand* (*GUiNZ*) cohort. The DCW12 was designed to collect key developmental and contextual information from contemporary New Zealand children during early adolescence. It is important to be aware of potential attrition bias due to the demographics of those who completed the 12-year data collection wave.

The key design components of DCW12 focused on young people's identity, health and wellbeing, cognitive and psycho-social development, relationships and emerging autonomy, as well as information about education. It included:

- An electronic questionnaire for the young person to complete, sometimes administered via a zoom interview.
- An electronic child activities questionnaire, including Te Reo Māori tool, Harter scale and cognitive functions.
- Biological samples sent via mail to the household for the young person to administer themselves (or with the help of an adult).
- Electronic questionnaire for the mother to complete.
- Electronic questionnaire for the mother's partner to complete.
- Electronic questionnaire for the young person's teacher to complete.

For more detail see the questionnaires available on the website (www.growingup.co.nz).

10.11. Data Collection Wave – 13-year Extreme Weather Event Survey (DCW13EW)

The Extreme Weather survey was completed by Growing Up in New Zealand young people and primary caregivers in August 2023. The aim of the Extreme Weather survey was to understand the impacts of the January/February extreme weather events (EWE) on rangatahi and their whānau. This survey was asked of a subsample of the cohort and was not a full data collection wave.

The constructs measured in the Extreme Weather Survey were informed by those measured at previous DCWs, as well as the priority constructs for this bespoke survey (i.e., housing and displacement, access to services, material wellbeing, access to emergency information). These included mental well-being, mental ill-being, physical health, impact of extreme weather events and neighbourhood engagement. The data collection wave included:

- An electronic child questionnaire.
- An electronic main caregiver questionnaire.

For more detail see the questionnaires available on the website (www.growingup.co.nz).

10.12. Naming conventions for Datasets:

The list of research datasets available and the variable naming convention that these datasets follow from DCW0 – DCW13 is presented in Table 6. Many of the datasets have multiple data collection points within the DCW. Participants who skipped a data collection point in these datasets will have missing information.

Table 3. Growing Up in New Zealand dataset naming

Data collection wave	Full dataset name	Short name for the dataset	Variable suffix	Reference for variable suffix
DCW0	Antenatal Mother	DCW0M	_AM	Antenatal mother
	Antenatal Partner	DCW0P	_AP	Antenatal partner
DCW1	9-month child dataset	DCW1C	_W6	6-week call
			_PDL	Perinatal
			_M9CM	9-month child
			_NIR1	National immunisation register
			_NMDS1	National minimum dataset
	9-month mother dataset	DCW1M	_M9M	9-month mother
	9-month partner dataset	DCW1P	_M9P	9-month partner
DCW2	2-year child dataset	DCW2C	_M16CM	16-month child
			_M23CM	23-month child
			_Y2CM	2-year child
	2-year mother dataset	DCW2M	_M16M	16-month mother
			_M23M	23-month mother
			_Y2M	2-year mother
	2-year partner dataset	DCW2P	_Y2P	2-year partner
DCW3	31-month child & mother dataset	DCW3C	_M31CM	31-month child
			_M31M	31-month mother
DCW4	45-month child dataset	DCW4C	_M45CM	45-month child
	45-month mother dataset	DCW4M	_M45M	45-month mother
DCW5	54-month child dataset	DCW5C	_M54CM	54-mother child
	54-month mother dataset	DCW5M	_M54M	54-month mother
DCW6*	72-month mother dataset	DCW6M	_M72M	72-month mother
DCW8	8-year mother dataset	DCW8M	_Y8M	8-year mother
	8-year child dataset	DCW8C	_ Y8C	8-year child
	8-year child-proxy dataset	DCW8Cm	_ Y8Cm	8-year child-proxy
	8-year child observation dataset	DCW8Co	_ Y86Co	8-year child observation
DCW11Covid19	11-year covid-19 dataset	DCW11Covid19	_Y11ldc	11-year covid-19 dataset
DCW12	12-year child dataset	DCW12C	_Y12C	12-year child
	12-year mother child-proxy dataset	DCW12Cm	_Y12CM	12-year mother proxy
	12-year child observation dataset	DCW12Co	_Y12CO	12-year child observation
	12-year partner child-proxy dataset	DCW12Cp	_Y12CP	12-year partner proxy
	12-year mother dataset	DCW12M	_Y12M	12-year mother
	12-year consent dataset	DCW12Con	_Y12CON	12-year consent
	12-year partner dataset	DCW12P	_Y12P	12-year partner
	12-year teacher dataset	DCW12T	_Y12T	12-year teacher
13-year data collection wave	13-year child dataset	DCW13EWC	_Y13EWC	13-year EWE child
	13-year mother dataset	DCW13EWM	_Y13EWM	13-year EWE mother

11. Focus on the 12-year DCW (2021-2022)

The 12-year DCW represents the sixth major DCW undertaken with the *GUiNZ* cohort, initially planned to be completed as a hybrid data collection model. The primary mode of data collection from the children was planned via a face-to-face interview in the children's homes (including an electronic self-complete component, biological sampling and anthropometric measurements conducted with the interviewer present). This was planned to be augmented with electronic questionnaires for the children's parent/s, their teachers, and parental consents to extend linkage to routine administrative datasets.

Due to COVID-19 restrictions during the DCW a fully online data collection mode was implemented. The cohort families had the option to connect with the field interviewer via Zoom for assistance to complete the questionnaires (noting parental and teacher questionnaires were always planned to be virtual/remote).

In summary, the plan included three modes of data collection:

- Remote data collection with concurrent video conferencing and/or phone assistance involved virtual collection of information with comprehensive support from trained interviewers via concurrent telephone or web-based conferencing (Zoom) to assist with questionnaires. The electronic survey with telephone and video support enabled face-to-face interactions while minimising the risk of virus transmission.

- Remote data collection with text, email, and LiveChat assistance involved virtual collection of information with extra support via dedicated text, email, LiveChat, and helpline, with or without specific interview times.

- Home visits involved collecting information with interviewers in the children's homes using either *GUiNZ* devices or participants' devices. These were only completed later in the DCW once risks related to the transmission of Covid-19 had reduced, ensuring public health guidance was adhered to.

These modes of data collection allowed the study to connect with families while adhering to public health advice during COVID-19 alert levels.

Prior to the 12-year DCW, 403 children had formally opted out of the study. The remaining 6,450 young people (94.1% of the baseline child cohort of 6,853) were invited to participate in the 12-year DCW. Of these young people, 4,624 (71.7%) participated in at least one component of the 12-year child questionnaire. As part of the DCW the following data were also collected:

- Household grid data from 4,988 mothers,
- Mother questionnaire data from 4,659 mothers, and
- Mother's partner questionnaire data from 2,507 partners.

11.1. Twelve Year Data Collection Overview

The 12-year DCW was originally planned as a hybrid data collection model that included in-home child observation questions and activities. However, due to COVID-19 restrictions, the child activities were adapted to be completed online. The parental and teacher questionnaires were always planned to be virtual/remote. Child anthropometry and the parent-child interactive task were not possible using a remote model, as an interviewer needed to be physically present in the home to complete the measurements and tasks. Therefore, they were not included in the 12-year DCW.

The 12-year DCW consisted of several components to continue the collection of age and context-specific information to address the overarching longitudinal study objectives. These components were grouped into different questionnaire types and settings, including:

- Household Grid Questionnaire (Mother - field interviewer administered)
- Mother Questionnaire - including Child Proxy questions (mother completed electronically)
- Child Questionnaire (child completed electronically with virtual/telephonic support)
- Child Activities (child completed - including assessment of the Te Reo Māori receptive vocabulary and a web-based cognitive tool)
- Mother's Partner Questionnaire - including Child Proxy questions (partner completed electronically)
- Collection of three non-invasive biological samples (self-completed, with written instructions and returned to *GUiNZ*)
- Teacher Survey (completed electronically by the child's 2021 teacher)
- New Consents for extending linkage to routine health, education and environment datasets (mother completed)
- Consent to contact the mother using social media and other messaging platforms (mother completed)

A summary of these components is provided in the *NWA12*. Naming conventions for the 12-year dataset can be found in Table 6. A summary of data available in this data release is provided at the end of this section. This information should be read in conjunction with accessing the questionnaires and data dictionaries.

11.2. Collection of 12-year information in the field

The 12-year main cohort data collection took place between September 2021 and July 2022. The teacher questionnaire continued until 18 October 2022, and the last biological sample kits were sent out on 3 August 2022, with a return cut-off date at the end of October 2022. The field operations workflow consisted of contacting families to confirm contact details and allocating them to a field interviewer for follow-up and support. The team was also responsible for managing the biological sampling process, overseeing teacher surveys, and conducting various end-of-DCW activities. These activities included contacting participants who had partially completed questionnaires, retrieving devices loaned to participants, and documenting feedback from participants and staff.

11.3. Cohort retention and characteristics of participants in DCW12

A **response rate** provides a measure of how many of the eligible cohort participated in any given DCW. A number of potential methods for calculating response rates exist in *GUiNZ* because: (1) each DCW included questionnaires completed by the mother, partner and/or child (therefore response rates can be calculated for each type of respondent); (2) the primary participants for the *NWA12* series are provided by self-completion of the questionnaire by the cohort children, but this has only been available since the 8-year DCW; (3) respondents can end an interview with only partial responses provided to any questionnaire; and (4) the eligible cohort can be defined in various ways (e.g., those who were alive at the time of data collection, or those who were alive at the time of data collection and had not formally opted out of the study).

In the current report, response rates for a DCW were defined as the number of household units where the mother and/or child responded to at least one survey question in the DCW, divided by the total number of households at baseline in the *GUiNZ* study minus the number of households where the child has died over the duration of the study (final N = 6,743).

Households were used as the unit of analysis for *NWA12* response and retention analysis because data collection focused on each household (which included children, mothers, and/or mothers' partners). While this results in the exclusion of twins and triplets who were not first-born, it does not devalue the important data provided by these young people. Data provided by these young people were included in other *NWA12* papers.

Using the definition of response rate described, the household response rate for the 12-year DCW was 71.0% (4,787 out of 6,743 households). In other words, mothers and/or children in 4,787 of 6,743 *GUiNZ* households either partially or fully completed the 12-year DCW. Multivariable binary logistic regression showed that households where mothers identified with a non-European ethnic group, who were younger, or had lower educational qualifications, were less likely to participate in the 12-year DCW (see Table 1). Households in more socioeconomically deprived areas were also less likely to participate. Child's sex assigned at birth, and urban/rural geography of the household, were not significantly associated with 12-year response rates. Note that except for child sex (taken from perinatal data), all characteristics examined were taken from the antenatal DCW to minimise missing data.

Table 4. Descriptive statistics and multivariable binary logistic regression of antenatal characteristics associated with 12-year response rates

Characteristic	Participated (*n* = 4,787)		Did not participate (*n* = 1,956)		Multivariable logistic model	
	n	%	*n*	%	Adjusted odds ratio[a]	*p*-value
Child sex assigned at birth						
Boy	2,459	51.4	1,024	52.4	1.00	Ref
Girl	2,328	48.6	932	47.6	0.96	0.439
Mother ethnicity[b]						
Māori	767	16.0	475	24.3	1.95	<0.001
Pacific	485	10.1	515	26.3	3.24	<0.001
Asian	640	13.4	390	19.9	3.25	<0.001
Other	167	3.5	79	4.0	2.42	<0.001
European	2,722	56.9	494	25.3	1.00	Ref
Missing	<10	<0.2	<10	<0.5	-	-
Mother age at pregnancy						
<20 years	147	3.1	175	8.9	1.00	Ref
20-24 years	540	11.3	442	22.6	0.76	0.045
25-29 years	1,127	23.5	518	26.5	0.53	<0.001
30-34 years	1,656	34.6	443	22.6	0.41	<0.001
35-39 years	1,102	23.0	306	15.6	0.46	<0.001
40+ years	214	4.5	72	3.7	0.49	<0.001
Missing	<10	<0.2	<10	<0.5	-	-
Mother education						
No secondary school qualification	235	4.9	241	12.3	1.00	Ref
Secondary school/NCEA 1-4	977	20.4	625	32.0	0.75	0.011
Diploma/trade cert/NCEA 5-6	1,410	29.5	653	33.4	0.64	<0.001
Bachelor's degree	1,250	26.1	274	14.0	0.39	<0.001
Higher degree	901	18.8	157	8.0	0.37	<0.001
Missing	14	0.3	<10	<0.5	-	-
Socioeconomic deprivation (NZDep2006 quintiles)						
Quintile 1 (least deprived)	903	18.9	188	9.6	1.00	Ref
Quintile 2	990	20.7	237	12.1	1.00	0.987
Quintile 3	899	18.8	258	13.2	1.02	0.875
Quintile 4	959	20.0	454	23.2	1.24	0.047
Quintile 5 (most deprived)	1,034	21.6	818	41.8	1.52	<0.001
Missing	<10	<0.2	<10	<0.5	-	-
Urban/rural geography						
Urban	4,405	92.0	1,874	95.8	1.00	Ref
Rural	381	8.0	82	4.2	0.84	0.187
Missing	<10	<0.2	<10	<0.5	-	-

Note. Except for child sex, all characteristics were measured in the antenatal DCW. Child sex was taken from perinatal data.

[a]An odds ratio greater than 1 indicates greater odds of non-response compared to the reference group; an odds ratio lower than 1 indicates lower odds of non-response compared to the reference group (i.e., greater odds of response).

[b]Externally prioritised ethnicity was used to create mutually exclusive groups for statistical modelling (see NWA12 Methods). This means those who reported more than one ethnic grouping were assigned to a single category based on the following order of priority: Māori, Pacific Peoples, Asian, Other, and European.

11.4. Incomplete responses to specific questionnaire items (item non-response)

While all participants are encouraged to answer all the questions within each component of the DCW, theyhave the choice about whether to skip a particular question without prejudice in terms of ongoing participation in the specific data collection process or the study overall. Aside from differential completion (participation) of some components of the DCW (as above) item non-response is an additional issue to consider in utilising the data from the 12-year DCW.

Overall non-item response is generally low within completed questionnaires for this cohort, given that responses to all questions are elicited by trained interviewers via phone calls and in-home interviews or via electronic questionnaires. Answering each question (in all modes) is generally required to progress through the questionnaires although participants can choose to answer "don't know" or "prefer not to say" should they wish to skip a particular question.

The proportions (percentage) and number of missing information for each variable in the 12-year datasets are provided in the accompanying data dictionaries for each component of the 12-year DCW. In general rates of item non-response is low, although it is important to use the information about missingness in conjunction with the study questionnaires as some missingness is due to routing and therefore not all participants were expected to fully complete all questions. Specific item response frequencies are available on request to potential users of *GUiNZ* datasets who are considering applying for data access. This information can only be used for research planning purposes. Please contact dataaccess@growingup.co.nz.

More detailed data profiles are made available for all bona fide data users with datasets and documentation on the secure *Growing Up in New Zealand* AWS platform.

12. Tools and instruments used in the Data Collection Waves

From DCW0 to the 12-year DCW (DCW12) we have used several tools and scales. We use validated scales where feasible and adapt others according to the particular context of the Growing Up in New Zealand study. These may be used for different respondents, that is for mothers (M), partners (P) and increasingly for the cohort children (C) themselves from DCW2 onwards.

Table 3 provides summary information to assist users of the datasets in addition to the information contained in the study questionnaires and the data dictionaries. The table contains information to assist users by providing (from left to right):

- the name of the specific dataset (nomenclature corresponds to DCW timing and respondent)
- what questions the tool refers to in the associated questionnaire (variable code name)

- the standard name of the tool or scale used
- the main study domain and/or construct the tool has been used to measure
- how the tool was applied, and a key reference used to justify the tool/ method being applied in this context. These references should be referred to prior to utilisation of a tool and referenced if the tool or scale is used
- the final 'Notes' column describes where the tool has been adapted or modified, or if the user requires further technical information for the data to be utilised (see Appendix A), or where the study team has published using a particular scale or tool (numbered references align to list in Appendix B).

For further guidance or to provide feedback on specific tools/scales please contact dataaccess@growingup.co.nz.

Developing technical documentation and derived variables (as detailed in Appendix A – Technical documentation) requires additional resources and time and where this work is ongoing this is flagged in the Notes column. Additionally, permissions to share tools publicly may be limited by licensing and copyright agreements. These are negotiated for all users to access if at all feasible.

Table 5. DCW 0-2 tools, scales and references

Dataset	Question/ variable number	Tool or scale	Domain-construct	Applied/used	Key reference	Notes and reference documents (reference list in Appendix B)
DCW0 M/P	ACT1A-7	The International Physical Activity Questionnaire	Health and Wellbeing – activity and exercise	Mother and Partner administered questionnaire	Craig, C. L., Marshall, A. L., et al. (2003). International physical activityquestionnaire: 12-country reliability and validity. *Medicine & Science in Sports & Exercise, 35*(8),1381-1395.	16, 29
DCW0 M/P	GH1	Perceived General Health	Health and Wellbeing – health status	Mother and Partner administered questionnaire	Ware, J. E., Kosinski, M., & Keller, S. K. (1994). *SF-36 physical and mental health summary scales: A user's manual*. Boston, MA: The Health Institute.	25, 28
DCW0 M	NUT9-15	Food Frequency Questionnaire	Health and Wellbeing – diet and nutrition	Mother administered questionnaire	Subar, AF (2006) The food propensity questionnaire: concept, development, and validation for use as a covariate in a model to estimate usual food intake. *JournalAmerican Diet Association,* 106(10), 1556-1563.	13, 14, 29
DCW0 M	ALC1GP-ALC3GP_ AM	Adapted questions from the National Nutrition Survey	Health and Wellbeing – pre- andduring pregnancy alcohol consumption	Mother administered questionnaire	Russell D. G., Parnell W. R., Wilson N. C. (1999) *NZ Food: NZ People. KeyResults of the 1997 National NutritionSurvey*. Wellington: Ministry of Health.	4, 29
DCW0 M/P	EDI1-10	Edinburgh Postnatal Depression Scale	Psychosocial and Cognitive Development – mental health	Mother and Partner administered questionnaire	Cox, J. L., Holden, J. M., Sagovsky, R. (1987). Detection of postnatal depression. Development of the 10-item Edinburgh postnatal depression scale. *The British Journal of Psychiatry, 150,*782-786.	2, 11, 15, 21, 25, 26, 28, 29
DCW0 M/P	PSS1-10	Perceived Stress Scale	Psychosocial and Cognitive Development – parental stress	Mother and Partner administered questionnaire	Cohen, S., Karmack, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social*	2, 1, 14, 21, 25, 26, 28

					Behavior, 24, 385- 396	
DCWO P	BFI1-44	Big Five Inventory – Adolescent Version	Psychosocial and Cognitive Development – temperament and personality	Partner administered questionnaire	John OP & Srivastava S (1999) The Big Five Trait Taxonomy: History, measurement, and theoretical perspectives. In LA Pervin & OP John (Eds.) Handbook of Personality: Theory and Research (2nd ed, 102-138) New York: Guilford Press.	Adolescent version used due to simplified text. Three minor modifications were made to items 8, 12, and 14 to help further clarify items. Also, two liking items, which are not used in the calculation of the big five but are included in the adolescent BFI, were not used.
DCWO M/P	COH1-9	Family Adaptation and Cohesion Scales	Family and Whānau – familycohesion	Mother and Partner administered questionnaire	Olson, D. H. (1985). FACES III (Family Adaptation and Cohesion Scales). St. Paul, MN: University of Minnesota.	The 9-item Family Cohesion scale was specifically developed for Growing Up in New Zealand with good reliability and validity (Cronbach's alpha for mothers α=.84 and fathers α=.83). It is based on items from the Family Adaptation and Cohesion Scales (FACES III; Olson, 1985), developed with Māori concepts of whānau to more appropriately reflect theNew Zealand context (see Waldie, Peterson, D'Souza, Underwood, Pryor, Atatoa Carr, Grant, Morton SMB, 2015, p.68). 21, 28
DCWO M/P	SPE1-6 & SPF1-6	Parenting Social Support Scale	Family and Whānau – parentingsupport	Mother and Partner administered questionnaire	Dunst, C. J., Jenkins, V., & Trivette, C. M. (1984). Family Support Scale:Reliability and validity. Journal of Individual, Family and Community Wellness, 1, 45-52.	10, 11, 21, 25, 26
DCWO M/P	WH1-9	Warmth and Hostility Scale (from Iowa Family Interaction Rating Scale)	Family and Whānau – interparental relationship and conflict	Mother and Partner administered questionnaire	Melby JN et al. (1989-1993). The Iowa family interaction rating scales(editions 1-4). Unpublished coding manual. Iowa State University, Institute for Social and Behavioral Research, Ames.	21, 25, 26
DCWO	CFL1-6	Items from	Family and Whānau	Mother and	Pryor, J. (2004). Stepfamilies and	11, 21

M/P		Resilience in Stepfamilies Study	– interparental relationship and conflict	Partner administered questionnaire	resilience. Final report. Prepared forCentre for Social Research and Evaluation/ Te Pokapū Rangahau Arotaki Hapori. Wellington: Roy McKenzie Centre for the Study of Families, Victoria University of Wellington.	
DCW0 M/P	CT1-6	Interparental Relationship – Commitment	Family and Whānau – interparental relationship/commitment	Mother and Partner administered questionnaire	Johnson, M. P., Caughlin, J. P., & Huston, T. L. (1999). The tripartite nature of marital commitment: personal, moral, and structural reasons to stay married. Journal ofMarriage and the Family, 61, 160-177.	11, 21
DCW0 M/P	IDQ6-10	Modified version of the Hawaiian Lifestyle Questionnaire	Culture and Identity – cultural knowledge, participation, and values	Mother and Partner administered questionnaire	Kaholokula, J. K., Nacapoy, A. H., Grandinetti, A. & Chang, H. K, (2008). Association between acculturation modes and type 2 diabetes among Native Hawaiians. *Diabetes Care, 31* (4), 698-700.	Modified with permission to reflect parental participation in New Zealandcultural practices.
DCW0 M/P	FIN1, FIN6, FIN10, OCC1-34, OCC1-36	Income and Occupation: Sources of income Labour force status Employment leave	Societal Context, Neighbourhoodand Environment	Mother and Partner administered questionnaire	Statistics New Zealand (2008) General Social Survey - Statistics New Zealand, Wellington, Social Conditions Business Unit, Statistics New Zealand. 30 January 2009, https://datainfoplus.stats.govt.nz/item/nz.govt.stats/d05011e3-db22-4789-8419-39f6bbc4e344/27	10, 26, 28.
DCW0 M/P	NE5-14	Neighbourhood Integration Scale	Societal Context, Neighbourhoodand Environment	Mother and Partner administered questionnaire	Turrell, G., Kavanagh, A., & Subramanian, S. V. (2006). Area variation in mortality in Tasmania (Australia): The contributions of socioeconomic disadvantage, social capital, and geographic remoteness. *Health and Place*, 12, 291-305.	10 items from the original scale were used for the GUiNZ questionnaires to reflect neighbourhood integration, isolation, and safety. 11, 21, 25, 26, 28
DCW1 M/P	M28-38 (EL1-11)	Extract from the	Psychosocial and	Mother and	Pridham, K. F., & Chang, A. S.	Items from the original Pridham

		Pridham Scale	Cognitive Development – Social and Emotional Adjustment & Maternal Attachment	Partner administered questionnaire	(1989). What being the parent of a new baby is like: Revision of an instrument. *Research in Nursing & Health, 12*, 323-329.	scale, plus further two items: one asking about overall parenting confidence; and the other about mother-child closeness. Also included: two items on satisfaction with support from partner and family. 17
DCW1 M	M94-101 (AX1-8)	GAD-7	Psychosocial and Cognitive Development – anxiety	Mother administered questionnaire	Spitzer, R. L., Kroenke, K., Williams, J. B. (2006). A brief measure for assessing generalised anxiety disorder: the GAD-7. Archives of Internal Medicine. 166:1092-1097.	10
DCW1 M	M83-93 (EDI1-10)	Edinburgh Postnatal Depression Scale	Psychosocial and Cognitive Development – mental health	Mother administered questionnaire	Cox, J. L., Holden, J. M., Sagovsky, R. (1987). Detection of postnatal depression. Development of the 10-item Edinburgh postnatal depression scale. *The British Journal of Psychiatry, 150*,782-786.	2, 10, 12, 15, 17, 25, 26
DCW1 P	P65-73 (PH1-10)	Patient Health Questionnaire-9	Psychosocial and Cognitive Development – mental health	Partner administered questionnaire	Kroenke, K., & Spitzer, R. L. (2002).The PHQ–9: A new depression diagnostic and severity measure. Psychiatric Annals, 32, 509–515. doi:10.3928/0048-5713-20020901-06	17, 26
DCW1 M /P	M110-121 & P92-103 (SPE1-6 & SPF1-6)	Parenting Social Support Scale	Family and Whānau – parenting support	Mother and Partner administered questionnaire	Dunst, C. J., Jenkins, V., & Trivette, C. M. (1984). Family Support Scale:Reliability and validity. *Journal of Individual, Family and Community Wellness, 1*, 45-52.	15, 17, 26
DCW1 M/P	M220-225 & P170- 175 (BL1-6)	PISA Sense of Belonging and Participation 2000	Culture and Identity – sense of belonging	Mother and Partner administered questionnaire	Willms, J. D. (2003). Student engagement at school: A sense of belonging and participation. Resultsfrom PISA 2000. Paris:	Questions were modified to tap individuals' sense of belonging to community, and two of the eight questions that related more

					OECD. https://www.oecd.org/education/school/programmeforinternationalstudentassessmentpisa/33689437.pdf	specifically to school belonging were dropped.
DCW1 M/P	M12-23 & P12-23 (TS1-12)	Time Spent with Child Scale	Family and Whanau – parent-child relationship - affiliation	Mother and Partner administered questionnaire	Davies PT et al. (2002). Child emotional security and interparental conflict. Monographs of the Society for Research on Child Development. Serial No. 270, 67(3).	This tool assesses the closeness component of the parent-child relationship from the perspective of the parent.
DCW1 - P	P162-169 (WL1-8)	Work-Life Balance Scale	Family and Whānau – Work-Life Balance	Mother administered questionnaire	Marshall, N. L. and R. C. J. J. o. C. P. Barnett (1993). "Work-family strainsand gains among two-earner couples." 21(1): 64-78; Losoncz, I. and N. J. J. o. F. S. Bortolotto (2009). "Work-life balance: The experiences of Australian working mothers." 15(2): 122-138.	To begin with this series of questions wasasked of the partners only at 9 months; but was subsequently included at DCW5 and DCW8.
DCW1 M/P	M122-127 & P104- 109 (PCT/RCT/ SCT)	Interparental Relationship – Commitment	Family and Whānau – interparental relationship/commitment	Mother and Partner administered questionnaire	Johnson, M. P., Caughlin, J. P., & Huston, T. L. (1999). The tripartite nature of marital commitment: personal, moral, and structural reasons to stay married. Journal of Marriage and the Family, 61, 160-177.	Items were developed for this study thatreflect the three dimensions of commitment identified by Johnson et al.15
DCW1M/P	M137-146 & P119- 124 (PCFL)	Items from Resilience in Stepfamilies Study	Family and Whānau – interparental relationship/conflict	Mother and Partner administered questionnaire	Pryor, J. (2004). Stepfamilies and resilience. Final report. Prepared forCentre for Social Research and Evaluation/ Te Pokapū Rangahau Arotaki Hapori. Wellington: Roy McKenzie Centre for the Study of Families, Victoria University of Wellington.	15, 26
DCW1M/P	M128-136 & P110- 118 (WH1-9)	Warmth and Hostility Scale (from Iowa	Family and Whānau – interparental relationship/warmth	Mother and Partner administered	Melby JN et al. (1989-1993). The Iowa family interaction rating scales(editions 1-4). Unpublished	11, 26

		Family Interaction Rating Scale)	and hostility	questionnaire	coding manual. Iowa State University, Institute for Social and Behavioral Research, Ames.	
DCW1M/P	M143-146 & P125- 128 (PCFL/ VCFL)	Women's Abuse Screening Tool (WAST)	Family and Whānau – interparental relationship/violence	Mother and Partner administered questionnaire	Brown, J. B., Lent, B., Brett, P., Sas, G., Pederson, L. (1996). Development of the woman abuse screening tool for use in family practice. *Family Medicine, 28*, 422– 428.	Only the first 4 items of the WAST wereincluded as these were less confrontational at this stage of the longitudinal study.
DCW1 C	NCN32_1 to CN34W_24	Food Frequency Questionnaire	Health and Wellbeing – diet and nutrition	Child proxy administered questionnaire	Subar AF (2006) The food propensity questionnaire: concept, development, and validation for use as a covariate in a model to estimate usual food intake. Journal American Diet Association 106(10), 1556-1563. Cade, J. E., Burley, V. J., Warm, D. L., Thompson, R. L., & Margetts, B. M. (2004). Food-frequency questionnaires: a review of their design, validation and utilisation. Nutrition research reviews, 17(1), 5-22.	The infant FFQ was developed in-house. See - Wall, C. R., Gammon, C. S., Bandara, D. K., Grant, C. C., Atatoa Carr, P. E., & Morton, S. M. (2016). Dietary patterns in pregnancy in New Zealand—Influence of maternal socio-demographic, health and lifestyle factors. Nutrients, 8(5), 300. And - Gontijo de Castro, T., Lovell, A., Santos, L. P., Jones, B., & Wall, C. (2023). Maternal determinants of dietary patterns in infancy and early childhood in the Growing up in New Zealand cohort. Scientific Reports, 13(1), 22754.
DCW1C	C103-C114, C150-C162, C166-C177 (IB4-34)	Very Short Form of IBQ-R	Psychosocial and Cognitive Development – temperament	Child proxy administered questionnaire	Rothbart & Bates, (2006). Temperament. In W. Damon, R. Lerner, & N. Eisenberg (Eds.), *Handbook of child psychology*: Vol. 3. Social, emotional, and personality development (6th ed) (pp. 99–166). New York: Wiley.	Note: we have identified and validated a NEW FIVE factor structure that discriminates well across Europeans, Māori, Pasifika and Asian children - see references below for details on this and how IBQ-R have been analysed: 17, 18
DCW1C	C132-139, C141-144 (MC1-12)	MacArthur CDI: Wordsand	Psychosocial and Cognitive	Child proxy administered	CDI Advisory Board (1992/1993). *TheMacArthur Communicative*	The 12 items of the First Communicative Gestures scale

		Gestures	Development – language and communication	questionnaire	*Development Inventory: Words and Gestures*. Paul H. Brookes Publishing Co.	were included as a measure of non-verbal communication. 19
DCW1C	C119, 120, 123-131 (SB1-11)	The Communication and Symbolic Behavior Scales (CSBS)	Psychosocial and Cognitive Development – expressive language	Child proxy administered questionnaire	Wetherby & Prizant (2001). *Communication and Symbolic Behavior Scales (CSBS)*. Paul H. Brookes Publishing Co.	Eleven items were used tapping three subscales: emotion and use of eye gaze; use of communication; and use of sounds. 17
DCW2 C	C246-248 (SLP1-3)	Brief Infant Sleep Questionnaire	Health and Wellbeing - sleep	Child proxy administered questionnaire	Sadeh A. (2004) A brief screening questionnaire for infant sleep problems: validation and findings for an internet sample. Pediatrics 113(6) e570-757.	
DCW2 C	O27-45 (HW1-16)	Anthropometry – heightand weight	Health and Wellbeing - growth	Interviewer collected Stadiometer – heightScales - weight	Pietilainen KH et al. (2001) Trackingof body size from birth to adolescence: Contributions of birth length, birth weight, duration of gestation, parents' body size, and twinship. American Journal of Epidemiology 154, 21-29.	A laser measuring device was introducedto replace the standard portable stadiometer. The laser device has also been used in the Growing Up in Australiastudy. Technical document in Appendices.
DCW2 C	C250-314 (FFQ1-101)	Food Frequency Questionnaire	Health and Wellbeing – diet and nutrition	Child proxy administered questionnaire	Subar AF (2006) The food propensityquestionnaire: concept, development, and validation for use as a covariate in a model to estimate usual food intake. JournalAmerican Diet Association 106(10), 1556-1563.	The child FFQ was developed in-house. See - Thornley, S., Bach, K., Bird, A., Farrar, R., Bronte, S., Turton, B., ... & Grant, C. (2021). What factors are associated with early childhood dental caries? A longitudinal study of the Growing Up in New Zealand cohort. International Journal of Paediatric Dentistry, 31(3), 351-360. And – Gontijo de Castro, T., Lovell, A., Santos, L. P., Jones, B., & Wall, C. (2023). Maternal determinants of dietary patterns in infancy and early childhood in

						the Growing up in New Zealand cohort. Scientific Reports, 13(1), 22754.
DCW2 C	C17-41 (SDQ1-25)	Strength and Difficulties Questionnaire (SDQ)	Psychosocial and Cognitive Development – conduct and behaviour	Child proxy mother and partner administered questionnaire	Goodman R (1997) The strength and difficulties questionnaire: a research note. Journal of Child Psychology and Psychiatry 38, 581-586.	Technical document in Appendices. 6, 7, 11, 15
DCW2 C	O2-17 (ST16-32)	Stack and Topple interaction task	Psychosocial and Cognitive Development – social competence, inhibitory control, motor control and play behaviour	Child interaction with interviewer	Ross HS (1982) Establishment of social games among toddlers. Developmental Psychology 18(4), 509-518.	Technical document in Appendices. 8
DCW2 M	M86-129 (BFI1-44)	Big Five Inventory (BFI) – Adolescent version	Psychosocial and Cognitive Development - personality	Mother administered questionnaire	John OP & Srivastava S (1999) The Big Five Trait Taxonomy: History, measurement, and theoretical perspectives. In LA Pervin & OP John (Eds.) Handbook of Personality: Theory and Research (2nd ed, 102-138) New York: Guilford Press.	Adolescent version used due to simplified text. Three minor modifications were made to items 8, 12, and 14 to help further clarify items, and two liking items, which are not used in the calculation of the big five but are included in the adolescent BFI, were not used.
DCW2 C	C43-80 (SC1-38)	Self-concept	Psychosocial and Cognitive Development – self-concept	Child proxy administered questionnaire	DesRosiers FS (1996) The assessment of self-concept in toddlers. Infant Behavior and Development 19, 422.	
DCW2 C	C334-434 (LD2-9)	MacArthur CDI-II short form A	Psychosocial and Cognitive Development – verbal communication	Child proxy administered questionnaire	Fenson L et al. (2000) Short-form versions of the MacArthur Communicative Development Inventories. Applied Psycholinguistics 21, 95-116. Reese, E., & Read, S. (2000). Predictive validity of the New Zealand MacArthur Communicative Development Inventory: Words and Sentences. *Journal of Child Language, 27,*	Permission granted by Philip Dale (100 items plus one question about word combinations). Note that we adapted the CDI-II Short Form A for New Zealand English (as per Reese & Read, 2000) and for Māori (direct translation by Peter Keegan), Samoan, Tongan (adapted by Elaine Ballard and Mele Taumoepeau) and Chinese (adapted by Elaine Ballard from the Chinese version of the CDI).

					255-266.	
DCW2 M/P	M3-14 (TS1-12)	Time Spent with Child Scale	Family and Whanau – parent-child relationship - affiliation	Mother and Partner administered questionnaire	Davies PT et al. (2002). Child emotional security and interparental conflict. Monographs of the Society for Research on Child Development. Serial No. 270, 67(3).	This tool assesses the closeness component of the parent-child relationship from the perspective of the parent.
DCW2 M/P	M140-148 (WH1-9)	Warmth and Hostility Scale	Family and Whanau – interparental relationship	Mother and Partner administered questionnaire	Melby JN et al. (1989-1993). The Iowa family interaction rating scales (editions 1-4). Unpublished coding manual. Iowa State University, Institute for Social and Behavioral Research, Ames.	15
DCW2 M/P	M34, 36, 38 (PID5,7,9)	Enjoyment of Parenting Scale	Culture and Identity – parental identity	Mother and Partner administered questionnaire	Martin, A. J. (2003). The relationship between parents' enjoyment of parenting and children's school motivation. *Australian Journal of Guidance and Counselling, 13*(2), 115-132.	
DCW2 C/M	O19-25 (PCI1-7)	Parent-child interaction	Family & Whānau – quality of parent-child interaction	Observation of Mother and child	Taumoepeau, M., & Ruffman, T. (2006). Mother and infant talk about mental states relates to desire language and emotion understanding. *Child Development 77*(2), 465–481.	Tool was adapted from Taumoepeau & Ruffman (2006) to tap into dimensions of the quality of the mother-child interaction: maternal warmth; open- ended questions; maternal talk about emotions; children's emotional expressions (empathy); maternal linking to child's own experience; and maternal discipline. Permission granted by Mele Taumoepeau.20
DCW2 P	M152-162 (CFL7-17)	Women's Abuse Screening Tool (WAST)	Family and Whanau – interparental relationship - violence	Partner administered questionnaire	Brown JB et al (1996). Development of the woman abuse screening tool for use in family practice. Family Medicine, 28, 422–428.	Only the first 4 items of the WAST were included as these were less confrontational at this stage of the longitudinal study. Only collected from partners at this time point.
DCW2 M/P	M173-183 (OC18–OC52) &	Income and Occupation:	Societal Context, Neighbourhood and	Mother and Partner	Statistics New Zealand (2008) General Social Survey – Statistics	26

	M185- 186 (FIN6, FIN10)	Sources of income Labour force status	Environment	administered questionnaire	New Zealand, Wellington, Social Conditions Business Unit, Statistics New Zealand. 30 January 2009, https://datainfoplus.stats.govt.nz/item/nz.govt.stats/d05011e3-db22-4789-8419-39f6bbc4e344/27	

Note: Reference list for DCW 0-2 can be found in Appendix B.

Table 6. DCW 5 tools, scales and references

Dataset	Question/ variable number	Tool or scale	Domain-construct	Applied/used	Key reference	Notes and reference documents (reference list in Appendix B)
DCW5- C	CO HW20-31 (OBS Q1.1-1.18)	Anthropometry – height,weight and waist	Health and Wellbeing - growth	Interviewer collected Stadiometer – height Scales – weight Tape - waist	Pietilainen KH et al. (2001) Trackingof body size from birth to adolescence: Contributions of birth length, birth weight, duration of gestation, parents' body size, and twinship. American Journal of Epidemiology 154, 21-29 McCarthy, H. D. (2014). Measuring growth and obesity across childhood and adolescence. Proceedings of the Nutrition Society, 73, 210-217. Ross R, Neeland IJ, Yamashita S, et al. Waist circumference as a vital sign in clinical practice: a Consensus Statement from the IAS and ICCR Working Group on Visceral Obesity. Nat Rev Endocrinol. 2020;16(3):177-189. doi:10.1038/s41574-019-0310-7 Ministry of Health. 2008. Protocolfor Collecting Height, Weight andWaist Measurements in New Zealand Health Monitor (NZHM) Surveys. Wellington: Ministry of Health	In order to further investigate early weight issues, trunk fat mass and obesityat the pre-school phase waist circumference was collected for 5yr dataset. Technical information in Appendices, Section 15.1.3.
DCW5- C	CM FFQ (Q2.1-2.60)	Food Frequency Questionnaire	Health and Wellbeing – diet and nutrition	Child proxy administered questionnaire	Subar AF (2006) The food propensity questionnaire: concept, development, and validation for use as a covariate in a model to estimate usual food intake. Journal American Diet Association 106(10), 1556-1563.	The child FFQ was developed in-house. The same questions were used as the 2-yearquestionnaire except for the following changes: Vegetable food group - Avocado was added as a variable. Milk, Cheese and Yoghurt food group – Infant formula/toddler milk was

						removed as a variable and breast milk was removed as an option under other milk. See – See - Thornley, S., Bach, K., Bird, A., Farrar, R., Bronte, S., Turton, B., ... & Grant, C. (2021). What factors are associated with early childhood dental caries? A longitudinal study of the Growing Up in New Zealand cohort. International Journal of Paediatric Dentistry, 31(3), 351-360. And - Gontijo de Castro, T., Lovell, A., Santos, L. P., Jones, B., & Wall, C. (2023). Maternal determinants of dietary patterns in infancy and early childhood in the Growing up in New Zealand cohort. Scientific Reports, 13(1), 22754.
DCW5- C	CM CBQ1- 36 (Q7.1- 7.36)	Child Behaviour Questionnaire – Very Short Form (CBQ-VSF)	Psychosocial and Cognitive Development – temperament	Child proxy administered questionnaire	Putnam, S. P., & Rothbart, M. K. (2006). Development of Short and Very Short forms of the Children's Behavior Questionnaire. Journal of Personality Assessment,87 (1), 103-113.	We used the Infant Behaviour Questionnaire-Very Short form (IBQ- VSF) at 9 months. The CBQ-VSF is an age-appropriate continuation of the IBQ-VSF measuring the same temperament factors. Technical document in Appendices (1) which further explains the factor structure in our data. A more detailed technical document is available by contacting dataaccess@growingup.co.nz **Peterson E.R. 2017. Technical Document for the Infant Behaviour Questionnaire (IBQ-VSF). Growing Up in New Zealand: Auckland.**
DCW5- C	CM SDQ1- 24	Strength and	Psychosocial and	Child proxy	Goodman R (1997) The strength and	Technical documentation in

	(Q8.1- 8.24)	Difficulties Questionnaire (SDQ)	Cognitive Development – conduct and behaviour	mother administered questionnaire	difficulties questionnaire: a research note. Journal of Child Psychology and Psychiatry 38, 581-586.	Appendices A, Section 15.1.6 (and references 1, 6, 7 from Appendix B).
DCW5- C	O OB 4-8, 40-41, 43- 45, 49 (OBS Q10.1-10.15)	Assessor report from the Preschool Self-Regulation Assessment (PSRA)	Psychosocial and Cognitive Development - conduct and behaviour	Interviewer observation of child	Smith-Donald, R., Raver, C. C., Hayes, T., & Richardson, B. (2007). Preliminary construct and concurrent validity of the Preschool Self-Regulation Assessment (PSRA) for field- based research. Early Childhood Research Quarterly, 22, 173-187.	Items A1, B5, C3, E6 and three items on aggression from the PSRA were chosen to provide two functions: 1) an indication of issues that may have affected the child's performance on the observation tasks and 2) easily observable behaviours that can be matched to parent reported behaviour and temperament.
DCW5- M	M PH1-10 (Q17.1- 17.10)	Patient Health Questionnaire-9	Psychosocial and Cognitive Development – mental health	Mother administered questionnaire	K., & Spitzer, R. L. (2002). The PHQ–9: A new depression diagnostic and severity measure. Psychiatric Annals, 32, 509–515. doi:10.3928/0048-5713-20020901-06	Maternal depression was measured before birth and at 9 months using the Edinburgh Post-Natal Depression Scale which would no longer be appropriate. The PHQ-9 was used in partners at 9-months. Technical document available by contacting dataaccess@growingup.co.nz
DCW5- C	CO GWT1-4 (OBS Q8.1-8.4)	Gift Wrap Task	Psychosocial and Cognitive Development - inhibitory emotion control (hot cognition)	Child observation	Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. Developmental Psychology, 36, 220–232.	Technical information in Appendices, Section 15.1.7.
DCW5- C	CO AKT1- 8 (OBS Q3.1-3.8)	Affective Knowledge Task (AKT) – modified version of the Expressive/ Receptive Task sub tasks	Psychosocial and Cognitive Development - emotion recognition & understanding	Child observation	Denham, S. A. (1986). Social cognition, social behavior, and emotion in pre-schoolers: Contextual validation. Child Development, 57, 194-201.	Slight changes were made to the scared face by removing the eyebrows to make it less feminine. We added the emotions (surprised and disgust) to try and avoid potential ceiling effects with the original four emotions. Technical document in Appendices, Section

						15.1.8.
DCW5- C	CM PAR7- 27 (Q13.7- 13.27)	Parenting Practices Questionnaire	Psychosocial and Cognitive Development - parenting style	Mother administered questionnaire	Robinson, C. C., et al. (1995). Authoritative, Authoritarian, And Permissive Parenting Practices: Development of a New Measure. Psychological Reports 77(3): 819-830.	A subset of 21 items were chosen from theoriginal 62-item scale to reflect each of the three parenting styles (authoritarian, authoritative, andpermissive).
DCW5- C	CO DIB1- 2, 42 (OBS Q4.1-4.3)	DIBELS – letter namingfluency (Grade K/Benchmark 1)	Psychosocial and Cognitive Development - phonological awareness/reading	Child observation	Good, R.H., & Kaminski, R. A. (Eds.) (2002). Dynamic Indicators of Basic Early Literacy Skills (6th ed.). Eugene, OR: Institute for theDevelopment of EducationalAchievement. Available: http://dibels.uoregon.edu/	Technical information in Appendices, Section 15.1.9.
DCW5- C	PPVT0_m54C0- PPVT44_m54C0 (OBS Q5.0- 5.44)	Adapted Peabody Picture Vocabulary Test (PPVT) version three	Psychosocial and Cognitive Development - verbal communication & comprehension	Child observation	Dunn, L. M., Dunn, L. M., & Williams, K. T. (1997). Peabody Picture Vocabulary Test–III. Circle Pines,MN: American Guidance Service. Rothman, S. (2005). Report on Adapted PPVT-III and Who Am I? Growing Up in Australia: The Longitudinal Study of Australian Children	Shortened version of the PPVT used, which is a test of receptive vocabulary used as a screening test of verbal ability.Adaptation based on work done in the United States for the Head Start ImpactStudy, with a number of changes for usein Australia (Rothman 2005). See technical document - Ly, K., Lai, H., Smith, A., Walker, C., Morton, S.M.B., Neumann, D. 2020. Growing Up in New Zealand Technical Report: Children's performance on the adapted Peabody Picture Vocabulary Test (3rd Edition)
DCW5- C	CO NN1-5 (OBS Q6.1-6.5)	Name and Numbers task from the Who Am I?	Psychosocial and Cognitive Development - writing, numeracy & symbols	Child observation	de Lemos, M. and Doig, B. (1999). Who Am I? Developmental Assessment: Melbourne. ACER	Technical document in Appendices, Section 15.1.11
DCW5- C	CO PTT1- 20 (OBS Q2.1- 2.20)	Hand clap (adapted version of the pencil tap task from the Preschool Self-	Psychosocial and Cognitive Development - executive functioning	Child observation	Golden, C. J., Hammeke, T. A., & Purisch, A. D. (1979) The Standardized Luria-Nebraska Neuropsychological Battery: A manual for clinical andexperimental	Technical document in Appendices, Section 15.1.10

		Regulation Assessment (PSRA)			use. Lincoln, Nebraska: University of Nebraska Press.	
DCW5- C	CO PCI20- 25 (OBS Q7.1-7.6)	Parent Child Interaction Task (Party invitation)	Family & Whānau – parent child interaction	Child observation	Aram, D., & Levin, I. (2001). Mother-child joint writing in low SES: Sociocultural factors, maternal mediation, and emergent literacy. *Cognitive Development, 16*, 831-852	Technical document in Appendices, Section 15.1.12.
DCW5- M	M CFL20- 22 (Q20.5- 20.7)	Verbal Conflict Scale (3 items from a scale developed for Resilience in Stepfamilies Study)	Family and Whānau – interparental relationship (verbal conflict)	Mother administered questionnaire	Pryor, J. (2004). Stepfamilies and resilience. Final report. Prepared for Centre for Social Research and Evaluation/ Te Pokapū Rangahau Arotaki Hapori. Wellington: Roy McKenzie Centre for the Study of Families, Victoria University of Wellington.	Only verbal conflict items were included at 54 months as physical conflict is covered by the other scales on violence (i.e. WAST).
DCW5- M	M CFL 18-19, 23-32 (Q20.8-20.19)	WHO Violence questionnaire (6 items), WOMEN'S ABUSE SCREENING TOOL (WAST) – three items	Family and Whānau – interparental relationship (violence)	Mother administered questionnaire	Brown, J.B., Lent, B., Brett, P., Sas, G., Pederson, L. (1996). Development of the woman abuse screening tool for use in family practice. Family Medicine, 28, 422–428	The World Health Organisation (WHO) violence questionnaire provides items on physical and psychological abuse. The WAST (Brown et al., 1996) is a widely used reliable screening tool for violence in relationships.
DCW5- M	M WL01- 08 (Q19.12- 19.19)	Work-life balance scale	Family and Whānau – work life balance	Mother administered questionnaire	Marshall, N. L. and R. C. J. J. o. C. P. Barnett (1993). "Work-family strains and gains among two-earner couples." 21(1): 64-78 Losoncz, I. and N. J. J. o. F. S. Bortolotto (2009). "Work-life balance: The experiences of Australian working mothers." 15(2): 122-138.	This series of questions was asked of the partners at 9 months (DCW1-P) and now has been asked of mothers.
DCW5- M	M ETHID1- 12 (Q18.1- 18.12)	Modified Multigroup Ethnic Identity Measure (MEIM)	Culture and Identity - ethnic identity, pride & belonging	Mother administered questionnaire	Phinney, J. (1992). The multigroup ethnic identity measure: A new scale for use with diverse groups. Journal of Adolescent Research, 7 (156), 156 – 176.	The 12-items were all used but slightly modified by addition of the word "culture" rather than just "ethnicity".
DCW5- M	CM NZID14	Modified version	Culture and Identity	Mother	Kaholokula et al. (2008). Association	Direct consultation with creator of

	(Q18.13- 18.16)	of the Lifestyle Attitude Questionnaire	- national identity	administered questionnaire	between acculturation modes and Type 2 diabetes among native Hawaiians. Diabetes Care, 31(4), 698-700.	the Lifestyle Attitude questionnaire, Dr Kaholokula, was undertaken prior to useand permission received to modify the tool for the New Zealand context. Only questions related to acculturation assessment used at this DCW.
DCW5- C	CM LD33- 37 (Q10.12- 10.16)	PROLL (Parent Rating of Oral Language & Literacy) – modified version of TROLL tool for teachers	Culture and Identity - child'spragmatic language	Child proxy administered questionnaire	Dickinson, McCabe, & Sprague. (2001). Teacher Rating of Oral Language and Literacy (TROLL): A research-based tool. Ciera Report #3-016. Michigan, US: Centre for the Improvement of Early Reading Achievement (CIERA), University of Michigan. Accessed 11 December 2014, from http://www.ciera.org/library/reports/inquiry- 3/3-016/3-016.pdf	Special permission was received from creator of TROLL, David Dickinson, tomodify some but not the entire instrument.
DCW5- M	CM OC100 (19.4) CM OC102- OC103 (19.2, 19.1) CM OC104- OC105 (19.3, 19.5) OCC4 (19.6) OCC5 (19.7) OCC6 (19.8) OCC7-OCC8 (19.9- 19.10) OC48 (19.11)	Employment: Employment Hours of work Reasons for working status	Societal Context, Neighbourhoodand Environment	Mother administered questionnaire	Statistics New Zealand (2008). General Social Survey - Statistics New Zealand, Wellington, Social Conditions Business Unit, Statistics New Zealand. 30 January 2009, https://datainfoplus.stats.govt.nz/item/nz.govt.stats/d05011e3-db22-4789-8419-39f6bbc4e344/27 Statistics New Zealand (2008). 2006 Census Questionnaires, Christchurch, Information Centre, Statistics New Zealand (SNZ). http://www.stats.govt.nz/census/about- 2006-census/2006-questionnaires.htm.	Labour force questions were derived fromthe NZ Census of Population and Dwellings (2006). These are validated within the NZ population and allow for comparability with official statistics. The hours of work question came from the General Social Survey (GSS, 2008, WORT1Q02). Other questions related toweekend work and work schedule came from the Household, Income & Labour Dynamics in Australia (HILDA) survey. 'Reasons for not working' were taken from LSAC wave 1.
DCW8- C	CO HW20-31 (OBS	Anthropometry – height,weight	Health and Wellbeing - growth	Interviewer collected	Pietilainen KH et al. (2001) Trackingof body size from birth to adolescence:	Repeated measures, same collection procedures as DCW2 and

	Q1.1-1.21)	and waist		Stadiometer – height Scales – weight Tape – waist	Contributions of birth length, birth weight, duration of gestation, parents' body size, and twinship. American Journal of Epidemiology 154, 21-29 McCarthy, H. D. (2014). Measuring growth and obesity across childhood and adolescence. Proceedings of the Nutrition Society, 73, 210-217. Ross R, Neeland IJ, Yamashita S, et al. Waist circumference as a vital sign in clinical practice: a Consensus Statement from the IAS and ICCR Working Group on Visceral Obesity. Nat Rev Endocrinol. 2020;16(3):177-189. doi:10.1038/s41574-019-0310-7 Ministry of Health. 2008. Protocol for Collecting Height, Weight and Waist Measurements in New Zealand Health Monitor (NZHM) Surveys. Wellington: Ministry of Health	5. However, the equipment was upgraded (see appendix 9.3). Technical information in Appendices, Section 15.1.3. Updated technical information on derived variables for BMI-for-age, height-for-age and weight-for-age available
DCW8-C	HD9_y8C (14.5) BI1_y8C (10.1) BI2_y8C (10.2)	Body Image	Culture and Identity/Health and Wellbeing –Body Image	Child administered questionnaire	Collins (1991) Body figure perceptions and preferences among preadolescent children. MEJIJoED;10(2):199-208. Daraganova, G. (2014). "Body image of primary school children." Annual statistical report 2013: 111.	A pictorial instrument was used to examine participants perceptions of their body image. This instrument was adapted from (Collins 1991) which is able to show whether the child perceived themselves as being larger or smaller than their body ideal.
DCW8-C	TRT2_y8Co - TRT47_y8Co (15.1-15.49)	Te Reo Māori Tool (bespoke)	Culture and Identity - Language	Child administered questionnaire – audible and pictorial questions	Developed by the Growing Up in New Zealand research team.	The Te Reo Māori tool was developed in house to assess young people's receptive vocabulary (words in a person's vocabulary that they can comprehend and respond to) in te reo Māori.

						The correct answer has been upcoded to answer option A in the dataset. Analyses using this tool requires extensive investigation and considerations. Users should have experience in research with te reo Māori, psychometric testing and statistical derivation. Users must acknowledge GUiNZ as the developer of the tool.
DCW8-C	DS1 _Y8C–DS10_Y8C (12.1-12.20)	Centre for Epidemiologic Studies Depression Scale (CESD-10)	Psychosocial and Cognitive Development/Depression	Child administered questionnaire	Andresen, E. M., Malmgren, J. A., Carter, W. B., & Patrick, D. L. (1994). Screening for depression in well older adults: Evaluation of a short form of the CES-D. *American journal of preventive medicine*, *10*(2), 77-84. Fendrich, M., Weissman, M. M., & Warner, V. (1990). Screening for depressive disorder in children and adolescents: validating the center for epidemiologic studies depression scale for children. American Journal of Epidemiology, 131(3), 538-551.	The 10-item short form is scored on a 4- point scale with anchors ranging from 0 (Not at all) to 3 (A lot) with 2 reverse- coded items. A score of 10 or higher out of 30 is indicative of clinically significant depressive symptoms. Preliminary findings suggest that CESD-10 is an acceptable tool for screening depression in adolescents; Wording has been used according to the CESD-CD child version. Technical document available by contacting dataaccess@growingup.co.nz **Cha, J., Neumann, D., Grant, M., Gawn, J., Fletcher, B.D., & Walker C. 2021. *Technical Document and Psychometric Properties for the* Center for Epidemiologic Studies Depression Scale 10-item Short Form (CES-DC-10)*: 8-year Data Collection Wave.* Growing Up in New Zealand: Auckland.** Also see publication -

						Cha, J., Waldie, K., Neumann, D., Smith., A. & Walker., C. 2021. Psychometric Properties and Factor Structure of the Center for Epidemiologic Studies Depression Scale 10-item Short Form (CES-D-10) in Aotearoa New Zealand children. *Journal of Affective Disorder Reports, 7*. https://doi.org/10.1016/j.jadr.2021.100298
DCW8-C	PAS1 _Y8C–PAS10_Y8C (13.1-13.10)	Anxiety scale from PROMIS and NIH toolboxfear tool	Psychosocial and Cognitive Development/Anxiety	Child administered questionnaire	Irwin DE, Stucky B, Langer MM, et al. An item response analysis of the pediatric PROMIS anxiety and depressive symptoms scales. *Qual Life Res*. 2010;19(4):595-607. doi:10.1007/s11136-010-9619-3 Pilkonis, P. A., Choi, S. W., Reise, S. P., Stover, A. M., Riley, W. T., Cella, D., & PROMIS Cooperative Group. (2011). Item banks for measuring emotional distress from the Patient-Reported Outcomes Measurement Information System (PROMIS®): depression, anxiety, and anger. Assessment, 18(3), 263-283.	We measured children's anxiety symptoms by NIH toolbox fear tool whichincludes 8 anxiety items from Version 2 of the PROMIS anxiety short form 8a and 2 items from the NIH fear tool. Items have been redacted in public forums due to copyright issues, however are available in the dataset to approved data users - for further informationplease contact dataaccess@growingup.co.nz **Neumann, D., Cha, J., Grant, M., Walker, C., Gawn, J., & Fletcher, B. D. *Technical Document for the PROMIS Anxiety Tool: 8-year Data Collection Wave.* Growing Up in New Zealand: Auckland.**
DCW8-C	CPR1_Y8C – CPR16_Y8C (5.1- 5.16)	Peer relationships	Psychosocial and Cognitive Development /Peer relationships	Child administered questionnaire	Rigby, K., & Slee, P. T. (1993). Dimensions of interpersonal relation among Australian children and implications for psychological well-being. The Journal of social psychology, 133(1), 33-42	16 Peer relationships questions came from 3 different questionnaires: ISCIWeb(CPR1_Y8C- CPR2_Y8C), Rigby and Slee 1993 (CPR3_Y8C-

					Rees, G., S. Andresen and J. R. Bradshaw (2016). "Children's Views on Their Lives and Well-being in 16 Countries: A report on the Children's Worlds survey of children aged eight years old 2013-15." Lawes, E., & Boyd, S. (2018). Makinga Difference to Student Wellbeing-- A Data Exploration. New Zealand Council for Educational Research. PO Box 3237, Wellington 6140 New Zealand.	CPR6_Y8C), NZCER Wellbeing@School (CPR7_Y8C-CPR16_Y8C).
DCW8-C	HS40_Y8C, HS1_Y8C, HS20_Y8C, HS9_Y8C, HS16_Y8C, HS17_Y8C, HS12_Y8C, HS13_Y8C, HS8_Y8C, HS21_Y8C, HS5_Y8C (6-6.12)	Harter scale	Psychosocial and Cognitive Development/Education/Self-concept and perceived competence	Child administered questionnaire	Harter, S. (2012). Emerging self-processes during childhood and adolescence. In: Leary, M. Tangney, J. (Eds.). Handbook of self and identity. New York: The Guilford Press, 2012, p. 680-715.	For the 8-year data collection wave the scholastic competence (6 items) and global self-worth (6 items) domains were used
DCW8-C	SIP1 _8YC–SIP20_Y8C. (9.1 – 9.20)	Dirks et al 2011 Youth responses to provocation scale.	Psychosocial and Cognitive Development/Social information processing of child	Child administered questionnaire	Dirks, M. A., Treat, T. A., & Weersing, V. R. (2011). The latent structure of youth responses to peer provocation. *Journal of psychopathology and behavioral assessment*, *33*(1), 58-68.	Two items were asked to tap children's hostile attribution bias (i.e., how much another child intended to be mean) - one a playground provocation, and another a peer approach situation. In addition to children's underlying cognitions, we also wanted to understand their behavioural responses. Two additional items (again a playground provocation and peer rejection situation) and children were asked to describe

						how they would respond. Response options were based on Professor Melanie Dirks research. These same items were asked of parents to identify which response they would encourage their child to use.
DCW8-C	IS1_Y8C – II8_Y8C (8.1-8.8)	Domain-Specific Impulsivity Scale forChildren (DSIS-C)	Psychosocial and Cognitive Development /Impulsivity Scale	Child administered questionnaire	Tsukayama, E., Duckworth, A. L., & Kim, B. (2013). Domain-specific impulsivity in school-age children. *DevelopmentalScience*, *16*(6), 879-893.	The tool has 8 items, measuring Schoolwork impulsivity, Interpersonalimpulsivity with Overall Impulsivity calculated as the mean of all items.
DCW8-C	QOL1-QOL10, (2.1-2,10)	KIDSCREEN	Health and Wellbeing – Child Quality of Life	Child administered questionnaire	Ravens-Sieberer, U., A. Gosch, L. Rajmil, M. Erhart, J. Bruil, W. Duer, P. Auquier, M. Power, T. Abel, L. J. E. r. o. p. Czemy and o. research (2005). "KIDSCREEN-52 quality-of-life measure for children and adolescents." 5(3): 353-364. Ravens-Sieberer, U., Erhart, M., Rajmil, L., Herdman, M., Auquier, P., Bruil, J., Power, M., Duer, W., Abel, T., Czemy, L., Mazur, J., Czimbalmos, A., Tountas, Y., Hagquist, C., & Kilroe, J. (2010). Reliability, construct and criterion validity of the KIDSCREEN-10 score:a short measure for children and adolescents' well-being and health- related quality of life. Quality of LifeResearch, 19(10), 1487-1500. doi: 10.1007/s11136-010-9706-5	KIDSCREEN-10 score: a short measure forchildren and adolescents' well-being and health-related quality of life. These items were redacted at the time of questionnaire publication however copyright has subsequently been lifted and the questions are now available publicly. They can be viewed in the 12-year Child Questionnaire. Derived variables are available within the dataset at age 8 and 12. For further informationplease contact dataaccess@growingup.co.nz
DCW8—C	CCQ1–CCQ6	School Satisfaction Subscale of the Student Personal Perception of	Education - Emotional Engagement / School satisfaction	Child administered questionnaire	Rowe, E. W., Kim, S., Baker, J. A., Kamphaus, R. W., & Horne, A. M. (2010). Student personal perception of classroom climate: Exploratory and confirmatory factor analyses.	Asked for the first time at 8 years. Items from the satisfaction sub-scale were chosen to understand children's perceptions of their experiences at schooland tap into

		Class Climate Scale (SPPCC)			*Educational and Psychological Measurement, 70*(5), 858-879. doi:10.1177/0013164410378085	the emotional component ofschool engagement. See technical document: Grant, M., Tait, J., Meissel, K. Technical Document for School Satisfaction Subscale of the Student Personal Perception of Classroom Climate Scale (SPPCC). Auckland (NZ): Growing Up in New Zealand; 2022.
DCW8-C and DCW8-M	GH14 (7.1) CH1 (5.1) QOL11 (2.11)	Perceived General Health	Health and Wellbeing – Parent and Child health status	Mother – reportedChild - reported	Ware, J. E., Kosinski, M., & Keller, S. K. (1994). *SF-36 physical and mental health summary scales: A user's manual*. Boston, MA: The Health Institute.	One question from SF-36. This perceived general health question has been asked across all of the major data collection waves to the parents. This is the first time it has also been asked of the children.
DCW8 - M	WL01_y8M - WL08_y8M (1.9-1.16)	Work-life balance scale	Family and Whānau – work life balance	Mother administered questionnaire	Marshall, N. L. and R. C. J. J. o. C. P. Barnett (1993). "Work-family strains and gains among two-earner couples." 21(1): 64-78 Losoncz, I. and N. J. J. o. F. S. Bortolotto (2009). "Work-life balance: The experiences of Australian working mothers." 15(2): 122-138.	This series of questions was previously asked of the partners at 9 months (DCW1-P) and mothers at 54 months. Technical document available by contacting dataaccess@growingup.co.nz See - **Walker C., Evans R. J. & Langridge F. 2022. Technical Document for Work life balance Tool: 8-year Data Collection Wave. Growing Up in New Zealand: Auckland.**
DCW8 – M	HE1_y8M - HE15_y8M (11.1-11.15)	Family environment, Confusion, Hubbub and Order Scale (CHAOS)	Family and Whānau – Family Environment	Mother administered questionnaire	Matheny Jr, A. P., T. D. Wachs, J. L. Ludwig and K. J. J. o. A. D. P. Phillips (1995). "Bringing order out of chaos: Psychometric characteristics of the confusion, hubbub, and order scale." 16(3): 429-444	Used for the first time in DCW8. The CHAOS scale assesses the spatial and non-affordance aspects of the physical environment. The factors assessed in thisscale typically refer to potential stressful,nonspecific background factors such as noise, crowding, and situational "traffic

						patterns" or "environmental confusion". Technical document available by contacting dataaccess@growingup.co.nz See - **Walker C. and Evans R. J. 2022. *Technical Document for CHAOS Tool: 8-year Data Collection Wave.* Growing Up in New Zealand: Auckland.**
DCW8 – M	SPE9-10 (6.1-6.2)	Parenting Social Support Scale	Family and Whānau – Parenting Support	Mother administered questionnaire	Dunst, C. J., Jenkins, V., & Trivette, C. M. (1984). Family Support Scale: Reliability and validity. Journal of Individual, Family and Community Wellness, 1, 45-52.	Items and potential responses adapted to the New Zealand cohort context.
DCW8 – M	PCI27-40	Parent-child interactiontask (interviewer observations)	Family and Whānau – Parent-child interactions	Observation of Mother and Child	Taumoepeau M & Ruffman T (2006) Mother and infant talk about mental states relates to desire language and emotion understanding. Child Development 77, 465-481.	Tool was adapted from Taumoepeau & Ruffman (2006) to tap into dimensions of the quality of themother-child interaction. Derived variables from audio being developed. Contact dataaccess@growingup.co.nz for updates.
DCW8 - M	M CFL45-50 CFL24,28,32	Items developed from WHO Violence questionnaire, WOMEN'SABUSE SCREENING TOOL (WAST) and Resilience in Stepfamilies Study.	Family and Whānau – interparental relationship (conflict, violence, warmth and hostility, controlling behaviours) and children's witness to violence	Mother administered questionnaire	Brown, J.B., Lent, B., Brett, P., Sas, G., Pederson, L. (1996). Development of the woman abuse screening tool for use in family practice. Family Medicine, 28, 422-428. Pryor, J. (2004). Stepfamilies and resilience. Final report. Prepared for Centre for Social Research and Evaluation/ Te Pokapū Rangahau Arotaki Hapori. Wellington: Roy McKenzie Centre for the Study of Families, Victoria University of Wellington.	Items developed from the WHO Violence Questionnaire, the WAST and the Resilience in Stepfamilies Study: widely used and reliable screening tools for violence and conflict in relationships. Items were merged to measure verbal, physical and psychological conflict. Additional items were adapted to measure controlling behaviours, children being witness to inter-

						parental conflict and positive aspects of relationship.
DCW8 - M	PH1_Y8M-PH10_Y8M (8.1-8.10)	Patient Health Questionnaire (PHQ-9)	Psychosocial and Cognitive Development/Depression	Mother administered questionnaire	Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: a new depression diagnostic and severity measure. *Psychiatric annals*, *32*(9), 509-515.	The PHQ-9 was previously administered in Partners at 9 months and in mothers at54 months (9 items) Technical document available by contacting dataaccess@growingup.co.nz See - **Walker, C., Fletcher B.D., Gawn, J., and Waldie K. 2022. *Technical Document for the Patient Health Questionnaire 9 (PHQ-9) Mother Depression Tool: 8-year Data Collection Wave.* Growing Up in New Zealand: Auckland.**
DCW8-M	Enforce lack: DP32 to DP38 and DP47 Economising: DP5, DP39, DP40, DP2, DP8, DP10, DP41 DP51, DP42 Housing problems: DP43 and DP44 Freedoms/ Restrictions: DP11, DP12 and DP45 Financial strain: DP13 and DP46 (2.1-2.25)	Material Wellbeing Index (MWI) with 5 sub-scales: Ownership or participation (enforcedlack) Economising Housing problems Freedoms/Restrictions Financial Strain	Societal Context, Neighbourhood, and Environment - Material wellbeing	Mother administered questionnaire	https://www.budget.govt.nz/budget/2019/wellbeing/child-poverty-report/how-measure-child-poverty.htm https://www.msd.govt.nz/documents/about-msd-and-our-work/publications-resources/monitoring/household-income-report/2017/incomes-report-overview.pdf	24 items that give direct information onthe day-to-day actual living conditions that households experience across the breadth of socioeconomic position (not just material deprivation). The questions ask about restrictions on spending on the basics such as food, clothes, accommodation, electricity, transport, keeping warm, maintaining household appliances in working order etc. and include giving gifts, covering unexpected costs, visiting the dentist, and domestic and international holidays. Scores range from 0 to 43, with a higher score reflecting higher material livingstandards.

						Technical document available by contacting dataaccess@growingup.co.nz See - **Walker C., Gerritsen S., Lai H., and Grant M. 2022. Technical Document for MWI and Dep-17: 8-year Data Collection Wave. Growing Up in New Zealand: Auckland.**
DCW8-M	DP14 to DP20 and DP31 (3.1-3.8)	Food insecurity index(FSI)	Health and Wellbeing - Food security	Mother-reported	Ministry of Health (2019) Household Food Insecurity among Children: New Zealand Health Survey https://www.health.govt.nz/publication/household-food-insecurity-among-children-new-zealand-health-survey Ministry of Health (2019) A Focus on Nutrition: Key findings from the 2008/09 NZ Adult Nutrition Survey – Chapter 7 https://www.health.govt.nz/publication/focus-nutrition-key-findings-2008-09-nz-adult-nutrition-survey	Eight items which can be analysed individually or combined into an index to classify households as mostly to fully food-secure, moderately food-insecure or severely food-insecure. Food Insecurity Category score is available as a derived variable in the 8-year dataset. See technical document: Kim H, Gerritsen S, Pillai A, Greenway K. 2021. Technical Document for Aggregated Food Insecurity Score: 8-year Data Collection Wave. Growing Up in New Zealand: Auckland.
DCW8-M	ALC9 to ALC11 (7.7-7.9)	Alcohol Use Disorders Identification Test Short Form (AUDIT-C)	Health and Wellbeing - Parental health	Mother-reported	Developed by World Health Organization (2001). AUDIT: The Alcohol Use Disorders Identification Test: Guidelines for use in primary care. Geneva: World Health Organization. Ministry of Health (2010) Alcohol and Pregnancy: A practical guide for health workers	Three questions to provide an estimate of frequency of drinking, quantity of typical drinking and frequency of risky/binge drinking. Gives a score from 0-12 points. AUDIT-C Sum Score is available in the 8-year dataset as a derived variable. Technical document available by

						contacting dataaccess@growingup.co.nz See - Walker C. 2022. Technical Document for AUDIT-C Tool: 8-year Data Collection Wave. Growing Up in New Zealand: Auckland.
DCW8- M	FIN56 OC103, OCC19, OCC5, OCC7, OCC8, OC48, OCC27, NOC52 FIN57_1_y8M to FIN57_99_y8M ;	Income and occupation: Income, Occupation Sources of income	Societal Context, Neighbourhoodand Environment	Mother administered questionnaire	Statistics New Zealand (2008). General Social Survey - Statistics New Zealand, Wellington, Social Conditions Business Unit, Statistics New Zealand. 30 January 2009, http://www.stats.govt.nz/developments/gen eral-social-survey.htm. Statistics New Zealand (2008). 2006 Census Questionnaires, Christchurch, Information Centre, Statistics New Zealand (SNZ). http://www.stats.govt.nz/census/about- 2006-census/2006-questionnaires.htm.	Labour force questions were derived fromthe NZ Census of Population and Dwellings (2006). These are validated within the NZ population and allow for comparability with official statistics. The hours of work question came from the General Social Survey (GSS, 2008, WORT1Q02). Other questions related toweekend work and work schedule came from the Household, Income & Labour Dynamics in Australia (HILDA) survey. 'Reasons for not working' were taken from LSAC wave 1.
DCW8- M	NZDEP2013	NZDep2013 New Zealand Index of Deprivation	Societal Context, Neighbourhoodand Environment	Mother administered questionnaire	Atkinson J, Salmond C, Crampton P (2014) NZDep2013 New Zealand Index of Deprivation. Wellington: Department of Public Health, University of Otago. Available from: https://www.otago.ac.nz/wellington/otago069936.pdf	
DCW8- M	Enforced lack ofessentials: DP- 32, DP-33, DP-34, DP-35, DP-37 Economising behaviour: DP-	DEP-17 Material Hardship	Societal Context, Neighbourhoodand Environment	Mother administered questionnaire	Statistics NZ (2019) Measuring Child Poverty: Material Hardship. Wellington: Statistics New Zealand. Available from: https://www.stats.govt.nz/methods/measuring-child-poverty-material-hardship	Developed by the Ministry of Social Development and used by Statistics NZ to measure material hardship in NZ households. A DEP-17 score of 6 or more is the threshold for material hardship and a score of 9 or more is severe hardship. Technical document available by

	5, DP-39, DP-2, DP-8, DP-10, DP-51, DP-42 Restrictions: DP-11, DP-45 Financial stress and vulnerability: DP-13, DP-46, DP-52					contacting dataaccess@growingup.co.nz See - **Walker C., Gerritsen S., Lai H., and Grant M. 2022. Technical Document for MWI and Dep-17: 8-year Data Collection Wave. Growing Up in New Zealand: Auckland.**
DCW8-M	GA5 - GA13 (7.14-7.22)	Problem Gambling Severity Index	Health and Wellbeing – Parental health	Mother - reported	Ferris J., Wynne H.J. (2001) The Canadian Problem Gambling Index Final Report. Ottawa, ON: Canadian Centre on Substance Abuse. Devlin, M. E. and D. J. I. G. S. Walton (2012). "The prevalence of problem gambling in New Zealand as measured by the PGSI: Adjusting prevalence estimates using meta-analysis." 12(2): 177-197	The problem gambling severity index (PGSI) is a widely used nine item scale that categorises people into four categories: non-problem, low-risk, moderate-risk, and problem gamblers. It was first developed in Canada and hasbeen widely used internationally including in New Zealand. It correlates highly with DSM-based scales such asthe National Opinion Research Center DSMScreen for Gambling Problems (NODS). Itis not an index of pathological gambling, but rather an index of problem gambling severity. Technical document available by contacting dataaccess@growingup.co.nz See - **Walker C. 2022. Technical Document for PGSI: 8-year Data Collection Wave. Growing Up in New Zealand: Auckland.**
DCW8-Cm	SIP1_Y8CM–SIP20_Y8CM (10.30-10.49)	Dirks et al 2011 Youth responses to provocation	Psychosocial and Cognitive Development/ Social	Child proxy administered questionnaire	Dirks, M. A., Treat, T. A., & Weersing, V. R. (2011). The latent structure of youth responses to peer provocation.	Two items were asked to tap children's hostile attribution bias (i.e., how much another child

		scale	information processing of mothers		*Journal of psychopathology and behavioralassessment*, *33*(1), 58-68.	intended to be mean) - one a playground provocation, and another apeer approach situation. In addition to children's underlying cognitions, we alsowanted to understand their behavioural responses. Two additional items (again aplayground provocation and peer rejection situation) and children were asked to describe how they would respond. Response options were based on Professor Melanie Dirks research. These same items were asked of parents to identify which response theywould encourage their child to use.
DCW8-Cm	SDQ1_Y8CM – SDQ41_Y8CM (14.1-14.27)	Strengths and Difficulties Questionnaire (SDQ)	Psychosocial and Cognitive Development/Conduct and Behaviour	Child proxy mother administered questionnaire	Goodman, R. (1997). The Strengths and Difficulties Questionnaire: a research note. *Journal of child psychology and psychiatry*, *38*(5), 581-586.	It was important to use the same measures as the 2Y DCW and the 54-month DCW so that conduct and behaviour over time can be explored. Technical information in Appendices, Sections 15.1.6 and 15.2.2.
DCW8-Cm	VSD36_Y8CM - VSD72_Y8CM (15.1-15.72)	Vinelands Questionnaire	Psychosocial and Cognitive Development/Social competence	Child proxy mother administered questionnaire	Cicchetti, D. V., & Sparrow, S. S. (1990). Assessment of adaptive behavior in young children.	The Socialisation domain of the Vinelands questionnaire for adaptivebehaviour has been administered. Questions and data redacted for public viewing due to copyright issues. These items will be available to approved data users in the dataset. For further information on what is available please contact dataaccess@growingup.co.nz

DCW8-Cm	EAH103 To EAH114 (3.5-3.16)	Child Food Neophobia Scale	Health and Wellbeing - Nutrition	Mother-reported	Pliner & Hobden (1992) Development of a scale to measure the trait of food neophobia in humans. Appetite, 19:105-120 Ritchey et al (2003) Validation and cross-national comparison of the food neophobia scale (FNS) using confirmatory factor analysis, Appetite 40(2): 163-173. doi: 10.1016/S0195-6663(02)00134-4 Damsbo-Svendsen et al (2017) Development of novel tools to measure food neophobia in children, Appetite, 113: 255-263. doi: 10.1016/j.appet.2017.02.035.	Twelve questions were asked on food neophobia, 10 of which can be combined into a scale, scoring the child from 10 to 70 on the degree of food neophobia, or avoidance of new foods.
DCW8-Cm	CH126 - CH133 (6.5-6.12)	ISAAC Questionnaire-Asthma questions	Health and Wellbeing – Respiratory	Child Proxy Questionnaire	Asher MI, Keil U, Anderson HR, Beasley R, Crane J, Martinez F, et al. International Study of Asthma and Allergies in Childhood (ISAAC): rationale and methods. *European Respiratory Journal* 1995;8(3):483-91.	8 Questions from ISAAC questionnaire pertaining to Asthma and Wheeze
DCW8-Cm	EFF10 - EFF13 (7.1-7.4)	Child Health Questionnaire	Health and Wellbeing – impact of illness	Child Proxy Questionnaire	Landgraf JM, Abetz L, and Ware JE. 1999. Child Health Questionnaire (CHQ): A User's Manual. 2nd edition. Boston, Health Act	Asked at 2-years, 4.5-years and 8-years.
DCW8-Cm	TU42-44, 91-92	IPSI – Internet Parenting Style Instrument	Family & Whānau, Societal Context, Neighbourhood and Environment – Parental mediation and monitoring of media use	Child Proxy Questionnaire	Valcke, M., S. Bonte, B. De Wever, I. J. C. Rots and Education (2010). "Internet parenting styles and the impact on Internet use of primary school children." 55(2): 454-464. Álvarez, M., Torres, A., Rodríguez, E., Padilla, S. & Rodrigo, M. (2014). Attitudes and parenting dimensions in parents' regulation of Internet use by primary and secondary school children. Computers & Education.	At the 8yr DCW, questions included for the first time 5 items from the Internet Parenting Style Instrument (IPSI) to measure parental mediation and monitoring of media use: 3 measuring the dimension of parental control (items related to supervision) and 2 measuring parental warmth (items related to communication).

					67(69–78).	
DCW8-Cm	PAR13, 31-35, 37, 39, 41, 43-49, 63-67, OP2	Parenting Items (warmth, consistency, efficacy, overprotectiveness and hostility)	Family & Whānau – Parenting	Mother administered questionnaire	Paterson, G. and A. J. S. D. Sanson (1999). "The association of behavioural adjustment to temperament, parenting and family characteristics among 5-year-old children." 8(3): 293-309. Hindman, A. H., L. E. Skibbe, T. D. J. R. Foster and Writing (2014). "Exploring the variety of parental talk during shared book reading and its contributions to preschool language and literacy: Evidence from the Early Childhood Longitudinal Study-Birth Cohort." 27(2): 287-313. Ryan, B. A. and G. R. Adams (1998). Family relationships and children's school achievement: Data from the national longitudinal survey of children and youth.	These items were taken from LSAC, adapted from several tools including the Child Rearing Questionnaire [CRQ]; Early Childhood Longitudinal Study of Children; National Longitudinal Survey of Children and Youth 1998-1999 [NLSCY]. A subset of21 items were chosen to assess the following aspects of parenting: warmth, consistency, efficacy, overprotectiveness and hostility. See LSAC technical documents for further information.
DCW8-Co	NIHT1_Y8CO - NIHT8_0_Y8CO (6.1-6.4.0)	NIH Toolbox Cognition Battery	Psychosocial and Cognitive Development/ Education/Child cognitive functioning	Child observation	Gershon, R. C., Cella, D., Fox, N. A., Havlik, R. J., Hendrie, H. C., & Wagster, M. V. (2010). Assessment of neurological and behavioural function: the NIH Toolbox. *The Lancet Neurology*.	Standard instrument developed by the National Institutes of Health (NIH) to measure cognitive functioning. Items redacted for public viewing due to copyright regulations, however these items will be available within the dataset for approved data users – for further information and to access the technical document please contact dataaccess@growingup.co.nz See also - **Neumann, D. 2021. *Technical Document for NIH Toolbox Cognition Battery: 8-***

						year Data Collection Wave. **Growing Up in New Zealand: Auckland.** See also - Neumann, D., Peterson, E. R., Underwood, L., Morton, S. M., & Waldie, K. E. (2021). Exploring the Factor Structure of the NIH Toolbox Cognition Battery in a Large Sample of 8-Year-Old Children in Aotearoa New Zealand. Journal of the International Neuropsychological Society, 1-10. doi:10.1017/S1355617720001265
DCW8-Co	NPMD1_Y8CO – PMD4_Y8CO (7.1-7.4)	Sticker Game	Psychosocial and Cognitive Development/ Prosocial / moral development and emotion regulation	Child observation	Zhao, K., Kashima, Y., & Smillie, L. D. (2018). From windfall sharing to property ownership: Prosocial personality traits in giving and taking dictator games. *Games*, *9*(2),30. Posid, T., Fazio, A., & Cordes, S. (2015). Being sticker rich: Numerical context influences children's sharing behavior. *PloS one*, *10*(11), e0138928.	Sticker Game developed based on the Dictator Game – developed in house by *Growing Up in New Zealand* team.
DCW8- Co	PCI27-40	Parent-child interactiontask (observations)	Family and Whānau – Parent-child interactions	Observation of Mother and Child	Bird, A., & Reese, E. (2006). Emotional reminiscing and the development of an autobiographical self. Developmental Psychology, 42, 613-626.	Based on the frequency of past event topics discussed by the Leading Light, parents and children were asked to discuss ONE past event from a choice ofthree (with picture prompts provided): arecent time the child experienced (1) a social disagreement (2) a loss or disappointment, or (3) a minor hurt or injury. Due to ethical considerations and to protect the privacy of participants these data files require

						special approval to access with sound research objectives and research expertise.
DCW12 - M	PH1_Y12M-PH10_Y12M (8.18.10)	Patient Health Questionnaire (PHQ-9)	Psychosocial and Cognitive Development/Depression	Mother administered questionnaire	Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: a new depression diagnostic and severity measure. Psychiatric annals, 32(9), 509-515.	The PHQ-9 was previously administered in Partners at 9-months and in mothers at 54-months (9 items) and 8-year. Technical document available by contacting dataaccess@growingup.co.nz See - **Walker, C., Fletcher B.D., Gawn, J., & Waldie, K. 2023. *Technical Document for the Patient Health Questionnaire 9 (PHQ-9) Mother Depression Tool: 12-year Data Collection Wave.* Growing Up in New Zealand: Auckland.**
DCW12 - P	PH1_Y12P-PH10_Y12P (8.1-8.10)	Patient Health Questionnaire (PHQ-9)	Psychosocial and Cognitive Development/Depression	Partner administered questionnaire	Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: a new depression diagnostic and severity measure. Psychiatric annals, 32(9), 509-515.	The PHQ-9 was previously administered in Partners at 9-months and in mothers at 54-months (9 items) and 8-year. Technical document available by contacting dataaccess@growingup.co.nz See - **Fletcher, B.D., & Gawn, J. 2023. *Technical Document for the Patient Health Questionnaire 9 (PHQ-9) Partner Depression Tool: 12-year Data Collection Wave.* Growing Up in New Zealand: Auckland.**
DCW12-C	DS1 _Y12C–DS10_Y12C (12.1-12.20)	Centre for Epidemiologic Studies Depression Scale	Psychosocial and Cognitive Development/Depression	Child administered questionnaire	Andresen, E. M., Malmgren, J. A., Carter, W. B., & Patrick, D. L. (1994). Screening for depression in well older adults: Evaluation of a short form of	The 10-item short form is scored on a 4- point scale with anchors ranging from 0 (Not at all) to 3 (A lot) with 2 reverse- coded items. A

		(CESD-10)			the CES-D. *American journal of preventive medicine*, *10*(2), 77-84. Fendrich, M., Weissman, M. M., & Warner, V. (1990). Screening for depressive disorder in children and adolescents: validating the center for epidemiologic studies depression scale for children. American Journal of Epidemiology, 131(3), 538-551.	score of 10 or higher out of 30 is indicative of clinically significant depressive symptoms. Preliminary findings suggest that CESD-10 is an acceptable tool for screening depression in adolescents; Wording has been used according to the CESD-CD child version and was previously administered at the 8-year and 10-year (COVID-19) DCW. Technical document available by contacting dataaccess@growingup.co.nz See - **Cha, J., Neumann, D., Grant, M., Fletcher, B. D., Gawn, J. and Walker, C. 2023. *Technical Document for the CES-D-10 Tool: 12-year Data Collection Wave.* Growing Up in New Zealand: Auckland.**
DCW12-C	PAS1 _Y12C–PAS10_Y12C (13.1-13.10)	Anxiety scale from PROMIS and NIH toolboxfear tool	Psychosocial and Cognitive Development/Anxiety	Child administered questionnaire	Irwin, D. E., Stucky, B., Langer, M. M., Thissen, D., DeWitt, E. M., Lai, J. S., ... & DeWalt, D. A. (2010). An item response analysis of the pediatric PROMIS anxiety and depressive symptoms scales. Quality of Life Research, 19, 595-607.	We measured children's anxiety symptoms by NIH toolbox fear tool which includes 8 anxiety items from PROMIS anxiety short form and 2 items from the NIH fear tool and was previously administered at the 8-year and 10-year (COVID-19) DCW. Technical document available by contacting dataaccess@growingup.co.nz See - **Neumann, D., Cha, J., Grant, M., Walker, C., Gawn, J., & Fletcher, B. D. 2023. *Technical Document for the PROMIS Anxiety Tool: 12-year Data Collection Wave.* Growing Up in**

						New Zealand: Auckland.
DCW12-C	CPR25_Y12C – CPR34_Y12C	Forms of Bullying Scale - victim	Psychosocial and Cognitive Development/Bullying	Child administered questionnaire	Shaw, T., Dooley, J. J., Cross, D., Zubrick, S. R., & Waters, S. (2013). The Forms of Bullying Scale (FBS): Validity and reliability estimates for a measure of bullying victimization and perpetration in adolescence. Psychological Assessment, 25(4), 1045-1057. https://doi.org/10.1037/a0032955	The Forms of Bullying Scale (FBS) is a 10-item self-report tool used to measure the frequency of five different forms of bullying, including verbal, threatening, physical, relational, and social bullying. The FBS is designed to measure behaviour from both victim (FBS-V) and perpetrator (FBS-P) in adolescents. This was a new tool used at the 12-year DCW. Technical document available by contacting dataaccess@growingup.co.nz See - **Fletcher, B.D., & Gawn, J. 2023. Technical Document for the Forms of Bullying Scale (FBS) Child Tool: 12-year Data Collection Wave. Growing Up in New Zealand: Auckland.**
DCW12-T	CPR18_Y12T – CPR27_Y12T	Forms of Bullying Scale - victim	Psychosocial and Cognitive Development/Bullying	Teacher administered questionnaire	Shaw, T., Dooley, J. J., Cross, D., Zubrick, S. R., & Waters, S. (2013). The Forms of Bullying Scale (FBS): Validity and reliability estimates for a measure of bullying victimization and perpetration in adolescence. Psychological Assessment, 25(4), 1045-1057. https://doi.org/10.1037/a0032955	The Forms of Bullying Scale (FBS) is a 10-item self-report tool used to measure the frequency of five different forms of bullying, including verbal, threatening, physical, relational, and social bullying. The FBS is designed to measure behaviour from both victim (FBS-V) and perpetrator (FBS-P) in adolescents. The teacher version measures their observation of bullying and perpetrating behaviour in the child. This was a new tool used at the 12year DCW. Technical document available by contacting

						dataaccess@growingup.co.nz See - **Fletcher, B.D., & Gawn, J. 2023. *Technical Document for the Forms of Bullying Scale (FBS) Teacher Tool: 12-year Data Collection Wave.* Growing Up in New Zealand: Auckland.**
DCW12-T	CPR28_Y12T – CPR37_Y12T	Forms of Bullying Scale - Perpetrator	Psychosocial and Cognitive Development/Bullying/Education	Teacher administered questionnaire	Shaw, T., Dooley, J. J., Cross, D., Zubrick, S. R., & Waters, S. (2013). The Forms of Bullying Scale (FBS): Validity and reliability estimates for a measure of bullying victimization and perpetration in adolescence. Psychological Assessment, 25(4), 1045-1057. https://doi.org/10.1037/a0032955	The Forms of Bullying Scale (FBS) is a 10-item self-report tool used to measure the frequency of five different forms of bullying, including verbal, threatening, physical, relational, and social bullying. The FBS is designed to measure behaviour from both victim (FBS-V) and perpetrator (FBS-P) in adolescents. The teacher version measures their observation of bullying and perpetrating behaviour in the child. This was a new tool used at the 12year DCW. Technical document available by contacting dataaccess@growingup.co.nz See - **Fletcher, B.D., & Gawn, J. 2023. *Technical Document for the Forms of Bullying Scale (FBS) Teacher Tool: 12-year Data Collection Wave.* Growing Up in New Zealand: Auckland.**
DCW12-M	Section 9	DEP-17 Index focusing on low living standards	Societal Context, and Neighbourhood Environment	Mother administered questionnaire	StatsNZ. Measuring child poverty: Material hardship. 2019. https://www.stats.govt.nz/methods/measuring-child-poverty-material-hardship/	The DEP-17 index is a 17-item tool used to assess low living standards. The index was developed by the Ministry of Social Development (MSD) for New Zealand. The DEP-17 index was also administered in the mother questionnaire at the 8-year data collection wave.

						The DEP-17 categorical and sum score variables are available in the 12-year mother dataset, additional information in Section 14.3.4. Additional information can be found in the 8-year technical document: **Walker, Gerritsen, Lai and Grant 2022. *Technical Document for MWI and Dep-17: 8-year Data Collection Wave.* Growing Up in New Zealand: Auckland.**
DCW12-M	Section 9	Material Wellbeing Index (MWI)	Societal Context, and Neighbourhood Environment	Mother administered questionnaire	StatsNZ. Measuring child poverty: Material hardship. 2019. https://www.stats.govt.nz/methods/measuring-child-poverty-material-hardship/	The MWI is a is a 24-item measure that covers a broad spectrum of material well-being, including questions around 'ownership or participation', 'economising', 'housing problems', 'freedoms/restrictions', and 'financial strain'. Additional information can be found in the 8-year technical document: **Walker, Gerritsen, Lai and Grant 2022. *Technical Document for MWI and Dep-17: 8-year Data Collection Wave.* Growing Up in New Zealand: Auckland.**
DCW12-M	Section 9	NZiDep	Societal Context, and Neighbourhood Environment	Mother administered questionnaire	Salmond C, Crampton P, King P, Waldegrave C. NZiDep: A New Zealand index of socioeconomic deprivation for individuals. Social science & medicine 2006;62:1474-85.	NZiDep provides a measure of absolute socioeconomic deprivation position for individuals in New Zealand. NZiDep consists of eight questions covering income and unemployment, help and assistance received, and the economised cut back on essentials. Additional information can be found

						in the 8-year technical document: **Lai H, Saraf R, Walker C, Langridge F, Napier C, Pillai A, Shackleton N, Exeter D, Morton SM. 2021. Growing Up in New Zealand Technical Report (Update): Deriving the NZiDep variable – a New Zealand Index of Socioeconomic Deprivation for Individuals. Auckland, Growing Up in New Zealand.**
DCW12-M	AGG_FIS_CAT_Y12M	Food insecurity score	Societal Context, and Neighbourhood Environment	Mother administered questionnaire	Gerritsen, S., Park, A., Wall, C., Napier, C., Exeter, D., Paine SJ. 2023. Now We Are 12: Indicators of food insecurity and access to food assistance in the Growing Up in New Zealand cohort. Snapshot 3. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz	See technical document from DCW8: Kim H, Gerritsen S, Pillai A, Greenway K. 2021. Technical Document for Aggregated Food Insecurity Score: 8-year Data Collection Wave. Growing Up in New Zealand: Auckland.
DCW12-M	HHTENURE_Y12M	4-category housing tenure	Societal Context, and Neighbourhood Environment	Mother administered questionnaire	Lai, H., & Prickett, K. (2023). Technical document for housing tenure: 12-year Data Collection Waves. Auckland: Growing Up in New Zealand, University of Auckland.	Technical documentation being developed.
DCW12-M	NE32_MOVE_CAT_Y12M	Main reason for moving home	Societal Context, and Neighbourhood Environment	Mother administered questionnaire	Lai, H., & Prickett, K. (2023). Technical document for the main reason of moving home: 12-year Data Collection Waves. Auckland: Growing Up in New Zealand, University of Auckland.	Technical documentation being developed.
DCW12-M	CCI_y12M SCI_y12M	Canadian crowding index and simple crowding index	Societal Context, and Neighbourhood Environment	Mother administered questionnaire	Lai, H., & Miller, S. (2023). Technical document for Canadian Crowding Index: 12-year Data Collection Waves. Auckland: Growing Up in New Zealand, University of Auckland.	Technical document available by contacting dataaccess@growingup.co.nz See - **Lai, H., Miller, S., & Fletcher, B.D. 2024. *Technical Document for the Canadian Crowding Index: Growing Up in New Zealand 12-year Data***

						Collection Wave. **Growing Up in New Zealand: Auckland, New Zealand.**
DCW12-M	OECD_HH_INCOME_y12M SRSE_HH_Income_y12M	Equivalised household income	Societal Context, and Neighbourhood Environment	Mother administered questionnaire	Lai, H., Miller, S., Prickett, K. (2023). Technical document for equivalised household income: 12-year Data Collection Waves. Auckland: Growing Up in New Zealand, University of Auckland.	Technical documentation being developed.
DCW12-M	DHB2015_; REGION_; NZDEP2018_10; NZDEP2018_5; RURALITY_UA2018; RURALITY_FUA2018; RURALITY_UR2018	Geospatial data: DHB, Region, Area-level deprivation, rurality	Societal Context, and Neighbourhood Environment	Mother administered questionnaire (with variables available in the mother, child, and partner datasets)	Atkinson, J., Salmond, C., & Crampton, P. (2020). NZDep18 Index of Deprivation. Wellington; New Zealand: University of Otago. Stats NZ. (2021a). Functional Urban Area 2018 [Data set]. https://datafinder.stats.govt.nz/layer/105288-functional-urban-area-2018/ Stats NZ. (2021b). Urban Accessibility 2018 (generalised) [Data set]. https://datafinder.stats.govt.nz/layer/105022-urban-accessibility-2018-generalised/ Stats NZ. (2021c). Urban Rural 2018 (generalised) [Data set]. https://datafinder.stats.govt.nz/layer/92218-urban-rural-2018-generalised/	Technical documentation being developed. Please contact dataaccess@growingup.co.nz for updated information
DCW12C	Section 35, NENG1_y12C–NENG11_y12C	Neighbourhood Integration Scale	Societal Context, Neighbourhoodand Environment	Child questionnaire	Turrell, G., Kavanagh, A., & Subramanian, S. V. (2006). Area variation in mortality in Tasmania (Australia): The contributions of socioeconomic disadvantage, social capital, and geographic remoteness. *Health and Place*, 12, 291-305.	Items were used in the GUiNZ questionnaires to reflect neighbourhood integration, isolation, and safety.
DCW12–Cm/Cp	PAR13, 31-34, 63	Parenting Items (warmth)	Family & Whānau – Parenting	Mother questionnaire, Partner questionnaire	Paterson, G. and A. J. S. D. Sanson (1999). "The association of behavioural adjustment to temperament, parenting and family	A subset of 6 items were chosen to assess the warmth aspect of parenting, taken from LSAC, adapted from the Child Rearing

					characteristics among 5-year-old children." 8(3): 293-309.	Questionnaire [CRQ]. Parental Warmth or responsive parenting — including displays of affection and awareness of child's needs – is considered a key area of interest. Generally, children show better developmental outcomes when exposed to parenting that is high on the dimension of warmth (Paterson & Sanson, 1999). See Section 15.3.5 for more details.
DCW12– Cm/Cp	PC5, 6, 19, 34, 35, 36	Parenting Items (involvement)	Family & Whānau – Parenting	Mother questionnaire, Partner questionnaire	See Section 15.3.5 for more details.	These questions have been developed in-house and used in previous DCWs. Questions on quantity of parent-child interactions were created specifically for GUiNZ at the 9-month and 2-year DCWs, then adapted for the 54-month, 8-year and 12-year DCWs to tap the essential elements of parent-child interaction and the home environment. See Section 15.3.5 for more details.
DCW12– C	SPEC1 – SPEC3	Presence of a Very Important Non-Parent Adult	Family & Whānau – Special Adult	Child questionnaire	Herrera, C., Grossman, J. B., Kauh, T. J., Feldman, A. F., & McMaken, J. (2007). Making a difference in schools: The Big Brothers Big Sisters School-based Mentoring Impact Study. Philadelphia, PA: Public/Private Ventures.	Used for the first time at the 12-year DCW. This scale assesses whether a young person has an adult in their life who fills the role of a special non-parental adult and describes how many they have and their relationships to them. Special adult relationships have not been previously collected in Aotearoa for this age group. Response options were adapted for NZ context.
DCW12- C	CPR17 – CPR24	Peer	Family & Whānau –	Child	Armsden, G.C., Greenberg, M.T. The	Used for the first time at 12Y. Tool

		Relationships	Peer Relationships	Questionnaire	inventory of parent and peer attachment: Individual differences and their relationship to psychological well-being in adolescence. J Youth Adolescence 16, 427–454 (1987). https://doi.org/10.1007/BF02202939	adapted by LSAC from the Peer Attachment Scale, Armsden and Greenberg (itself adapted from the Inventory of Peer and Parental Attachment (1987)). The Peer Relationships tool consists of 2 subscales: Trust and Communication. See Section 15.3.5 for more details.
DCW12- C	PCHR1 – PCHR8	Parent-Child Relationship	Family & Whānau – Parent-Child Relationship	Child Questionnaire	Ridenour TA, Greenberg MT, Cook ET. Structure and validity of people in my life: A self-report measure of attachment in late childhood. J Youth Adolesc. 2006 Dec;35(6):1037-1053. doi: 10.1007/s10964-006-9070-5. PMID: 17476310; PMCID: PMC1862408.	Used for the first time at 12Y. Tool adapted by LSAC from the People in My Life measure (PIML), Ridenour, Greenberg & Cook (2006). The PIML instrument was developed to obtain 10- to 12-year-old children's self-reports of attachment to parents, peers, teachers and school, and neighbourhood. Strong, warm and positive parent-child relationships have a protective influence against a variety of individual and/or family difficulties. The Parent-Child Relationships tool consists of 2 subscales: Trust and Communication. See Section 15.3.5 for more details.
DCW12-C DCW12-T	SCHE1 – SCHE6_Y12C CCQ7-CCQ12_Y12T	Following Class Rules Subscale of the Class Maps survey	Education – Behavioural engagement	Child Questionnaire Teacher Questionnaire	Doll, B., Spies, R. A., LeClair, C. M., Kurien, S. A., & Foley, B. P. (2010). Student perceptions of classroom learning environments: Development of the ClassMaps Survey. School Psychology Review, 39(2), 203-218.	Asked for the first time at age 12. This scale has not previously been validated for use with teachers as a proxy respondent. Scale testing is recommended. For additional information on derivation and use of this tool see - **Tait, J., Grant, M., Meissel, K.,**

						Bullen, P., Peterson, E.R., Fenaughty, J., Miller, S., Paine, S-J. 2023. Supplementary materials for Now We Are 12: School Engagement of the Growing Up in New Zealand cohort. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz
DCW12-C DCW12-T	SCHE7-SCHE11_Y12C CCQ13-CCQ17_Y12T	Regulation Subscale of the Goal Orientation and Learning Strategies Survey (GOALS-S)	Education – Cognitive engagement	Child Questionnaire Teacher Questionnaire	Dowson M, McInerney DM. The development and validation of the Goal Orientation and Learning Strategies Survey (GOALS-S). Educational and psychological measurement. 2004 Apr;64(2):290-310.	Asked for the first time at age 12. This scale has not previously been validated for use with teachers as a proxy respondent. Scale testing is recommended. For additional information on derivation and use of this tool see - **Tait, J., Grant, M., Meissel, K., Bullen, P., Peterson, E.R., Fenaughty, J., Miller, S., Paine, S-J. 2023. Supplementary materials for Now We Are 12: School Engagement of the Growing Up in New Zealand cohort. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz**
DCW12—C DCW12-T	CCQ1–CCQ6_Y12C CCQ1–CCQ6_Y12T	School Satisfaction Subscale of the Student Personal Perception of Class Climate Scale (SPPCC)	Education – Emotional Engagement / School satisfaction	Child questionnaire and Teacher questionnaires	Rowe, E. W., Kim, S., Baker, J. A., Kamphaus, R. W., & Horne, A. M. (2010). Student personal perception of classroom climate: Exploratory and confirmatory factor analyses. Educational and Psychological Measurement, 70(5), 858-879. doi:10.1177/0013164410378085	Asked for the first time at 8 years. Items from the satisfaction sub-scale were chosen to understand children's perceptions of their experiences at school and tap into the emotional component of school engagement. For additional information on derivation and use of this tool see - Tait, J., Grant, M., Meissel, K., Bullen, P., Peterson, E.R., Fenaughty, J., Miller, S., Paine, S-

						J. 2023. Supplementary materials for Now We Are 12: School Engagement of the Growing Up in New Zealand cohort. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz Technical document also available by contacting dataaccess@growingup.co.nz See - Grant, M., Tait, J., Meissel, K. Technical Document for School Satisfaction Subscale of the Student Personal Perception of Classroom Climate Scale (SPPCC). Auckland (NZ): Growing Up in New Zealand; 2022.
DCW12-C	ACSE1-ACSE5_Y12C	Patterns of Adaptive Learning Scale (PALS), Academic Efficacy Subscale	Engagement – Academic Efficacy	Child Questionnaire	Midgley, C., Maehr, M. L., Hruda, L. Z., Anderman, E., Anderman, L., Freeman, K. E., & Urdan, T. (2000). Manual for the patterns of adaptive learning scales. Ann Arbor: University of Michigan.	Asked for the first time at 12 years. See section 15.3.6 for additional information. For additional information on derivation and use of this tool see - Tait, J., Grant, M., Meissel, K., Bullen, P., Peterson, E.R., Fenaughty, J., Miller, S., Paine, S-J. 2023. Supplementary materials for Now We Are 12: School Engagement of the Growing Up in New Zealand cohort. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz
DCW12-C	ACRES1-ACRES4_Y12C	Academic Buoyancy Scale	Education - Academic Buoyancy	Child Questionnaire	Martin, A. J., & Marsh, H. W. (2008). Academic buoyancy: Towards an understanding of students' everyday academic resilience. Journal of	Asked for the first time at 12 years. See section 15.3.6 for additional information.

					school psychology, 46(1), 53-83.	For additional information on derivation and use of this tool see - Tait, J., Grant, M., Meissel, K., Bullen, P., Peterson, E.R., Fenaughty, J., Miller, S., Paine, S-J. 2023. Supplementary materials for Now We Are 12: School Engagement of the Growing Up in New Zealand cohort. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz
DCW12-C	STR1 – STR8_Y12C	Class Maps Survey: My Teacher Subscale	Education – Student-Teacher Relationship	Child Questionnaire	Doll, B., Spies, R. A., LeClair, C. M., Kurien, S. A., & Foley, B. P. (2010). Student perceptions of classroom learning environments: Development of the ClassMaps Survey. School Psychology Review, 39(2), 203-218.	Asked for the first time at 12 years. See section 15.3.6 for additional information. For additional information on derivation and use of this tool see - Tait, J., Grant, M., Meissel, K., Bullen, P., Peterson, E.R., Fenaughty, J., Miller, S., Paine, S-J. 2023. Supplementary materials for Now We Are 12: School Engagement of the Growing Up in New Zealand cohort. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz
DCW12-T	STR10-STR23_Y12T	Student-Teacher Relationship Scale – Short Form	Education – Student Teacher Relationship	Teacher Questionnaire	Pianta RC. Student–teacher relationship scale–short form. Lutz, FL: Psycho-logical Assessment Resources. 2001.	Asked for the first time at 12 years. See section 15.3.6 for additional information. For additional information on use of this tool see - Grant, M., Tait, J., Meissel, K., Peterson, E.R., Bullen, P., Wheadon, M., Miller, S., Pillai, A., Paine, S-J. 2023. *Now We Are 12: Teacher Survey Report.* Auckland: Growing Up in New

						Zealand. Available from www.growingup.co.nz
DCW12 - T	CCQ20, CCQ22, CCQ24, CCQ25, CCQ28_Y12T	Class Maps Survey, Kids in this class subscale	Education – Class Climate	Teacher Questionnaire	Doll B, Spies RA, LeClair CM, Kurien SA, Foley BP. Student perceptions of classroom learning environments: Development of the ClassMaps Survey. School Psychology Review. 2010 Jan 1;39(2):203-18.	Adaptations were made to reflect wider classroom cohesion. Asked for the first time at 12 years. These items are negatively worded, and therefore consider reverse coding. See section 14.3.6 for additional information. For additional information on use of this tool see - Grant, M., Tait, J., Meissel, K., Peterson, E.R., Bullen, P., Wheadon, M., Miller, S., Pillai, A., Paine, S-J. 2023. *Now We Are 12: Teacher Survey Report.* Auckland: Growing Up in New Zealand. Available from www.growingup.co.nz
DCW12 - T	CCQ18, CCQ19, CCQ21, CCQ23, CCQ26, CCQ27_Y12T	Positive Peer Interaction subscale of the School Climate Inventory	Education – Class climate	Teacher Questionnaire	Brand, S., Felner, R., Shim, M., Seitsinger, A. and Dumas, T., 2003. Middle school improvement and reform: Development and validation of a school-level assessment of climate, cultural pluralism, and school safety. *Journal of educational psychology*, *95*(3), p.570.	Adaptations were made to reflect wider classroom cohesion. Asked for the first time at 12 years. See section 14.3.6 for additional information. For additional information on use of this tool see - Grant, M., Tait, J., Meissel, K., Peterson, E.R., Bullen, P., Wheadon, M., Miller, S., Pillai, A., Paine, S-J. 2023. *Now We Are 12: Teacher Survey Report.* Auckland: Growing Up in New Zealand. Available from www.growingup.co.nz
DCW12-C	QOL1-QOL10_Y12C (2.1-2.10)	KIDSCREEN	Health and Wellbeing – Child Quality of Life	Child Questionnaire	Ravens-Sieberer, U., A. Gosch, L. Rajmil, M. Erhart, J. Bruil, W. Duer, P. Auquier, M. Power, T. Abel, L. J. E. r. o. p. Czemy and o. research (2005).	Also asked at 8-year the KIDSCREEN-10 is a short measure of children and adolescents' well-being and health-related quality of

					"KIDSCREEN-52 quality-of-life measure for children and adolescents." 5(3): 353-364. Ravens-Sieberer, U., Erhart, M., Rajmil, L., Herdman, M., Auquier, P., Bruil, J., Power, M., Duer, W., Abel, T., Czemy, L., Mazur, J., Czimbalmos, A., Tountas, Y., Hagquist, C., & Kilroe, J. (2010). Reliability, construct and criterion	life. See Section 15.3.3 for details.
DCW12-Cm DCW12-C	CH1_Y12Cm QOL11_Y12C	Perceived General Health	Health and Wellbeing - Child health status	Child proxy & Child – questionnaire	Ware, J. E., Kosinski, M., & Keller, S. K. (1994). SF-36 physical and mental health summary scales: A user's manual. Boston, MA: The Health Institute.	One question from SF-36. This perceived general health question has been asked across all the major data collection waves to the child proxy. This is the second time it has also been asked of the children.
DCW12-M DCW12-P	GH14_ Y12M GH14_ y12P	SF-36 Global Health Questions	Health and Wellbeing – Parental health (general health)	Mother questionnaire Partner Questionnaire	RAND®. 36-Item Short Form Survey (SF-36) California, USA: RAND Corporation; 2023 [Available from: https://www.rand.org/health-care/surveys_tools/mos/36-item-short-form.html.	Total response count was used for these variables
DCW12-Cm	INJ1_y12Cm INJ7_1_y12CM to INJ7_97_y12Cm	Injury	Health and Wellbeing - Injury	Child proxy questionnaire	Fleming T, Peiris-John R, Crengle S, Archer D, Sutcliffe K, Lewycka S, et al. Youth19 Rangatahi Smart Survey, Initial Findings: Introduction and Methods. New Zealand: The Youth19 Research Group, The University of Auckland and Victoria University of Wellington; 2020.	The two questions were taken from the Youth 19 Survey. Responses were informed by the Safekids Aotearoa report which found the leading causes of injuries in children were land transport injuries (motor vehicle traffic crashes and non-motor vehicle traffic crashes), suffocation, falls, drowning, inanimate mechanical forces, animate mechanical forces, poisoning and burns.
DCW12- C	DIS1-6 (16.1-16.6)	Washington Group Short Set	Health & Wellbeing - Disability	Child Questionnaire	Washington Group on Disability Statistics. The Washington Group	Used for the first time at 12Y. The Washington Group on Disability

		on Functioning (WG-SS)			Short Set on Functioning (WG-SS) 2022 [Available from: https://www.washingtongroup-disability.com/fileadmin/uploads/wg/Washington_Group_Questionnaire_1_-_WG_Short_Set_on_Functioning_-_October_2022_.pdf	Statistics designed the Washington Group Short Set on Functioning (WG-SS) to identify people who may be experiencing disability for use in a general population aged five years and over. This tool is recommended for self-report or to be answered by a knowledgeable proxy respondent when the person cannot answer for themselves. During the 12-year data collection wave Growing Up in New Zealand asked young people to respond to these questions about their own level of functioning as part of the child questionnaire. This tool has not been validated for self-report in this age group. See Section 15.3.3. For additional information on use of this tool see - **Marks, E.J., Tait, J., Miller, S., Liang, R., Bullen, P., Fenaughty, J., Grant, C.C. and Paine, S-J. 2023. Now We Are 12: The impact of disability on young people and their family. Snapshot 8. Supplementary Material. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz**
DCW12-Cm	DIS1_y12CM – DIS8_y12CM	Washington Group Child Functioning Questions	Health and Wellbeing - Disability	Child proxy questionnaire	Washington Group on Disability Statistics. The Washington Group / UNICEF Child Functioning Module (CFM) – Ages 5-17. 2020. [Available from: https://www.washingtongroup-disability.com/fileadmin/uploads/wg/Docum	We used eight questions (DIS1-8) taken from the Washington Group CFM. The CFM has been designed to be answered by a primary caregiver regarding children aged 5-17 years. See Section 15.3.3.

					ents/Washington_Group_Questionnaire_-_5_-_WG-UNICEF_Child_Functioning_Module_-_ages_5-17_.pdf]	For more information of the use of these questions see: Marks, E.J., Tait, J., Miller, S., Liang, R., Bullen, P., Fenaughty, J., Grant, C.C. and Paine, S-J. 2023. Now We Are 12: The impact of disability on young people and their family. Snapshot 8. Supplementary Material. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz
DCW12- C	PUB1-PUB9_Y12C	Peterson Puberty Scale	Health and Wellbeing - Puberty	Child Questionnaire	Petersen AC, Crockett L, Richards M, Boxer A. A self-report measure of pubertal status: Reliability, validity, and initial norms. J Youth Adolesc. 1988;17(2):117-33.	See Section 15.3.3. For further detail on the derivation and analysis of this measure see Petersen et al (1988) or refer to the NWA12 report on puberty - Marks, E., Walker, C., Reid-Ellis, M., Tait, J., Bullen, P., Fenaughty, J., Liang, R., Grant, C., Paine, S.J. 2023. Now We Are 12: Young People's Experiences of Puberty at Age 12. Report. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz
DCW12- C	BI1_Y12C-BI2_Y12C	Body Image	Health and Wellbeing – Body Image	Child Questionnaire	Collins ME. Body figure perceptions and preferences among preadolescent children. Int J Eat Disord. 1991;10:199-208.	GUiNZ adapted a pictorial instrument to measure young people's perceptions of their body image. This was a repeat of questions asked at 8-year.
DCW12- C DCW12-Cm	ALC12_y12C – ALC13_y12C SM16_y12C, SM18_y12C, DU1_y12C	Risky Behaviours	Health and Wellbeing – Risky behaviours	Child Questionnaire Child Proxy Questionnaire	Ministry of Health. A Portrait of Health: Key results of the 2006/07 New Zealand Health Survey. Wellington, New Zealand: New Zealand Government; 2008. Growing Up in Australia: The	Items were developed in-house based on questions from LSAC, the 'What About Me?' Youth Health and Wellbeing Survey, and the New Zealand Health Survey.

	PI1_y12Cm				Longitudinal Study of Australian Children. Study questionnaires Australia: Australian Institute of Family Studies; 2023 [Available from: https://growingupinaustralia.gov.au/data-and-documentation/study-questionnaires/downloads. What About Me NZ: The biggest survey of your generation Wellington, New Zealand: New Zealand Government; [Available from: https://www.whataboutme.nz/.Fleming T, Peiris-John R, Crengle S, Archer D, Sutcliffe K, Lewycka S, et al. Youth19 Rangatahi Smart Survey, Initial Findings: Introduction and Methods. New Zealand: The Youth19 Research Group, The University of Auckland and Victoria University of Wellington; 2020.	
DCW12-Cm	FFQ1A-FFQ62A_Y12Cm	Food Frequency Questionnaire	Health and Wellbeing – Food frequency	Child Proxy Questionnaire	Subar AF (2006) The food propensity questionnaire: concept, development, and validation for use as a covariate in a model to estimate usual food intake. Journal American Diet Association 106(10), 1556-1563.	These questions were developed in-house based on the Food Frequency Questionnaires used in previous DCWs. The questionnaire included food items that were typical of a New Zealand diet, informed by the 1997 National Nutrition Survey, the 2002 National Children's Nutrition Survey and the 2008/09 Adult Nutrition Survey. For further information see – See - Thornley, S., Bach, K., Bird, A., Farrar, R., Bronte, S., Turton, B., ... & Grant, C. (2021). What

						factors are associated with early childhood dental caries? A longitudinal study of the Growing Up in New Zealand cohort. International Journal of Paediatric Dentistry, 31(3), 351-360. And - Gontijo de Castro, T., Lovell, A., Santos, L. P., Jones, B., & Wall, C. (2023). Maternal determinants of dietary patterns in infancy and early childhood in the Growing up in New Zealand cohort. Scientific Reports, 13(1), 22754.
DCW12-Cm	EAH18_Y12Cm	Family Eating Patterns	Health and Wellbeing – Family Eating Patterns	Child Proxy Questionnaire	NZ Health Survey [https://www.health.govt.nz/nz-health-statistics/surveys/new-zealand-health-survey].	One question on family eating patterns was taken from the New Zealand Health Survey. We collected information on how often young people sit with their families to eat their main meals.
DCW12-M	DP14_y12M - DP20_y12M DP31_y12M	Food Security Index	Health and Wellbeing – Food security	Mother Questionnaire	Russell D, Parnell W, Wilson N, Faed J, Ferguson E, Herbison P, et al. NZ Food: NZ People. Key results of the 1997 National Nutrition Survey. Wellington, New Zealand: Ministry of Health; 1999.	These questions were previously asked at the 8-Year DCW. They have also been asked in the 2002 New Children's Nutrition Survey, 2008/09 Adults Nutrition Survey, and the New Zealand health Survey. A technical document is available for the Food Insecurity Index based on DCW8. See - Kim H, Gerritsen S, Pillai A, Greenway K. 2021. Technical Document for Aggregated Food Insecurity Score: 8-year Data Collection Wave. Growing Up in New Zealand: Auckland.
DCW12-C	EATK1_Y12C DIET1_y12C	Disordered Eating	Health and Wellbeing – Disordered Eating	Child Questionnaire	University of Otago, Ministry of Health. 2008/09 New Zealand Adult Nutrition Survey	Total response count was used for these variables in the Now We Are 12 Reports.

					Questionnaire Wellington, New Zealand: Ministry of Health; 2011.	
DCW12-C	BREATH1_y12C DIET1_y12C	Physical Activity	Health and Wellbeing – Activity & Exercise	Child Questionnaire	Currie C, Roberts C, Morgan A, Smith R, Settertobulte W, Samdal O, et al. Young people's health in context. Health Behaviour in School-aged Children (HBSC) study: international report from the 2001/2002 survey. Denmark: World Health Organization; 2004. What About Me NZ: The biggest survey of your generation Wellington, New Zealand: New Zealand Government. [Available from: https://www.whataboutme.nz/	Total response count was used for these variables in the Now We Are 12 Reports.
DCW12-C	SLP16_y12C	Sleep - quality	Health and Wellbeing – Activity & Exercise	Child Questionnaire	Growing Up in Australia: The Longitudinal Study of Australian Children. Study questionnaires Australia: Australian Institute of Family Studies; 2023 [Available from: https://growingupinaustralia.gov.au/data-and-documentation/study-questionnaires/downloads.	Total response count was used for these variables in the Now We Are 12 Reports.
DCW12-Cm	SLP1_Y12CM SLP12_Y12CM SLP10_Y12CM	Sleep - quantity	Health and Wellbeing – Activity and Exercise	Child Proxy Questionnaire	NZ Health Survey [https://www.health.govt.nz/nz-health-statistics/surveys/new-zealand-health-survey].	Total response count was used for these variables in the Now We Are 12 Reports.
DCW12-M DCW12-P	GH2_y12M GH2_y12P NGH3_1_y12M to NGH3_97_y12M NGH3_1_y12P to NGH3_97_y12P	Parental Disability	Health and Wellbeing – Parental health (parental disability)	Mother Questionnaire Partner Questionnaire	Ministry of Health. A Portrait of Health: Key results of the 2006/07 New Zealand Health Survey. Wellington, New Zealand: New Zealand Government; 2008.	Questions asked of long-term disability (six-months or more).

	GH13_y12M GH13_y12P					
DCW12-M DCW12-P	ALC9_Y12M ALC9_Y12P ALC10_y12M ALC10_y12P ALC11_y12M ALC11_y12P	Alcohol Use	Health and Wellbeing – Parental health	Mother Questionnaire Partner Questionnaire	Babor TF, Higgins-Biddle JC, Saunders JB, Monteiro MG. AUDIT The Alcohol Use Disorders Identification Test: Guidelines for Use in Primary Care (Second Edition). Geneva: Department of Mental Health and Substance Dependence, World Health Organisation; 2001.	AUDIT-C technical documentation beingdeveloped. Please refer to technical document developed after the 8-year DCW available by contacting dataaccess@growingup.co.nz See - Walker C. 2022. Technical Document for AUDIT-C Tool: 8-year Data Collection Wave. Growing Up in New Zealand: Auckland.
DCW12-M DCW12-P	SM16_y12M SM16_y12P SM17_y12M SM17_y12P	Vaping	Health and Wellbeing – Parental Health	Mother Questionnaire Partner Questionnaire	NZ Health Survey [https://www.health.govt.nz/nz-health-statistics/surveys/new-zealand-health-survey].	Two questions asked. Total response count was used for the variables.
DCW12-C	ETHID1_y12C - ETHID12_y12C)	Multigroup Ethnic Identity Measure (MEIM)	Culture & Identity – Ethnic Identity	Child Questionnaire	Roberts RE, Phinney JS, Masse LC, Chen YR, Roberts CR, Romero A. The structure of ethnic identity of young adolescents from diverse ethnocultural groups. The Journal of Early Adolescence 1999;19:301–22. https://doi.org/10.1177/0272431699019003001 Phinney JS. The Multigroup Ethnic Identity Measure: A new scale for use with diverse groups. Journal of Adolescent Research 1992;7:156–76. https://doi.org/10.1177/074355489272003 https://doi.org/10.1177/027243169901900 3001	See Section 15.3.1 for details. For an example of using this tool see **Neumann, D., Yao, E., Fenaughty, J., Liang, R., Kingi, T.K., Taufa, S., Atatoa Carr, P., Paine, S.J. 2023. Now We Are 12: Ethnic and Gender Identity. Snapshot 1. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz** See also - **Paine S-J., Neumann D., Yao E. 2023. Now We Are 12: Structural disadvantage and rangatahi Māori mental wellbeing. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz**

DCW12-C	TRT2_Y12CO – TRT42CO	Te Reo Māori tool (bespoke)	Culture and Identity - Language	Child administered questionnaire – audible and pictorial questions	Developed by the Growing Up in New Zealand research team. Contact the team for further information around specific tool via dataaccess@growingup.co.nz	The Te Reo Māori tool was developed in house to assess young people's receptive vocabulary (words in a person's vocabulary that they can comprehend and respond to) in te reo Māori. Analyses using this tool requires extensive investigation and considerations. Users should have experience in research with te reo Māori, psychometric testing and statistical derivation. Please contact dataaccess@growingup.co.nz for updated information on timing of further information regarding utility and processes to derive information relevant to this bespoke tool and to acknowledge the tool development.
DCW12-C	DISO_1_y12M to DISO_972_y12M NDISO_1_y12P to NDISO_972_y12P	Adapted from the questionnaire used in the 2017 SOAR study	Culture and Identity - Discrimination	Child Questionnaire	https://csrm.cass.anu.edu.au/sites/default/files/docs/2019/8/CSRM-WP-SOAR_PUBLISH_1.pdf	Items were sourced and designed in conjunction with experts, based on the questionnaire used in the 2017 SOAR study. https://csrm.cass.anu.edu.au/sites/default/files/docs/2019/8/CSRM-WP-SOAR_PUBLISH_1.pdf
DCW12-C	ETH5L3_1_Y12C to ETH5L3_36_y12C ETH5L3_1_Y12M to ETH5L3_36_y12M	Census ethnicity question	Culture and Identity - Ethnicity	Child Questionnaire Mother Questionnaire Partner Questionnaire Teacher	Statistics New Zealand. Statistical standard for ethnicity. Wellington, New Zealand: Statistics New Zealand; 2005	The ethnicity question used in GUiNZ ("Which ethnic group or groups do you belong to?") was slightly modified from the standard Census ethnicity question ("Which ethnic group do you belong to?") to emphasise that multiple responses were allowed. This means responses may not be directly comparable to Census responses.

	ETH5L3_1_Y12P to ETH5L3_36_y12P ETH5_1_Y12T to ETH5_9_Y12T			Questionnaire		For information regarding use of and derivation of ethnicity variables see section 15.3.1
DCW12-C	ET20_y12C ET16_y12C NET17_971_y12C to NET17_974_y12C	Standard Census Iwi questions	Culture and Identity – Iwi affiliation	Child Questionnaire	Statistics New Zealand. Iwi statistical standard. Wellington, New Zealand: Statistics New Zealand, 2017. https://aria.stats.govt.nz/aria/?_ga=2.104000388.522338775.1689549049-1431371O1.1689549049#StandardView:uri=http://stats.govt.nz/cms/StatisticalStandard/WGrXPMXiOEXvDzUf	We recommend careful considerations when using and reporting Iwi data.
DCW12-C	GI1_y12C GI3_y12C – GI8_y12C	Unipolar gender identity question Dual/Multipolar gender identity and expression: A 6-item modified version of the Perceived Similarity to Gender Groups Scale	Culture& Identity - Gender	Child Questionnaire	Unipolar gender identity question was developed in-house by GUiNZ team) Dual/Multipolar gender identity and expression modified version of Perceived Similarity to Gender Groups Scale: Martin CL, Andrews NC, England DE, Zosuls K, Ruble DN. A dual identity approach for conceptualizing and measuring children's gender identity. Child Dev. 2017;88(1):167-82.	For information on the use and derivation of the gender variables see Section 15.3.1
DCWEWE-C	QOL1-QOL10, (2.1-2.10)	KIDSCREEN	Health and Wellbeing – Child Quality of Life	Child Questionnaire	Ravens-Sieberer, U., A. Gosch, L. Rajmil, M. Erhart, J. Bruil, W. Duer, P. Auquier, M. Power, T. Abel, L. J. E. r. o. p. Czemy and o. research (2005). "KIDSCREEN-52 quality-of-life measure for children and adolescents." 5(3): 353-364. Ravens-Sieberer, U., Erhart, M., Rajmil, L., Herdman, M., Auquier, P., Bruil, J., Power, M., Duer, W., Abel, T.,	KIDSCREEN-10 score: a short measure forchildren and adolescents' well-being and health-related quality of life. Also asked at 8-year. See technical document for details. Pillai A., Kim H., Langridge F., Cha J., Miller S., Crosby, K., Walker C.

					Czemy, L., Mazur, J., Czimbalmos, A., Tountas, Y., Hagquist, C., & Kilroe, J. (2010). Reliability, construct and criterion	2021. Technical Document for Kidscreen Tool: 8-year Data Collection Wave. Growing Up in New Zealand: Auckland. For further information please contact dataaccess@growingup.co.nz
DCWEWE - M	PH1_Y13EWM - PH9_Y13EWM (8.1-8.10)	Patient Health Questionnaire (PHQ-9)	Psychosocial and Cognitive Development/Depression	Mother administered questionnaire	Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: a new depression diagnostic and severity measure. Psychiatric annals, 32(9), 509-515.	The PHQ-9 was previously administered in Partners at 9-months and in mothers at 54-months (9 items) and 8-year. Technical document available by contacting dataaccess@growingup.co.nz
DCWEWE-M	DS1 _Y13EWM–DS10_Y13EWM (12.1-12.20)	Centre for Epidemiologic Studies Depression Scale (CESD-10)	Psychosocial and Cognitive Development/Depression	Child administered questionnaire	Andresen, E. M., Malmgren, J. A., Carter, W. B., & Patrick, D. L. (1994). Screening for depression in well older adults: Evaluation of a short form of the CES-D. *American journal of preventive medicine*, *10*(2), 77-84. Fendrich, M., Weissman, M. M., & Warner, V. (1990). Screening for depressive disorder in children and adolescents: validating the center for epidemiologic studies depression scale for children. American Journal of Epidemiology, 131(3), 538-551.	The 10-item short form is scored on a 4- point scale with anchors ranging from 0 (Not at all) to 3 (A lot) with 2 reverse- coded items. A score of 10 or higher out of 30 is indicative of clinically significant depressive symptoms. Preliminary findings suggest that CESD-10 is an acceptable tool for screening depression in adolescents; Wording has been used according to the CESD-CD child version and was previously administered at the 8-year and 10-year (COVID-19) DCW. Technical document available by contacting dataaccess@growingup.co.nz See - See - **Fletcher, B.D. & Gawn, J. 2023. Technical Document for Patient Health Questionnaire 9 (PHQ-9) Mother Depression Tool: 13-**

						year Extreme Weather Survey. Growing Up in New Zealand: Auckland.
DCWEWE-M	AX1-AX7_Y13EWM	GAD-7	Psychosocial and Cognitive Development – anxiety	Mother administered questionnaire	Spitzer, R. L., Kroenke, K., Williams, J. B. (2006). A brief measure for assessing generalised anxiety disorder: the GAD-7. Archives of Internal Medicine. 166:1092-1097.	This tool assesses General Anxiety Disorders and was previously used in DCW1 (10). Technical document available by contacting dataaccess@growingup.co.nz **Fletcher, B.D. & Gawn, J. 2023. *Technical Document for the Generalised Anxiety Disorder Screener (GAD-7) Mother Anxiety Tool: 13-year Extreme Weather Survey.* Growing Up in New Zealand: Auckland.**
DCWEWE-C	PAS1 _Y13EWC–PAS10_Y13EWC (13.1-13.10)	Anxiety scale from PROMIS	Psychosocial and Cognitive Development - Anxiety	Child questionnaire	Irwin DE, Stucky B, Langer MM, et al. An item response analysis of the pediatric PROMIS anxiety and depressive symptoms scales. *Qual Life Res*. 2010;19(4):595-607. doi:10.1007/s11136-010-9619-3 Pilkonis, P. A., Choi, S. W., Reise, S. P., Stover, A. M., Riley, W. T., Cella, D., & PROMIS Cooperative Group. (2011). Item banks for measuring emotional distress from the Patient-Reported Outcomes Measurement Information System (PROMIS®): depression, anxiety, and anger. Assessment, 18(3), 263-283.	Items have been redacted in public forums due to copyright issues, however, are available in the dataset to approved data users. Technical document available by contacting dataaccess@growingup.co.nz See - **Fletcher, B.D. & Gawn, J. 2023. *Technical Document for the PROMIS Anxiety Tool: 13-year Extreme Weather Survey.* Growing Up in New Zealand: Auckland.**
DCWEWE-C	RES14-RES15_y13EWC	Connot-Davidson Resilience Scale (CD-RISC)	Psychological and Cognitive Development - Resilience	Child questionnaire	**See http://www.connordavidson-resiliencescale.com/index.php**	This tool is restricted in the public domain as it is protected by copyright. The items are available for use by data users however questions must not be shared in

						publications. Technical document available by contacting dataaccess@growingup.co.nz See - **Fletcher, B.D. & Gawn, J. 2023. *Technical Document for the Connor-Davidson Resilience Scale (CDRISC) Child Resilience Tool: 13-year Extreme Weather Survey.* Growing Up in New Zealand: Auckland.**

13. Technical documents

13.1. Questionnaires

The *Growing Up in New Zealand* questionnaires used during the DCWs are available (from growingup.co.nz) *after data collection is completed in the field.*

Note that where licensing does not permit reproduction of questions or tools used on a public website this is indicated in the documentation and further information may be obtained by contacting the Growing Up in New Zealand team via dataaccess@growingup.co.nz.

13.2. Data dictionaries

The *Growing Up in New Zealand* data dictionaries are designed to provide researchers with a comprehensive understanding of the content and variables available within each research dataset. These should be read alongside the relevant questionnaires. Each record describes a single variable, and the fields are shown in the order in which they appear (left to right) across the top row of the data dictionaries:

- No.: Row number in data dictionary.
- Research Domain/ Subdomain: Name of relevant research area.
- Questionnaire Number: The questionnaire number for the variable.
- Question: The question text or a shortened version of the question text.
- Variable Name: Name of the variables as they appear in the research dataset. This field will be empty,where a variable is unavailable.
- Formatted Data Values: Lists levels or categories within a variable, where a description is required.
- Value Labels: Description of formatted data values.
- Variable Type: Describes how different variables in the external datasets are presented. These are:
    - Raw Variables: Data values that have maintained their original form and structure from the raw dataset with no subsequent transformations.
    - Categorised Variables: Variable categories were combined from the raw form.
    - Re-classified Variables: Variables resulting from multiple response question/s exhibiting low cellcontents and counts were combined. In other cases, variables were mapped to standard classifications such as Languages/Ethnicity/ICD classification/Religion etc.
    - Derived Variables: A new variable that has been constructed from one or more raw variables.

- Derived and Categorised Variables: A new variable that has been both derived first and subsequently categorised.

- Proportion of missingness: new column added from the 8-year research datasets to describe the percentage of missing data for each variable in the research dataset. Applying for access to the research working datasets.

14. Appendix A – Technical documentation

As outlined in Table 3 post the initial provision of research datasets for all users to apply for access, ongoing work to derive variables and develop associated technical documentationto enhance the datasets occurs. As outlined in Table 3 post the initial provision of research anonymised datasets for all usersto apply for access, ongoing work to derive variables and develop associated technical documentationto enhance the datasets occurs. This Appendix summarises where this work has occurred, and research datasets have been updated as a result. Most of the effort to undertake these tasks for the 12-year datasets is ongoing. When derived variables and technical documents have been created the research datasets will be updated accordingly. In the interim (as per Table 3) if users would like to discuss utilising the raw variables and/or contribute to the development of technical documentation for the benefit of all users they are encouraged to contact the Growing Up team directly to discuss options (via dataaccess@growingup.co.nz).

14.1. Technical documentation for DCW1-DCW5

14.1.1. Immunisation information – DCW1

Purpose

The purpose of this technical document is to explain the steps undertaken to create immunisation timeliness and completeness information using exact linkage of the *Growing Up in New Zealand* data to routinely collected data from the Ministry of Health National Immunisation Register (NIR).The resulting derived variables are available in DCW1C research dataset.

Methodology

National Immunisation Register data was retrieved for *GUiNZ* children whose caregivers had consented to *GUiNZ* researchers accessing their health records when they undertook the antenatal interview. Exact data linkage was used based on the National Health Index (NHI) numbers of the cohort children (also available in the NIR) to link information about immunisations contained in theNIR with DCW1C information. Children who could not be linked to any immunisation records were assumed not to be immunised.

Schedule and type of immunisation doses the child received

All New Zealand-born children are scheduled for immunisation doses at 6 weeks, 3 months and 5 months of age. At each of these times, children receive:

- 1 dose of Diphtheria/ Tetanus/ Pertussis/ Polio/ Hepatitis B/ *Haemophilus influenza* type bvaccine; and

- 1 dose of Pneumococcal Conjugate Vaccine

Complete immunisation was defined as having received all six of these immunisation doses by one year (the age at which the NIR data was linked). Timely immunisation was defined as receiving all six vaccines (scheduled at 6 weeks, 3 months and 5 months) within 30 days of their due date.

Development process

A total of 6,847 children from the *GUiNZ* main cohort are included in the research datasets (tripletsare excluded because of ease of identifying individuals). Caregiver consent for linkage to routine health records, including the NIR, was given for 6,676 of the children (97.5%). Caregivers of 171 children did not consent to NIR linkage. No NIR linkage was made for 8 children. In total 6,668 children were linked to NIR records (see figure below).

Figure 2 below illustrates this process and provides the number of children for whom completion (VAC_ALL6_NUM_SL) and timeliness (VAC_ALL6_ONTIME_SL) are available

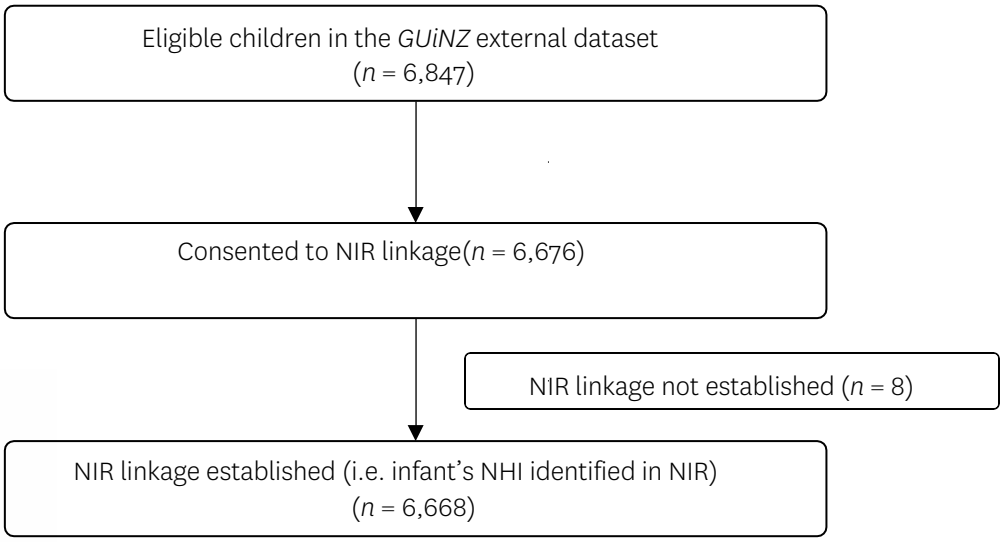


Figure 4. Process flow of NIR data linkage and the number of participants with linkage consented/established

Derived variables created – definitions and variable names

Two new derived variables from the NIR have been added to the DCW1C dataset as a result of this linkage.

Completion: VAC_ALL6_NUM_SL: The child has received all immunisation doses up to one year. Timeliness: VAC_ALL6_ONTIME_SL: All vaccine doses were given on time.

14.1.2. Respiratory hospitalisation and admission information – DCW1

Purpose

The purpose of this technical document is to explain the steps undertaken to create derived variables for admission to hospital for respiratory conditions in the first 12 months of life using deterministic linkage of the *Growing Up in New Zealand* (*GUiNZ*) data to routinely collected data from the Ministry of Health National Minimum Dataset (NMDS). These resulting derived variablesare available in DCW1C research dataset.

Background

The NMDS is New Zealand's national collection of hospital discharge information for inpatients andday patients. In New Zealand, the NMDS captures data on all acute hospital admissions in public hospitals or publicly funded private hospitals. The NMDS data up to age 1 year were available for the cohort children for whom consent for data linkage was obtained. 6,853 children were enrolled into the *Growing Up in New Zealand* cohort. Consent for linkage of the National Minimum dataset inthe first year of life was obtained for 93% (n=6,376) of the cohort children (Figure 3).

This document describes the process for derivation of three respiratory admission variables from the NMDS. These derived variables are: (1) admissions for respiratory tract infections (RES_ADM),

(2) length of hospital stay for respiratory tract infections (RES_LOS), and (3) recurrent admissions for respiratory tract infections (RES_RECURRENT). These derived variables are available in the DCW1C research dataset.

Methodology

The NMDS was provided by Ministry of Health in an excel format for all *Growing Up in New Zealand* children for whom consent to collect routine health data for the first year of life was obtained. Linkage to *Growing Up in New Zealand* data was performed using the child's NHI. The dataset was cleaned, and this process has been documented in the "Data Cleaning and Access Plan Document" dated 31st August 2013 and also in a PhD thesis. Variables such as child ID, mother ID and family ID had to be added into the NMDS from the linked perinatal dataset as a reference source. Addition ofthese variables allowed for deterministic linkage of the NMDS with other *Growing Up in New Zealand* datasets.

Screening for Respiratory tract infections

ICD-10 diagnostic codes were used to identify whether each hospital admission was for a respiratory tract infection. Respiratory infections are described by codes contained in 5 of the 20 ICD-10 chapters. The relevant codes from Chapters X, VII, VIII, I and XVI can be included (Table 8). Disease

codes for the eye (Chapter VII) and ear (Chapter VIII) can be included as these sense organscan potentially be involved during an acute respiratory infection (ARI). The codes within each chapter that were considered during the screening process are:

- Chapter X. Diseases of the Respiratory System: Acute upper respiratory infections (J00-J06); Influenza and pneumonia (J10-J18); Other acute lower respiratory infections (J20-J22); Otherdiseases of the upper respiratory tract (J30-39); Chronic lower respiratory tract diseases (J40-J47); Suppurative and necrotic conditions of the lower respiratory tract (J85, J86); Other diseases of pleura (J90-J93) and Other diseases of the respiratory system(J95-J99).Chapter VII. Diseases of the Eye and Adnexa: Disorders of the eyelid, lacrimal system andorbit (H00, H01, H04); Disorders of conjunctiva (H10).

- Chapter VIII. Diseases of the Ear and Mastoid Process: Diseases of the external ear (H60); Diseases of the middle ear and mastoid (H65-67, H70-75,H83).

- Chapter I. Certain Infections and Parasitic Infections: Tuberculosis (A15, A16, A19); other bacterial diseases (A36-A37); other diseases caused by chlamydia (A71, A74); other viral diseases (B26, B27, B30).

- Chapter XVI. Certain Conditions Originating in the Perinatal Period (Respiratory and cardiovascular disorders specific to the perinatal period (P23); Infections specific to the perinatalperiod (P36, P39).

Data was also extracted for length of hospital stay (LOS) for each respiratory admission as another measure of respiratory disease burden during infancy. The NMDS in long format (multiple lines of data per child corresponding to the number of hospital events) was used to describe the hospital admissions of those children with more than one respiratory admission (recurrent respiratory infection).

Table 7. Listing of International Classification of Diseases diagnostic codes for respiratory tract infections

Upper respiratory tract infection		Upper and Lower respiratory infection		Type	Lower respiratory tract infection	
Code	**Description**		**Description**		**Code**	**Description**
A36	Diphtheria	J06	Acute upper respiratory	URTI*	A15	Respiratory tuberculosis, confirmed
A37	Whooping cough	J09	Influenza due to certain identified influenzavirus	URTI	A16	Respiratory tuberculosis, not confirmed
A71	Trachoma	J10	Influenza due to, virus not identified	URTI	A19	Miliary tuberculosis
B26	Mumps	J30	Vasomotor and allergic rhinitis	URTI	J11	Influenza with pneumonia, virus not identified
B30	Viral conjunctivitis	J31	Chronic rhinitis, nasopharyngitis andpharyngitis	URTI	J12	Viral pneumonia, NC
H00	Hordeolum and chalazion	J32	Chronic sinusitis	URTI	J13	Pneumonia due to *streptococcus pneumoniae*
H01	Other inflammation of eyelid	J33	Nasal polyp	URTI	J14	Pneumonia due to *Haemophilus influenzae*
H04	Disorders of lacrimal system	J34	Other disorders of nose and nasal sinus	URTI	J15	Bacterial pneumonia, NC
H10	Conjunctivitis	J35	Chronic diseases of tonsils and adenoids	URTI	J16	Pneumonia due to other infectious organisms
H60	Otitis externa, not specified	J36	Peritonsillar abscess	URTI	J17	Pneumonia in diseases, CE
H65	Nonsuppurative otitis media	J37	Chronic laryngitis and laryngotracheitis	URTI	J18	Pneumonia, organism unspecified
H66	Suppurative and unspecified Otitis Media	J38	Diseases of vocal cords and larynx, NC‡	URTI	J20	Acute bronchitis
H67	Otitis media	J39	Other diseases of upper respiratory tract	URTI	J21	Acute bronchiolitis
H70	Mastoiditis and related conditions	J93	Pneumothorax	LRTI†	J22	Unspecified acute lower respiratory infection
H71	Cholesteatoma of middle ear	J95	Post procedural respiratory disorders, NC	LRTI	J40	Bronchitis, not specified as acute or chronic
H72	Central perforation of tympanic membrane	J96	Respiratory failure, non-classified	LRTI	J41	Simple and mucopurulent chronic bronchitis
H73	Other disorders of tympanic membrane	J98	Other respiratory disorders	LRTI	J42	Unspecified chronic bronchitis
H74	Other disorders of middle ear andmastoid	J99	Respiratory disorders in diseases, CE§	LRTI	J43	Emphysema
H75	Other disorders of middle ear andmastoid				J44	Other chronic obstructive pulmonary disease
H83	Other diseases of inner ear				J45	Asthma
J00	Acute nasopharyngitis (common cold)		*URTI Upper respiratory tract infections		J46	Status Asthmaticus
J01	Acute sinusitis		†LRTI Lower respiratory tract infections		J47	Bronchiectasis
J02	Acute pharyngitis		‡ NC Non-classified		J86	Pyothorax
J03	Acute tonsillitis		§ CE Classified elsewhere		J90	Pleural effusion, non-classified
J04	Acute laryngitis				J91	Pleural effusion, in conditions CE
J05	Acute laryngitis [croup] & epiglottis				J92	Pleural plaque

Development process

6,853 children were enrolled into the *Growing Up in New Zealand* cohort and consent for linkage ofthe National Minimum dataset was provided for 93% of the cohort children (n=6,376). Consent for linkage was not obtained for 172 children (Figure 3).

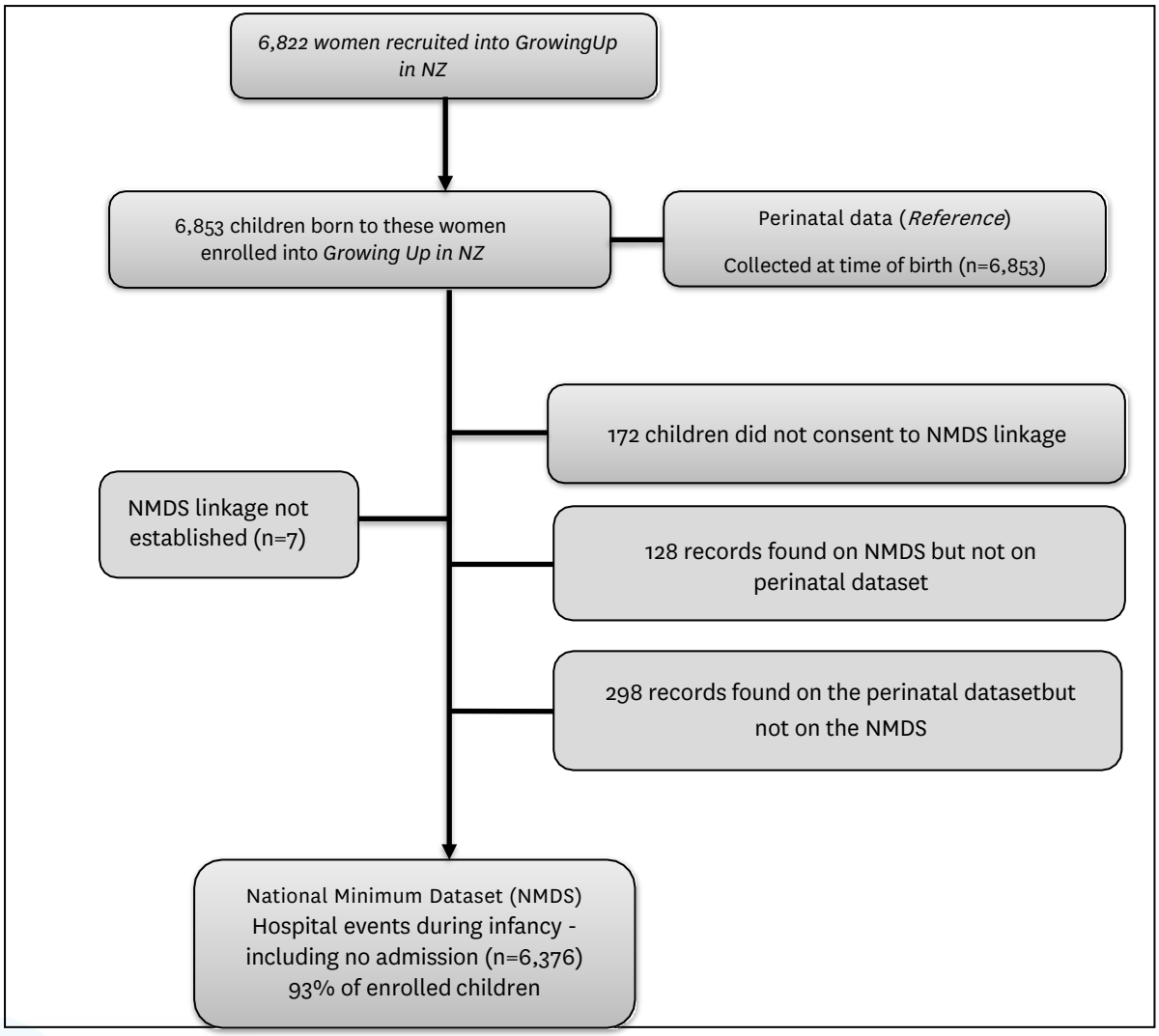


Figure 5. Summary of the linkage process and number of children for whom the RES_ADM, RES_LOS, and RES_RECURRENT data is available in DCW1C

There were 128 records on the NMDS that did not match with the perinatal datasets. These records were removed. There were 298 records on the perinatal dataset but not on the NMDS. These children were not followed further, but numbers seemed consistent with the findings reported in the *Growing Up in New Zealand* "Now we are born" report that approximately 5% of the cohort were either born at home or born overseas or elsewhere (outside of areas defined by Waikato, Counties Manukau and Auckland). NMDS linkage was not able to be established with 7 children in the next step. Therefore, NMDS information was available for 6,376 of the *Growing Up in New Zealand* cohortchildren and derived variables describing the respiratory admissions have been integrated into DCW1C dataset for data users.

Definition of respiratory admission variables

The definitions for the derived variables with the labels and code frames are provided in Table 9. The RES_ADM data label "98" was applied for children who were seen at the hospital for a respiratory infection but not admitted for further care.

Table 8. Variable Name, definition and code frame for the three derived variables

Variable Name	Label	Code frame
RES_ADM_NMDS1	Whether child admitted to hospital due to a respiratoryinfection	0= No 1= Yes 98= seen at hospital for respiratory infection but notadmitted
RES_LOS_NMDS1	Total length of stay in hospital for all respiratory infections infirst year of life	1 to 9 and more= Number ofdays admitted in hospital
RES_RECUR_NMDS1	Number of times the child wasadmitted due to respiratory infection	1= 1 times 2= 2 times … 5+= 5 and more times

Summary

Three derived variables from the NMDS are provided in the DCW1C child dataset. Deterministic data linkage established respiratory admission information for children whose parents consented to health data linkage in the first year of the cohort child's life.

Notes

The linkage to NMDS was undertaken by Rajneeta Saraf and Mark Hobbs as part of their PhD projects under the supervision and guidance of Dinusha Bandara (Biostatistician) and CameronGrant (Associate Director-*Growing Up in New Zealand* and PhD supervisor). Saraf's project was funded by Cure Kids and Hobbs' project by the Auckland Medical Research Foundation.

The *Growing Up in New Zealand* team and PhD students should be acknowledged as per the External Data Access process, along with the additional funding sources, when the derived respiratory variables are used by external researchers.

Key references:

- Saraf, R. Acute Respiratory Tract Infections and Vitamin D. Neonatal vitamin D levels and acuterespiratory tract infections in the first year of life. (PhD Doctoral thesis)
- World Health Organization. ICD-10 International statistical classification of diseases and relatedhealth problems. 10th revision. Geneva: World Health Organization.
- Morton, S.M.B., Atatoa Carr, P.E., Grant, C C (for *GUiNZ* team). (2012). *Growing Up in New Zealand*: A longitudinal study of New Zealand children and their families. Report 2: Now we areBorn. University of Auckland, Auckland. ISSN: 2253-2501.
- Hobbs, M. R., Morton, S. M., Atatoa-Carr, P., Ritchie, S. R., Thomas, M. G., Saraf, R., Chelimo, C., Harnden, A., Camargo, C. A. and Grant, C. C. (2016),Ethnic disparities in infectious disease hospitalisations in the first year of life in New Zealand. J Paediatr Child Health.doi: 10.1111/jpc.13377

14.1.3. Anthropometry – DCW2, DCW5, DCW8

Why we chose this tool - background

Anthropometric measures provide important longitudinal measures to understand growth trajectories, which may be used as a marker of nutritional status. Classic anthropometric measures of weight and height in early life (i.e. birth, infancy, childhood and adolescence) are alsoassociated with the likelihood of later health and wellbeing (e.g. obesity and other chronic diseases). In order to further characterise early growth and investigate the early determinants of later obesity and chronic diseases in the *GUiNZ* cohort (McCarthy 2014; Taylor et al. 2008), waist circumference measurements were collected in addition to standard height and weight at the pre-school phase (DCW5).

Why other tools were excluded

A laser stadiometer was chosen, rather than a classic portable stadiometer, in order to reduce the weight and volume of the equipment that the interviewers had to carry. To take height measurements, the laser stadiometer was attached to a metal bracket, specifically designed for this study. The laser device for measuring height in children has previously been used successfully by the Growing Up in Australia Study (LSAC) and has been validated for taking height measurements among children 2-12 years old (Garcia-Turner 2015). Caregiver's anthropometric measurements have not been taken in *GUINZ* because of time constraints and sensitivity around consent for measurements.

How the tool was used and if specifically adapted for our use

At 2 Years, 54 months, and 8 years, anthropometric measurements were collected by trained interviewers during face-to-face interviews. Measurements of weight (kilograms) and height (centimetres) were taken in duplicate. The protocol for measuring weight and height has been prescribed by the World Health Organization (WHO 1995) and adapted for use in New Zealand by the Ministry of Health (2008). At 2 years and 54 months, weight was measured using the Tanita Digital bathroom scale (Model HD-351) ®, with capacity of 200kg and precision of 0.1kg. If differences between two measurements were higher than 0.5 kg a third measurement of weight was performed. Height at 2 years and 54 months was measured using the laser stadiometer Precaster CA 600®, with capacity of 50 meters and precision of 0.2 cm. If differences between twomeasurements were greater than 1 cm, a third measurement of height was performed. At 8 years of age, more robust equipment was used: a Seca Scale and a Leica stadiometer. Third measurements of weight and height were collected if differences in weight were > 0.1 kg and in height if >0.5 cm.

Stadiometers and scales were checked and calibrated monthly during data collection.

At the 54 months and 8 years DCW, waist circumference (centimeters) was collected in addition to height and weight. Measurements were made at the midpoint between the lower margin of the least palpable rib (bottom of rib cage/10th rib) and the top of the iliac crest (hip bone), against the skin with the child wearing light clothing (WHO 2008). Measurements were taken in duplicate. If differences between the two measurements were greater than 1 cm, a third measurement was performed. Waist circumference was taken using a Lufkin W606PM tape measure, with capacity of2 meters and precision of 0.1cm.

In DCWs where it was not possible to measure anthropometry for logistical reasons (e.g. child was asleep) or if the child or parent refused, measurements were copied from the most recent records of weight and height recorded in the Well child Tamariki Ora book (www.wellchild.org.nz), or alternatively from other health records or from parental report (note these alternate measures also included age at measurement and are indicated in the dataset).

How we have created the outcome variables/ any up-coding/ collation of variables etc.

All raw anthropometry data that relates to height, weight and waist circumference were recorded by interviewers and multiple measures were recorded as above. We have subsequently undertaken data integration to provide the single most accurate measurement value for researchers. We have additionally provided the variables “Notes on quality” for each of the measurements at 2-year,54

months, & 8 years (weight, height and waist circumference). Those variables describe the quality of the anthropometric measurements taken for each child according to the interviewer.

Additional information

Additional data cleaning and harmonisation of *Growing Up in New Zealand* anthropometric data is being undertaken, in order to improve accuracy of the measurements and to check biological plausibility of extremes values of weight, height and waist circumference within the cohort. Please contact the *Growing Up in New Zealand* team if you require more information on data cleaning and harmonisation of the anthropometry variables.

Notes

The *Growing Up in New Zealand* team should be acknowledged as per the External Data Access process, along with the additional funding sources, when the anthropometric variables are used by external researchers.

Key references:

- Garcia-Turner VM (2015). Validation study of a laser as a new tool for height measurement. Abstractpublished on Anais of AAAS2015 Annual Meeting-Innovations, information and imaging. February 2015, San Jose, California, USA (on-line).
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- Pietilainen K. H. Kaprio J. Rasanen M. Winter T. Rissanen A. & Rose R. J. (2001). Tracking of bodysize from birth to late adolescence: Contributions of birth length, birth weight, duration of gestation, parents' body size, and twinship. American Journal of Epidemiology, 154, 21-29.
- Taylor R. W. Williams S. M. Grant A. M. Ferguson E. Taylor B. J. & Goulding A. (2008). Waist circumference as a measure of trunk fat mass in children aged 3 to 5 years. International Journal ofPediatric Obesity, 3, 226-233.
- World Health Organization. Physical status: the use and interpretation of anthropometry. Geneva:World Health Organization; 1995 (Technical Report Series, 854).
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14.1.4. Stack and Topple – DCW2

Why we chose this tool - background

We choose the stack and topple task (Ross, 1982) for several reasons. Firstly, it has been used experimentally with toddlers. It is a structured and interactive play task that can be used with an unfamiliar person such as the interviewer. Secondly, it best represents four main characteristics of social games: mutual involvement; turn taking; repetition of a sequence; and non-literality. Finally, and importantly, we were able to easily modify previous procedures of this task to measure key aspects of the child's:

- Attention (orienting, sustained, joint)
- Inhibitory control (self-control)
- Motor control, and
- Social engagement.

Why other tools were excluded

There is currently not a systematic repertoire of infant or toddler game-playing behaviours in the literature and nor are there any interactive, short, standardised tools that quickly measure the subskills we sought to measure. We did consider other structured games such as "peek a boo" and others, but none were as age appropriate, met our criteria or were appropriate to be played with a stranger.

How the tool was used and if specifically adapted for our use.

We modified the stack-and-topple activity by introducing three phases: Demonstration, Individual Pay, and Cooperative Play. In the demonstration phase, we measured the child's attention orienting and joint attention, as well as the ability to inhibit their impulses to reach for the blocks. The Individual Play phase allowed us to measure motor ability (and by proxy sustained attention). The Cooperative Play phase allowed us to measure social engagement, sustained and joint attention, and inhibitory control.

How we have created the outcome variables/ any up-coding/ collation of variables etc.

The stack and topple task was a brief child-interviewer interaction activity designed to assess six key measures of early social and cognitive functioning: attention orienting, sustained attention, joint attention, motor ability, inhibitory control and sociability.

As such, the protocol that interviewers completed for each participant (see 2-year observation booklet) addressed these constructs. After preliminary analyses, some of the data were collapsed due to the following reasons:

- Low response rates (when response rates were <=1% of the sample) incertain categories (see below).
- When the child was interviewed by an interviewer who did not achieve greater than 75% reliability on the particular measure during training.
- For additional information: Refer to Henderson, Waldie, Peterson, Underwood and Morton (in prep). Or contact Dr Annette Henderson, a.henderson@auckland.ac.nz.

It is important to note the following two processes for ensuring that data analysis is being carried out on the appropriate sample.

For all analyses, select only participants who were <36 months old at data collection

AND

For each of the variables, "select if" the child was interviewed by an interviewer who achieved sufficient reliability. That is, the child has a "1" for each reliability measure (see Table 10).

Table 9. Process for analysing Stack and Topple variables

Measure	Variable (s)	Step 1	Step 2	Consider
Attention orienting	ST17_Y2CO	Select only participants <36m	"Select if" AO_Reliability_Y2CO = 1	nST32_1_Y2CO
Joint attention/ demonstration task	ST18_Y2CO	Select only participants <36m	"Select if" JA_Reliability_Y2CO = 1	nST32_1_Y2CO
Joint attention/ co-operative task	ST24_Y2CO	Select only participants <36m	"Select if" JA_Reliability_Y2CO = 1	nST32_3_Y2CO nST32_4_Y2CO
Motor Skills	ST23_Y2CO	Select only participants <36m	"Select if" MS_Reliability_Y2CO = 1	nST32_2_Y2CO
Inhibitory control/ demonstration task	ST20_Y2CO	Select only participants <36m	"Select if" IC_Reliability_Y2CO = 1	nST32_1_Y2CO

Inhibitory control/co-operative task	ST25_Y2CO	Select only participants <36m	"Select if" IC_Reliability_Y2CO = 1	nST32_3_Y2CO nST32_4_Y2CO
Sustained attention	ST26_Y2CO	Select only participants <36m	"Select if" SA_Reliability_Y2CO = 1	nST32_3_Y2CO nST32_4_Y2CO
Social engagement	ST27_Y2CO	Select only participants <36m	"Select if" SE_Reliability_Y2CO = 1	nST32_3_Y2CO nST32_4_Y2CO

Additional information

Researchers may also want to explore the impact of the four variables that indicate which Stack and Topple tasks the child attempted [nST32_1_Y2CO; nST32_2_Y2CO; nST32_3_Y2CO; nST32_4_Y2CO]. Further details on the data collected and suggested recoding are provided below.

Attention Orienting [ST17_Y2CO]

- Task Question: At the start of the task, did the child pay attention before you started demonstrating the stacking?
- This variable indicates toddlers' ability to orient their attention from one activity towards the interviewer at the beginning of the task. Due to very few responses in the "No" and "Yes, after 2 prompts" categories, it is suggested that these are combined to form one category resulting in the following response categories for attention orienting: "Not at all orafter 2 prompts"; "After 1 prompt"; or "Yes, immediately".

Joint Attention [ST18_Y2CO; ST24_Y2CO]

- Task Question: Did the child maintain joint attention (look at the interviewer and the blocks)during both demonstrations/cooperative task?
- For analyses, it is suggested that both joint attention variables (Demonstration: ST18_Y2CO; Cooperative Task: ST24_Y2CO) are dichotomised as follows (because few children looked primarily at the interviewer): "Child looked mostly at blocks or mostly at interviewer"; or "Child looked actively at both blocks and interviewer".

Motor Skills [ST23_Y2CO]

- Task Question: During the individual task, what was the highest number of blocks stacked?

Inhibitory control (IC) [ST20_Y2CO; ST25_Y2CO]

- Task Question: During the second [demonstration: ST20_Y2CO/cooperative task: ST25_Y2CO(where the child goes first)], did the child wait his/her turn?

- Due to low response rates in the “Hardly ever” or “A little” categories for both tasks, it is suggested that these categories are combined to make two categories for this measure: “Under-controlled and inconsistent”; or “Controlled”.

Sustained attention [ST26_Y2CO]

- Task Question: During the cooperative tasks, did the child stay focused on the task?
- Due to very few responses in the “Hardly ever” and “A little” categories, it is suggested thatthese categories are combined to make two categories for this measure: ”Low sustained attention” (Child stayed focused on the task hardly ever, or a little; or “High sustained attention” (Child stayed focused on task most of the time).

Social engagement [ST27_Y2CO]

- Task Question: During the cooperative tasks, was the child socially engaged (e.g. smiling, talking, enjoying the task)?
- Due to low response rates in the “Hardly ever” category, it is suggested that these categories are combined with “Showed some signs” to make two categories for this measure: (Child hardly ever showed signs of being socially engaged during task OR Child showed some signs of being socially engaged during task); or “Child showed signs of beingsocially engaged during most of the task”.

Key reference:

Ross, H.S. (1982) Establishment of social games among toddlers. Developmental Psychology, 18(4), 509-518.

14.1.5. Child Behaviour Questionnaire (VSF) - DCW5

Why we chose this tool – background

A number of instruments have been developed to measure temperament (Rothbart 2011), but those associated with the work of Mary Rothbart are among the most popular for use in researchand in practice (Peterson et al., *2017a*).

Growing Up in New Zealand used the Infant Behavior Questionnaire-Very Short form (IBQ-VSF) at 9 months. The CBQ-VSF (Putnam & Rothbart 2006) is an age-appropriate continuation of the IBQ- VSF (Putnam et al. 2015) measuring the same temperament factors.

How the tool was used and specifically adapted for our use

The CBQ-VSF questionnaire was designed to measures three broad scales of a child’s temperament: Negative Affect (NA), Surgency (S) and Effortful Control (EC). However, our research (described below)has suggested that a different three factor structure *Negative Affect (NA), Effortful*

Control (EC), and Boldness (B)) is a better fit for the data, and the factors show continuity of temperament from infancy (Schoeps et al. under review).

There original CBQ-VSF has 36 questions in total, 12 for each broad factor. Each question is a statement to which the mother responds whether the statement is a true or untrue description of their child's behaviour over the past six months. The items are rated on a scale from 1 to 7 (1 = Extremely untrue, 2 = Quite untrue, 3 = Slightly untrue, 4 = Neither true nor untrue, 5 = Slightly true, 6 = Quite true, 7 = Extremely true). Mothers can also respond that they didn't know or that the question was not applicableif they had never seen the child in a certain situation. These responses are treated as missing data. Table 11 lists the 36 items, the subscales they are from, and the three broad factors reported by the scale authors.

Inspection of the answer patterns however, revealed that the three negatively phrased items (items 20,26, and 29) did not work well in our study population, so they were excluded. The internal consistency (McDonald's omega) for the three original CBQ – VSF factors with these 3 items removed were: ω_{NA} = .73; ω_S = .72; ω_{EC} α = .71. In addition, a confirmatory factor analysis (CFA) based on the remaining 33 items and the originally proposed CBQ-VSF three factor model using all children whose mother responded to all the CBQ-VSF items (N=5836) and Maximum Likelihood Estimation yielded poor model fit (CFI = 0.735; RMSEA = .059; and SRMR = .077), suggesting that the model was not the best representation of the data. Previous researchers have also suggested that the original 3 factor structuremay not be the most parsimonious (e.g. Sleddens et al. 2011 and Allan et al. 2013).

How we have created the outcome variables/any up-coding/collation of variables etc.

New three factor structure of temperament using the CBQ-VSF

Exploratory Factor analysis (EFA) suggested that structure of between 3 and 5 factors would fit the databest. While the 3-factor solution was most parsimonious, all three factor structures (3, 4, and 5 factors) made conceptual sense. Thus, while we mainly present results from the 3- factor structure (*Negative Affect, Effortful Control, and Boldness*), it is also possible to work with a 4- or 5-factor structure. Table 11 shows the factor loadings of the single items on the 3 new factors. Only 20 items were retained in this structure, as 13 items had low loadings or strong cross-loadings between *factors.*

Table 10. Factor loadings of 33 items of the very short form of the child behavior questionnaire on the 3-factor structure from exploratory factor analysis with oblique rotation (N=2,989 (sample randomly split in half for validation purposes))

Item No.	CBQ subscale (broad factor)	Statement	Factor 1 *(NA)*	Factor 2 *(EC)*	Factor 3 *(B)*
2	Anger *(NA)*	Gets quite frustrated when prevented from doing something s/he wants to do.	**0.51†**	‡	
~~5~~§	Discomfort *(NA)*	Is quite upset by a little cut or bruise.	**0.31**		
8	Sadness *(NA)*	Tends to become sad if the family's plans don't work out.	**0.49**	0.15	
~~11~~	Fear *(NA)*	Is afraid of burglars or the "boogie man".	**0.27**	0.17	
14	Soothability *(NA)*	When angry about something, s/he tends to stay upset for ten minutes or longer.	**0.57**		-0.20
17	Sadness *(NA)*	Seems to feel depressed when unable to accomplish some task.	**0.47**		
20	Discomfort *(NA)*	Hardly ever complains when ill with a cold.			
23	Soothability *(NA)*	Is very difficult to sooth when s/he has become upset.	**0.57**		-0.27
26	Fear *(NA)*	Is not afraid of the dark.			
29	Discomfort *(NA)*	Is not very upset at minor cuts or bruises.			
32	Anger *(NA)*	Gets angry when s/he can't find something s/he wants to play with.	**0.56**		
~~35~~	Sadness *(NA)*	Becomes upset when loved relatives or friends are getting ready to leave following a visit.	**0.32**	0.19	
1	Activity Level *(S)*	Seems always in a big hurry to get from one place to another.	**0.44**		0.29
~~4~~	High Intensity Pleasure *(S)*	Likes going down high slides or other adventurous activities.	0.16		**0.34**
7	Impulsivity *(S)*	Often rushes into new situations.	0.37		**0.51**
10	Shyness *(S)*	Seems to be at ease with almost any person.		0.22	**0.60**
~~13*~~	Activity Level *(S)*	Prefers quiet activities to active games.		-0.28	**0.28**
~~16~~	High Intensity Pleasure *(S)*	Likes to go high and fast when pushed on a swing.			**0.25**
19*	Impulsivity *(S)*	Takes a long time in approaching new situations.	-0.24		**0.60**
22*	Shyness *(S)*	Is sometimes shy even around people s/he has known a long time.	-0.27		**0.57**
~~25~~	Activity Level *(S)*	Is full of energy, even in the evening.	**0.30**		0.26
~~28~~	High Intensity Pleasure *(S)*	Likes rough and rowdy games.	0.20		**0.35**
~~31*~~	Impulsivity *(S)*	Is slow and unhurried in deciding what to do next.			**0.29**
34*	Shyness *(S)*	Sometimes turns away shyly from new acquaintances.	-0.16		**0.56**
3	Attention Focusing *(EC)*	When drawing or colouring in a book, shows strong concentration.		**0.38**	
6	Inhibitory Control *(EC)*	Prepares for trips and outings by planning things s/he will need.		**0.45**	
9	Low Intensity Pleasure *(EC)*	Likes being sung to.		**0.36**	
12	Perceptual Sensitivity *(EC)*	Notices it when parents are wearing new clothing.		**0.60**	
~~15~~	Attention Focusing *(EC)*	When building or putting something together, becomes very involved in what s/he is doing, and works for long periods.		**0.28**	
18	Inhibitory Control *(EC)*	Is good at following instructions.	-0.23	**0.43**	
21	Low Intensity Pleasure *(EC)*	Likes the sound of words, as in nursery rhymes.		**0.43**	
24	Perceptual Sensitivity *(EC)*	Is quickly aware of some new item in the living room.		**0.45**	
27	Attention Focusing *(EC)*	Sometimes becomes absorbed in a picture book and looks at it for a long time.		**0.31**	
~~30~~	Inhibitory Control *(EC)*	Approaches places s/he has been told are dangerous slowly and cautiously.	-0.18	**0.26**	
33	Low Intensity Pleasure *(EC)*	Enjoys gentle rhythmic activities, such as rocking or swaying.		**0.30**	
36	Perceptual Sensitivity *(EC)*	Comments when a parent has changed his/her appearance.		**0.58**	
	Factor Correlations				
		NA			
		EC	-0.01		
		B	-0.41**	-0.09**	

CBQ – Child Behavior Questionnaire, *NA – Negative Affectivity, EC – Effortful Control, B – Boldness*, †main loadings in bold,

‡Loadings <0.15 not shown, §deleted items had low factor loadings of <0.3 and/or cross-loadings that differed by less than 0.2from at least one other loading on a different factor, *reverse-coded items to fit with the overall factor structure.

As a result of these deletions, six items remained in the original NA factor (factor 1), and ten items remained in the original EC factor (factor 2). Only four items of the original Surgency factor remained in our new 20-item temperament structure. This subset comprises items related to the child's willingness to approach new people and situations, namely item 10 '*Seems to be at ease with almost any person*', reversed item 19 '*Takes a long time in approaching new situations*', reversed item 22 '*Is sometimes shy even around people s/he has known a long time*', and reversed item 34 '*Sometimes turns away shyly from new acquaintances*'.

McDonald's omegas showed acceptable internal consistency for this new structure: ω_{NA}=0.71; ω_{EC}=0.70; and ω_{B}=0.75. Model fit indices for the new 3-factor structure were also acceptable: RMSEA=0.047; SRMR=0.048; and CFI=0.903, which indicates that the new parsimonious 3-factor structure fits the *Growing Up in New Zealand* data better than the original 3-factor structure.

Model fit for our new 22-item 4-factor and 25-item 5-factor structures was somewhat but not largely inferior to the 20-item 3-factor structure. Allowing for four and five factors retrieved a Surgency factor,and one additional factor, Perceptual Sensitivity (PS), separated out from the EC factor the 5-factor structure. More details on the items that make up the respective factors are presented in Table 12. Items making up the temperament factors in the respective factor structures, should researchers want to use these more fine-grained factors.

Table 11. Items making up the temperament factors in the respective factor structures

	3-factor structure	4-factor structure	5-factor structure
Negative Affectivity (NA)	2, 8, 14, 17, 23, 32	2, 5, 8, 14, 17, 23, 32	**2, 5, 8, 11, 14, 17, 23, 32**
Negative Emotionality (EC)	3, 6, 9, 12, 18, 21, 24, 27, 33, 36	3, 6, 9, 12, 21, 24, 33, 36	**3, 15, 18, 21, 27, 33**
Boldness (B)	10, 19*, 22*, 34*	10, 19*, 22*, 34*	**10, 19*, 22*, 34***
Surgency (S)	x	4, 16, 28	**4, 16, 25, 28**
Perceptual Sensitivity (PS)	**x**	**x**	**12, 24, 36**

*reversed items

Invariance testing of our preferred revised three factor structure revealed metric but not scalar invariance for all factor structures between the four main ethnic groups. Using our new 3-factor model for child temperament and the previously determined 5-factor model for infant temperament, we couldreplicate the expected homotypic continuity between *Negative Emotionality (NEG)* and *NA* (β=0.26), *Orienting Capacity (OC)* and *EC* (β=0.23), and *Affiliation/Regulation (AR)* and *EC* (β=0.12), and the expected heterotypic continuity between *Positive Affect/Surgency (PAS)* and *EC* (β=0.14) and *AR* and *NA*(β=-0.10). Although *Fear* had separated out from the broad *NEG* factor and *Boldness* separated out from the broad *Surgency* factor, we found a strong association between *Fear* in infancy and *Boldness* in childhood (β=-0.21).

Homotypic continuity between *PAS* and *Surgency* could not be assessed in the 3-factor structure because we did not find a *Surgency* factor. However, *PAS* was strongly associated with the *Surgency* factor from the 5-factor structure (β=0.25). The major associations between *NEG* and *NA*, *OC* and *EC*, and *PAS* and *EC* were found across all four major ethnic groups, but were more or less pronounced. Thestrong inverse associations between *Fear* and *Boldness* and *AR* and *NA*, however, could not be shown inchildren of Pacific mothers.

Additional information

Table 12 identifies the items that make up our proposed 3 factor structure of temperament at 4.5 yearsusing the CBQ-VSF. Note some items are reversed scored (see * items in Table 12). Please email e.peterson@auckland.ac.nz if you wish to be added to a mailing list to receive a copy of the paper on thenew 3 factor structure once it has been accepted for publication.

Key references:

- Allan, N. P., Lonigan, C. J., & Wilson, S. B. (2013). Psychometric evaluation of the Children's BehaviourQuestionnaire – Very Short Form in preschool children using parent teacher report. Early Childhood Research Quarterly, 28(2), 302-313. Retrieved from http://dx.doi.org/10.1016/j.ecresq.2012.07.009.
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14.1.6. Strengths and Difficulties Questionnaire – DCW2, DCW5, DCW8

Why we chose this tool – background

The Strengths and Difficulties Questionnaire (SDQ; Goodman, 1987) is a parent-rated 25-item scale thatmeasures five aspects of child behaviour (see Table 13: child behaviours measured by the SDQ).

Table 12. Child behaviours measured by the SDQ

Subscales of the SDQ	Internalising and externalising Problems Score	Total Difficulties Score
1) emotional symptoms (5 items)	1) to 2) added together to generate an 'internalising problems' score (based on 10 items)	1) to 4) added together to generate a total difficulties score (based on 20 items).
2) peer relationship problems (5 items)		
3) hyperactivity/inattention (5 items)	3) to 4) added together to generate an 'externalising problems' score (based on 10 items)	
4) conduct problems (5 items)		
5) prosocial behaviour (5 items)		

For each of the 5 subscales, the score can range from 0 to 10, the externalising/ internalising scorescan range from 0 to 20 and the total difficulties score can range from 0 to 40. The SDQ is used widely and internationally; it is argued to have the advantages of being reliable, brief, comprehensive and simple to administer. It assesses positive and negative behaviours, it can be used across a wide range of ages, and it has self, parent and teacher report versions.

The SDQ can screen for behavioural difficulties typically identified in longer questionnaires such asthe Child Behaviour Checklist. It has norms for use in multiple countries including Australia, United

Kingdom and the USA (see www.sdqinfo.com). It is also used in the New Zealand Before School Check (B4SC).

Why other tools were not chosen

Other questionnaire-based scales considered included:

- Child Behaviour Checklist (CBCL) - This was identified as being too long and the items were too negative.
- Brief Infant Toddler Socio Emotional Assessment (BITSEA) - This scale was too expensive to administer.
- Ages and Stages Questionnaire - The socio-emotional items were too long.

How the tool was used and if specifically adapted for our use

At the 2Y DCW, the "early-years" SDQ (for ages 2-4) was included in the mother (n=6242) and partner (n=3804) questionnaires. Confirmatory factor analysis was used to evaluate the SDQ's factor structure/test for measurement invariance, normative New Zealand scores/banding havebeen described and mother/partner scores compared with the following results:

We found support for a modified five-factor model, in which the prosocial factor was extended into a positive construal factor.

For mothers, full measurement invariance of the modified model was found across child gender and socioeconomic status, partial invariance was found across mother's ethnicity.

Full measurement invariance of the modified model was found across mothers and fathers.

Parents showed moderate agreement in their SDQ ratings.

At the 54m DCW, the "standard" SDQ (for ages 4-17) was included in the child proxy questionnaire.In the process of processing the data it was discovered that one item had been omitted from the 54m Child Proxy Questionnaire. The missing SDQ item was:

"*Often fights with other children or bullies them*".This item contributes to the following scores:

- conduct problems
- externalising problems, and
- total difficulties.

The missing item also affects the ability to determine whether a child meets the criteria for normal,borderline or abnormal behaviour on these scales.

This technical document includes information to help users account for the missing item in their analyses.

At the 8Y DCW mothers of the children completed the 25 items of the "standard" SDQ (for ages 4-17).It was important to use the same measures as the 2-year DCW and the 54-month DCW so that conduct and behaviour over time can be explored.

How we have created the outcome variables/ any up-coding/ collation of variables etc.

The research dataset includes raw data for 24 SDQ items and derived subscale data for: Emotional problems; Peer problems; Hyperactivity-Inattention; Prosocial behaviour. Detailed information on scoring the SDQ can be found on the "youth *in* mind" website: sdqinfo.org/py/sdqinfo/c0.py

Table 14 shows the variable names for each of the SDQ items that belong to these subscales. Note: variables with an asterisk should be reverse coded before they are used for analysis.Also note that in the 54M research dataset, all SDQ items are coded as follows:

1= Not true; 2= Somewhat true; 3= Certainly true; 99= Don't know or 98 =Refused. Individual items for use in subscale scores were recoded as 0= Not true; 1= Somewhat true; 2= Certainly true.

Table 13. SDQ variables for each subscale

Subscale	**Items**
Emotional problems	SDQ3_m54Cm; SDQ8_m54Cm; SDQ13_m54Cm; SDQ16_m54Cm; SDQ24_m54Cm
Peer problems	SDQ6_m54Cm; SDQ11_m45Cm*; SDQ14_m54Cm*; SDQ19_m54Cm; SDQ23_m54Cm
Hyperactivity-Inattention	SDQ2_m54Cm; SDQ10_m54Cm; SDQ15_m54Cm; SDQ29_m54Cm*; SDQ31_m54Cm*
Prosocial behaviour (positively worded items)	SDQ1_m54Cm; SDQ4_m54Cm; SDQ9_m54Cm; SDQ17_m54Cm; SDQ20_m54Cm

*One missing item as described above

Managing the missing SDQ item

Growing Up in New Zealand has carried out a review to:

- identify information available to potentially contribute to resolving the issue of the missing SDQ item
- identify methods that could be used to deal with the missing SDQ item, and
- evaluate each of these methods.

Useful information available to users are described in Table 15.

*Table 14. **Growing Up in New Zealand** SDQ data available*

Information
Scores of 25 items (and all derived subscale scores) from mothers & partners at 2Y
Scores of 24 items (and subset of derived subscale scores) from mothers at 54M
Scores of 25 items (and all derived subscale scores) from mothers at 8Y

We explored the following methods of dealing with the missing SDQ item.

- multiple and simple imputation
- using the SDQ scoring method for missing values

For each of these methods, we provide: a brief description of the method and how it could be applied to the data; how the method was evaluated and what the findings were.

Imputation

This work explored whether the missing values could be imputed. A literature search on the application of imputation was carried out and expert views were sought on whether this methodcould be used when an entire item was missing.

Imputation is the practice of substituting missing values with 'reasonable guesses' and there are various statistical approaches available for achieving this. In single imputation procedures, the missing data is imputed once (for instance, by imputation of the mean, last value carried forward, regression modelling), and then the analysis continues as normal. Multiple imputation is a more statistically principled technique than single imputation but creates multiple versions of the dataset.

In principle, multiple imputation should be undertaken in a bespoke way depending on specific research questions. Due to these reasons, multiple imputation was not felt to be appropriate.

Single imputation of an item with missing values relies on having observed values for that item upon which to base the imputation of the missing values. Given that an entire item was missing (i.e. there were no observed values) different ways of creating these observed values were reviewed.

We considered using the 2Y SDQ item data carried forward as the basis (observed values) for imputation. In this approach, each child's SDQ data for the missing item from the 2Y interview would be carried forward and used to replace the missing values for a random subsection of the cohort – this data would form the basis of the observed values upon which to impute the remainingmissing values for the cohort. This method assumes that children's scores on individual SDQ items do not change significantly over time. However, as Table 16 shows, this does not appear to be the case. At 54M, scores among the cohort have generally 'improved' compared with scores at 2Y.

Table 15. 2Y responses to the SDQ conduct items [with corresponding 54M data]

Response	Temper	Obedient*	Fights	Argues	Spiteful	[Lies]	[Steals]
Not true	22% [39%]	33% [47%]	62%	51%	69%	[68%]	[87%]

Somewhat true	53% [48%]	62% [49%]	31%	40%	28%	[30%]	[11%]
Certainly true	25% [13%]	5% [3.5%]	7.5%	9%	3.5%	[2%]	[2%]

* Scores reversed; missing item in grey column

More complex methods of imputation could make use of other available data, in the form of *Growing Up in New Zealand* SDQ data from both the 2Y and 54M. For these methods, these data would be included in the imputation model to help predict the imputed values with better accuracythan simply carrying forward the missing item 2Y scores. Further data for imputation will be available when the SDQ is re-administered to the cohort at the 8Y DCW; mother-reported data willbe collected.

SDQ scoring method for missing values

Where there are SDQ missing data, a scoring method can be applied whereby item scores are scaled up pro-rata (if at least 3 items have been completed) (see sdqinfo.org/py/sdqinfo/co.py). For example, a score of 4 based on 3 completed items isscaled up to a score of 7 (6.67 rounded up) for 5 items (4 divided 3 multiplied by 5). The easiest wayof calculating pro-rata subscale scores is to multiply the mean of individual item scores by 5 (provided there are at least 3 subscale scores available). Using this method, the subscale scores, externalising/ internalising scores and total difficulties score have the same ranges as described previously.

To evaluate this method, the missing SDQ item was removed from the 2Y dataset and the impact on the results of original (25 item) analyses was explored. In addition, confirmatory factor analysisof the 2Y data was rerun as if the SDQ item had been missing (see D'Souza et al. 2017, for a full description of the methods used). The findings of this work are shown in Table 17.

Table 16. Comparison of 2y SDQ data with and without missing item

	25 items (N=6242)	**24 items (N=6237)**	**Differences in scores/%**
Mean (SD) scores:			
Conduct problems	3.13 (1.97)	3.47 (2.04)*	Significant, p<.01
Externalising problems	7.48 (3.46)	7.82 (3.51)	Significant, p<.01
Total difficulties	11.53 (5.16)	11.87 (5.17)	Significant, p<.01
Conduct problems			
Normal	76.1% (n=4752)	70.3% (n=4384)	Significant, X2=
Borderline	11.5% (n=719)	16.1% (n=1005)	6262.42, p<.01
Abnormal	12.4% (n=771)	13.6% (n=848)	
Total difficulties			
Normal	78.2% (n=4874)	76.5% (n=4764)	Significant, X2=
Borderline	11.7% (n=729)	12.7% (n=794)	9170.94, p<.01
Abnormal	10.1% (n=630)	10.8% (n=671)	
Confirmatory factor analysis (modified model$)	CFI = 0.905; X2 = 3361.02;	CFI = 0.908; X2 = 2945.66;	

** Conduct problem scores for 24 items calculated using four items and scaled up to rangeofo-10*

$ see D'Souza et al., 2017.

The original 25 item and the revised 24 item datasets both had full measurement invariance across child's gender and deprivation, and partial but satisfactory invariance across mother's ethnicity.

Confirmative factor analysis showed that both methods had good model fit. However, the SDQ results for the revised 24 item dataset were significantly different than those for the original 25 item dataset. Thus, dealing with the missing SDQ item in this way may significantly impact the result of any analysis carried out.

This method may result in inflated conduct subscale scores thus leading to inflated externalising and total difficulties scores. An explanation for this is found in Table 16; with the exception of the 'spiteful' item, the cohorts' scores on the missing item (fighting with or bullying other children) at2Y were significantly lower than most of the other conduct item scores ($p<0.001$). Currently, we cannot ascertain whether this pattern of low scoring relative to other items persists or how it changes as the cohort children get older. As Table 17 shows there are changes in the pattern of responses to each of the other SDQ conduct items at 54M. Further information on these patternswill be available when the 8Y external dataset becomes available.

This method of rescoring the conduct problems subscale may be appropriate for specific research questions. In particular, the total difficulties score and bandings appear to be less impacted than the conduct problems and externalising subscales.

Additional information

Accompanying variables for the SDQ are as follows:

- SDQ32_m54Cm [Overall, do you think that {NAME} has difficulties in one or more of the followingareas: emotions, concentration, behaviour or being able to get on with other people?]

If the response to this item was "Yes", the following items were administered:

- SDQ33_m54Cm [How long have these difficulties been present?]
- SDQ34_m54Cm [Do the difficulties upset or distress your child?]
- SDQ35_m54Cm; SDQ36_m54Cm; SDQ37_m54Cm; SDQ38_m54Cm [Do the difficulties interfere with your child's everyday life in the following areas? Home life; Friendships; Learning; Leisure activities]
- SDQ39_m54Cm [Do the difficulties put a burden on you or the family as a whole?]

Key references:

- D'Souza, S., Waldie, K.E., Peterson, E.R. et al. (2017a). Psychometric Properties and NormativeData for the Preschool Strengths and Difficulties Questionnaire in Two-Year-Old Children. J Abnorm Child Psychol 45: 345. doi:10.1007/s10802-016-0176-2

- D'Souza, S., Waldie, K.E., Peterson, E.R. et al. (2017b). The Strengths and Difficulties Questionnaire: Factor structure and parent agreement in 2-year-old children. *Assessment.*

- Goodman R (1997) The Strengths and Difficulties Questionnaire: A Research Note. Journal of ChildPsychology and Psychiatry, 38, 581-586.

- Morton, S.M.B., Atatoa Carr, P.E., Grant, et al., (2014). *Growing Up in New Zealand*: A longitudinalstudy of New Zealand children and their families. Now we are Two: Describing our first 1000 days.Auckland: *Growing Up in New Zealand*.

14.1.7. Gift Wrap Task – DCW5

Why we chose this tool – background

This measure was selected to get an observational measure of the ability to control emotionally arousing behaviour prior to entering school. The task selected is a brief observational measure of delayed gratification and is argued to be a measure of hot cognition.

The ability to delayed gratification has been found to be predictive of multiple life outcomes including, prevention of developmental and mental health problems, and increase in resilience, fewer conduct disorders and addictive and antisocial behaviours and greater scholastic achievement (Mishcel 1974 and Mischel et al.1989).

More recently, Caspi et al. (2011) found that high levels of self-control identified in 3-year-olds was associated with adults reporting fewer health problems, less substance dependence fewer criminal convictions, reduced chance of having children raised in single parent homes and less likelyto have annual income of less than $NZ 20,000.

The tool is used widely in the research literature and in several longitudinal studies. For example, it was used in the Chicago Neighbourhoods study (N= 6000) as part of the Preschool Self-Regulation scale.

Why other tools were excluded

The original delayed gratification task more commonly known as the Marshmallow task (Mischel and Ebbeson 1970) was excluded due to difficulties around using food as an incentive and due to inability to film the child's behaviour.

How the tool was used and if specifically adapted for our use

The child was told "Now I have a surprise to show you, but I don't want you to see it. I want to wrapit first. Please turn around so you won't see it. Please don't look or peek while I wrap it. I'll tell you when I'm done".

A timer is set for 1 minute. The interviewer takes out wrapping materials and pre-wrapped gift (being careful not to let the child see that gift is already wrapped). The interviewer noisily pretendsto wrap while watching child's behaviour. After 1 minute they say "Ok, I'm all done, you can turn around now".

The interviewer records the time of the child's first peek. They also record each time the child turnsaround or peeks and they say "Remember, no peeking. I'll tell you when I'm done". The interviewer also codes how many times the child peeked.

How we have created the outcome variables/ any up-coding/ collation of variables etc.

The outcome variables were 'time to first peek' and 'how many times the child peeked'.

Four response options were possible:

- Child peeked once
- Child peeked more than once
- Child peeked once or more and then remained peeking for the remainder of the timing
- Child peeked (one or more times) and touched the gift.

Key references:

- Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. Developmental Psychology, 36,220–232.
- Metcalf, J., & Mischel,W (1999). A Hot/Cool-System Analysis of Delay of Gratification: Dynamics ofWillpower. Psychological Review, 106, 1, 3-19.
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14.1.8. Modified version of the Expressive/Receptive Task of the Affective Knowledge Task (AKT) – DCW5

Why we chose this tool – background

Denham's (1986) Affective Knowledge Task is one of the most widely used emotion knowledge tests (Morgan et al. 2009). It has good internal consistency and 1 year stability (Denham et al. 2012). Early child socio-emotional learning is increasingly being seen as vital component with respect to school readiness, school adjustment, social competence and academic achievement (e.g. Denham et al. 2003; Denham et al. 2012). This is because a pre-schooler who has attained age-appropriate socio-emotional learning skills is more able to pay more attention to tasks, plan more, and devote more resources to learning and this enables them to work better with their teachers and peers to share resources and maximise learning opportunities (Denham et al. 2012).

We were not able to use the full AKT due to time constraints. Instead, we used the Expressive/ Receptive Task of the AKT and in conjunction with the test author we modified the task slightly. Rather than using puppets with stick on faces we used cards with simple cartoon faces. We used theoriginal four faces for happy, sad, scared and angry (although slight changes were made to the scared face by removing the eyebrows to make it less feminine, we also added the emotions (surprised and disgust) in order to try and avoid potential ceiling effects with the original four emotions (Denham et al. 2012).

Why other tools were excluded

We also considered using the Pearlman Emotional Knowledge Task and the Test of Emotion Comprehension (Pons et al. 2004), the Emotion Matching Task (Morgan et al. 2009) and the Kusche Affective Interview (Kusche 1984). These measures had various limitations such as they were too long, had less evidence for reliability and validity, required extensive interview training , required recording equipment, involved listening to American voices which may be confusing to some New Zealand children, or used actual faces that were from one particular ethnic group.

How the tool was used and if specifically adapted for our use

The tool was scored in the same way that the original AKT task was scored. In keeping with the AKTmanual, interviewers were trained on the administration of this task to ensure consistency in delivery.

Children were presented with six face cards presented in a random order. The interviewer pointed to the first card and ask the child in a neutral tone, "How does [HE/ SHE] feel?"

If the child uses a descriptive word such as "crying", or "smiling" they prompted the child again bysaying "yes, very good, but how does [HE/ SHE] feel?"

- 2 points were given for the correct emotion or acceptable synonym (e.g. "mad" for angry, "shocked" for surprised, etc.)
- 1 point was given for an incorrect emotion that is within the same emotional valence (e.g. "afraid" for sad, "upset" for angry, etc.)
- 0 points were given for an incorrect emotion with the opposite emotional valence (e.g. "happy"for sad etc.) or for a word that is not an emotion (e.g. "crying" for sad, or "smiling" for happy etc.)

A child score on the Modified Expressive AKT task is obtained by calculating a total score from the six presented cards.

How we have created the outcome variables/ any up-coding/ collation of variables etc.

Following this task the interviewer was asked to code whether the child stayed focused on this task.Consideration should be given as to whether to only use the data from those children who were identified as concentrating on the task "Most" or "All of the time".

A paper is being prepared by the *GUiNZ* team which describes how this this tool was modified and how the cohort performed on the task at the 54-month interview.

Key References:

- Denham, S. A. (1986). Social cognition, social behavior, and emotion in pre-schoolers: Contextualvalidation. Child Development, 57, 194-201.
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- Denham, Hamada Bassett, Way, Mincic, Zinsser & Graling (2012): Pre-schoolers' emotion knowledge: Self-regulatory foundations, and predictions of early school success Cognition andEmotion, 26(4): 667–679.
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- Morgan,J. K., Izard, C.E., King, K.A. (2009) Construct Validity of the Emotion Matching Task: Preliminary Evidence for Convergent and Criterion Validity of a New Emotion Knowledge Measurefor Young Children. Soc Dev. 2009 January 21; 19(1): 52–70 doi:10.1111/j.1467-9507.2008.00529.x.
- Pons, F., Harris, O.L., deRosnay, M. (2004). Emotion comprehension between 3 and 11 years:developmental period and hierarchical organization. European Journal of Developmental Psychology, 1(2), 127-152

14.1.9. DIBELS Letter Naming Fluency – DCW5

Why we chose this tool – background

We chose the Dynamic Indicators of Basic Early Literacy Skills subtest of Letter Naming Fluency (DIBELS LNF) from the DIBELS NEXT battery as our early literacy task because children's letter knowledge is a key indicator of their later success in reading (Adams 1990). DIBELS LNF offers an efficient and valid way to assess children's letter knowledge. The LNF assesses children's knowledgeof letters, their ability to say the letters, and their naming speed or fluency. We used the Grade K/ Benchmark 1 version with a list of randomly ordered lower-case and upper-case letters.

Why other tools were excluded

The DIBELS LNF is free, and it is the most efficient measure of children's letter knowledge available.It has been validated with New Zealand children (Schaughency & Suggate 2008). We explored assessing the children's phonological awareness using the DIBELS First Sound Fluency task as another key indicator of children's oral language and early literacy, but that measure was cut due to time constraints.

How the tool was used and if specifically adapted for our use

We followed the instructions from the DIBELS NEXT manual in administering and scoring the DIBELS LNF (see https://dibels.org/dibelsnext.html).

How we have created the outcome variables/ any up-coding/ collation of variables etc.

The number of letters correctly named in the 1-minute time limit is the outcome variable. The lowercase "l" was counted as correct if called either "L" or "I". If the child self-corrected a response within 3 seconds, the letter was counted as correct. We used a discontinue rule if the child did not correctly name any letters in the first row. Children were not penalised for differences in pronunciation due to dialect, articulation delays or impairments, or speaking a first language otherthan English.

Additional information

If standard scores are desired, we recommend calculating z-scores or percentiles/ quartiles. We do not recommend using the US benchmarks for DIBELS LNF because the *Growing Up in New Zealand* children differ from typical US samples in age, school experience, and dialect.

Key references:

- Adams, M. J. (1990). Beginning to read: Thinking and learning about print. Cambridge MA: The MITPress.
- Kaminski, R. A., Baker, S. K., Chard, D., Clarke, B., & Smith, S. (2006). Final report: Reliability,validity, and sensitivity of Houghton Mifflin Early Growth Indicators (Tech. Rep.). Eugene, OR: Dynamic Measurement Group and Pacific Institutes for Research.
- Schaughency, E., & Suggate, S. (2008). Measuring basic early literacy skills amongst year 1 studentsin New Zealand. New Zealand Journal of Educational Studies, 43(1), 85-106.

14.1.10. Luria 'hand clap' task – DCW5

Why we chose this tool – background

The Hand Clap Task measures: inhibitory control/ response inhibition (cold cognition) - the ability tostop doing something that is almost a natural response. In the case of hand clapping it is the ability not to copy the interviewer, but do the opposite. It also allows a measure of attention - the ability to stay focused on the number of claps, and the executive component of memory - the ability to remember what was clapped and do the opposite.

The Luria pencil tap task is a measure of children's inhibitory control that is part of the well-known and widely-used Luria-Nebraska Neuropsychological Battery (Golden et al. 1979). The task requires children to perform the opposite action of what an assessor does (e.g. tap once when an assessor taps twice and tap twice when an assessor taps once) across 16trials.

The Luria pencil tap task has been used by the Head Start for Faces 2009 cohort study of 3,500 children, the Universal Preschool Child Outcomes longitudinal study (N=1000) and is part of the Pre-

School Self-Regulation Assessment (PSRA; Smith-Donald et al. 2007) which is used in the Chicago School Readiness Project.

Why other tools were excluded

Other inhibitory tasks that were part of the PSRA were considered (e.g. balance beam and toy sorting task) but these required more equipment and were longer in duration.

How the tool was used and if specifically adapted for our use

The task was modified to a hand clap to reduce potential bias/ confounds with fine motor skills withthe possibility that some children may have had less exposure to holding pens and pencils than others. The task was administered as follows:

Interviewer: [Showing hands and clapping] “Now for this game, when I clap one time, you clap twotimes. And when I clap two times, you clap one time, ok? Let’s try.”

Teaching trials:

- Clap once [child should clap twice]
- Clap twice [child should clap once]
- Clap twice [child should clap once]

Up to six teaching trials were completed. The interviewer stopped the teaching trials and moved onto the testing trials when the child responded correctly on three trials in a row. Of these three trials, at least one must have required the child to clap once as the correct response, and at least one of these trials must have required the child to clap twice as the correct response. The first three teaching trials are shown above. If further teaching trials were required, then the interviewer repeated the three listed above.

The interviewer recorded the number of teaching trials completed (maximum of six) and recorded whether or not the child got the last teaching trial correct. Once the teaching trials were completedthe task moved on to the test trials.

Test trials:

The administration and response recording are detailed in Table 18.

Table 17. Administration of the Luria hand clap task

Number of interviewer claps			0. Child did not clap	1. Child clapped once	2. Child clapped twice	3. Child clapped more than twice	4. Unclear how many times
1.	2 claps	*PTT4_M54Co*	◯	◯	◯	◯	◯
2.	1 clap	*PTT5_M54Co*	◯	◯	◯	◯	◯
3.	1 clap	*PTT6_M54Co*	◯	◯	◯	◯	◯
4.	2 claps	*PTT7_M54Co*	◯	◯	◯	◯	◯
5.	1 clap	*PTT8_M54Co*	◯	◯	◯	◯	◯
6.	2 claps	*PTT9_M54Co*	◯	◯	◯	◯	◯
7.	1 clap	*PTT10_M54Co*	◯	◯	◯	◯	◯
8.	2 claps	*PTT11_M54Co*	◯	◯	◯	◯	◯
9.	2 claps	*PTT12_M54Co*	◯	◯	◯	◯	◯
10.	1 clap	*PTT13_M54Co*	◯	◯	◯	◯	◯
11.	2 claps	*PTT14_M54Co*	◯	◯	◯	◯	◯
12.	1 clap	*PTT15_M54Co*	◯	◯	◯	◯	◯
13.	1 clap	*PTT16_M54Co*	◯	◯	◯	◯	◯
14.	2 claps	*PTT17_M54Co*	◯	◯	◯	◯	◯
15.	2 claps	*PTT18_M54Co*	◯	◯	◯	◯	◯
16.	1 clap	*PTT19_M54Co*	◯	◯	◯	◯	◯

How we have created the outcome variables/ any up-coding/ collation of variables etc.

The external variable [NAME] provides the number of correct responses across the 16 test trials. As such, [NAME] is a scale variable with minimum score 0 and maximum score 16.

This is a standardised scoring technique for the task, see: Bialystok et al. (2010).

Additional information

Accompanying variables for this task are as follows:

[NAME]: whether the child was able to engage in the hand clap task at all.[NAME]: whether the child stayed focused on the hand clap task.

Key references:

- Golden CJ, Hammeke TA & Purisch AD. (1979). The Standardized Luria-Nebraska Neuropsychological Battery: A manual for clinical and experimental use. Lincoln, Nebraska:University of Nebraska Press.
- Bialystok E, Barac R, Blaye A & Poulin-Dubois D (2010). Word Mapping and Executive Functioning inYoung Monolingual and Bilingual Children, Journal of Cognition & Development, 11:4, 485-508.

- Smith-Donald R, Raver CC, Hayes T, Richardson B. (2007). Preliminary construct and concurrentvalidity of the Preschool Self-regulation Assessment (PSRA) for field-based research. Early Childhood Research Quarterly, 22(2), 173-187.

14.1.11. Name and Numbers task – DCW5

Why we chose this tool – background

The 'Who am I?' Developmental Assessment is an indicator of school readiness designed for pre-school and the first two years of school. The test includes a series of writing and copying tasks designed to assess children's understanding and use of conventional symbols.

'Who Am I?' has been used by the Longitudinal Study of Australian Children (LSAC) at and numerousother longitudinal studies. It has also been used across cultures. It is quick to administer and has a standardised scoring procedure. Two numbers tasks were added: counting up to 10 and counting down from 10.

Why other tools were excluded

No other writing or numeracy measures were considered.

How the tool was used and if specifically adapted for our use

The 'Who Am I?' Developmental Assessment includes 11 tasks in which children are asked to write their name, copy shapes, and write numbers, letters and words. For the *Growing Up in New Zealand* Leading Light observations, Questions 1 to 7 (name writing, copying five shapes, number writing) ofthe assessment were used under licence from The Australian Council for Educational Research Ltd. Only the name and numbers tasks were administered to the main cohort plus two counting tasks.

The tasks were administered as follows:

- The children were provided with an A4 Name and Numbers Worksheet, and a pencil/ pen. The sheethad two large spaces on it for writing.

Interviewer:

- [Pointing to the space provided]. "Write your name here."Any response, even if only a scribble was praised.
- [Pointing to the space provided]. "On this page I want you to write some numbers"
- Interviewer could prompt to ensure that children understood but avoided instructing specifically which numbers to write. Children could be encouraged to respond further

("Can you write some more numbers?"). Children who wrote larger numbers (> 20) were asked if they could write somebigger numbers.

- Worksheet was collected back from the child. Interviewer: "Please can you count up from 1 to 10?"Interviewer wrote down the child's responses.
- Interviewer: "Please can you count down from 10 to 1?"Interviewer wrote down the child's responses.

How we have created the outcome variables/ any up-coding/ collation of variables etc.

Coding for the name and numbers task was carried out by trained researchers according to a scoring protocol. All scores were double checked by a second researcher.

Responses for the 'Who am I?' items were coded according to the standard scoring manual wherebyeach response is assessed on a four-point scale relating to the skill required for the task (Table 19).

Table 18. Who am I? scoring

	Score				
Task	0	1	2	3	4
My name is	No response	Scribble, or no recognisable letters from the name	Criteria: Some recognisable letters from the name. Permitted: letters formed poorly; an incomplete name	Criteria: Recognisable name. Permitted: letters formed poorly; name written in reverse (mirror writing)	Criteria: Recognisable name; letters generally clear. Permitted: some letters reversed
I can write numbers	No response	Scribble, or no recognisable numbers	Criteria: At least 1 recognisable number. Permitted: numbers mixed with letters; difficulty in distinguishing between numbers & letters	Criteria: Numbers only; more than 1 number written; reasonable well-formed numbers. Permitted: reversals; in sequence or not	Criteria: Numbers only; several numbers written; numbers clearly formed and separated. Permitted: few if any reversals; in sequence or not

The counting tasks were coded according to the number of correct numbers in the longest numbersequence given by the child (the inclusion of other words (i.e. not numbers) or interruptions in the sequence was permitted).

The external variables for the name and number are as follows.NN6_m54Co: ' 'My name is' score (range 0-4)

NN7_m54Co: ' 'I can write numbers' score (range 0-4) NN3s_m54Co: 'Count up from 1 to 10' score (range 0-10) NN4s_m54Co: 'Count down from 10 to 1' score (range 0-10)

Additional information

Accompanying variables for this task are as follows: [NN1_m54Co]: whether the child was able to engage in the name and numbers at all; [NN2_m54Co]: which hand the child used to write their name or numbers; [NN5_m54Co]: whether the child stayed focused on the name and numbers task.

Key References:

- de Lemos M. & Doig B. (1999). Who Am I? Developmental Assessment Manual. Melbourne: ACER.
- Rothman, S. (2005). Report on Adapted PPVT-III and Who Am I? Growing Up in Australia: The Longitudinal Study of Australin Children

14.1.12. Parent-Child Interaction task (party invitation) – DCW5

Why we chose this tool – background

We chose this tool because it offers a way to directly observe mother-child teaching and learning interactions in a context that is age-appropriate and applicable across a broad range of cultures: creating a birthday party invitation together (Aram & Levin 2001). Writing a birthday party invitation is flexible enough to elicit a range of responses from parents and children, yet challengingenough that 4-year-olds would not be able to complete the task without help. The tool has been used extensively with parents and preschool children from diverse cultures and socioeconomic backgrounds and with children with special needs (Aram, Most & Mayafit 2006). This research shows that maternal writing mediation with pre-schoolers predicts children's literacy levels in primary school, even after controlling for children's preschool literacy skills and sociodemographic factors (Aram & Levin 2004). The tool also allowed us to sample a broad range of dimensions: mothers' specific help with writing; mothers' support in the form of open-ended questions; mothers' warmth during the interaction, defined as instances of praise and encouragement; mothers' sensitivity in providing just enough help but not taking over the interaction from the child.

Why other tools were excluded

There were not any readily available tools for assessing mother-child interactions in large samples.Other possibilities for adaptation that we considered and rejected included book-reading interactions and conversational interactions. We selected the writing interaction as offering the best way of observing mother-child teaching interactions in early childhood across a diverse range of

cultures. Moreover, the tool can be administered and scored in any language, as long as the interviewer was fluent in that language.

How the tool was used and if specifically adapted for our use

We adapted the tool for the *Growing Up in New Zealand* sample in the following ways:

- In the original task, the child was asked to imagine having a birthday party and to write a list of guests to be invited to the party. We adapted those instructions with the following: "For the next activity, we will be asking you to help your child with some writing, so it would be best if you couldsit near a table or other hard surface. I'm going to give you some paper and a felt. Please help yourchild to create a party invitation. You will have about 5 minutes to work on it together".
- Previous administrations of the birthday party task with small samples employed videotaping andthen fine-grained coding of maternal assistance with various aspects of writing. We instead trained interviewers to become reliable with a master coder prior to going out into the field, where they coded the interactions live on four different dimensions.
- We timed the interactions with a stopwatch to aid in coding of the different dimensions, withinterviewers rating only one of the dimensions at a time in 30-second blocks to aid reliability.
- We added the dimensions of open-ended questions, maternal warmth and maternal sensitivity tolink to our earlier observations of mothers and children at age 2 and to tap into a more global interaction style that goes beyond writing help.

How we have created the outcome variables/ any up-coding/ collation of variable set.

The four outcome variables are: mothers' print talk; mothers' open-ended questions; mothers' praise/ encouragement; and overall quality of the interaction.

Key references:

- Aram, D., & Levin, I. (2001). Mother-child joint writing in low SES: Sociocultural factors, maternalmediation, and emergent literacy. *Cognitive Development, 16, 831*-852.
- Aram, D., & Levin, I. (2004). The role of maternal mediation of writing to kindergartners in promoting literacy in school: A longitudinal perspective. Reading and Writing, 17(4), 387-409.

- Aram, D., Most, T., & Mayafit, H. (2006). Contributions of mother–child storybook telling and joint writing to literacy development in kindergartners with hearing loss. Language, Speech, and HearingServices in Schools, 37(3), 209-223.

14.2. DCW8 derived variable summary

The 8-year DCW of *GUiNZ* (2017-2019) included several question sets or measurements that required processing to derive final variables that data users can use in their analyses. The following describes the variables derived, a summary of the psychometric analyses undertaken and the variable names. A citation for the full technical documentation is provided for each set of variables. If you require access to these documents, please contact: dataaccess@growingup.co.nz

Table 19. Summary of derived variables released with 8-year datasets 2022 that are described in the following pages.

Construct/Topic	Tool/measurement
Health and wellbeing	
Child anthropometry	Weight, Height, Waist circumference (including Z scores), zBMI, Waist to height ratio.
Mother alcohol intake	AUDIT-C total score and binary derived variable
Mother problem gambling	Problem gambling severity index score and categorical variables
Psychosocial and cognitive development	
Child behaviour	SDQ total difficulties and subscales. Continuous variables and bands.
Child cognition	NHI toolbox cognition battery tasks derived variables.
Child depression	10-item Center for Epidemiological Studies Depression Scale (CES-D-10) score.
Child anxiety	PROMIS paediatric anxiety v2 raw score, SD and T-score
Child impulsivity	Domain specific impulsivity scale (DSIS).
Child prosocial activity	Sticker task – based on the dictator game.
Mother depression	Patient health questionnaire 9 total score and binary variable.
Societal context, neighbourhood, environment	
Food insecurity	Ministry of Health's 8-item Aggregated Food Insecurity Score
Material wellbeing/deprivation	Material wellbeing index score and Dep-17 score.
Family and Whanau	
Work-life balance	Work-Life Balance scale total score and subscale scores.
Family environment	CHAOS scale sum variable
Education	
Child school satisfaction	Global self-worth and scholastic competence subscales of the Harter scale.

14.2.1. Health and wellbeing

Anthropometry

A technical report has been written to assist users of the *GUiNZ* Anthropometry data in understanding data collection, cleaning, and the process of creating derived variables for height, weight, central adiposity (waist circumference), and body mass index (BMI/age). The report details the protocols for anthropometry where measurements were collected directly from children by trained interviewers.

When using the anthropometry data, researchers should note:

- Generally, the quality of anthropometric data collected in *GUiNZ* is good quality and improves as the cohort children age.
- There are a small number of measurements collected by *GUiNZ* interviewers which deviated from the protocol.
- We recommend excluding the measurements of weight, height and waist circumference with poor intra-observers reliability (detailed in the report).
- Some measurements came from health records or parent's memory (i.e. there are not objective measurements).
- We advise at a minimum to exclude measurements that have come from other health records or parent's memory when the difference between the date when measure was recorded and the date of the *GUiNZ* interview was greater than 90 days.
- There are some outlier values for one or more anthropometric indexes and waist circumference values to note. Check the biological plausibility of outlier values using longitudinal approaches that are currently available in the literature. If outliers are identified as biologically plausible, they should be kept in the analysis.

Researchers should decide whether to exclude some anthropometry data based on these notes, and whether to include outliers, in their analyses. Missing data should also be noted.

Table 20. Derived anthropometric variables at 8 Years.

Anthropometric indexes/related variables	Variable name	Variable label	Unit	Categories of classification of the nutritional status
Final weight	CHILD_WT_FINAL_ANTH_Y8CO	Child weight (kg)- measured or last recorded	kilograms	Continuous variable
Notes on quality of weight at 8 Years	QUALITY_WT_ANTH_Y8CO	Notes on quality of weight measurement	--	1. According to GUiNZ protocol 2. Deviated from GUiNZ protocol 3. GP or other health professional 4. At home 5. Other

Additional Notes on quality of weight at 8 Years	QUALITY_WT_AD_ANTH_Y8CO	Notes on quality of weight measurement	--	1. Only one measurement taken 2. Two measurement taken 3. Three measurement taken 4. No weight measures registered 5. Not applicable
Final Height	CHILD_HT_FINAL_ANTH_Y8CO	Child height (m) measured or last recorded	meters	Continuous variable
Notes on quality of height at 8 Years	QUALITY_HT_ANTH_Y8CO	Notes on quality of height measurement	--	1. According to GUiNZ protocol 2. Deviated from GUiNZ protocol 3. GP or other health professional 4. At home 5. Other
Additional Notes on quality of height at 8 Years	QUALITY_HT_AD_ANTH_Y8CO	Notes on quality of height measurement	--	1. Only one measurement taken 2. Two measurement taken 3. Three measurement taken 4. No height measures registered 5. Not applicable
BMI for age at 8 Years (z-score)- WHO	ZBMI_ANTH_Y8CO	BMI-for-age z-score	z-score	Continuous variable
BMI for age at 8 Years categories (z-score)	ZBMI_C_ANTH_Y8CO	BMI-for-age z-score	z-score	<-3z (Severe thinness) ≥ -3z & -2z (Thinness) ≥ -2z & 1z (Normal) ≥ 1z & 2z (Overweight) ≥ 2z (Obesity)
BMI for age at 8 Years (percentiles) – CDC	ZBMI_P_CDC_ANTH_Y8CO	BMI-for-age percentiles	percentiles	Continuous variable
BMI for age at 8 Years categories (percentiles) - CDC	ZBMI_C_CDC_ANTH_Y8CO	BMI-for-age percentiles	percentiles	1. ≥ 95th (overweight) 2. ≥ 85th & < 95th (risk of overweight) 3. ≥ 5th & < 85th (eutrophic) 4. < 5th (underweight)
BMI for age at 8 Years (index) - IOTF	ZBMI_C_IOTF_ANTH_Y8CO	BMI-for-age index	index	Range of values, age and sex specific, correspondent to the following BMI cut-offs at the age of 18 years old (adjusted for age at measurement): 1. Thinness 2. Eutrophic 3. Overweight 4. Obesity

				5. Morbid obesity
Weight for age at 8 Years (z-score)-WHO	ZWEI_ANTH_Y8CO	Weight-for-age z-score	z-score	Continuous variable
Weight for age at 8 Years categories (z-score)-WHO	ZWEI_C_ANTH_Y8CO	Weight-for-age z-score	z-score	1.< -6z 2. ≥-6z & ≤ -3z 3.> -3z & ≤ -2z 4.> -2z & < +2z 5.> +2z & < +3z 6.> +3z & ≤ +5z 7. >+5z
Height for age at 8 Years (z-score)-WHO	ZLEN_ ANTH_Y8CO	Height-for-age z-score	z-score	Continuous variable
Height for age at 8 Years categories (z-score)-WHO	ZLEN_C_ ANTH_Y8CO	Height-for-age z-score	z-score	1. < -6z 2.≤ -3z & ≤-6z 3.> -3z & < -2z 4.> -2z & ≤+6z 5.>+6z
Final waist circumference	CHILD_WC_FINAL_ANTH_Y8CO	Child waist circumference (cm) measured	centimetre	Continuous variable
Notes on quality of waist circumference at 8 Years	QUALITY_WC_ANTH_Y8CO	Notes on quality of waist circumference measurement		1 According to GUiNZ protocol 2 Deviated from GUiNZ protocol
Additional Notes on quality of waist circumference at 8 Years	QUALITY_WC_AD_ANTH_Y8CO	Additional Notes on quality of weight at 8 Years	--	Additional Notes on quality of weight at 8 Years
Waist circumference/ height ratio at 8 Years	WCFL_RATIO_ANTH_Y8CO	Child waist circumference/height ratio	ratio	Continuous variable

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation:

Gerritsen S, Kim H, de Castro, T, Wall C. 2021. *Growing Up in New Zealand* Technical Report: Anthropometric variables: data cleaning and harmonisation for the 8-year dataset. Auckland, *Growing Up in New Zealand*.

Mother alcohol intake – AUDIT-C

The Alcohol Use Disorders Identification Test (AUDIT) short form (AUDIT-C) was used to assess likely problem alcohol use in mothers of the *GUiNZ* cohort mother at the 8-year DCW. The questionnaire was developed by the World Health Organization (WHO) to screen and evaluate alcohol problem severity. The three questions in the AUDIT-C provide estimates of the frequency of drinking, the quantity of typical drinking and frequency of risky/binge drinking. AUDIT-C scores rage from 0 to 12, with higher scores indicating more hazardous and harmful drinking. Scores for each question

(ranging from 0 to 4) are summed to create the final score. Using a cutoff of 3 or greater identified 90% of people with active alcohol abuse or dependence and 98% of people with heavy drinking.

Two derived variables for AUDIT-C have been created at the 8-year DCW and are described in Table 22 below.

Table 21. AUDIT-C derived variables

	Variable
AUDIT-C continuous variable	AUDIT_C_SUM_Y8M
AUDIT-C category (4+)	AUDIT_C_BINARY_Y8M

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation:

Walker C. 2022. *Technical Document for AUDIT-C Tool: 8-year Data Collection Wave. Growing Up in New Zealand*: Auckland.

Mother problem gambling – PGSI

Problem gambling of the cohort mothers was assessed using the problem gambling severity index (PGSI) at the 8-year DCW (2017-2019). The PGSI is a widely used nine item scale that categorises people into four categories: non-problem, low-risk, moderate-risk, and problem gamblers. Mothers were first asked a set of questions about whether they had gambled in the past 12 months. If they answered yes, they proceeded to the PGSI questionnaire.

The PGSI derived variables are described in Table 23 below.

Table 22. PGSI derived variables

Scale	**Variable**
PGSI score	GAMBLING_SCORE_Y8M
PGSI category	GAMBLE_SEV_INDEX_Y8M

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation:

Walker C. 2022. *Technical Document for PGSI: 8-year Data Collection Wave. Growing Up in New Zealand*: Auckland.

14.2.2. Psychosocial and cognitive development

Child behaviour

The Strengths and Difficulties Questionnaire (SDQ) was used to measure child behaviour at the 8-year DCW (2017-2019). The SDQ consists of six behavioural subscales. The Cronbach alpha ranged from

0.62 to 0.83 for these subscales. Confirmatory factor analysis suggested that the original 5-factor structure, the modified 5-factor structure, and the 3-factor structure did not show adequate model fit for the *GUiNZ* cohort at 8-years. Caution is needed when using the SDQ subscales for analysis and interpretation, especially for analysis across ethnic groups. We recommend using the total difficulties score rather than other subscales.

The variables derived are described in Table 24. Briefly, for each subscale a total score was derived and both a 3-band and 4-band category were derived.

Table 23. List of SDQ subscale derived variables.

Subscale	Total score	3 bands	4 bands
Total difficulties	TOTALDIFF_Y8CM	TOTALDIFF_L3_CAT_Y8CM	TOTALDIFF_L4_CAT_Y8CM
Internalising	Not derived	Not derived	Not derived
Emotional	EMOTION_Y8CM	EMOTION_L3_CAT_Y8CM	EMOTION_L4_CAT_Y8CM
Peer relationship	PEER_Y8CM	PEER_L3_CAT_Y8CM	PEER_L4_CAT_Y8CM
Externalising	Not derived	Not derived	Not derived
Conduct	CONDUCT_Y8CM	CONDUCT_L3_CAT_Y8CM	CONDUCT_L4_CAT_Y8CM
Hyperactivity	HYPER_Y8CM	HYPER_L3_CAT_Y8CM	HYPER_L4_CAT_Y8CM
Prosocial	PROSOCIAL_Y8CM	PROSOCIAL_L3_CAT_Y8CM	PROSOCIAL_L4_CAT_Y8CM

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation:

Walker C, Neumann D, Cha J, Fletcher B, Waldie K. 2022. Technical Document for SDQ Tool: 8-year Data Collection Wave. *Growing Up in New Zealand*: Auckland.

Child cognition – NIH toolbox

Cognitive functioning at the 8Y DCW was measured by the National Institutes of Health (NIH) Toolbox Cognition Battery of the NIH Toolbox® for Assessment of Neurological and Behavioral Function. The NIH Toolbox Cognition battery is a standard set of measures of cognitive function across the lifespan (aged 3–85 years) with the aim to address the needs for an assessment tool that is brief and suitable for large-scale epidemiologic and longitudinal studies and to allow for international cross-study comparisons. The tool was chosen for the 8 Year DCW as it is a brief, easy to use tool for assessing a broad range of cognitive abilities at different ages in large-scale studies.

The NIH Toolbox Cognition Battery data were collected using standardised administration procedures and trained interviewers administered the tests. The version 7-17 years was applied to the

GUiNZ cohort at age 8 using the NIH Toolbox iPad app, assisted by interviewers. It comprised the following seven subtests: Picture vocabulary test; Flanker inhibitory control and attention test; List sorting, working memory test; Dimensional change card sort test; Pattern comparison processing speed test; Picture sequence memory test; Oral reading recognition test. In addition to the scores of the individual measures for these subdomains, the NIH Toolbox Cognition Battery provides several composite scores: Fluid Cognition Composite; Crystallised Cognition Composite; Global Cognition Function Composite; Early Childhood Composite.

The general scoring approach is that for each individual measure the NIH Toolbox provides raw/that/computed scores and two different normative scores based on a nationally representative U.S. sample:

- Uncorrected standard scores: This score uses a standard score metric (normative mean = 100, SD = 15). It compares the performance of the test-taker to those in the entire NIH Toolbox nationally representative normative U.S. sample, regardless of age or any other variable.
- Age-corrected standard scores: for which the normative mean is 100 and the SD is 15. The age-corrected standard score compares the score of the test-taker to those in the NIH Toolbox nationally representative normative U.S. sample at the same age.
- From our psychometric analyses using 8Y *GUiNZ* data, we recommend:
- Using total individual NIH Toolbox Cognition Battery measures rather than Cognition Composites
- Using raw/theta/computed scores of the individual NIH Toolbox Cognition Battery measures rather than standard scores as the standard scores are computed in comparison to the general U.S. population
- The Cognition Composite or factor scores of the three-factor structure should not be used to make any direct comparisons of group differences between various groups stratified by ethnicity and socioeconomic status using *GUiNZ* data

Table 25 details the variables codes for the NIH toolbox derived variables, as available in the 8-year dataset.

Table 24. Key variables for NIH toolbox cognition battery.

	Variable name in dataset		
Subtest/composite score	Raw/theta/computed score	Uncorrected standard score	Age-corrected standard score
Picture vocabulary test	PVT_THETA_Y8CONIH	PVT_UNR_Y8CONIH	PVT_AGER_Y8CONIH
Flanker inhibitory control and attention test	FLANKER_SCORE_Y8CONIH	FLANKER_UNR_Y8CONIH	FLANKER_AGER_Y8CONIH
List sorting, working memory test	LISTSORT_RS_Y8CONIH	LISTSORT_UNR_Y8CONIH	LISTSORT_AGER_Y8CONIH
Dimensional change card sort test	DCCS_SCORE_Y8CONIH	DCCS_UNR_Y8CONIH	DCCS_AGER_Y8CONIH
Pattern comparison processing speed test	PATTERNCOMP_SCORE_Y8CONIH	PATTERNCOMP_UNR_Y8CONIH	PATTERNCOMP_AGER_Y8CONIH
Picture sequence memory test	PSM_THETA_Y8CONIH	PSM_UNR_Y8CONIH	PSM_AGER_Y8CONIH
Oral reading recognition test	ORR_THETA_Y8CONIH	ORR_UNR_Y8CONIH	ORR_AGER_Y8CONIH
Fluid Cognition Composite	-	COGFLUIDCOM_UNR_Y8CONIH	COGFLUIDCOM_AGER_Y8CONIH
Crystallised Cognition Composite	-	COGCRYSCOM_UNR_Y8CONIH	COGCRYSCOM_AGER_Y8CONIH
Global Cognition Function Composite	-	COGTOTALCOM_UNR_Y8CONIH	COGTOTALCOM_AGER_Y8CONIH
Early Childhood Composite	-	COGECCOM_UNR_Y8CONIH	COGECCOM_AGER_Y8CONIH

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation or see the below publication:

Neumann, D. 2021. Technical Document for NIH Toolbox Cognition Battery: 8-year Data Collection Wave. *Growing Up in New Zealand*: Auckland.

Neumann, D., Peterson, E. R., Underwood, L., Morton, S. M., & Waldie, K. E. (2021). Exploring the Factor Structure of the NIH Toolbox Cognition Battery in a Large Sample of 8-Year-Old Children in Aotearoa New Zealand. *Journal of the International Neuropsychological Society,* 1-10. doi:10.1017/S1355617720001265

Child depression – CES-D-10

The 10-item Center for Epidemiological Studies Depression Scale (CES-D-10) was used to assess depressive symptoms in the cohort children at both 8- and 11-year DCWs (8-year, 2017-2019; 11-year, 2020). This tool primarily assesses depressive symptoms experienced in the past week with response anchors ranging from 0 (rarely or none of the time/ not at all) to 3 (all of the time/ a lot). The internal consistency of the 10-item tool was just below the recommended range at 8 years (α = .69) but was within the acceptable range at 11 years (α = .76). At the 8-year DCW, we found that a unidimensional/one factor structure without the 'hopeful' item was the best fit to our data. This model

showed excellent model fit, and reliability - the Cronbach's alpha and McDonald's Omega were both above the recommended <.70 (0.73 and 0.74, respectively). This model also had the best fit for our data at the 11-year DCW. Table 27 provides the variable names for depression score using both the 9 item and 10 item version.

Table 25. List of Depression score derived variables.

DCW	Total score for 10-items	Total score for 9-items
8-year DCW	DEPRESS_SCORE_10_Y8C	DEPRESS_SCORE_9_Y8C
Covid-19 Wellbeing Survey	DEPRESS_SCORE_10_Y11LDC	DEPRESS_SCORE_9_Y11LDC

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation (8 and 11 year) and publication (8 year only):

[a]Cha, J., Neumann, D., Grant, M., Walker C. 2021. Technical Document for CES-D-10 Tool: 8-year Data Collection Wave. *Growing Up in New Zealand*: Auckland.

Cha, J., Waldie, K., Neumann, D., Smith., A. & Walker., C. 2021. Psychometric Properties and Factor Structure of the Center for Epidemiologic Studies Depression Scale 10-item Short Form (CES-D-10) in Aotearoa New Zealand children. *Journal of Affective Disorder Reports, 7*. https://doi.org/10.1016/j.jadr.2021.100298

Child anxiety – PROMIS

The 8-item Patient-Reported Outcomes Measurement Information System (PROMIS) Paediatric Anxiety short form was used at both the 8- and 10-year DCWs (both v1 and v2 questions were asked). Both PROMIS-SF versions show excellent model fit and reliability for the total cohort as well as for the total response samples of the Māori, Pacific and Asian cohort. Thus, both PROMIS-SF 8-item scale versions can be recommended for use. The PROMIS-SF version 2 demonstrated adequate model fit and reliability within the 10-year Covid-19 Lockdown Survey cohort. Thus, the PROMIS-SF 8-item scale version 2 can be recommended for general use. Note that the scale has not been tested specifically for psychometric properties across the different ethnic groups at 10 years of age. We recommend that researchers employ sound validity and reliability testing to determine the suitability of this scale for their research. The PROMIS-SF version 1 demonstrated excellent reliability, but poor model fit for the 10-year Covid-19 lockdown survey cohort. Thus, the PROMIS-SF 8-item scale version 1 is not recommended for use Table 28 describes the derived variables created for the PROMIS anxiety scale available in the dataset.

Table 26. Variable names for anxiety score derived variables.

Scale	8-year variable	Covid-19 lockdown survey variable
V1 8-item short form raw score	PAS_TOTAL_RAW_SCORE1_Y8C	PAS_TOTAL_RAW_SCORE1_Y11LDC
V1 8-item short form T-score	PAS_T_SCORE1_Y8C	PAS_T_SCORE1_Y11LDC
V1 8-item short form SD	PAS_SD1_Y8C	PAS_SD1_Y11LDC
V2 8-item short form raw score	PAS_TOTAL_RAW_SCORE2_Y8C	PAS_TOTAL_RAW_SCORE2_Y11LDC
V2 8-item short form T-score	PAS_T_SCORE2_Y8C	PAS_T_SCORE2_Y11LDC
V2 8-item short form SD	PAS_SD2_Y8C	PAS_SD2_Y11LDC

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation (8- and 11-year):

Neumann, D., Cha, J., Grant, M., Walker, C., Fletcher, B. Technical Document for PROMIS Anxiety Tool: 8-year Data Collection Wave. *Growing Up in New Zealand*: Auckland.

Child impulsivity – DSIS-C

The 8-item Domain-Specific Impulsivity Scale for Children (DSIS-C) was used at the 8-year DCW to assess children's level of impulsivity. Various psychometric evaluations of DSIS-C revealed that a one-factor structure model with all 8-items (the total DSIS-C score) was most suitable for interpreting children's overall impulsivity level at 8-years of age. This model showed excellent model fit and acceptable reliability (α = 0.67). Further psychometric validation is recommended for future works. Table 29 shows the variable names for the total DSIS-C score, as well as for the interpersonal and schoolwork subscales.

Table 27. Domain specific impulsivity scale derived variable.

Scale	Variable name	Response categories
Total DSIS-C	IS_TOTAL_SCORE_Y8C	Score range: 1-5
Interpersonal subscale	IS_INTER_SCORE_Y8C	Score range: 1-5
Schoolwork subscale	IS_SCHOOL_SCORE_Y8C	Score range: 1-5

For further detail on the derivation of this measure you can request access to the following technical documentation.

Cha, J., Neumann, D., & Fletcher B. D. *Technical Document for Impulsivity - Domain-Specific Impulsivity Scale (DSIS-C) Tool: 8-year Data Collection Wave. Growing Up in New Zealand*: Auckland.

Child prosocial activity – the sticker task

Based on the Dictator Game, we employed the Sticker Task to assess children's development of prosocial behaviour. Similar to the standard Dictator Game, children were given a set number of resources (stickers) and subsequently asked to decide how much of the stickers will be kept for

oneself vs. given away to an anonymous receiver (another child participant in the study). Although money is often used as the main resource in the standard Dictator Game, using stickers is more relatable for children as they have more exposure and experience with consumables such as stickers

Table 28. Prosocial activity - the sticker task variable for analyses.

Variable name	Response categories
PMD5_Y8CO	1-10 stickers given away

For further detail on the derivation of this measure you can request access to the following technical documentation.

Henderson A, Walker C, Cha J. 2022. *Technical Document for sticker game Tool: 8-year Data Collection Wave. Growing Up in New Zealand*: Auckland.

Food insecurity

Food insecurity is limited or uncertain access to adequate, safe, and nutritious food that is culturally appropriate and able to be obtained in a socially acceptable way. In New Zealand, food insecurity is generally measured using an 8-item questionnaire in the National Adult and Child Nutrition Surveys and New Zealand Health Surveys, which has been shown to have internal and external validity. *GUINZ* included the 8-items in the mother questionnaire at the 8DCW. This document describes the steps taken to create the Aggregated Food Insecurity Score derived variable. The score classifies participants' households as either Food Secure, Moderately Food Insecure or Severely Food Insecure.

Table 29. Variable Name for Food Insecurity Score in 8-year Dataset.

Variable name	Response categories
AGG_FIS_CAT_Y8M	1= Food secure 2= Moderately food insecure 3= Severely food insecure

For further detail on the derivation of this measure you can request access to the following technical documentation:

Kim H, Gerritsen S, Pillai A, Greenway K. 2021. Technical Document for Aggregated Food Insecurity Score: 8-year Data Collection Wave. *Growing Up in New Zealand*: Auckland.

Analyses using the FIS can be found in the following publication:

Greenway K. 2021. *Food insecurity among 8-year-olds in the* Growing Up in New Zealand *study.* A thesis submitted in partial fulfilment of the requirements for the degree of Master of Public Health, The University of Auckland: Auckland.

Work-life balance

The Work-Life Balance scale was used to assess both the impact of family on work life and the impact of work on family life for mothers of the 8-year cohort children (2017-2019). Literature demonstrates that work-life balance is a central issue affecting health and wellbeing: any competing demands of work and family life can cause conflict and negatively affect the wellbeing of individuals and those that surround them (Wong, Lee and colleagues, 2021). The psychometric properties of this tool, using a collapsed 5-point scale, demonstrated moderate reliability, however these are consistent with previous use of the scale (Marshall and Barnett, 1993) and we suggest that there may be an advantage in using omega coefficients in this scale as items differ in quality.

The derived variables have been created by the *GUiNZ* research team, using a collapsed 5-point Likert scale (see Table 32 below).

Table 30. Derived work-life balance scores in the GUiNZ datasets

Subscale	Variable name
Work-family synergy	WFLB_SUM_Y8M
Work-parenting (positive/gains)	WORK_PARENTING_SUM_Y8M
Work-self (positive/gains)	WORK_SELF_SUM_Y8M
Work-family (negative/strains)	WORK_FAMILY_SUM_Y8M
Family-work (negative/strains)	FAMILY_WORK_SUM_Y8M

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation:

Walker C., Langridge F. & Evans R. J. 2022. Technical Document for Work life balance Tool: 8-year Data Collection Wave. *Growing Up in New Zealand*: Auckland.

Analyses using this tool can be found in the following publications:

Marshall, N. L. and Barnett, R. C. (1993). Work-family strains and gains among two-earner couples. *Journal of Community Psychology, 21*(1), 64-78.

Wong, K. P., Lee, F. C. H., Teh, P. and Chan, A. H. S. (2021). The Interplay of Socioecological Determinants of Work–Life Balance, Subjective Wellbeing and Employee Wellbeing. *International Journal of Environmental Research and Public Health, 18*(9), 4525. https://doi.org/10.3390/ijerph18094525

Material wellbeing and deprivation – MWI and DEP17

Material wellbeing and hardship were assessed using the material wellbeing index (MWI) and the Dep-17 index at the 8-year DCW (2017-2019). The MWI score is a positively scored scale, with a higher score reflecting better material wellbeing, conversely the Dep-17 score is negatively worded with

higher scores reflecting more hardship. The final scores of MWI and DEP-17 are therefore inversely correlated.

The derived variables created for MWI and DEP-17 are described in Table 33 below.

Table 31. Material wellbeing index and DEP-17 index derived variables.

Scale	Variable name
Material wellbeing index	MWI_SCORE_Y8M
DEP-17 index	Dep_17_INDEX_Y8M

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation:

Walker, Gerritsen and Lai 2022. Technical Document for MWI and Dep-17: 8-year Data Collection Wave. *Growing Up in New Zealand*: Auckland.

Mother depression – PHQ9

The Patient Health Questionnaire-9 (PHQ-9) was used to assess depression in mothers at the 8-year DCW (2017-2019). The tool had good internal consistency (0.85). When examined by ethnic identity, reliability was above 0.80 for each of the four most common ethnicities (European, Māori, Pacific, Asian).

The derived variables for mother depression are listed in Table 34 below. For each DCW that depression questionnaires were administered, both a total score and a binary variable have been derived. For the PHQ-9, it is also possible to categorise the severity of depression symptoms by creating new variables using the total score and the bands described above.

Table 32. Mother depression tool variable names

DCW	Mother depression tool	Total score variable name	Binary variable name
Antenatal	Edinburgh Depression Scale	edi_am	edigp_am
9month	Edinburgh Depression Scale	edi_m9m	edigp_m9m
54month	Patient health questionnaire 9	PHQ_9_SCORE_M54M	PHQ_9_BINARY_M54M
8year	Patient health questionnaire 9	PHQ_9 _SCORE_Y8M	PHQ_9_BINARY_Y8M

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation:

Walker C and Waldie K. 2022. *Technical Document for Patient Health Questionnaire 9 Tool: 8-year Data Collection Wave. Growing Up in New Zealand*: Auckland.

Family environment – CHAOS

At the 8-year data collection wave the Confusion, Hubbub and Order Scale (CHAOS) was used to assess spatial and non-affordance aspects of the physical environment (sometimes termed "environmental confusion"). The tool demonstrated good overall internal consistency with a Cronbach Alpha of 0.82.

The CHAOS derived variable (Table 35) was created by summing the responses to the 15 questions in the scale.

Table 33. Variable name for CHAOS derived variable.

DCW	Tool	Variable name
8-year	Confusion, Hubbub and Order Scale (CHAOS)	CHAOS_SUM_Y8M

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation:

Walker C. and Evans R. J. 2022. Technical Document for CHAOS Tool: 8-year Data Collection Wave. *Growing Up in New Zealand*: Auckland

14.2.3. Education

Child school satisfaction

To assess school satisfaction at the 8- and 11-year DCWs we used the 6-item version of the Student Personal Perception of Class Climate Scale (SPPCC). This scale was developed by Rowe and colleagues and was an adaption of the MSLSS school satisfaction subscale. The wording in the 8-year child questionnaire was adjusted slightly for two of the items (CCQ2 and CCQ4), to be relevant to the range of school environments of the *GUiNZ* cohort children (e.g., home schooling). Additional adjustments accounted for the change in school modality during the COVID-19 lockdown measures in Aotearoa New Zealand at the time of the survey. Two versions of the scale were administered, and children answered either version depending on whether they had returned to face-to-face schooling or not. The tool had excellent internal consistency ($\alpha > 0.85$) at both time points. CFA revealed a one-factor model to fit the data, for both time points (i.e., the 8-year and COVID-19 Wellbeing DCWs). These results suggest that the relationship between the six items can be explained by a single underlying construct.

Two methods are recommended for calculating school satisfaction scores using the *GUiNZ* data — a mean score and a refined factor score. Regardless of which method is chosen, we encourage researchers to employ sound validity and reliability testing. Alternative uses of the school satisfaction items should also be subjected to robust testing to determine suitability. In analyses, if comparing

school satisfaction scores between groups is required to address the research aims, we recommend researchers undertake invariance testing.

Table 26 details the variables codes for the school satisfaction variables, as available in the 8-year and the 11-year COVID-19 Wellbeing datasets. Variables with 'combined' include all responses to both versions of the scale, whereas 'BBL1' and 'BBL2' refer to the two different versions which account for whether children had returned back to face-to-face learning or were still learning from home.

Table 34. Derived Variables for school satisfaction derived variables in the 8-year and 11-year Lockdown Datasets.

	Variable Code in Datasets		
DCW	**Sum Score**	**Mean Score**	**Refined Factor Score**
8-Year	CCQ_TOTAL_Y8C	CCQ_MEAN_Y8C	CCQ_REFINEDSCORE_Y8C
COVID-19 Wellbeing Survey	CCQ_TOTALCOMBINED_Y11LDC	CCQ_MEANSCOMBINED_Y11LDC	CCQ_REFINEDSCORE COMBINED_Y11LDC
	CCQ_TOTALBBL1_Y11LDC	CCQ_MEANBBL1_Y11LDC	CCQ_REFINEDSCORE BBL1_Y11LDC
	CCQ_TOTALBBL2_Y11LDC	CCQ_MEANBBL2_Y11LDC	CCQ_REFINEDSCORE BBL2_Y11LDC

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation (8 and 11 year):

Grant, M., Tait, J., Meissel, K. Technical Document for School Satisfaction Subscale of the Student Personal Perception of Classroom Climate Scale (SPPCC). Auckland (NZ): *Growing Up in New Zealand*; 2022.

Self-concept

The global self-worth and scholastic competence subscales of the Harter scale were used to assess self-concept in the children at 8 years of age. The global self-worth scale had acceptable internal consistency however the scholastic competence scale was not in the acceptable range (Cronbach alpha <0.7). Note that the scale has not been tested specifically for psychometric properties across the different ethnic groups. We recommend that researchers employ sound validity and reliability testing to determine the suitability of this scale for their research.

In the 8-year datasets, a mean score has been calculated for each child who completed all items within each subscale. Table 36 provides the variable names for the mean scores for both the global self-worth subscale and the scholastic competence subscale.

Table 35. Variable Names for Harter Subscale in 8-year Dataset.

Sub-scale	8-year variable name
Global Self-worth	HS_GLOB_SCORE_Y8C
Scholastic competence	HS_SCHO_SCORE_Y8C

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation:

Walker C, Cha, J, Grant M, Peterson E. 2022. *Technical Document for Harter Tool: 8-year Data Collection Wave. Growing Up in New Zealand*: Auckland.

14.3. DCW12 derived variable summary

The 12-year DCW of *GUiNZ* (2021-2022) included several sets of questions or measurements that required processing to derive final variables that data users can use in their analyses. The following describes the variables derived, a summary of the psychometric analyses undertaken and the variable names. A citation for the full technical documentation is provided for each set of variables. If you require access to these documents, please contact: dataaccess@growingup.co.nz

Table 36. Summary of derived variables released with the 2023 12-year datasets that are described in the following pages.

Construct/Topic	Tool/measurement
Culture and identity	
Child gender	Gender, Trans-Non-binary/Cisgender (3 categories)
Child ethnicity	Total response ethnicity (Level 3 and 1), Sole European, externally prioritised ethnicity, single/combination ethnicity, total number of identified ethnicities
Psychosocial and cognitive development	
Child depression	10-item Center for Epidemiological Studies Depression Scale (CES-D-10) score.
Child anxiety	PROMIS paediatric anxiety v2 raw score, SD, and T-score
Bullying	Continuous: Forms of Bullying Scale - Victim scale
Mother depression	Patient health questionnaire 9 total score and binary variable.
Partner depression	Patient health questionnaire 9 total score and binary variable.
Health and wellbeing	
Child HRQoL	Child health-related quality of life (KIDSCREEN-10)
Child disability	Categorical: self-report measure of functional disability using Washington Group Short Set (WG-SS).
Puberty	Categorical: self-report measure of pubertal status; derived outcome (mean puberty score and Puberty Category Score).

Societal context, neighbourhood, environment	
Food insecurity	Ministry of Health's 8-item Aggregated Food Insecurity Score
Material Hardship	Dep-17 index of material hardship. Sum score and categorical variables available.
Housing tenure	Categorical: home owned, private rental, public housing, other
Main reason for moving home	Categorical: improvement, involuntary, practical, other
Household crowding	Canadian crowding index (categorical: crowded, not crowded) and simple crowding index (categorical: low, medium, high)
Equivalised household income	Modified OECD scale (continuous variable), square root scale (continuous variable)
Geospatial data	Geospatial data derived variables: NZDEP2018, Region, DHB, Rurality.
Family and whanau	
Parenting	Parental involvement score, parental warmth score
Child parent relationship	8-item parent-child relationship tool: summed scores, subscale summed scores and binary variable.
Child peer relationship	8-item peer relationships tool: summed scores, subscale summed scores and binary variable.
Household composition	Household composition (4 derived variables), household structure (combined derived variable) and household bubble size.
Education	
School satisfaction (emotional school engagement)	Ordinal variable: Feelings and attitudes towards learning and school.
Behavioural engagement in school	Ordinal variable: Actions students take in their learning.
Cognitive engagement in school	Ordinal variable: How students think about their learning.
School engagement	Ordinal variable: A variable that considers the elements of behavioural engagement, emotional engagement, and cognitive engagement in school.
Academic buoyancy	Ordinal variable: How students deal with normal everyday setbacks that are part of everyday school life.
Student-teacher relationship	Ordinal variable: Students' perceptions of their relationship with their teacher.
Academic efficacy	Ordinal variable: Students perceptions about their competence to complete schoolwork.
Parental involvement in school	Ordinal variable: The interest of parents in their young person's learning.

14.3.1. Culture and identity

Child gender

Two tools were used to measure gender identity in the 12-year DCW:

1. The unipolar gender identity question (developed in-house for the 8Y DCW), which explores gender using a single scale ranging from masculine to feminine: *Thinking about*

who you are, do you see yourself as a boy, a girl, or somewhere in between? The response options were: Boy; Mostly a boy; Somewhere in the middle; Mostly a girl; Girl; I don't know.

2. A 6-item modified version of the Perceived Similarity to Gender Groups Scale (Martin et al., 2017) which explores gender with two scales (dual/multipolar) to identify the strength of masculine and feminine identity and expression for each participant: *How similar do you feel to girls? How similar do you feel to boys? How much do you act like girls? How much do you act like boys? How much do you like to do the same things as girls? How much do you like to do the same things as boys?* The response options were: Not at all; A little bit; A medium amount; Pretty much; A lot.

A three-category Gender variable was derived from the unipolar question (Boy/Mostly a boy, Girl/Mostly a girl, Non-binary/Unsure). In addition, a three-category Trans-Non-binary/Cisgender variable was derived from the unipolar gender identity question and sex assigned at birth (Cisgender boy, Cisgender girl, Trans-non-binary/Unsure). Table 38 provides the variable names and categories for the derived gender variables. The technical documentation for gender identity contains more information on which derivation to use given the specific research question.

Table 37. List of Gender derived variables.

Derived variable	12-year variable	Variable categories
Gender (3 categories)	GENDER_Y12C	1 = Boy/Mostly a boy 2 = Girl/Mostly a girl 3 = Non-binary/Unsure
Trans-Non-binary/Cisgender (3 categories)[a]	TRANS_NB_CAT_Y12C	1 = Cisgender boy 2 = Cisgender girl 3 = Trans-Non-binary/Unsure

[a] Note we have redacted trans-non-binary/cisgender data for 15 participants for whom we have conflicting sex at birth data. These data will be released once resolved.

For further detail on the derivation and analysis of this measure refer to:

Paine, S-J., Gerritsen, S., Napier, C., Pillai, A., Prickett, K., Atatoa Carr, P., Yao, E., Fenaughty, J., Morton, S.M.B. 2023. Now We Are 12: Methods. Auckland: *Growing Up in New Zealand*. Available from: www.growingup.co.nz

Neumann, D., Yao, E., Fenaughty, J., Liang, R., Kingi, T.K., Taufa, S., Atatoa Carr, P., Paine, S-J. 2023. Now We Are 12: Ethnic and Gender Identity. Snapshot 1. Auckland: *Growing Up in New Zealand*. Available from: www.growingup.co.nz

Ethnicity

As with previous DCWs, ethnicity was measured using two items in the 12Y DCW:

1. All the ethnicities that the participant identified with (total response ethnicity), and
2. The main ethnicity the participant identified with (self-prioritised ethnicity).

The following variables were derived from total response ethnicity:

1. 36 total response ethnic groups aggregated at Level 3 of Statistics New Zealand's (2005) ethnic classification system (i.e., finer categories).
2. 6 total response ethnic groupings aggregated at Level 1 of Statistics New Zealand's (2005) ethnic classification system (i.e., broad categories – Māori, Pacific, Asian, Middle Eastern/Latin American/African [MELAA], Other, European).
3. A "sole European" variable which includes young people who only identified with one or more European ethnicity. For descriptive statistics, we recommend using total response Māori, Pacific, Asian, MELAA, and Other, together with the sole European variable.
4. Externally prioritised ethnicity (mutually exclusive groupings determined by the following hierarchy: Māori > Pacific > Asian > MELAA > Other > European).
5. Single/combination grouping (mutually exclusive groupings according to the ethnic group or combination of groups reported, e.g., "Māori only", "Māori/European", "Māori/Pacific/European"); and
6. Total number of identified ethnicities (at Level 1).

The total response ethnicity question was also asked to mothers and partners at the 12Y DCW, and the same derived variables are available for these respondents. Table 39 provides the variable names and categories for the derived ethnicity variables. Note total response ethnicity data were also collected from teachers in the teacher questionnaire.

Table 38. List of Ethnicity derived variables.

Derived variable	12-year variable	Variable categories
Level 3 Total Response - European nfd	ETH5L3_1_[suffix]	0 = No 1 = Yes
Level 3 Total Response - New Zealand European	ETH5L3_2_[suffix]	
Level 3 Total Response - British and Irish	ETH5L3_3_[suffix]	
Level 3 Total Response - Dutch	ETH5L3_4_[suffix]	
Level 3 Total Response - Greek	ETH5L3_5_[suffix]	
Level 3 Total Response - Polish	ETH5L3_6_[suffix]	
Level 3 Total Response - South Slav	ETH5L3_7_[suffix]	
Level 3 Total Response - Italian	ETH5L3_8_[suffix]	
Level 3 Total Response - German	ETH5L3_9_[suffix]	
Level 3 Total Response - Australian	ETH5L3_10_[suffix]	
Level 3 Total Response - Other European	ETH5L3_11_[suffix]	
Level 3 Total Response - Māori	ETH5L3_12_[suffix]	
Level 3 Total Response - Pacific Peoples nfd	ETH5L3_13_[suffix]	
Level 3 Total Response - Samoan	ETH5L3_14_[suffix]	
Level 3 Total Response - Cook Islands Māori	ETH5L3_15_[suffix]	
Level 3 Total Response - Tongan	ETH5L3_16_[suffix]	
Level 3 Total Response - Niuean	ETH5L3_17_[suffix]	
Level 3 Total Response - Tokelauan	ETH5L3_18_[suffix]	
Level 3 Total Response - Fijian	ETH5L3_19_[suffix]	
Level 3 Total Response - Other Pacific Peoples	ETH5L3_20_[suffix]	
Level 3 Total Response - Asian nfd	ETH5L3_21_[suffix]	
Level 3 Total Response - Southeast Asian nfd	ETH5L3_22_[suffix]	
Level 3 Total Response - Filipino	ETH5L3_23_[suffix]	
Level 3 Total Response - Cambodian	ETH5L3_24_[suffix]	
Level 3 Total Response - Vietnamese	ETH5L3_25_[suffix]	
Level 3 Total Response - Other Southeast Asian	ETH5L3_26_[suffix]	
Level 3 Total Response - Chinese	ETH5L3_27_[suffix]	
Level 3 Total Response - Indian	ETH5L3_28_[suffix]	
Level 3 Total Response - Sri Lankan	ETH5L3_29_[suffix]	
Level 3 Total Response - Japanese	ETH5L3_30_[suffix]	
Level 3 Total Response - Korean	ETH5L3_31_[suffix]	
Level 3 Total Response - Other Asian	ETH5L3_32_[suffix]	
Level 3 Total Response - Middle Eastern	ETH5L3_33_[suffix]	
Level 3 Total Response - Latin American	ETH5L3_34_[suffix]	
Level 3 Total Response - African	ETH5L3_35_[suffix]	
Level 3 Total Response - Other Ethnicity	ETH5L3_36_[suffix]	
Level 1 Total Response - Māori	ETH5_M_[suffix]	
Level 1 Total Response - Pacific	ETH5_P_[suffix]	
Level 1 Total Response - Asian	ETH5_A_[suffix]	
Level 1 Total Response - MELAA	ETH5_MELA_[suffix]	
Level 1 Total Response - Other	ETH5_O_[suffix]	
Level 1 Total Response - European	ETH5_E_[suffix]	
Sole European (Level 1)	ETH5_ES_[suffix]	

Externally prioritised ethnicity (Level 1)	EXT_PROETH_[suffix]	1 = European 2 = Māori 3 = Pacific 4 = Asian 5 = MELAA 6 = Other
Single/combination ethnicity (Level 1)	ETH5_SC_[suffix]	1 = European Only 2 = Māori Only 3 = Pacific Only 4 = Asian Only 5 = MELAA Only 6 = Other Ethnicity Only 7 = Māori/European 8 = Māori/Pacific 9 = Pacific/European 10 = Asian/European 11 = Two Groups NEI 12 = Māori/Pacific 13 = Three Groups NEI 14 = Four to Six Groups 15 = NEI
Total number of identified ethnicities (Level 1)	ETH5_TOT_[suffix]	1 = 1 2 = 2 3 = 3+

Note. The suffixes for children, mothers, and partners are "y12C", "y12M", and "y12P", respectively (e.g., the variable name for European NFD is "ETH5L3_1_y12C" for children, "ETH5L3_1_y12M" for mothers, and "ETH5L3_1_y12P" for partners). MELAA = Middle Eastern/Latin American/African. NFD = not further defined. NEI = not elsewhere identified.

For further detail on the derivation and analysis of this measure refer to:

Paine, S-J., Gerritsen, S., Napier, C., Pillai, A., Prickett, K., Atatoa Carr, P., Yao, E., Fenaughty, J., Morton, S.M.B. 2023. Now We Are 12: Methods. Auckland: *Growing Up in New Zealand*. Available from: www.growingup.co.nz

Neumann, D., Yao, E., Fenaughty, J., Liang, R., Kingi, T.K., Taufa, S., Atatoa Carr, P., Paine, S-J. 2023. Now We Are 12: Ethnic and Gender Identity. Snapshot 1. Auckland: Growing Up in New Zealand. Available from: www.growingup.co.nz

The use of ethnicity variables requires careful considerations, please refer to:

Yao ES, Meissel K, Bullen P, Atatoa Carr P, Clark TC, Morton SMB. Classifying multiple ethnic identifications: Methodological effects on child, adolescent, and adult ethnic distributions. Demographic Research 2021;44:481–512. https://doi.org/10.4054/DemRes.2021.44.21

Yao ES, Meissel K, Bullen P, Clark TC, Atatoa Carr P, Tiatia-Seath J, et al. Demographic discrepancies between administrative-prioritisation and self-prioritisation of multiple ethnic

identifications. Social Science Research 2022;103:1–16.
https://doi.org/10.1016/j.ssresearch.2021.102648

Atatoa Carr P, Bandara D, Berry S, Kingi T, Grant CC, Morton S. Ethnic identification complexity across generations: Evidence from *Growing Up in New Zealand*. New Zealand Population Review 2017;43:35–61.

14.3.2. Psychosocial and cognitive development

Child depression – CES-D-10

The 10-item Center for Epidemiological Studies Depression Scale (CES-D-10) was used to assess depression symptoms in the cohort children at the 8-year, 10-year, and 12-year DCWs (8-year; 2017-2019, 10-year; 2020, 12-year; 2021-2022). This tool primarily assesses depression symptoms experienced in the past week with response anchors ranging from 0 (rarely or none of the time/ not at all) to 3 (all of the time/ a lot). Preliminary analyses suggest that the tool has adequate internal consistency and that the one factor model is appropriate. Full details of the psychometric analyses will be released in the near future. Table 40 provides the variable names for depression score using both the 9 item and 10 item version.

Table 39. List of Depression score derived variables.

Scale	12-year variable
Total score for 10-items	DEPRESS_SCORE_10_Y12C
Total score for 9-items	DEPRESS_SCORE_9_Y12C

For further detail on the derivation and analysis of this measure refer to:

Cha J, Neumann D, Grant M, Walker C, Gawn J. Fletcher BD. Technical Document for CES-D-10 Tool: 8-year, 10-year, and 12-year Data Collection Waves. Auckland: *Growing Up in New Zealand*; 2023.

Fletcher, B.D., Walker, C., Cha, J.E., Neumann, D., Paine S.J., Park A., Fenaughty, J., Bird, A.L., Waldie, K.E. 2023. Now We Are 12: Young people's experiences of depression and anxiety symptoms. Snapshot 7. Auckland: *Growing Up in New Zealand*.

Cha JE, Waldie KE, Neumann D, Smith A, Walker CG. Psychometric properties and factor structure of the Center for Epidemiologic Studies Depression scale 10-item short form (CES-D-10) in Aotearoa New Zealand children. J Affect Disord Rep. 2022;7:100298.

Child anxiety - PROMIS

The 8-item Patient-Reported Outcomes Measurement Information System (PROMIS) Paediatric Anxiety short form was used at both the 8- and 10- and 12-year DCWs (both v1 and v2 questions were asked). At 8 and 10 years both PROMIS-SF versions show excellent model fit and reliability for the total cohort as well as for the total response samples of the Māori, Pacific and Asian cohort. Preliminary analyses suggests that at 12 years the model fit, and reliability is appropriate for use. Full details of the psychometric analyses will be released in the near future. In the interim, we recommend that researchers employ sound validity and reliability testing to determine the suitability of this scale for their research. Table 41 describes the derived variables created for the PROMIS anxiety scale available in the dataset.

Table 40. List of anxiety score derived variables.

Scale	12-year variable
V1 8-item short form raw score	PAS_TOTAL_RAW_SCORE1_Y12C
V1 8-item short form T-score	PAS_T_SCORE1_Y12C
V1 8-item short form SD	PAS_SD1_Y12C
V2 8-item short form raw score	PAS_TOTAL_RAW_SCORE2_Y12C
V2 8-item short form T-score	PAS_T_SCORE2_Y12C
V2 8-item short form SD	PAS_SD2_Y12C

For further detail on the derivation and analysis of this measure refer to:

Neumann D, Cha J, Grant M, Walker C, Fletcher B. Technical Document for PROMIS Anxiety Tool: 8-year Data Collection Wave. Auckland: *Growing Up in New Zealand*; 2021.

Fletcher, B.D., Walker, C., Cha, J.E., Neumann, D., Paine S.J., Park A., Fenaughty, J., Bird, A.L., Waldie, K.E. 2023. Now We Are 12: Young people's experiences of depression and anxiety symptoms. Snapshot 7. Auckland: *Growing Up in New Zealand*.

Mother and partner depression – PHQ-9

The Patient Health Questionnaire-9 (PHQ-9) is a self-report, standard instrument for diagnosing depression and depression severity. It was chosen because it is brief, free, and has excellent psychometric properties in both patient samples and the general population. The Patient Health Questionnaire- (PHQ-9) is a nine-item questionnaire. The items in the PHQ-9 are coded from 0 (Not at all) to 3 (Nearly every day). The PHQ-9 has been well validated and reported to have good sensitivity and specificity for detecting depressive disorders. The total score is determined by summing all items (PH1_Y12 through to PH9_Y12). The standard cut-off score for screening to identify possible major depression is 10 or above. The score can also be used to categorise the severity of any depressive symptoms.

- Depression – binary categorisation
- Score 0-9 = No

- Score 10+ = Yes

Full details of the psychometric analyses will be released in the near future. In the interim, we recommend that researchers employ sound validity and reliability testing to determine the suitability of this scale for their research. Table 42 describes the derived variables created for the PHQ depression scale available in the dataset.

Table 41. List of PHQ-9 depression scale derived variables.

Scale	12-year variable	Response
Patient health questionnaire 9	PHQ_9 _Y12M	
Patient health questionnaire 9	PHQ_9 _BINARY_Y12M	0-9 = No, 10+ = Yes
Patient health questionnaire 9	PHQ_9 _Y12P	
Patient health questionnaire 9	PHQ_9 _BINARY_Y12P	0-9 = No, 10+ = Yes

For further detail on the derivation and analysis of this measure refer to:

Walker C, Fletcher B, Gawn J, Waldie K. Technical Document for Patient Health Questionnaire 9 Tool: 8-year and 12-year Data Collection Waves. Auckland: *Growing Up in New Zealand*; 2022.

Fletcher, B.D., Walker, C., Cha, J.E., Neumann, D., Paine S.J., Park A., Fenaughty, J., Bird, A.L., Waldie, K.E. 2023. Now We Are 12: Young people's experiences of depression and anxiety symptoms. Snapshot 7. Auckland: *Growing Up in New Zealand*.

Child bullying

The Forms of Bullying Scale (FBS) was used in the 12-year data collection wave to determine the frequency in which young people experienced being bullied or were perpetrators of bullying. The FBS has two scales: bullying victimization (FBS-V) and perpetration (FBS-P). The 10-items from the FBS-V were asked from the child's perspective to determine their experiences of bullying. This tool primarily assesses bullying experienced in the last school term with response anchors ranging from 1 (This did not happen to me) to 5 (Several times a week or more), with an additional option of 95 = Not applicable. A composite mean score of all items is calculated to give the prevalence of bullying experienced (FSB-V) with higher mean scores representing greater exposure to bullying.

Additionally, an adapted version of the FBS-V and FBS-P was also asked to teachers. Teachers rated the prevalence of both victim and perpetrator bullying perspectives for the child using six-point Likert-type response scales: 1 = I am not aware this happened, 2 = Once or twice, 3 = Every few weeks, and 4 = About once per week, 5 = Several times per week or more, 95 = Not applicable. As in the child questionnaire, a composite mean score of all 10-items can be used to give the prevalence of bullying known to the teacher for each scale, with higher scores representing greater prevalence of bullying behaviours that the teacher reported being aware of. These derived scores require statistical testing prior to use as this tool has not been verified for use by teacher responses.

A binary score can used based on a cut-off of a mean score of 2 representing the prevalence of bullying. Binary scores should be computed for each scale.

Full details of the psychometric analyses will be released in the near future. In the interim, we recommend that researchers employ sound validity and reliability testing to determine the suitability

of this scale for their research. Table 43 describes the derived variables created for the Forms of Bullying Scale available in the dataset.

Table 42. List of forms of bullying derived variables.

Scale	12-year variable
FBS-V child mean	FBS_V_MEAN_Y12C

For further detail on the derivation and analysis of this measure refer to:

Fletcher B, Gawn J. Technical Document for The Forms of Bullying Scale (FBS): 12-year Data Collection Wave. Auckland: *Growing Up in New Zealand*; 2023.

Fletcher, B.D., Walker, C., Cha, J.E., Neumann, D., Paine S.J., Park A., Fenaughty, J., Bird, A.L., Waldie, K.E. 2023. Now We Are 12: Young people's experiences of depression and anxiety symptoms. Snapshot 7. Auckland: *Growing Up in New Zealand*.

14.3.3. Health and wellbeing

Child health related quality of life - KIDSCREEN-10

The KIDSCREEN-10 index assesses young people's subjective general health and psychological, mental, and social wellbeing. It is a short form of the KIDSCREEN-52 and KIDSCREEN-27 instruments and is suitable for all children and teenagers aged eight to 18 years, particularly as it only takes a few minutes to complete (Herdman et al., 2002; Ravens-Sieberer et al., 2001; Ravens-Sieberer & Europe, 2006; Ravens-Sieberer et al., 2008). It is recommended that young people self-report their responses to the index questions. A proxy measure for parents and main caregivers is also available, however, as a child-centric study, Growing Up in New Zealand only utilised the young person self-report measure as part of the questionnaire. The questions asked young people whether they have felt fit and well, got on well at school, been able to pay attention, felt full of energy, felt sad, felt lonely, had enough time for themselves, been able to do the things they want to do in their free time, been treated fairly, and had fun with their friends.

Reliability, construct, and criterion validity of KIDSCREEN-10 has been published previously (Ravens-Sieberer et al., 2010) and should be read before using the data generated from the index. Regarding psychometric properties, this instrument provides good discriminatory power and enables precise, stable wellbeing and health-related quality of life (HRQoL) measurements. In particular, the distribution of raw scores resembles the theoretical expected normal distributions and it has good internal consistency reliability (α=0.82), and test-retest reliability/stability (r=0.73; ICC0.72) (Ravens-Sieberer et al., 2010).

The items of the KIDSCREEN-10 instrument can be scored as Rasch scales as they fulfil the assumption of the Rasch model (unidimensionality, homogeneity of items and persons, sufficiency of the sum score). A low score indicates poor HRQoL, whilst higher scores indicate better HRQoL (Ravens-Sieberer et al., 2010). In the 12-year data collection wave, we reported HRQoL using three main categories: low, average, or high HRQoL and as a continuous sum score. Table 44 describes the derived variables created for the KIDSCREEN-10 index. Both the Rasch score (HRQoL_R_y12C) and T score (HRQoL_T_y12C) variables are required in order to derive the categorical variable.

We have not assessed the individual items of the index for response rate bias. We recommend that researchers conduct their own reliability and validity testing to determine the suitability of this scale to their research.

Table 43. List of KIDSCREEN-10 derived variables.

Scale	12-year variable
Kidscreen-10 sum score	QOL_SUM_SCORE_Y12C
Kidscreen-10 Rasch score	HRQoL_R_y12C
Kidscreen-10 T score	HRQoL_T_y12C
Kidscreen-10 categorical (low, average, high)	Kidscreen_cat_y12C

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation (which will be updated for the 12-year data collection wave in the future).

Pillai A., Kim H., Langridge F., Cha J., Miller S., Crosby, K., Walker C. 2021. *Technical Document for Kidscreen Tool: 8-year Data Collection Wave.* Growing Up in New Zealand: Auckland.

Child disability – Washington 6

The Washington Group on Disability Statistics designed the Washington Group Short Set on Functioning (WG-SS) to identify people who may be experiencing disability for use in a general population aged five years and over (. Washington Group on Disability Statistics, 2022). This tool is recommended for self-report or to be answered by a knowledgeable proxy respondent when the person cannot answer for themselves. During the 12-year data collection wave Growing Up in New Zealand asked young people to respond to these questions about their own level of functioning as part of the questionnaire.

This tool has not (to date) been validated for self-report in this age group. The Washington Group acknowledge that use of this tool is likely to under-represent disability prevalence in children and

young people, particularly for young people with psychosocial or developmental disabilities (. Washington Group on Disability Statistics, 2022; . Washington Group on Disability Statistics, 2023). This variable (seen in Table 45) provides a binary yes/no categorisation to whether the young person self-reported that they had a functional impairment indicating they are at greater risk of disablement, and therefore, can be categorised as 'disabled'. Young people were classified as 'disabled' If they responded as having 'yes - a lot of difficulty' or 'cannot do at all' to any of the six Washington Group Items (DIS1_Y12C, DIS2_Y12C, DIS3_Y12C, DIS4_Y12C, DIS5_Y12C, DIS6_Y12C) which included difficulty with seeing, hearing, walking, or climbing stairs, remembering, or concentrating, self-care, and/or communication

We have not assessed the individual items for response rate bias. We recommend researchers conduct their own reliability and validity testing.

Table 44. List of WS-SS derived variables.

Scale	12-year variable
Washington Group Short Set on Functioning (WG-SS)	W6S_Y12C

For further detail on the derivation and analysis of this measure you can request access to the technical documentation that will be available in the future.

Puberty – Mean puberty score and Puberty Category Score (PCS)

As a child-centric study, *Growing Up in New Zealand* asked young people about pubertal development in the child questionnaire using questions from Petersen *et al.*'s study of pubertal status (Petersen, Crockett, Richards, & Boxer, 1988). The cohort were all asked about growth spurts, skin changes, and body hair development in the armpit and/or pubic areas, regardless of their sex at birth. Females (sex assigned at birth) were also asked about breast development and menstruation, whilst males (sex assigned at birth) were asked about voice changes and facial hair growth.

The Petersen *et al.* (Petersen et al., 1988) questions were scored from one to four, where 1=Not yet started, 2=Has just started, 3=Is definitely underway, and 4=Seems completed (except for the menstruation question (*PUB5_y12C*) where a score of 1=no menstruation and 4=menstruation). Responses to these questions were then summed and divided by five to derive a mean puberty score ranging from 1-4 for both males and females.

The data was also used to derive a Puberty Category Score (PCS) based on that described by Pompéia *et al.* (Pompéia et al., 2019), whereby each young person was assigned to one of the five Tanner stages of pubertal development (Tanner, 1962). Female PCSs were developed based on the sum

of body hair and breast development scores (minimum PCS=2, maximum PCS=8) as well as binary menstruation status. Male PCSs were developed based on the sum of body hair, voice changes, and facial hair scores (minimum PCS=3, maximum PCS=12). These PCSs were used to assign young people to one of the five Tanner stages: pre-pubertal, early-pubertal, mid-pubertal, late-pubertal, or post-pubertal (Tanner, 1962). Where the skip logic did not work correctly, and participants potentially answered the incorrect puberty questions according to their sex assigned at birth (n = 19), their data was removed from analyses of the Petersen *et al.* (Petersen et al., 1988) questions, mean puberty scores and subsequent Puberty Category Score derivation. Table 46 describes the derived variables created for the puberty construct.

Preliminary analyses of the five individual puberty items have been undertaken for response rate bias (see reference below). We have not undertaken reliability and validity testing and recommend researchers conduct their own.

Table 45. List of puberty derived variables.

Scale	12-year variable
Puberty mean score	PUB_MEAN_Y12C
Puberty Category Score (PCS)	PUB_CAT_Y12C

For further detail on the derivation and analysis of this measure you can request access to the technical documentation that will be available in the future.

Marks, E., Walker, C., Reid-Ellis, M., Tait, J., Bullen, P., Fenaughty, J., Liang, R., Grant, C., Paine, S.J. 2023. Now We Are 12: Young People's Experiences of Puberty at Age 12. Report. Auckland: *Growing Up in New Zealand*. Available from: www.growingup.co.nz

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Petersen, A. C., Crockett, L., Richards, M., & Boxer, A. (1988). A self-report measure of pubertal status: Reliability, validity, and initial norms. *Journal of Youth & Adolescence, 17*(2), 117-133. 10.1007/bf01537962

Pompéia, S., Zanini, G. A. V., Freitas, R. S., Inacio, L. M. C., Silva, F. C. D., Souza, G. R., . . . Cogo-Moreira, H. (2019). Adapted version of the Pubertal Development Scale for use in Brazil. *Revista de Saude Publica, 53*, 56. 10.11606/s1518-8787.2019053000915

Ravens-Sieberer, U., Abel, T., Auquier, P., Bellach, B.-M., Bruil, J., Duer, W., . . . Group, E. K. (2001). Screening for and Promotion of Health-Related Quality of Life in Children and Adolescents-A European Public Health Perspective. *Quality of Life Research*, 269-269.

Ravens-Sieberer, U., Erhart, M., Rajmil, L., Herdman, M., Auquier, P., Bruil, J., . . . Kilroe, J. (2010). Reliability, construct and criterion validity of the KIDSCREEN-10 score: a short measure for children and adolescents' well-being and health-related quality of life. *Qual Life Res, 19*(10), 1487-1500. 10.1007/s11136-010-9706-5

Ravens-Sieberer, U., & Europe, K. G. (2006). *The Kidscreen questionnaires: quality of life questionnaires for children and adolescents; handbook*: Pabst Science Publ.

Ravens-Sieberer, U., Gosch, A., Rajmil, L., Erhart, M., Bruil, J., Power, M., . . . Kilroe, J. (2008). The KIDSCREEN-52 quality of life measure for children and adolescents: psychometric results from a cross-cultural survey in 13 European countries. *Value Health, 11*(4), 645-658. 10.1111/j.1524-4733.2007.00291.x

Tanner, J. M. (1962). *Growth at adolescence* (2nd ed.). Oxford: Blackwell Scientific Publications.

Washington Group on Disability Statistics. (2022). The Washington Group Short Set on Functioning (WG-SS). Retrieved Mar 10, 2023, from https://www.washingtongroup-disability.com/fileadmin/uploads/wg/Washington_Group_Questionnaire_-_1_-_WG_Short_Set_on_Functioning_-_October_2022_.pdf

Washington Group on Disability Statistics. (2023). Short Set - Frequently Asked Questions. Retrieved Mar 10, 2023, from https://www.washingtongroup-disability.com/resources/frequently-asked-questions/short-set/

14.3.4. Societal context, neighbourhood, environment

Housing tenure

The types of housing tenure have changed over time and have become more diversified as new housing policies have been implemented. Conditions of occupancy have been shifted from a dichotomy between owning and renting to a continuum with regard to specific situations and dwelling environment (Hulse, 2008). Defining housing tenure based on all available information about occupancy situations would enable a better understanding of not only the types of property that the households usually reside, but also other property they may own, rent, or be able to occupy in

situations other than owning or renting (Hulse, 2008). At the 12-year DCW, four variables from the mother questionnaire were used to derive the housing tenure variable (HHTENURE_Y12M).

Table 46. List of housing tenure derived variable.

Scale	12-year variable
4-category housing tenure (12Y)	HHTENURE_Y12M

For further details on how this variable was derived, please refer to the following technical report:

Lai, H., Prickett, K. 2023. Technical Document for housing tenure: 12-year Data Collection Waves. *Growing Up in New Zealand*: Auckland.

Main reason for moving home

Residential mobility is one important aspect of housing experiences during childhood as the potential impacts have been found recently, including cognitive outcomes and behavioural problems. In 12-year DCW, we asked the mothers one question about the main reason for moving home: "Thinking about your most recent move, what is the most important reasons why you have moved house?" We provided 17 options of reasons for the mothers to choose from and we categorised these options into four categories: "improvement moves", "involuntary moves", "practical moves", and "other reasons".

Improvement moves were those where respondents indicated that the main driver for their move was to improve their living conditions. This category included four options:

- Moving to a bigger property/house
- Buying a new house
- Wanting to move to a different neighbourhood
- Moving to a warmer, drier and/or safer house

Involuntary moves were those where the main driver was likely outside the respondents' control. This category included:

- Living in a rental property and was sold
- Breakdown of a relationship or marriage that necessitated a move
- Moving for financial reasons
- Tenancy termination (for a reason other than the rental property being sold)
- Rent increased for rental property

Practical moves were those where respondents indicated that the primary driver for their move was not necessarily to do anything with their home but in response to other factors in their life that they have potential agency over. This category included:

- Moving for employment reasons
- Moving closer to a particular school
- Moving closer to family support or moving in with family
- Moving into a smaller property/house

All other reasons for move were categorised into "other reasons".

Table 48 displays the variable name for the moving home derived variables in the 12-year DCW.

Table 47. List of main reason for moving home derived variables.

Scale	12-year variable
Main reason for moving home	NE32_MOVE_CAT_Y12M

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation:

Lai, H., & Prickett, K. (2023). Technical document for the main reason of moving home: 12-year Data Collection Waves. Auckland: *Growing Up in New Zealand*, University of Auckland.

Household crowding

Overcrowding is an indication of social disadvantages, poorer socioeconomic status, and health inequalities for children (Stats NZ, 2019). Two crowding measures were derived in the 12-year DCW: (i) simple crowding measure, refers to the total number of people divided by the total number of bedrooms; (ii) Canadian Crowding Index, refers to a household is considered to be crowded if the dwelling requires extra bedrooms to meet the following five criteria:

- There should be no more than two people per bedroom; parents or couples share a bedroom.
- Children aged less than five years, either of the same or opposite sex, may reasonably share a bedroom.
- Children aged less than 18 years, of the same sex, may reasonably share a bedroom.
- A child aged five to 17 years should not share a bedroom with one aged under five years of the opposite sex.
- Single adults aged 18 years and over, and any unpaired children, require a separate bedroom.

Table 48. List of household crowding derived variables.

Scale	12-year variable
Simple crowding index	CROWDING_Y12M
Canadian crowding index	CROWDING_CI_Y12M

To assist users in determining the appropriate crowding tool to use they may like to refer to Goodyear et al. (2019).

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation:

Lai, H., & Miller, S. (2023). Technical document for Canadian Crowding Index: 12-year Data Collection Waves. Auckland: *Growing Up in New Zealand*, University of Auckland.

Equivalized household income

When family size increases, consumption needs also increase, but in a way that is not necessarily proportional to the number of household members. While the needs for food, bedrooms, electricity, and water will be higher among couples than for a single person, they will not be twice as high for a couple. Income equivalisation represents an adjustment to family or household income that takes account of the economies of scale that flow from sharing resources. The equivalisation scale assigns values to households in proportion to their needs after considering the household size and the relative consumption needs of adults and children. These values help to adjust the household income in a more meaningful way that enables comparison of relative economic wellbeing across different types of families. Importantly, these income equivalisation measures are often used in measures that determine whether families are considered in income poverty or not.

Table 49. List of equivalised household income derived variables.

Scale	12-year variable
Modified OECD scale	OECD_HH_INCOME_y12M
Square root scale	SRSE_HH_Income_y12M

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation:

Lai, H., Miller, S., Prickett, K. (2023). Technical document for equivalised household income: 12-year Data Collection Waves. Auckland: *Growing Up in New Zealand*, University of Auckland.

Food insecurity

In the 8Y and 12Y DCW, we asked eight questions that make up the Food Insecurity Index and a derived Aggregated Food Insecurity Score, which has been constructed using the Multidimensional Item Response Theory (MIRT) modelling package in R.

The index categorises households as either mostly to fully food-secure, moderately food-insecure or severely food-insecure using cut-points developed by the Ministry of Health based on the total child population in New Zealand aged 0-14 years. Variable DP14_y8M can also be analysed on its own as the main indicator of food security as 'always', 'sometimes' or 'never' and the other seven questions can be presented in a graph analysed by 'Sometimes' and 'Often' as in the Ministry of Health's report Household Food Insecurity Among Children.

Table 50. List of food insecurity derived variables.

Scale	12-year variable
Food insecurity score	AGG_FIS_CAT_Y12M

For further detail on the derivation and analysis of this measure, please refer to the following documentation:

Park, A., & Gerritsen, S. (2023). Supplementary materials for Now We Are 12: Indicators of food insecurity and access to food assistance in the *Growing Up in New Zealand* cohort. https://www.growingup.co.nz/growing-up-report/food-insecurity

Material hardship (DEP-17)

At age 12, we asked the mothers of the cohort about their material circumstances using the DEP-17 index of material hardship. The 17 items in this index focused on low living standards with respect to paying for food, clothing, housing, utilities, and other everyday costs. As the items were asked to the mothers of the cohort, the DEP-17 scores are representative of the households that the 12-year-olds were living in at the time of the DCW.

In accordance with the Statistics New Zealand DEP-17 index derivation, we converted each of the responses across the 17 items to binary responses ("0" = no hardship; "1" = hardship) before summing responses across the scale (for more information see Statistics New Zealand, 2019). Scores ranged from 0–17, with a higher score indicating lower living standards. These scores are in the dataset, with the variable name DEP17_total_Y12M. Young people were also grouped into three categories based on

their DEP-17 scores: no/little material hardship (scores 0–5), material hardship (6–8), and severe material hardship (9+). This categorical variable is labelled DEP17_CAT_Y12M in the dataset.

Psychometric analyses to assess the reliability and validity of this scale are currently underway and updated information will be provided in the future.

Table 51. List of material hardship derived variables.

Scale	Scale	Response options
DEP-17 sum score	DEP17_TOTAL_Y12M	Score range: 0–17
DEP-17 categorical variable	DEP17_CAT_Y12M	Options: - No/little material hardship - Material hardship - Severe material hardship

For further details on the derivation and analysis of this measure you can request access to the technical documentation that will be available in the near future. In the meantime, please refer to the Material Hardship topic paper:

Grant, M., Prickett, K. C., Morton, S. M. B., Miller, S., Pillai, A., Paine, S-J. 2023. Now We Are 12: Material Hardship. Snapshot 2. Auckland: *Growing Up in New Zealand*. Available from: https://www.growingup.co.nz/growing-up-report/material-hardship

Geospatial data—DHB, region, NZDep, rurality

Google geocoding API was used to convert participant addresses into spatial point coordinates. We then ran spatial joins to match the GUiNZ Google-geocoded point location coordinates with the Meshblock 2018 polygons obtained from Stats NZ (2019), and to generate DHB, region, deprivation, and rurality variables.

DHB refers to New Zealand's 20 District Health Boards which were responsible for providing or funding health services in their geographical districts, up until 2022. The DHB variable provides an indication of the district that participants were living in at the time of the 12-year DCW, based on the 2015 boundaries defined by the Ministry of Health. The region variable is a more granular measure of the area in which participants were living.

The deprivation variables were derived from the New Zealand Deprivation Index (Atkinson et al 2020) and is provided in two formats—deciles and quintiles. NZDep2018 combines nine variables from the 2018 census which reflect eight dimensions of deprivation. The NZDep2018 decile scale ranges from 1–10, where 1 represents the areas with the least deprived scores and 10 the areas with the most deprived scores. The quintile measure is a collapsed version, derived from the deciles.

Three rurality variables are included based on Urban Accessibility (UA), Functional Urban Area (FUA), and Urban Rural (UR) classifications from Stats NZ. UA is a measure of proximity or remoteness of rural areas from urban areas to understand the degree of accessibility of rural areas to urban areas. FUAs describe cities and surrounding areas where people live and work—these include heavily populated cities and the surrounding areas where people travel from to work in the city. URs classifies New Zealand into areas that share common urban or rural characteristics.

These variables are generated individually for each active participant, rather than at the family level. It is important to note that there may be participants who share the same Family ID but have different addresses and therefore, may have different geospatial data. These variables can be found in the DCW12C, DCW12M, and DCW12P datasets, providing specific information for each participant.

Table 52. List of geospatial data derived variables.

Derived variable	Variable name	Response code
DHB	DHB2015_Y12C DHB2015_Y12M DHB2015_Y12P	Please see data profile for full list of categories.
Region	REGION_Y12C region_Y12M region_Y12P	Please see data profile for full list of categories.
NZDep Deciles	NZDEP2018_10_Y12C NZDEP2018_10_Y12M NZDEP2018_10_Y12P	1-10; with decile 1 indicating areas with the lowest deprivation, and decile 10 indicating areas with the highest levels of deprivation.
NZDep Quintiles	NZDEP2018_5_Y12C NZdep2018_5_Y12M NZdep2018_5_Y12P	1-5; with decile 1 indicating the two lowest deprivation deciles, and decile 5 indicating the two highest deprivation deciles.
Urban/Rural categorisation based on UA2018 classification	RURALITY_UA2018_Y12C rurality_UA2018_Y12M rurality_UA2018_Y12P	"High urban accessibility" "Large urban area" "Low urban accessibility" "Major urban area" "Medium urban accessibility" "Medium urban area" "Remote"

		"Very remote"
Urban/Rural categorisation based on FUA2018 classification	RURALITY_FUA2018_Y12C rurality_FUA2018_Y12M rurality_FUA2018_Y12P	"Area outside functional urban area" "Large regional centre" "Medium regional centre" "Metropolitan area" "Small regional centre"
Urban/Rural categorisation based on UR2018 classification	RURALITY_UR2018_Y12C rurality_UR2018_Y12M rurality_UR2018_Y12P	"Large urban area" "Major urban area" "Medium urban area" "Rural other" "Rural settlement" "Small urban area"
Binary Urban/Rural categorisation based on UR2018 classification	RURALITY_BIN_UR2018_Y12C rurality_bin_UR2018_Y12M rurality_bin_UR2018_Y12P	"Urban" "Rural"

Further details on the derivation and analysis of this measure will be available in the near future. Please contact data access for more information.

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14.3.5. Family and Whanau

Parenting

In the 12Y DCW, we asked six questions developed in-house to measure parental involvement, asked of both mothers and their partners. The parental involvement derived variable is a summed score of these six items. Items PC5_&suffix, PC6_&suffix, PC19_&suffix, PC34_&suffix, PC35_&suffix, and PC36_&suffix were recoded from 0-4 into 1-5, then scores were summed.

At the 12Y DCW, we also asked six questions to measure parental warmth, asked of both mothers and their partners. These comprise the Parental Warmth subscale of the Parenting Practices Questionnaire adapted by Growing Up in Australia: The Longitudinal Study of Australian Children (29). Items PAR13_&suffix, PAR31_&suffix, PAR32_&suffix, PAR33_&suffix, PAR34_&suffix, and PAR63_&suffix were recoded from 0-4 into 1-5, then scores were summed.

Preliminary analyses suggest that at 12 years the reliability of each scale is appropriate for use. We recommend that researchers employ sound validity and reliability testing to determine the suitability of these scales for their research. Table 54 describes the derived variables created as measures of parenting available in the dataset.

Table 53. List of parenting derived variables.

Scale	12-year variable
Parental involvement derived score – Mother	PAR_INV_Y12Cm
Parental involvement derived score – Partner	PAR_INV_Y12Cp
Parental warmth derived score – Mother	PAR_WAR_Y12Cm
Parental warmth derived score – Partner	PAR_WAR_Y12Cp

Parent-child relationship tool

In the 12Y DCW, we asked eight questions that make up the parent-child relationship tool (PCHR1_y12C - PCHR8_y12C). To create summed scores, we removed missing data and 99 responses (don't know), then summed the responses. Lower scores indicate stronger parent-child relationship experiences.

A reversed summed score was also created for ease of interpretation (where higher scores represent stronger parent-child relationships), and for ease of utility in some models. In addition, a binary variable was created to have a measure of 'strong' and 'less close' parent-child relationships; information for how the cut-offs were determined can be found in Supplementary Material – Relationships. Finally, summed scores for each of the Trust and Communication subscales were created, details of these subscales can also be found in Supplementary Material – Relationships.

Preliminary analyses suggests that at 12 years the reliability is appropriate for use. We recommend that researchers employ sound validity and reliability testing to determine the suitability of these scales for their research. Table 55 describes the derived variables created for the Parent-Child Relationship tool available in the dataset.

Table 54. List of 8-item parent-child relationship tool derived variables.

Scale	12-year variable
Parent-Child Relationship score	PCHR_SUM_Y12C
Parent-Child Relationship score - reversed	PCHR_REV_SUM_Y12C
Parent-Child Relationship binary score	PCHR_BIN_Y12C
Parent-Child Relationship Trust subscale score	PCHR_TRUST_SUM_Y12C
Parent-Child Relationship Communication subscale score	PCHR_COMM_SUM_Y12C

It Is recommended that research carry out psychometric testing prior to using these variables In their analyses.

Peer relationships tool

In the 12Y DCW, we asked eight questions that make up the Peer Relationships tool (CPR17_y12C – CPR24_y12C). To create summed scores, we removed missing data and 99 responses (don't know), then summed the responses. Lower scores indicate stronger peer relationship experiences.

A reversed summed score was also created for ease of interpretation (where higher scores represent stronger peer relationships), and for ease of utility in some models. A binary variable was created to have a measure of 'strong' and 'less close' peer relationships; information for how the cut-offs were determined can be found in Supplementary Material – Relationships. In addition, summed scores for each of the Trust and Communication subscales were created, details of these subscales can also be found in Supplementary Material – Relationships. Preliminary analyses suggest that at 12 years these scores were appropriate for use.

We recommend that researchers employ sound validity and reliability testing to determine the suitability of these scales for their research. Table 56 describes the derived variables created for the Peer Relationship tool available in the dataset.

Table 55. List of 8-item peer relationship tool derived variables.

Scale /variable	12-year variable
Peer Relationship score	CPR_SUM_Y12C
Peer Relationship score - reversed	CPR_REV_SUM_Y12C
Peer Relationship binary score	CPR_BIN_Y12C
Peer Relationship Trust subscale score	CPR_TRUST_SUM_Y12C
Peer Relationship Communication subscale score	CPR_COMM_SUM_Y12C

It Is recommended that research carry out psychometric testing prior to using these variables In their analyses.

Household composition

In the 12Y DCW, we asked several questions to capture household composition, using both the Household Grid (answered by mothers or primary caregivers) and questions asked within the mother questionnaire. With these responses the following derived variables were created.

To create the **Single parent family** derived variable, we included those who answered yes to one or more of the following: Mother, Father, Mother's partner (Female), Mother's partner (Male), Stepfather, Stepmother.

To create the **Living with extended family** derived variable, we included those who answered yes to one or more of the following: Aunt, Brother-in-law, Cousin (Female), Cousin (Male), Grandfather, Grandmother, Great aunt, Great grandfather, Great grandmother, Great uncle, Nephew, Niece, Sister-in-law, Uncle, Sister's partner, Brother's partner.

To create the **Living with non-kin** derived variable, we included those who answered yes to one or more of the following: Boarder (Female), Boarder (Male), Flatmate (Female), Flatmate (Male), Friend (Female), Friend (Male), Homestay (Female), Homestay (Male), Caregiver (Female), Caregiver (Male), Other (Male), Other (Female).

To create the **Intergenerational household** derived variable, we included those living with one or more of the following: Grandfather, Grandmother, Great aunt, Great uncle, Great grandfather, Great grandmother.

The **Household structure** derived variable has four response categories as detailed below, combining the Single parent family, Living with extended family and Living with non-kin family derived variables.

The **Household bubble size** derived variable is a measure the number of people, including the cohort young person (or persons if twins or triplets), that reside in the household.

Table 56. List of household composition derived variables.

Scale	12-year variable	Response options
Single parent family	HHST_PAR_Y12M	1 = Sole parent 2 = Two or more parents 3 = Other
Living with extended family	HHST_EXT_Y12M	0 = Not living with extended family 1 = Living with extended family
Living with non-kin	HHST_NONKIN_Y12M	0 = Not living with non-kin 1 = Living with non-kin
Living in intergenerational household	HHST_INTGEN_Y12M	0 = Not an intergenerational family 1 = Intergenerational family
Household structure	HHST_Y12M	1 = Sole parent 2 = Two or more parents 3 = Parent(s) living with extended family 4 = Parent(s) living with non-kin
Household bubble size	HHST_BUBBLE_Y12M	Numeric

14.3.6. Education

School satisfaction

The 6-item Student Personal Perception of Class Climate Scale (SPPCC) (1), adapted for brevity from the 8-item MSLSS School Satisfaction subscale (2), was utilised to ask about students' emotional engagement such as whether they look forward to going to school, and if they think school is interesting. Confirmatory factors analysis, conducted by Rubie-Davies and colleagues (3) revealed that all 6 items relating to school satisfaction loaded onto one factor. The authors found that this subscale represented the same conceptual framework for European, Māori, Pasifika, and Asian students (configural invariance), and therefore concluded it was fit for use within the multicultural Aotearoa New Zealand primary school population. This 6-item school satisfaction subscale was used with the Growing Up in New Zealand cohort at the 8-year, COVID-19 Lockdown, and 12-year data collection waves. Additionally, in the teacher survey, teachers were asked about their perceptions of their students' emotional engagement. The SPPCC(1) was adapted from the young person version for response by teachers (i.e. Written in third person). Within each dataset, a mean score was derived by summing the scores across all six items, then dividing by six (i.e., the number of items). Table 58 shows the variable names available for the relevant data collection waves.

Table 57. List of school satisfaction derived variables.

Scale	12-year variable
Mean score of 6 items at 12-year DCW	SCHOSAT_MEAN_Y12C
Mean score of 6 items at 12-year DCW, behav	SCHOSAT_MEAN_Y12T

Preliminary testing of the child self-reported responses indicated that this school satisfaction scale was psychometrically sound and fit for use. The Cronbach alpha (α = .91) indicated that this scale had acceptable internal consistency. Confirmatory factor analysis suggested that a one factor model had acceptable fit for the 12-year data (Tucker-Lewis index =.97; Comparative Fit index = .98; Root Mean Square Error of Approximation= .097; Standardized Root Mean Square Residual = .023). Measurement invariance testing of the identified model was tested across child's gender and ethnicity and was confirmed (configural, metric, scalar, residual invariance). However, we recommend researchers further explore this scale when using this scale in analyses.

For further detail on the derivation and analysis of this measure you can request access to the following technical documentation (8- and 10- year time points only).

Behavioural engagement in school

The items relating to behavioural engagement were taken from the Following Class Rules subscale of the Class Maps Survey (4), adapted from previous iterations, to ask young people their perception of their own behaviour in class, such as on-task behaviour in the classroom and whether students follow class rules. This iteration of an earlier scale shifted the focus of the questions from the class wide perspective to focus on the individual. Minor adaptions to the tool were made for use in the *Growing Up in New Zealand* 12-year data collection wave to contextualise the language for the New Zealand context. A mean score was derived through summing the scores across all items, then dividing by the number of items (see Table 58).

Table 58. List of behavioural engagement in school derived variable.

Scale	12-year variable
Mean score of 6 items at 12-year DCW	BEHAV_MEAN_Y12C

Preliminary testing indicated that this behavioural engagement in school scale was psychometrically sound and fit for use. The Cronbach alpha (α = .91) indicated that this scale had acceptable internal consistency. Confirmatory factor analysis suggested that a one factor model had acceptable fit for the 12-year data (Tucker-Lewis index =.96; Comparative Fit index = .98; Root Mean Square Error of Approximation= .097; Standardized Root Mean Square Residual = .024). Measurement invariance testing of the identified model was tested across child's gender and ethnicity and was confirmed (configural, metric, scalar, residual invariance). However, we recommend researchers further explore this scale when using this scale in analyses.

Cognitive engagement in school

The Regulating sub-scale of the Goal Orientation and Learning Strategies Survey (GOALS-S) (5) was used to ask young people to reflect on their perceptions of their cognitive engagement in school,

such as whether they ask for help, and whether they will try to learn something again later if they are confused. Note that the GOALS-S Regulating subscale only assesses one aspect of cognitive engagement. This scale was created for use in an Australian sample and was shown to be invariant across males and females but has not yet been validated within a New Zealand sample.

A mean score for cognitive engagement was derived through summing the scores across all items, then dividing by the number of items (see Table 59). Preliminary testing indicated that this scale had acceptable internal consistency (Cronbach alpha, $\alpha = .83$). However, we recommend researchers further explore this scale when using this scale in analyses.

Table 59. List of cognitive engagement in school derived variable.

Scale	12-year variable
Mean score of 5 items at 12-year DCW	COG_MEAN_Y12C

School engagement

This derived variable was created to provide an overall school engagement score that considers the components of emotional engagement (school satisfaction), behavioural engagement and cognitive engagement at school. An overall school engagement mean score (see Table 60) was created for each young person by first re-scaling their raw scores across the cognitive engagement, behavioural engagement and school satisfaction scales so that all three scales are on a scale of 1-5, then for each subscale mean scores were created. Subsequently a mean score for school engagement was created by summing their mean scores for the emotional, behavioural, and cognitive engagement scales, and dividing by three.

Table 60. List of overall school engagement derived variable.

Scale	12-year variable
Mean score of combined three engagement components at 12-year DCW	SCHENG_MEAN_Y12C

We recommend that researchers conduct psychometric testing prior to using this variable.

Academic buoyancy

The tool utilised in the 12-year DCW to assess academic buoyancy was described and validated by Martin and Marsh (6). It utilises a 7-point Likert scale (1-strongly disagree to 7-strongly agree) to ask students to reflect on their approach to challenges that they may face at school on any given day. This tool was validated with 598 Australian high school students in Years 8 and 10 (mean age 14.3 years), following on from earlier testing and refinement of the tool. Permission was granted for use of this study by Growing Up in New Zealand by Professor Martin (author) on 20.10.2020 through email correspondence. To our knowledge, this scale has not before been used in the NZ context. The

academic buoyancy score was created by summing responses across all four items, then creating a mean score by dividing by four (Table 61).

Table 61. List of academic buoyancy derived variable.

Scale	12-year variable
Sum score of 4 items at 12-year DCW	BUOY_MEAN_Y12C

Preliminary testing indicated that this academic buoyancy scale was psychometrically sound and fit for use. The Cronbach alpha (α = .83) indicated that this scale had acceptable internal consistency. Confirmatory factor analysis suggested that a one factor model had acceptable fit for the 12-year data (Tucker-Lewis index =.95; Comparative Fit index = .98; Root Mean Square Error of Approximation= .115; Standardized Root Mean Square Residual = .025). Measurement invariance testing of the identified model was tested across child's ethnicity and gender and was confirmed for ethnicity (configural, metric, scalar, and residual invariance). For gender, configural, metric, and scalar invariance was confirmed but not residual invariance. We recommend researchers further explore this scale when using this scale in analyses.

Student-teacher relationship

For the child scale, 7-items were utilised from the Class Maps Survey My teacher subscale (4). The Class Maps Survey has not been validated in the NZ context. An additional item ("expects me to do my best") was added to capture this additional component of the student-teacher relationship. A mean score for cognitive engagement was derived through summing the scores across all items, then dividing by the number of items (Table 62).

Table 62. List of student-teacher relationship derived variable.

Scale	12-year variable
Mean score of 8 items at 12-year DCW	STR_MEAN_Y12C

Preliminary testing indicated that this student-teacher relationship scale was psychometrically sound and fit for use. The Cronbach alpha (α = .92) indicated that this scale had acceptable internal consistency. Confirmatory factor analysis suggested that a one factor model had acceptable fit for the 12-year data (Tucker-Lewis index =.96; Comparative Fit index = .97; Root Mean Square Error of Approximation= .09; Standardized Root Mean Square Residual = .025). Measurement invariance testing of the identified model was tested across child's ethnicity and gender and was confirmed (configural, metric, scalar, and residual invariance). We recommend researchers further explore this scale when using this scale in analyses.

Academic efficacy

The Patterns of Adaptive Learning Scale (PALS), Academic Efficacy Subscale (7) asked five questions related to students' perceptions of their own competence to complete their class work. Each subscale of the PALS has been approved for individual use. Students were asked to respond based on a 5-point Likert-type scale (0-not at all true; 2-somewhat true; 4-Very true which is different from the original scale which was scored 1-not at all true; 3-somewhat true; 5-very true). The adaptions for this scale used in the 12-year DCW were based on previous NZ adaptions to PALS (8, 9). The academic efficacy score was created by summing responses across all five items, then creating a mean score by dividing by five (Table 63).

Table 63. List of academic efficacy derived variable.

Scale	12-year variable
Mean score of 5 items at 12-year DCW	ACAEFF_MEAN_Y12C

Preliminary testing indicated that this academic efficacy scale was psychometrically sound and fit for use. The Cronbach alpha (α = .85) indicated that this scale had acceptable internal consistency. Confirmatory factor analysis suggested that a one factor model had acceptable fit for the 12-year data (Tucker-Lewis index =.98; Comparative Fit index = .99; Root Mean Square Error of Approximation= .065; Standardized Root Mean Square Residual = .016). Measurement invariance testing of the identified model was tested across child's gender and ethnicity and was confirmed for gender (configural, metric, scalar, and residual invariance). For ethnicity, configural, metric, and residual invariance was confirmed but not scalar invariance. We recommend researchers further explore this scale when using this scale in analyses.

Parental involvement in learning

The items used for this variable were developed in house, aiming to capture the interest of parents in their child's learning. The parental involvement in learning score was created by summing responses across all three items (PC34_Y12M, PC35_Y12M, PC36_Y12) then creating a mean score by dividing by three (Table 65).

Table 64. List of parental involvement in learning derived variable.

Scale	12-year variable
Parental involvement in school mean	PARENTINVOL_MEAN_Y12CM

Preliminary testing indicated that this scale had acceptable internal consistency (Cronbach alpha, α = .78). However, we recommend researchers further explore this scale when using this scale in analyses.

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15. Appendix B – Selected publications that have utilised established tools and scales

Below is a list of publications that have used *Growing Up in New Zealand* data and the specific tools and scales described in Appendix A and noted in Table 3.

1. Ahmad S, Peterson E R, Waldie KE, Morton S M B. (2019). Development of an index of Socio- Emotional Competence for preschool children in the *Growing Up in New Zealand* study. *Front. Educ*. 31 January 2019 | https://doi.org/10.3389/feduc.2019.00002
2. Bécares L & Atatoa Carr P. (2016). The association between maternal and partner experienced racial discrimination and prenatal perceived stress, prenatal and postnatal depression: findingsfrom the *Growing Up in New Zealand* cohort study. *International Journal for Equity in Health.* 15(1): 1-12. doi:10.1186/s12939-016-0443-4
3. Berry S, Atatoa Carr P, Kool B, Mohal J, Morton S, Grant C. (2017). Housing tenure as a focus for reducing inequalities in the home safety environment: evidence from *Growing Up in New Zealand*. *Australian and New Zealand Journal of Public Health* online doi: 10.1111/1753- 6405.12695
4. Bird A L, Grant C C, Bandara D K, Mohal J, Atatoa Carr P E, Wise M R, Inskip H, Miyhara M, Morton S M B. (2016). Maternal health in pregnancy and associations with adverse birth outcomes: Evidence from *Growing Up in New Zealand*. *Australian and New Zealand Journal ofObstetrics and Gynaecology*. doi: 10.1111/jpc.13377
5. Buckley J, Peterson E R, Underwood L, D'Souza S, Morton S M B and Waldie K E. (2020) Socio-demographic and maternal health indicators of inhibitory control in preschool age children: evidence from *Growing Up in New Zealand*. *Longitudinal and Life Course Studies*. DOI: https://doi.org/10.1332/175795919X15746664055477
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11. Morton S M B, Atatoa Carr P E, Berry S D, Grant C C, Bandara D K, Mohal J, Tricker P J. (2014).*Growing Up in New Zealand*: A longitudinal study of New Zealand children and their families. Residential Mobility Report 1: Moving house in the first 1000 days. Auckland: *Growing Up in New Zealand*

12. Morton S M B, Atatoa Carr P E, Grant C C, Berry S D, Marks E J, Chen X M-H, Lee A C. (2014). *Growing Up in New Zealand*: A longitudinal study of New Zealand children and their families. Vulnerability Report 1: Exploring the Definition of Vulnerability for Children in their First 1000Days. Auckland: *Growing Up in New Zealand*

13. Morton S M B, Grant C C, Wall C R, Atatoa Carr P E, Bandara D K, Schmidt J M, Ivory V, Inskip H M, Camargo Jr C A. (2014). Adherence to nutritional guidelines in pregnancy: Evidence fromthe *Growing Up in New Zealand* birth cohort study. *Public Health Nutrition*, *FirstView Article*. 1- 11. doi:10.1017/S1368980014000482

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