E Tū Whānau!

Te Mana Kaha o te Whānau

TOTO KAKA

Te Pikitia a te Whānau

Wānanga and measurement tool development and validation

Pūrongo Taipitopito | Technical Report

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MINISTRY OF SOCIAL DEVELOPMENT
TE MANATŪ WHAKAHIATO ORA

“Measure, measure, measure!”

Ann Dysart (Te Rarawa)

1951 – 2021

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Whakapapa

We acknowledge the tīpuna (ancestors) of Te Pikitia a te Whānau and Te Tohu o te Whānau:

- *Whānau Rangatiratanga Measurement Framework* (Superu, 2016), led by Kahukore Baker
- *Whānau Ora Outcomes Framework* (Te Puni Kōkiri, 2016)
- *He Arotahi Tatauranga – Māori Statistical Framework* (Statistics New Zealand, 2014)
- *Te Puāwaitanga o Ngā Whānau* (Kingi et al., 2014)
- *Kaupapa Māori Wellbeing Framework* (Dobbs and Eruera, 2014)
- *Te Kupenga* (Statistics New Zealand, 2013), led by Atawhai Tibble
- *Towards a Māori Statistics Framework* (Werata and Bishop, 2004)
- *Transforming Whānau Violence: A Conceptual Framework* (Second Māori Taskforce on Whānau Violence, 2004)
- *Te Wheke* (Pere, 1991)
- *Te Whare Tapa Whā* (Durie, 1984).

We also acknowledge our tuakana (elder siblings), the other Māori-centred health and wellbeing indicator frameworks and psychometric scales that have been developed in recent years, particularly including:

- *The Ngaruroro Māori wellbeing model* (Johnson et. al. 2024)
- *The Māori Cultural Embeddedness Scale (MaCES)* (Fox et al., 2023)
- *Te Kāpehu Whetū | Māori Outcomes Framework* (ACC, 2023)
- *Te Kāhui o Matariki* – the Ngā Tini Whetū logic model (Whānau Ora, 2022)
- *He Ara Oranga te Tarāwaho Putanga Toiora* (Te Hiringa Mahara Mental Health and Wellbeing Commission, 2022)
- *Whiti Te Rā* (McLachlan et al., 2021)
- *The Revised Multidimensional Model of Māori Identity and Cultural Engagement (MMM-ICE3)* (Matika et al., 2020)
- *He Ara Waiora* (Treasury, 2018).

Executive summary

E Tū Whānau is a movement for positive change developed by Māori for Māori, with the support of the government. It promotes community flourishing and mobilisation through supporting culturally responsive strengths-based interventions and initiatives targeted at reinforcing protective factors for whānau.

Qualitative evidence from a formative evaluation (2017) suggests E Tū Whānau meaningfully improves the lives of whānau. Previously, there have not been any tools equipped to quantitatively measure whānau wellbeing to evaluate what about E Tū Whānau works, for whom, in which contexts, in what respects and over what duration. The whānau wellbeing measure introduced in this report addresses this issue by providing an innovative and robust psychometric scale, nested within a whānau wānanga tool.

This research worked at the interface of kaupapa Māori and Western scientific paradigms, employing both qualitative (interviews and wānanga) and quantitative (scale development and validation) methods. In the process, a wānanga-based collective whānau wellbeing tool – Te Pikitia a te Whānau – was developed, tested and validated, and a new whānau wellbeing model – Te Tohu o te Whānau – was developed.

Key findings:

- The measure is robust across different Māori demographic groupings, suggesting it is sensitive to diverse Māori realities.
- Urban, low-income, culturally disconnected youth were found to be the most vulnerable Māori group for reporting lower levels of whānau wellbeing.
- Collective approaches to measurement are important to consider when working with whānau Māori.

The findings from this research illustrate the holistic nature of whānau wellbeing, emphasise the importance of taking intersectional approaches, and demonstrate the benefits of centring kaupapa Māori paradigms when working to uplift the wellbeing of Māori.

This research is of great significance locally, nationally and internationally as it:

- provides whānau with a tool to support positive change in their wellbeing journeys
- improves the monitoring and evaluation capacities of E Tū Whānau
- highlights priority demographics for policy seeking to improve whānau wellbeing
- pushes the boundaries of the psychometric measurement field.

People

E Tū Whānau and Tūtū Kākā acknowledge the significant contributions made by everyone who was involved in the co-creation of Te Pikitia a te Whānau: the pūkenga (expert) panel established for this project, E Tū Whānau kaimahi (workers), pou (pillars), and kahukura (community leaders), interview participants, online survey participants, Te Hapori Ora and the whānau that participated in the pilot wānanga. We acknowledge the early involvement of Mat Mullany and early-stage advice of long-time E Tū Whānau collaborator, Dr Cristy Trewartha.

We particularly acknowledge Whaea Moerangi Falaoa-Rakaupai, who has generously lent her wisdom, experience and expertise to this project. Features of Te Pikitia a te Whānau stem from the Organisational Assessment Tool designed by Whaea Moerangi as a multi-purpose resource for kaupapa Māori member organisations of Te Korowai Aroha o Aotearoa. Other design concepts and elements of Te Pikitia a te Whānau Kete Tuatoru whakapapa to E Tū Whānau resources created for whānau by Whaea Moerangi.

Kairangahau

Te Pikitia a te Whānau, the new wānanga, and Te Tohu o te Whānau, the new model of whānau wellbeing, were co-created in partnership between Tūtū Kākā and E Tū Whānau:

Finley Ngarangi Johnson (Rongomaiwahine, Ngāti Kahungunu) Director of Tūtū Kākā and PhD candidate in Psychology (focused on kaupapa Māori and Indigenous Psychology and Psychometrics) at Te Herenga Waka – Victoria University of Wellington.

Dr Zachary Penman (Muslim, Pākehā) philosopher, transdisciplinary social scientist and former Principal Advisor – E Tū Whānau, Ministry of Social Development.

Pūkenga

To ensure cultural safety, the integrity of mātauranga Māori and theoretical and technical rigour, the development of the wānanga and the tool were supported by a panel of pūkenga Māori:

Associate Professor Krushil Watene (Ngāti Manu, Te Hikutu, Ngāti Whātua o Orākei, Tonga) of the Philosophy Department at the University of Auckland, specialist in wellbeing, justice and the human development and capabilities approach, and member of the UNDP Human Development Report Advisory Board.

Professor Tracey McIntosh (Ngāi Tūhoe) Chief Science Advisor for the Ministry of Social Development and Co-Head of Te Wānanga o Waipapa (School of Māori Studies and Pacific Studies) at the University of Auckland.

Atawhai Tibble (Ngāti Porou, Te Whānau a Apanui, Tuwharetoa, Whanganui, and Raukawa ki te Tonga) Director Māori Tatauranga for Statistics New Zealand.

Dr Ririwai Fox (Ngāti Kahungunu ki Wairarapa, Ngāti Porou) Lecturer in kaupapa Māori and Indigenous Psychology and Psychometrics at the University of Waikato.

Pou

In addition to the theoretical and technical pūkenga of the panel, E Tū Whānau pou provided their pūkenga spanning kaupapa Māori, te reo, and tikanga, and knowledge of E Tū Whānau:

Matua Keelan Ransfield (Ngāti Tukorehe, Ngāti Raukawa, Ngāti Porou) Team Leader – E Tū Whānau, Ministry of Social Development.

Whaea Moerangi Falaoa-Rakaupai (Niue, Ngāti Tūwharetoa, Ngāti Maniapoto, Ngāti Raukawa) Lead Advisor – E Tū Whānau, Ministry of Social Development.

Introduction

Main ideas

- Challenge: Measuring whānau wellbeing in a culturally appropriate, meaningful and robust way.
- Solution: Culturally grounded, strengths-focused, whānau-centred, wānanga-based measurement.
- Success: The creation of a wānanga tool that is robust and valid from both kaupapa Māori and psychometric perspectives.

Te Pikitia a te Whānau is a wānanga for whānau to measure, understand and enhance their wellbeing

Te Pikitia a te Whānau is a new whānau-centred wānanga based on the E Tū Whānau kaupapa and moemoeā (dream):

Whānau are strong, safe, and prosperous – active within their community, living with a clear sense of identity and cultural integrity and with control over their destiny
– *te mana kaha o te whānau!*

The wānanga empowers whānau to take control over their destinies and find the solutions from within to end violence. Whānau are equipped with tools to measure and understand their wellbeing and take practical steps to change their lives.

The name of the wānanga, Te Pikitia a te Whānau, symbolises the long-term, intergenerational transformation of whānau to a state of whānau mana kaha.

From within our kaupapa Māori theory of change, Te Pikitia can be understood as the ascension of whānau from Te Kore (the state of darkness and absolute potential), through the phases of Te Pō (the night, with its many stages of becoming) to Te Ao Mārama (the world of light and being).

Rather than a scale, test or survey completed by individuals or administered by clinical practitioners, the measurement tool is embedded in whānau wānanga. As a way of measuring whānau wellbeing, wānanga radically challenges the theory and practice of psychometric scale development, validation and administration.

Centuries of mātauranga Māori, decades of kaupapa Māori theory, years of E Tū Whānau indigenous practice and data from the piloting of Te Pikitia a te Whānau support the use of the wānanga format.

Whānau wānanga are an embodied and embedded method of data generation and collection.

Naming the wānanga

Pikitia is a word used in karakia (ritual chant) and pūrākau (legends or narratives) about the ascent of Tāne-nui-a-Rangi (or Tāwhaki) to Te Toi-o-ngā-rangi, the uppermost realm of the heavens, on an epic journey seeking māramatanga (enlightenment).

In that realm, Tāne / Tāwhaki received Ngā Kete Wānanga from the supreme being, Io-Matua-Kore, with which he returned to our material world to bring māramatanga to humanity.

When Tāne / Tāwhaki ascended the heavens, in some narrations he is said to have scaled Te Ara Poutama.

The Poutama motif often features on tukutuku panels decorating wharenui (meeting houses) and in the designs of tā moko (tattoos) and whāriki (woven mats).

The Poutama motif also represents whakapapa (genealogical descent).

Today, Te Ara Poutama is often used to symbolise Māori development.

Te Pikitia a te Whānau was endorsed as the appropriate name for this wānanga as the E Tū Whānau theory of change is grounded in these pūrākau.

The name symbolises the ascension of the whānau to Te Ao Mārama, a state of enlightenment and wellbeing.

Wānanga are:

- the most culturally safe and appropriate practice and setting for whānau to discuss potentially challenging issues
- a mana-enhancing, Māori-centred alternative to clinical assessment, standardised test administration and government-administered surveys that blend scientific and indigenous knowledge (Macfarlane, Blampied and Macfarlane, 2011)
- a valid, alternative data generation and collection mechanism to scales, tests and surveys rooted in Western paradigms, with clear advantages for measuring the latent attributes of collectives (whānau, hapū, iwi or hapori) rather than individuals.

'Te Pikitia' also doubles as a reference to the measurement function of the wānanga, as 'Pikitia' is a kupu mino (loanword) for 'picture'. Through the wānanga, whānau get a snapshot of their wellbeing at that point in time.

Te Kupenga (Statistics NZ, 2013) measures *subjective* whānau wellbeing, based on *individual* survey responses to questions about whānau. Within a collectivist culture, while this response is still interpreted as a whānau view, it is not seen as representing the collective view of the whole whanau (Tibble and Ussher, 2012). Te Pikitia a te Whānau measures *intersubjective* whānau wellbeing. Measurements of whānau capabilities and connections constituting their wellbeing are the self-determined representative *collective* view of the whānau.

Te Pikitia a te Whānau has been designed as both a measurement tool and an intervention

Te Pikitia a te Whānau is more than just a whānau wellbeing measurement tool, it is also a whānau-centred intervention. The whānau wānanga are made of three kete wānanga, or resource kits, that support whānau to self-determine:

1. the tikanga of their wānanga
2. their collective responses to carefully designed questions about different indicators of whānau wellbeing
3. how they will navigate their journey of transformation.

Kete Tuatahi: Tūtaki – Introduction	**Kete Tuarua: Tohutohu – Indicators**	**Kete Tuatoru: Whakaata – Reflections**
The introduction to the wānanga familiarises whānau with the purpose, whakapapa and structure of the wānanga. Here whānau create tikanga to ensure everyone's voices are heard and respected, to manage conflicting ideas, opinions and memories and to manage difficult emotions and feelings that could arise.	The 33 questions that make up the whānau wellbeing psychometric tool. This is the measurement section of the wānanga in which the items are presented in line with the model of Te Tohu o te Whānau. Here, whānau come together to collectively respond to the items.	Five primary and four additional activities designed to help whānau better understand: *who* they are and who they are becoming as a whānau Māori; *what* their whānau wellbeing currently looks like; *which* of the areas of wellbeing are the greatest strengths for the whānau; *why* things are the way they are now for the whānau; *where* the whānau wants to go next, and *how* they can get there.

Table 1: The three kete wānanga resource kits of Te Pikitia a te Whānau

The wānanga provides a culturally safe and mana-enhancing environment for whānau to discuss and reflect on their past and present, to plan their future and to transmit knowledge intergenerationally.

Te Tohu o te Whānau is a new kaupapa Māori model of whānau wellbeing supported by psychometrics

Te Tohu o te Whānau

Te Tohu o te Whānau is a new kaupapa Māori model of whānau wellbeing emerging from Te Pikitia a te Whānau. It uses the three parts of the E Tū Whānau logo to represent the structure of the three distinct but interrelated factors that constitute wellbeing at the whānau level.

From a practical perspective, Te Tohu o te Whānau illustrates the areas where changes can be made in people's daily lives to improve the wellbeing of whānau. These three areas are:

1. **Aukaha** – Strengthening whānau capabilities and connections related to a) living conditions and lifestyles, b) conflict and safety and c) communication and cooperation.
2. **Hononga** – Strengthening whānau capabilities in and connections with te ao Māori, e.g., tikanga, mātauranga, and reo.
3. **Herenga** – Strengthening whānau capabilities and connections related to communities, society and the economy.

Te Tohu o te Whānau was developed through extensive qualitative and quantitative research at the interface of kaupapa Māori and a global body of knowledge in psychometric theory, method and practice. Te Tohu is a robust model that is grounded in the voices of whānau, kaumātua (elders) and pūkenga, previous literature, the E Tū Whānau *Mahere Rautaki — Framework for Change 2019 – 2024* and quantitative data.

Te Tohu o te Whānau has been psychometrically validated using advanced statistical techniques, including Item Response Theory and Factor Analyses (process and results are discussed in the Validation section). The model is about the structure and the measurement of whānau wellbeing: how we measure specific aspects of whānau wellbeing (latent variables) from the kōrero about the items in the whānau wānanga (observed variables).

Te Tohu o te Whānau maps onto the E Tū Whānau tohu (logo) (see below). Aukaha can be represented by the koru in the middle, Herenga by the blue area and Hononga by the green area.

The E Tū Whānau tohu

The E Tū Whānau tohu is made of three interconnected parts and it represents whānau in the process of standing up. This is depicted by an unfolding central koru. The kikorangi (blue) section represents Ranginui (the sky father) and the kākāriki (green) section represents Papatūānuku (the earth mother).

Figure 1: The E Tū Whānau tohu

Aukaha

Meaning

- This part of the model relates to the capabilities and connections within whānau that keep whānau strong, united and resilient.
- The name Aukaha comes from waka and refers to the lashings that fasten rauawa (top boards) to the hull of the waka. Aukaha is also used as a verb, meaning to repair, strengthen, reinforce or bolster.
- Aukaha provide waka with the flexibility to move with, and remain strong in, the presence of harsh conditions such as storms and rough seas. This is a metaphor for resilience to adversity and challenges in life.
- The Aukaha items are organised into three areas to help whānau reflect upon and take action in relation to this theme of whānau wellbeing. These include 1) living conditions and lifestyles, 2) conflict and safety and 3) communication and cooperation.
- These items related to whānau functioning are critical for keeping whānau strong and working together.

Aukaha items

○ Moemoeā achievement capability	○ Collective needs fulfilment capability	○ Challenge response capability
○ Uniting to act capability	○ Effective communication capability	○ Hauora hinengaro (mental wellbeing)
○ Hauora tinana (physical wellbeing)	○ Housing needs fulfilment capability	○ Whānau roles and responsibilities fulfilment capability
○ Leadership capability	○ Collective decision-making capability	○ Safe and effective discipline capability
○ Violence de-normalisation capability	○ Conflict management capability	○ Safety roles and responsibilities fulfilment capability

Table 2: Aukaha items

Hononga

Meaning

- This part of the model relates to whānau connections and capabilities relevant to te ao Māori that keep whānau grounded in their culture and spirituality and connected with their whakapapa.
- The name Hononga was inspired by the saying *"Āpiti hono, tātai hono"* which relates to joining together – a kind of *"spiritual binding that gives unity and strength"* (Niania et al., 2016, p.7).
- Whānau Māori are connected with te ao Māori through whakapapa and wairua, even if those bonds have yet to be discovered or understood due to the impacts of colonisation and modern life.
- Hononga consists of items related to feeling connected to and engaging with things that are often considered to be pillars of the Māori culture including te reo Māori, tīpuna (ancestors), te taiao (the natural environment) and Māori values.
- Whānau experience an increased sense of belonging and feel grounded and connected when their bonds with te ao Māori are strong.

Hononga items

○ Connection to hapū and iwi	○ Connection with tīpuna	○ Connection with te taiao
○ Connection with te reo Māori	○ Connection with tikanga Māori	○ Connection with Māori culture
○ Hauora wairua (spiritual wellbeing)	○ Strength and power drawn from traditional Māori values	○ Cultural roles and responsibilities fulfilment capacity
○ Collective Māoritanga confidence		

Table 3: Hononga items

Herenga

Meaning

- This part of the model relates to whānau capabilities and connections both in their communities and across wider society and the economy.
- The name Herenga was inspired by tumu herenga waka (posts that waka are fastened to) and, in this context, refers to the ties and ways of relating that connect our whānau with communities, resources, and services that can grow our whānau wellbeing.
- Whānau can more easily meet their needs when they feel like they are connected to others and can access external support and resources.
- These whānau capabilities and connections are also important for individual whānau members to be able to participate in society and the economy, including through paid employment.

Herenga items

○ Hapori connection	○ Intercommunal connection	○ Service connection
○ Sense of belonging	○ Connection with Māori people	○ Hauora whanaungatanga (social wellbeing)
○ Resource utilisation capability	○ Express manaakitanga capability	

Table 4: Herenga items

Measuring as Māori: Background, developments and opportunities

Psychometrics and econometrics are the leading disciplines in scientific measurement in the social and behavioural sciences. Psychometrics is the applied statistical science of measuring latent variables (that cannot be observed directly) such as wellbeing, attitudes, beliefs, intelligence, identity, learning or capabilities. Psychometric techniques relate to the design, administration, scoring and interpretation of quantitative instruments for the measurement of latent variables which, in this context, is whānau wellbeing.

It is critical that we acknowledge that the field of psychometrics (and psychological science more broadly) has historically been entangled with scientific racism: the mainstream pseudo-scientific attempt by Western scientists and scientific institutions to rationalise colonialism, slavery, genocide and white supremacy in the 19th and early 20th centuries (Adkins-Jackson, 2024; Nobles, 1987; Teo, 2022).

While psychometric assessment is often associated with Western research paradigms that stand in contrast to Indigenous methodologies, these techniques can be adapted and have been used by Indigenous researchers to conduct decolonising research.

Palmer (2005) argues that psychometrics is an ancient construct for Māori who have always defined and measured unobservable phenomena, and that its modern theory and practice has transformative potential for kaupapa Māori in four areas:

1. Monitoring, evaluating and reporting the advantages of participation in te ao Māori, particularly in the governance context of evidence-based policy and managing for outcomes.
2. Operationalising culturally relevant constructs integral to kaupapa Māori research agendas.
3. Developing theory and testing hypotheses about mechanisms that underpin explanatory models of Māori cognition, identity, behaviour and social phenomena.
4. Critiquing psychometric tools and assessment practices that are used by and on Māori to make informed self-determinations about which tools and practices to accept, reject or adapt for Māori.

Psychometric identity research in Aotearoa New Zealand has undergone an emic revolution (Greaves et. al., 2017), meaning culturally specific perspectives, understandings and values are being prioritised. In contrast, etic research takes an external perspective, applying concepts that are assumed to be universal but which have historically been Eurocentric. Emic perspectives align with kaupapa Māori methodologies and highlight the opportunity to indigenise psychometric research.

Name	What it measures	Reference
Pacific Identity and Wellbeing Scale (PIWBS)	Pacific identity and wellbeing	Manuela & Sibley 2013, 2015a
Revised Multidimensional Model of Māori Identity and Cultural Engagement (MMM-ICE3)	Māori identity and cultural engagement	Matika et al., 2020
Measuring Whanaungatanga and Identity for Wellbeing in Rangatahi Māori	Whanaungatanga	Greaves et al., 2021
Māori Cultural Embeddedness Scale (MaCES)	Māori cultural embeddedness	Fox et al., 2023

Table 5: Examples of psychometric research from Aotearoa New Zealand that take an emic perspective

Building upon the momentum of these psychometric developments, there remains a gap in the literature for a measure of whānau wellbeing.

Challenges in measuring Māori wellbeing

In “Measuring Māori Wellbeing”, his 2006 lecture to the New Zealand Treasury, Tā Mason Durie laid down the wero (challenge) for kaupapa Māori research on wellbeing to conceptualise and measure Māori-specific wellbeing at the individual, collective (whānau, hapū and iwi) and population levels – as illustrated below, in Table 6.

	Individuals The wellbeing of individuals	**Collectives** The wellbeing of families, groups	**Populations** The wellbeing of whole populations
Universal measures	Measures that are relevant to all people e.g. life expectancy, mortality data	Measures that can be applied to diverse groups e.g. aggregated data	Measures that apply to all populations & nations e.g. GNP, 'Global Burden of Disease'
Māori-specific measures	Measures that are specific to Māori individuals e.g. Hua Oranga	Measures that are relevant to Māori collectives e.g. whānau capacities	Measures that are relevant to te ao Māori e.g. Te Ngahuru

Table 6. Levels of measuring Māori wellbeing identified by Durie (2006, p.2)

The Ngaruroro model measures Māori wellbeing at the individual level and was designed to be the foundation of a self-report psychometric measure of Māori-specific wellbeing (Johnson et al., 2024). Although individual-level measures are important, whānau-centred approaches like E Tū Whānau require whānau-level data and insights for evaluation and reporting purposes. However, these collective-level data are yet to be captured by tools that are yet to be created. Bishop (2015) speaks to this issue in saying, "Official Māori statistics typically use the individual as the basic unit of measurement, meaning that none of the existing data allows the observation of Māori collective entities such as whānau or Māori governance bodies".

The approach to measuring whānau wellbeing

The development and validation of Te Pikitia a te Whānau and Te Tohu o te Whānau utilised the He Awa Whiria – Braided Rivers model (Macfarlane et al, 2015) of inter-epistemic dialogue between Indigenous and Western knowledge and value systems.

This approach drew upon and integrated the best of both psychometric and kaupapa Māori paradigms to inform theory, methods, data and analyses. This allowed researchers to integrate mātauranga and kaupapa Māori priorities with conventional scientific practices and standards. This approach ensured that the whānau wellbeing scale is not only scientifically robust but also deeply resonant with the experiences and needs of whānau, improving outcome measurement and evaluation of whānau-centred interventions.

The most important criteria for validating the measurement tool were that Te Pikitia is accessible, useful and valid for use by everyday whānau Māori. Therefore, throughout the design, development and validation stages of this research, while both epistemic sources were woven together, **the kaupapa Māori stream was prioritised.**

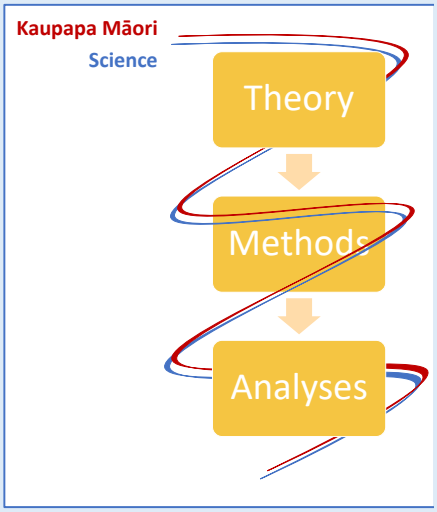
Best practices in scale development, as outlined in Boateng et al. (2018), provided a comprehensive framework for creating a new psychometric scale to measure outcomes of social programmes for improving whānau wellbeing. Our approach combined the human-centred, iterative and collaborative nature of design thinking with the structured, evidence-based approach of scale development in the health, social and behavioural sciences. In practice, this meant rapidly prototyping, testing and iterating each stage of the Boateng et al. (2018) process so that the final product is fit for purpose.

Following the lead of Wereta (2001), Durie (2006) and Watene (2016), we conceptualised and measured (or "operationalised") capabilities, functioning and wellbeing as properties of the collective and as relational phenomena. This approach to measuring whānau wellbeing pushed the limits of psychometrics which is typically methodologically individualist.

The biggest innovation of Te Pikitia a te Whānau is the introduction into psychometrics of the ancient practice of wānanga as a "tool" – a stimulus for observable behaviours that can be used to measure latent variables. Whereas conventional psychometric tools are individual and objective data-generating processes, wānanga are collective, intersubjective data-generating processes. Wānanga thus have the properties of a conventional tool, with the additional property that they generate collective data.

He Awa Whiria – Braided Rivers

Inspired by the concept of a braided river, the He Awa Whiria framework has been used to support bicultural partnership approaches to research, policy and practice in iwi organisations, tertiary institutions, private corporations and government ministries.



McFarlane, A., Derby, M., and Macfarlane, S. (2024) *He Awa Whiria: Braiding the Knowledge Streams in Research, Policy, and*

Scientific validity

Our research process for developing and validating the measurement tool adopts and adapts international best practices for measurement in the health, social and behavioural sciences.

Boateng G.O., Neilands T.B., Frongillo E.A., Melgar-Quiñonez H.R., and Young S.L. (2018) "Best Practices for Developing and Validating Scales for Health, Social, and Behavioral Research: A Primer." *Frontiers in Public Health* 6:149. doi: 10.3389/fpubh.2018.00149

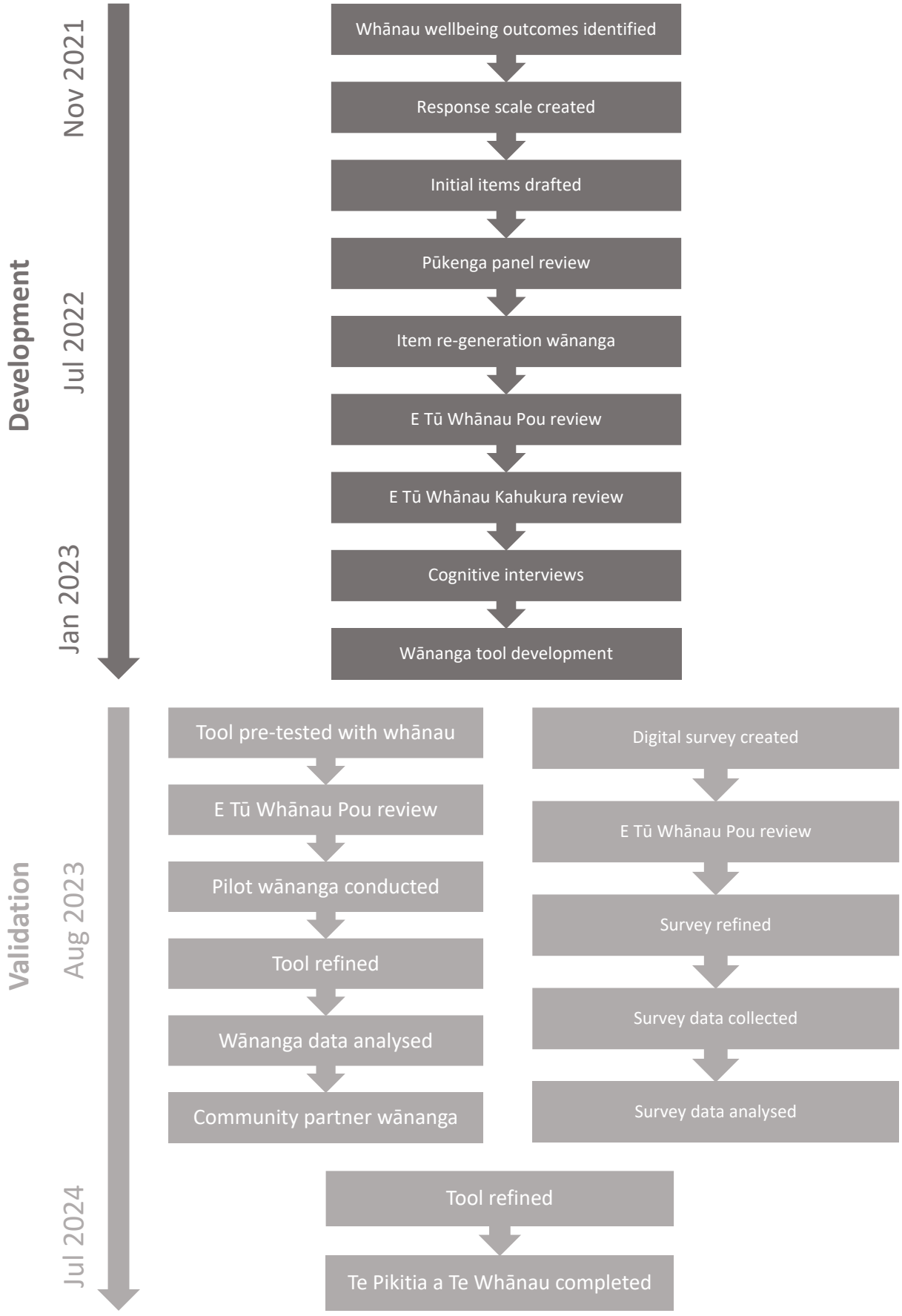


Figure 2. Timeline of development and validation

Development

Operationalising whānau wellbeing

In psychometrics and the social sciences, operationalising an abstract theoretical concept means defining it in a way that it can be measured or tested. For example, if you want to study intelligence then you need to define exactly what intelligence means in your study, based on prior theory and empirics, and design a method for how you're going to measure it.

The challenge is that abstract concepts like intelligence are typically *latent* variables, which can't be directly or readily measured as height, weight or other variables can be. Instead, intelligence is measured through *observable* variables like performance on different types of tests (verbal, logical, mathematical, etc.) or responses to a survey. These behaviours (test performance, survey responses, etc.) are the observed variables, or indicators, that, when statistically analysed together, under certain conditions, can be a good estimate of the latent variable.

Latent variables are crucial in psychometrics and the social sciences for measuring complex, abstract concepts such as intelligence, personality traits, mental health conditions, economic resilience or trust in institutions. Latent variables are typically identified and analysed through advanced statistical methods.

Many of the outcomes that governments are interested in measuring are of this type, but there are scarce examples of psychometric techniques being applied in policy contexts. In comparison, it is fairly common in policy research and evaluation to apply econometric techniques to measure less abstract variables, such as the unemployment rate, at a macroeconomic level, or number of weeks unemployed, at the microeconomic level, and to attribute changes in these magnitudes to policy interventions.

Beyond estimating effect sizes of policy on indicators like family violence-related hospitalisations, convictions or verified child abuse cases using administrative data, self-reported violence-use or victimisation using survey data, we want to measure meaningful outcomes. For E Tū Whānau, the measures that count relate to whānau wellbeing. These are latent variables that need to be operationalised to become measurable.

The process of operationalising a latent variable like whānau wellbeing involves a few steps:

1. **Define the concept**: Concepts like wellbeing can be conceptualised in different ways by different people based on culture, tradition, discipline and lived experiences. Operationalising a concept first involves getting clarity about what it means.
2. **Develop indicators**: Indicators are specific, observable, measurable signs or overt behaviours that show the presence or level of the concept and which cannot be measured directly.
3. **Create a measurement tool**: This could be a questionnaire, an examination, a set of tasks or physical tests (or in our case, a wānanga), that can reliably measure these indicators.
4. **Validation and iteration**: The measurement tool is tested to see if it actually measures the concept, and refinements are made to fit the model to the data.

In simple terms, **operationalising a concept in psychometrics means defining it in a clear, measurable way** and then **developing a method to measure it accurately**. This process turns a complex, abstract idea like whānau wellbeing into something we can measure and study scientifically.

Whānau unit of analysis

This wānanga tool was primarily designed to measure and uplift the wellbeing of whānau who are engaged with the E Tū Whānau kaupapa. The applied, intervention-like wānanga context within which this measurement tool sits makes the whānau the most appropriate unit of analysis.

Whānau is widely recognised to be "the foundation of Māori society … a principal source of strength, support, security and identity" (Ministry of Health, 2014 , p.1). It is the smallest most basic institution in the Māori world and plays a central role in the wellbeing of Māori, both individually and collectively (Smith, 2021).

Durie (2003) describes how *whānau* can refer to a number of different Māori collectives, including whakapapa whānau, kaupapa whānau and statistical whānau. Te Kupenga adopts a model that considers both whakapapa and kaupapa whānau as valid and leaves it to the individual to define their own whānau.

Type of whānau	Description
Whakapapa whānau	Whānau with shared ancestry.
Kaupapa whānau	Whānau who are organised to address a particular kaupapa or shared interests but who may not have shared ancestry.
Statistical whānau	Whānau who reside in the same household, nuclear family or extended family.

Table 7: Types of whānau (Durie, 2003)

Despite its central importance, the whānau collective itself is often overlooked as a unit of analysis. When attempting to measure whānau-level outcomes, social scientists typically rely on aggregated individual-level data and narrowly defined household or 'family' data. Te Kupenga took a step in the right direction by utilising individual-level responses to ask respondents *about* the wellbeing of their whānau.

Cram and Kennedy (2010) describe the importance of conducting research with whānau in ways that "capture the fullness of the relationships and connectedness that exist between whānau members that makes them so much more than the sum of their component parts / members" (p.10). The idea that whānau are dynamic, interconnected and adaptive systems that are more than just the sum of their parts is aligned with Māori philosophies related to whakapapa, wairua and mauri, as well as with ideas of emergence from the field of systems thinking.

The whānau wānanga approach of Te Pikitia captures complex collective responses that arise from simple interactions between whānau members. This could be as simple as the contribution from one whānau member sparking the memory of another member who is then able to remind the group of a time when they collectively demonstrated a specific capability. These real-life interactions and decision-making processes that take place in whānau wānanga can deeply enrich the quality of the resultant whānau-level responses. These whānau-level responses would theoretically provide insights that are beyond what you can find using the sums or averages of aggregated individual-level responses.

Overall, this approach ensures that the richness and complexity of whānau interactions and relationships are accurately captured, providing a more comprehensive understanding of whānau wellbeing. Aligned with Māori

philosophies and systems thinking principles, this whānau wānanga method offers valuable insights that go beyond conventional data generating processes and data collection tools like surveys and tests.

E Tū Whānau wellbeing outcomes and indicators

Whānau are the heart of E Tū Whānau, and ultimately, the kaupapa aims to nurture and support positive whānau transformation. E Tū Whānau developed a set of aspirational wellbeing outcomes for whānau, based on the Whānau Rangatiratanga capability dimensions (Baker, 2016), Whānau Ora outcomes (Te Puni Kōkiri, 2018) and findings from Te Puāwaitanga o Ngā Whānau (Kingi et al., 2014). These outcomes are aligned with Durie's (2006) suggested approach to measuring collective wellbeing, which focuses on the collective capacity to perform tasks that are within the scope and influence of whānau. The whānau wellbeing outcomes also align with the capability approach of Wereta's (2001) Māori statistics framework.

The seven wellbeing outcomes and their indicators are stated in the E Tū Whānau Mahere Rautaki (Framework for Change) 2019 – 2024 and were named and described as pou by Whaea Moerangi Falaoa-Rakaupai. The seven pou are outlined below in Table 2.

MANAWAROA	HERENGA	HONONGA	MARUTAU	MATAROA	TOROKAHA	RANGATIRA
Whānau are self-managing and resilient	Whānau are connected and feel like they belong	Whānau have positive relationships in te ao Māori	Whānau feel safe in their homes and communities	Whānau are living healthy lifestyles	Whānau are strengthened and participating in society	Whānau have increased economic independence and rangatiratanga

Table 8. The seven E Tū Whānau wellbeing pou

Prototyping new ordinal scale to measure whānau progress

The E Tū Whānau Theory of Change, grounded in te ao Māori creation narratives, views the cosmos as dynamic. The creation dynamic begins in Te Kore (the state of darkness and potential), moving through the phases of Te Pō (the night, with its many stages of becoming), to Te Ao Mārama (the world of light and being).

This symbolises the potential in whānau to become strong, safe and prosperous and live violence-free lives.

Defying misrepresentations and deficit thinking, the E Tū Whānau Theory of Change highlights the inherent strengths and potential in te ao Māori traditions, culture, value and knowledge, recognising that there are important challenges to overcome and that these internal resources can empower whānau Māori to transform their lives.

For E Tū Whānau, Te Pō is the journey and space within which transformation takes place. It encompasses the kaupapa, values, strategies and actions that nurture positive change for whānau, that lead to Te Ao Mārama. Te Kore is the untapped source of our potential. The concept of Te Kore is central to notions of mana, tapu and mauri.

Grounded in the E Tū Whānau Theory of Change, a novel measurement scale was prototyped. This is a strengths-based Guttman-type ordinal scale (instead of the typical Likert-type scale that has polar negative and positive scores). Each item consists of five indicators that follow a scale from tuatahi to tuarima. In order, the indicators describe the ascension from the potential state (Te Kore) through three intermediate states (Te Pō) to the actualised state (Te Ao Mārama) – as illustrated in Table 9 below.

	Te Kore	Te Pō			Te Ao Mārama
	Tuatahi (1st)	**Tuarua (2nd)**	**Tuatoru (3rd)**	**Tuawha (4th)**	**Tuarima (5th)**
Item	Indicator 1: Potential state of whānau wellbeing	Indicator 2: Intermediate state of whānau wellbeing	Indicator 3: Intermediate state of whānau wellbeing	Indicator 4: Intermediate state of whānau wellbeing	Indicator 5: Actualised state of whānau wellbeing

Table 9. Scale of ascension from Te Kore through Te Pō to Te Ao Mārama for a single item

First generation of items

Generating items from E Tū Whānau Mahere Rautaki (Framework for Change) 2019 – 2024

In the original prototype scale, items were written for each of the seven E Tū Whānau wellbeing pou. The E Tū Whānau Mahere Rautaki (Framework for Change) 2019 – 2024 had up to seven indicators for each of the pou. Sometimes the same indicator was used for two wellbeing pou, illustrating the interconnected nature of whānau wellbeing outcomes.

To limit response burden, three items for each pou were selected as the most relevant. These were operationalised and mapped onto the 5-point Te Kore to Te Ao Mārama scale, as illustrated in Figure 3 below.

	Te Kore	Te Pō			Te ao Mārama
	Tahi	Rua	Toru	Whā	Rima
How connected are your whānau to your hapū, iwi and te ao Māori?	Our whānau know our hapū and iwi.	Our whānau are connected to our marae and to our whenua.	Our whānau are usually present and seen at tangi and other important hapū and iwi events. We are known faces to our our hapū and iwi.	Our whānau are actively involved in hapū, iwi and Māori society, culture, economics and politics.	Our whānau live as Māori and live in te ao Māori.
How would you describe your participation in Māori culture?	Our whānau use some words or phrases in te reo Māori and practise some of the traditions or customs of our ancestors.	Our whānau regularly: ▪ watch Māori on TV ▪ read Māori writers and journalists ▪ listen to Māori radio ▪ follow Māori social media accounts ▪ attend Māori sports and cultural events.	Our whānau participate in Māori culture and sporting activities such as kapa haka or waka ama.	Our whānau are learning more about our culture, language and who we are as Māori and as whānau, hapū and iwi. We are highly active in Māori culture and sports.	Our whānau practise tikanga Māori and speak te reo Māori. We transmit our te reo, tikanga and mātauranga from our ancestors to our future generations.
What role does your whānau play in leadership in te ao Māori?	Some of our whānau are leading positive change within themselves and in our whānau.	Our whānau are leading positive change within ourselves and our hapū, iwi and communities.	Our whānau guide others away from harmful and unhealthy behaviours and lifestyles toward a state of Mauri Ora.	Our whānau are leaders within the community, hapū, iwi, business or politics.	Our whānau are widely recognised as leaders in te ao Māori.

Table 10: Initial item design prototype

Testing scale and items with pūkenga

The whānau wellbeing pou, their indicators and the items for each indicator were revised by a pūkenga (expert) panel to ensure te ao Māori content validity, the compatibility of the items with statistical assumptions and the integrity of the mātauranga Māori interwoven with global knowledge on the conceptualisation and measurement of wellbeing.

The pūkenga panel review highlighted a range of ways and areas in which the items could be improved upon. This feedback was compiled and integrated into a second iteration of the tool.

Regeneration of items

Wānanga with pūkenga

Following further development, a full-day item re-generation wānanga was held in Auckland with pūkenga panel member Associate Professor Krushil Watene.

In the wānanga, Krushil, Zach and Finley established a robust theoretical foundation for writing new items. Most of the time was spent brainstorming and then debating what language, concepts and outcomes were appropriate to include. During this process, the contents and descriptions of pou were edited, specific items were deleted, item indicator formulas were written and new items were drafted. This initial process required more thought and consideration than anticipated so a second day of item re-generation and refinement was held to complete the item writing process.

These items were designed and developed to not only measure whānau wellbeing but to also stimulate and uplift it. It was deemed important that whānau are able to respond to these items in a strengths-based way that doesn't make them feel like they are lacking, that they are to blame or are incapable of change. This was a meticulous process that required careful consideration when choosing the right words, concepts and response formula.

The idea of 'speaking things into reality' was drawn upon to support this endeavour when formulating the various item response options. This was most important and was primarily implemented in the Te Kore response options.

Some items were intentionally designed to be easier than others so that lower-scoring whānau can still have the opportunity to respond with the Te Ao Mārama response option.

Testing scale and items with pou

The reworked items were compiled into a draft booklet and shared in a hui with Whaea Moerangi and Matua Keelan. They provided feedback on the item language, content, structure and presentation. Their suggestions and recommendations were noted in the hui and implemented shortly after.

Cognitive interviews to refine items

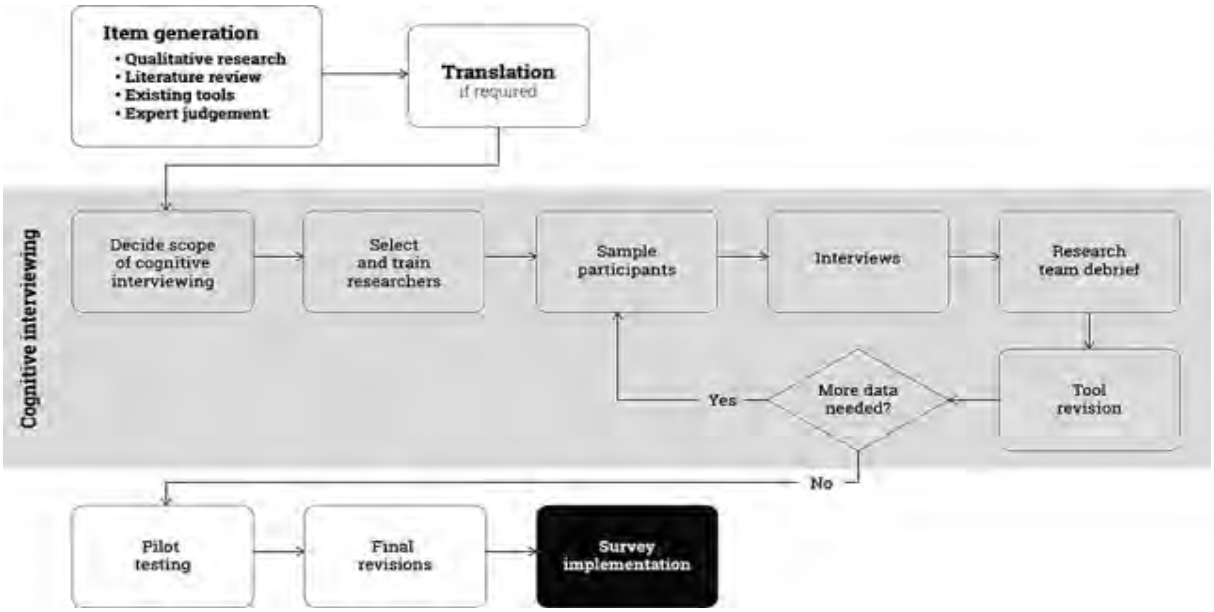


Figure 3: Steps involved in cognitive interviews from Scott et al. (2021)

Cognitive interviews are a qualitative research method for improving the validity of quantitative surveys. The interviews are a means of testing the survey's word choice, syntax, sequencing, sensitivity, response options, conceptual resonance and cognitive mismatches (Scott et al., 2021). The research team conducted the interviews based on the steps outlined by Scott et al. (2021; see Figure 3 above).

Previous literature has identified between five and fifteen to be an appropriate number of interviews (Ryan et al., 2012). Nine cognitive interviews were conducted with Māori participants. Participants were provided with the most up-to-date iteration of the tool at the time. This consisted of a single booklet containing items, various reminders and affirmations, and reflection questions.

The interviews took around an hour on average and utilised both item and scale-level probes to better understand how the survey items and scale were being received. The interviews tested the survey's word choice, syntax, sensitivity, response options, cognitive resonance and content validity.

During the cognitive interviews, participants were asked to complete an item, rate how difficult it was to answer out of 10 and then respond to one probe related to each of the 'sources of confusion' (retrieval, judgement and response; Peterson et al., 2017). After completing each item, participants responded to the item-level probes listed below in Table 11 and, upon completing all of the items, were asked to respond to the scale-level probes outlined in Table 12.

Level	Source of confusion	Question
Item	Understanding	How difficult was it to answer this question out of 10?
		Was there any language used in this item that was difficult to understand?
	Retrieval	How sure are you about the response you picked?
	Judgement	Did you find answering this item uncomfortable at all?
	Response	Were you able to respond to this item in a way that is true to your whānau?

Table 11. Item-level cognitive interviewing probes adapted from Peterson et al. (2017)

Level	Target	Question
Scale	Guttman errors	Were there any instances in which the indicators didn't seem to go from easiest to hardest?
	Content validity	Did you find the items accurately reflected the pou and their descriptions?

Table 12. Scale-level cognitive interviewing probes adapted from Peterson et al. (2017)

Results

During the cognitive interviews, participants' responses to the prompts were recorded on individual documents. These responses were then categorised as either 'suggested major changes', 'suggested minor changes', or 'suggested specific changes' and compiled into a master feedback document. This feedback suggested changes to the likes of aesthetics, definitions, formatting, item wording and language. These suggestions were discussed with the research team and either implemented or rejected. This feedback provided insights that were critical to the development of the measure, which greatly improved its overall look, feel, clarity and general robustness.

Developing the wānanga

The tool started off as a single booklet split into two parts. The first part was a general introduction to the tool and the second part was comprised of seven smaller sections, one for each of the whānau wellbeing pou. Each of the seven sections contained a one-page introduction to the pou, the relevant items and three discussion questions that asked whānau to reflect upon "Why are things the way they are?", "What are our aspirations for our whānau", and "What are our goals and ideas?".

The tool became Te Pikitia a te Whānau as it is now as a result of feedback from one of the cognitive interview participants who suggested we split the tool into different booklets. This suggestion inspired us to further fill the kete wānanga booklets with content and imagine what else we could include in the wānanga. This led to the development of the final three kete structure and the creation of the activities for Kete Tuatoru.

The revised wānanga structure and activities were reviewed by the E Tū Whānau Pou, Whaea Moerangi and Matua Keelan. The wānanga tool was then further refined before taking it to be piloted with whānau.

Validation

Process

Te Pikitia a te Whānau was validated utilising a combination of qualitative and quantitative methods. This included pilot wānanga hosted by the E Tū Whānau research team, pilot wānanga hosted by a community partner and psychometric analyses of online survey data.

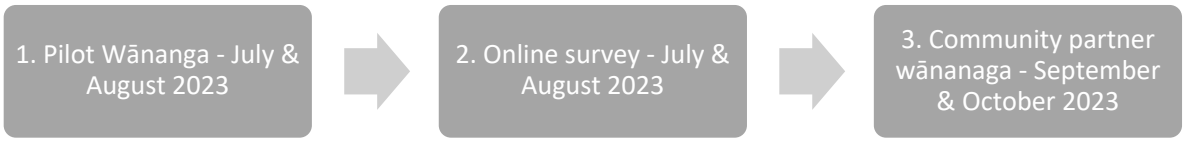


Figure 4: Qualitative and quantitative validation methods

Wānanga validation

Three pilot wānanga were facilitated to test the performance of the tool with real whānau. These wānanga provided whānau with opportunities to be reunited, come together, reconnect and reflect. E Tū Whānau removed the financial barriers for whānau by covering the expenses related to travel, accommodation, venue hire and food.

The three wānanga were organised and facilitated by Finley Johnson (see Appendix 3 for details of the wānanga). The full day wānanga involved whānau completing the three kete wānanga that make up the tool.

Activities were tested in the pilot wānanga to find out what whānau thought of them, which of them were most engaging and approximately how long they took.

The original activities and the wānanga facilitation guide were tweaked and reiterated after receiving feedback from whānau in the pilot wānanga.

An additional five activities were later added to provide whānau with a greater number of options. This was important as whānau will complete the wānanga multiple times and will have opportunities to partake in all the activities over time.

Feedback from whānau

Whānau who participated in the pilot wānanga said that it:

- *"was a fantastic, engaging and fun time"*
- *"left the whānau feeling empowered, and well-equipped to put things into action"*
- *"made the whānau stronger"*
- *"helped us understand each other better"*
- *"benefitted everyone in the whānau, from rangatahi to kaumātua".*

Whānau also said that the wānanga outputs they created were taonga.

In two of the pilot wānanga, whānau members were able to individually complete the online survey version of the tool before completing the booklet version collectively. This provided the data presented in Table 28 which is attached in Appendix 4. Below in Table 13 is the comparison of the total scores between the mean of the individual responses and the collective whānau responses.

	Total mean of individual responses	Total collective whānau responses	Difference
Wānanga 1	105	118	+13
Wānanga 2	76	92	+16

Table 13. Total mean wānanga scores

At the end of the wānanga, whānau were invited to share their thoughts, reflections and feedback on the wānanga process, content and components (see Appendix 3 for further details regarding the process of gathering, recording and synthesising of feedback from whānau).

Community partner wānanga

Te Pikitia a te Whānau was tested and piloted in three different ways by Te Hapori Ora, an E Tū Whānau community partner. The tool was tested in a staff wānanga, in a wāhine (female)-specific focus group setting and with a whānau that Te Hapori Ora works with.

Although Te Pikitia was primarily designed for use with whakapapa whānau, the unique and innovative application of the wānanga with staff and gender-specific focus groups illustrates how the tool can also be used with various types of kaupapa whānau. These unique applications highlight the relevance of whānau-centred approaches to kaupapa whānau who might work, operate or support each other like whakapapa whānau.

These wānanga provided valuable insights and feedback as to the factors that helped the wānanga run smoothly. This led to the wānanga facilitation guide being further refined.

Community feedback

Te Hapori Ora compiled feedback from the participants of their wānanga.

What the wānanga helped participants discover about themselves:

- *"We have strong leadership amongst us and capability is high."*
- *"Our collective skill set are the reason we are successful in our spaces of mahi."*
- *"Our whānau has learnt to dream together, enhancing our collective knowledge."*
- *"This helps us better to plan for our tamariki and mokopuna."*

What the wānanga helped participants commit to:

- *"Spending more quality time with my tamariki creating memories."*
- *"Evaluating my life regularly and utilising the supports around us."*
- *"Teaching my future generations to not accept violence as normal."*
- *"Returning to my marae and sharing the tikanga and stories with my children."*

Online survey validation

Te Pikitia generates collective whānau-level responses, which is an issue for conventional statistical analyses that are often used in psychometric validation. At the time of publication, the research team were unaware of statistical analyses appropriate for validating collective-level responses to survey measures.

The research team were advised by a number of psychometricians and statisticians that there needed to be innovations in the field to be able to properly utilise whānau-level data. Therefore, they advised us to try to gather evidence using analyses and to do the best we could within the old paradigm.

The research team decided to primarily gather empirical evidence for the validation of Te Pikitia by psychometrically validating the tool for individuals and asking respondents about their whānau, using the subjective approach of Te Kupenga. Further insights about the whānau-level responses were gathered using the survey in the pilot wānanga, when the whānau members were asked to complete the survey individually before coming together and filling it out collectively as a whānau.

Survey sample

A sample of 1498 self-identified Māori who were at least 16 years of age and lived in Aotearoa New Zealand completed the survey. We attempted to clean the dataset by excluding abnormal responses and ended up with 1485 responses (see Appendix 5 for a detailed breakdown of our data-cleaning process).

Participants were asked a range of demographic questions at the beginning of the survey. The graphs in Figure 5 below depict the distribution of the sample across the various demographic variables.

The final sample comprised 353 males, 1116 females and 16 individuals who identified with other gender identities, including transgender and non-binary. English kupu were used in the demographic questions, and two participants nominated other gender identities using kupu Māori.

Participants spent around 13 minutes on average responding to the digitised online survey version of Kete Two. The resultant data was analysed to check the psychometric properties of the measure.

Psychometric validation

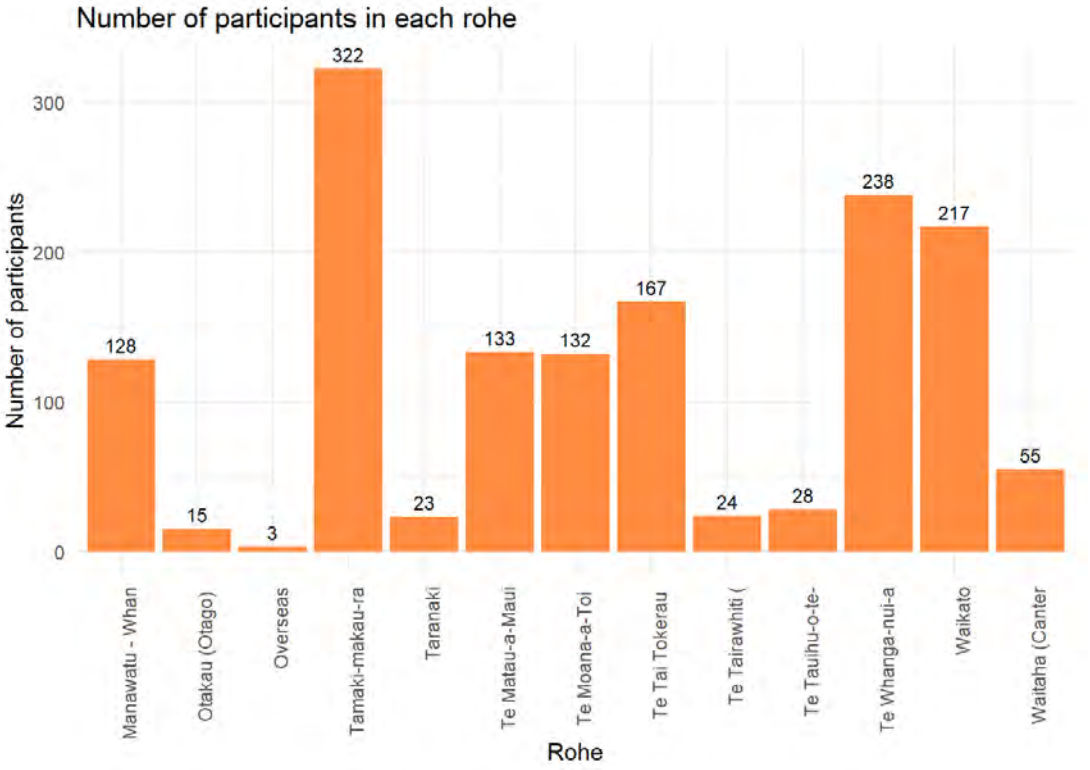
Collecting survey data and applying psychometric analyses is an important step in measure validation as it is important to know that:

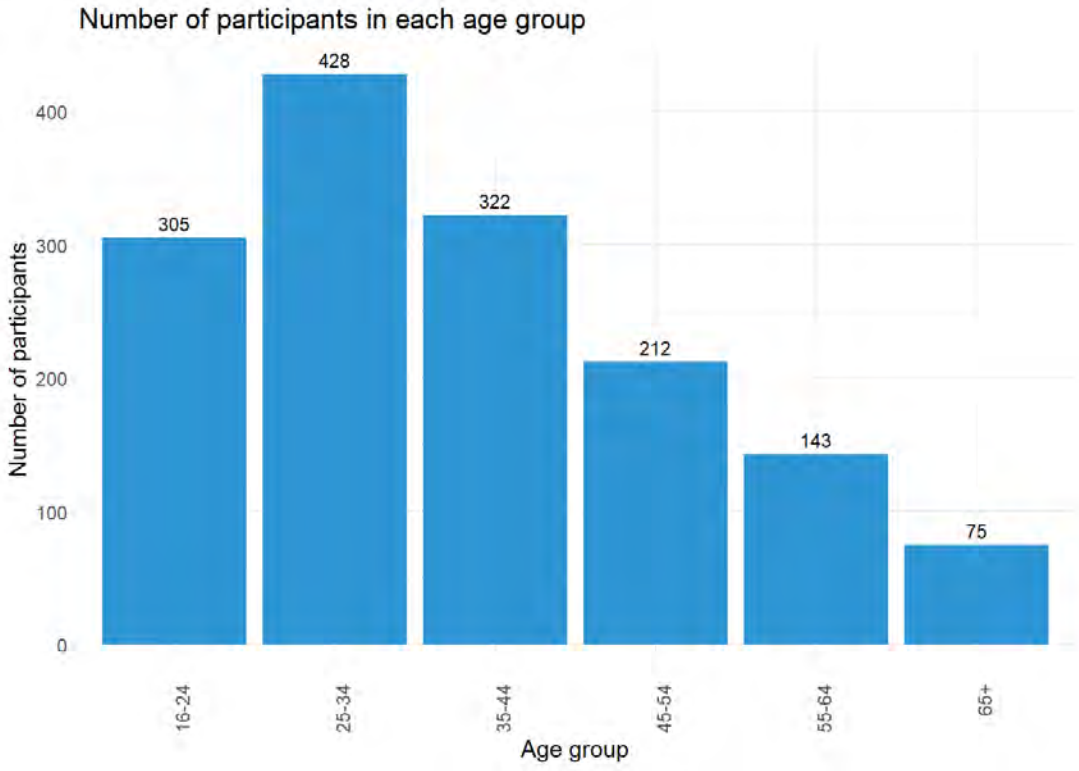
- the measure actually measures whānau wellbeing
- the measure comprises robust items
- the measure works well for whānau across different levels of wellbeing
- the item grouping structures reflect kaupapa Māori theories
- the items are related to their relevant groupings
- the measure works similarly across demographic groups.

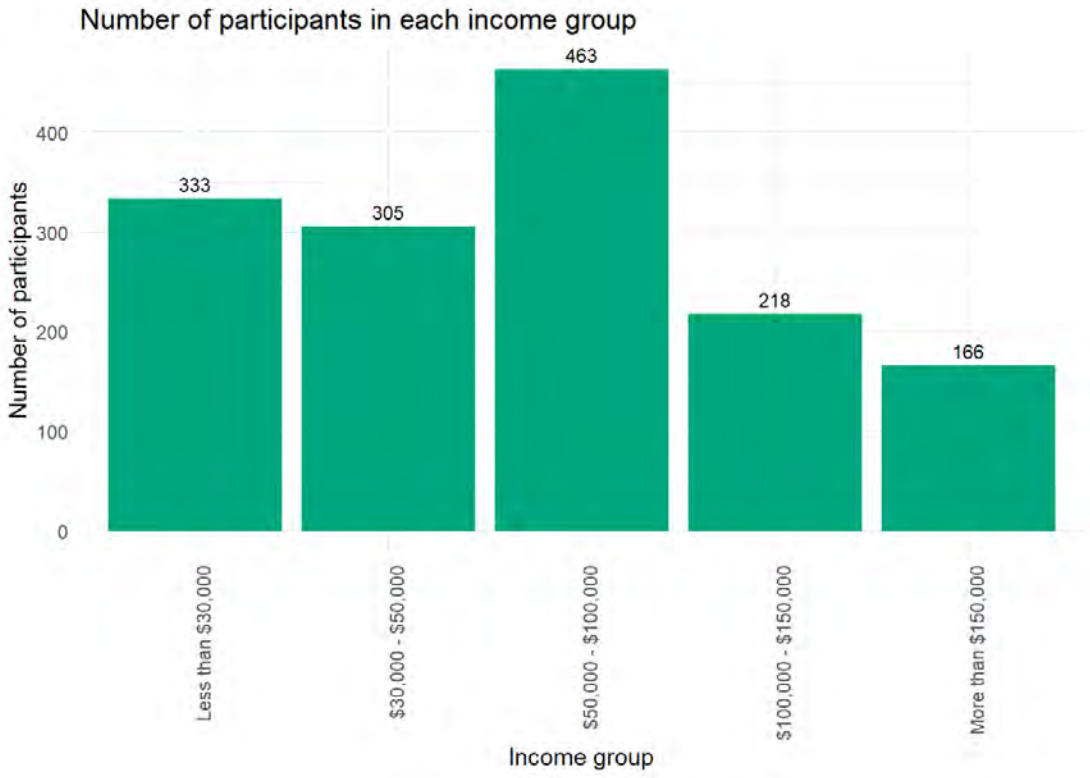
A range of statistical analyses were conducted to validate Te Pikitia a te Whānau. See Table 15 for a comprehensive breakdown of what types of analyses were performed, which analyses were performed and why they were performed. These were always interpreted against the background of theory and history and triangulated with the qualitative insights from the pilot wānanga. This ensured that the scientific perspective was not epistemically privileged over the kaupapa Māori perspective in scale validation.

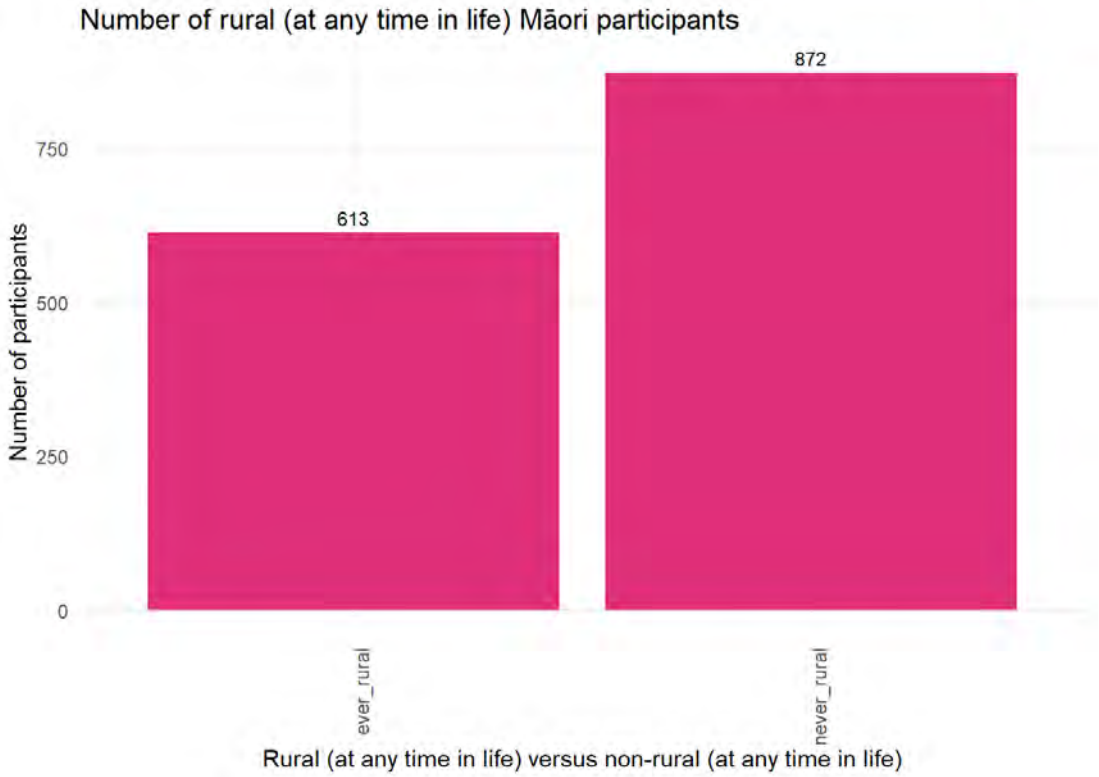
We started with simpler analyses and progressed to more complex ones, ensuring each step built on the insights of the previous (see Appendix 1 for the response frequency plot and the inter-item correlation plot). We began with statistical methods that have more relaxed (non-parametric) assumptions to ensure foundational aspects of our scale were solid before moving on to techniques with stricter (parametric) assumptions. This structured progression helped us anticipate issues related to item information that would later emerge and provided us with rich overall understandings of our items.

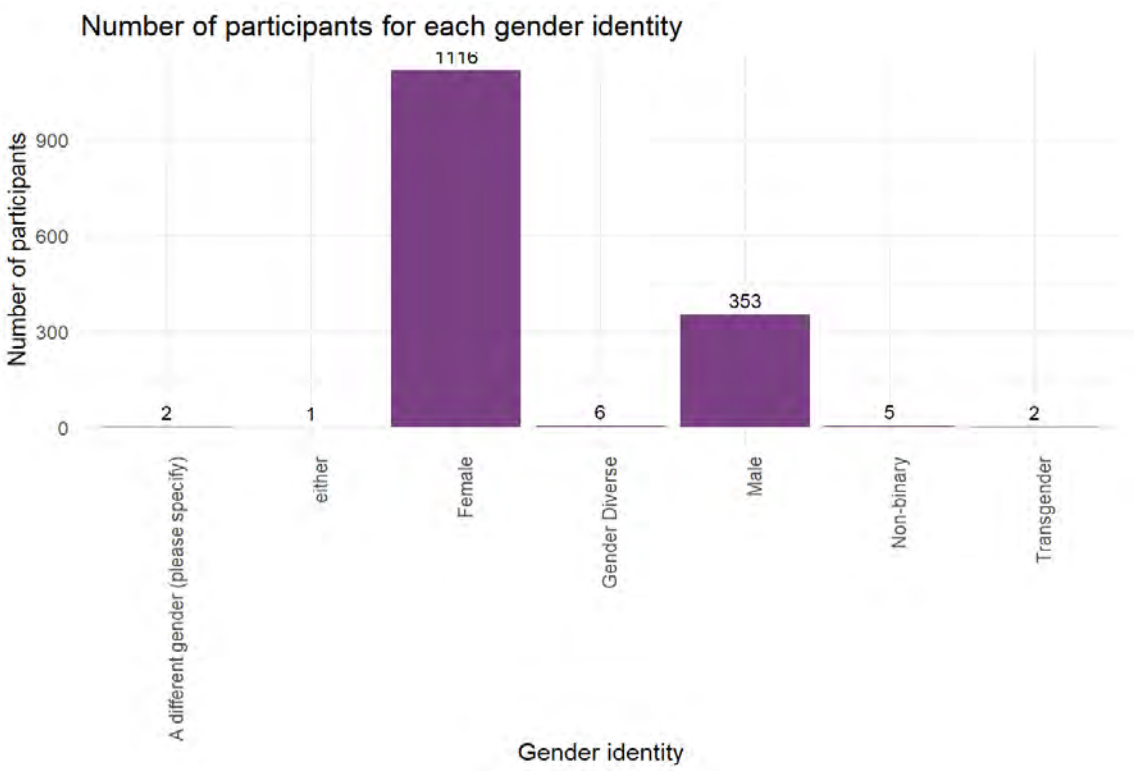
Figure 5: Online survey sample characteristics

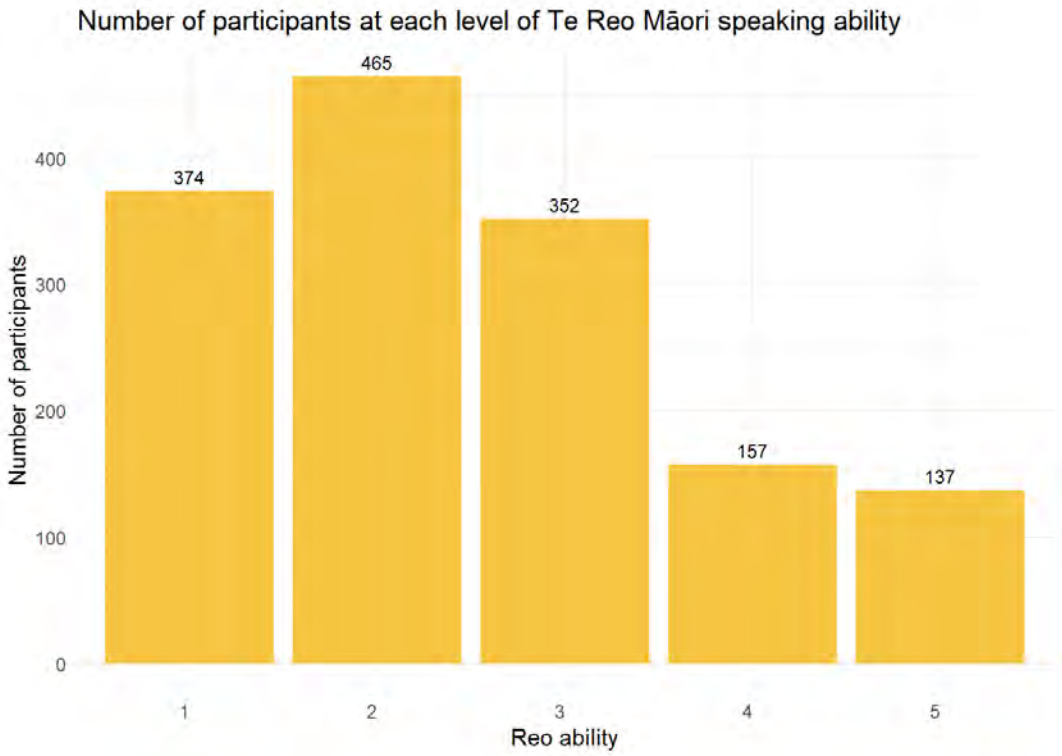





Number of participants in each income group
463
333
305
218
166
400
300
200
100
0
Number of participants
Less than $30,000
$30,000 - $50,000
$50,000 - $100,000
$100,000 - $150,000
More than $150,000
Income group


Number of rural (at any time in life) Māori participants
872
613
750
500
250
0
Number of participants
ever_rural
never_rural
Rural (at any time in life) versus non-rural (at any time in life)


Number of participants for each gender identity
Number of participants
0
300
600
900
1116
353
2
1
6
5
2
A different gender (please specify)
either
Female
Gender Diverse
Male
Non-binary
Transgender
Gender identity


Number of participants at each level of Te Reo Māori speaking ability
Number of participants
0
100
200
300
400
374
465
352
157
137
1
2
3
4
5
Reo ability

Validation criteria

Taking a thoroughly emic approach to both the content and the psychometric properties of the tool, generic psychometric criteria for measurement scale development have been adopted and adapted to have specific meanings and markers of success for E Tū Whānau as a kaupapa Māori initiative working with marginalised communities. This approach strives to realise the ideals of He Awa Whiria – Braided Rivers.

GENERIC CRITERIA	SPECIFIC MEANING	E TŪ WHĀNAU MARKERS OF SUCCESS
Content validity	Te ao Māori content validity	The tool is recognised as being firmly grounded in mātauranga Māori and reflective of diverse Māori realities by whānau, hapori, hapū, academic and government stakeholders.
Construct validity	Scores are consistent with the unique reality of the whānau	Whānau in general will have moderate to high scores of wellbeing, consistent with reports of subjective wellbeing and known population-level statistics of Māori success. Whānau and hapori beginning their journeys from positions of marginalisation and persistent disadvantage will have low to moderate scores consistent with whānau narratives.
Structural validity	The data structures reflect the multidimensionality of holistic, integrated whānau wellbeing	Factor structures will be consistent with theoretical models of whānau wellbeing.
Item validity	Items measure what they are designed to measure	The response options for each item will accurately reflect stages of growth relevant to the aspect of whānau wellbeing.
Tool reliability	Scores are stable over time	Kōrero within whānau is robust and leads to accurate data that would be unlikely to change if, hypothetically, the measurement tool were to be used again within a month.
Interpretability	Item and test scores have a qualitative meaning	Item and test scores correspond with accurate and meaningful descriptions of the journey to whānau wellbeing.
Pedagogicality	Critical consciousness raising	The tool acts as a kāpehu whetū (star compass), helping the whānau to envisage their whānau wellbeing moemoeā (dream) and take action to safely navigate their journey.
Simplicity	A psychometrically valid and powerful tool to measure whānau outcomes that is easy to use, simple to understand and readily enables interpretation of results.	The raw scores are useable and meaningful for whānau without having to do any data transformations or analysis. Results can be easily visualised on a diagram to represent whānau wellbeing holistically. The explanation of how to use the tool in the wānanga and interpret the results is simple for whānau.

Table 14: Validation criteria for Te Pikitia a te Whānau

Validation process

This tool was empirically tested and validated using a modified version of the 6-step protocol outlined by Dima (2018).

Test	Why we do it	Assumptions	Requirements / Indicators
Mokken Scale Analysis (MSA)	• Test if items form a single overarching Mokken Scale • Identify potential idiosyncratic response patterns • Assess for dimensionality • Test for assumption violations	• Monotonicity • Unidimensionality • Local independence	• Monotonicity Violations (crit values >80) • Scalable items ($H^i > .30$) • Scale H ($H > .30$)
Unidimensional Item Response Theory (UIRT) analyses	• Test dimensionality • Test if there are levels of the latent trait continuum that have too many / few items • Identify potential confounding items • Explore how well the measure is able to differentiate respondents with different levels of the latent trait • Test if increasing scale scores align with increasing levels of the latent trait	• Unidimensionality of the measured trait • Local independence • Monotonicity • Sufficient sample size	• Model misfit (CFI ≤ 0.95; RMSEA ≥ 0.06; SRMR ≥ 0.08; $\chi 2$ p value ≤ .05) • Reasonable Category Response Curves (CRCs) and Item Information Curves (IICs) • Scale Information Curve (SIC) with a high and broad 'loaf shaped' curve • A linear looking 'S-shaped' Scale Response Function (SRC) • Balanced distribution of items among latent variable continuum
Confirmatory Factor Analysis (CFA)	• Further test for dimensionality • Explore factor structure of the scale • Identify model modifications to improve fit	• Multivariate normality • Sufficient sample size • Correct a priori model specification • Data from a random sample	• Model misfit (CFI ≤ 0.95; RMSEA ≥ 0.06; SRMR ≥ 0.08; $\chi 2$ p value ≤ .05)
Multi-Group Confirmatory Factor Analysis (MGCFA)	• Test different levels of invariance (configural, metric, scalar), i.e. if our measure performs the same across demographic groups (age, gender, etc)	• Multivariate normality • Sufficient sample size • Correct a priori model specification • Data from a random sample	• Scalar invariance between different demographic groups • $\Delta CFI < -.01$, $\Delta RMSEA < .015$, $\Delta SRMR < .015$

Table 15. Details of why the tests were conducted, their statistical assumptions and the requirements / general indicators of success

Mokken Scale Analysis

The items form a Mokken Scale that measures a single latent trait, whānau wellbeing

Mokken Scale Analysis (MSA) is a non-parametric method that is used to check if and how well items fit together to measure a specific latent trait. MSA was used in this context to help us understand how the Pikitia items behaved and the extent to which they met important statistical assumptions of unidimensionality, monotonicity, and local independence. The analysis does so by conveniently providing information about the collective scalability of the Pikitia items.

Levels of whānau wellbeing and responses to the items typically move in the same direction

The assessment of the monotonicity assumption, a foundational principle in Item Response Theory (IRT), was conducted for each of the 33 measurement items. Monotonicity posits that as levels of the latent trait increase, the likelihood of selecting a higher response option should not decrease. The examination of the results revealed varying levels of adherence to this assumption among the items.

- Item 1 demonstrated strong conformity to monotonicity with a low violation rate (Item H = 0.46) and no significant violations (zsig = 0), reinforcing the reliability of its monotonic response pattern.
- In contrast, Item 21 exhibited a higher violation rate (Item H = 0.44) and significant violations (zsig = 3), indicating potential challenges to the monotonicity assumption for this item.
- A number of items (e.g. Item 7 and Item 26) showed intermediate results with moderate violation rates (Item H = 0.42 and 0.53, respectively) but no significant violations.

The findings suggest that the majority of items align satisfactorily with the monotonicity assumption, supporting their suitability for subsequent IRT analyses. However, a subset of items did not conform. These poorly conforming items were inspected and their results were considered in the context of how they had been written. Reflecting upon the purpose of some items (e.g. giving whānau an opportunity to score high on the measure by providing an easier item), these abnormalities were not concerning.

The items perform well when analysed individually and as a scale

Item Scalability Coefficients (H^i) evidence the extent to which items measure a latent trait. Higher coefficients suggest that the items are consistent with the construct while lower coefficients may indicate items that are less aligned with the construct. All 33 of the Pikitia items had H^i coefficients > .30, meeting conventional thresholds (Palmgren et al., 2018). Items 19 and 31 had the weakest H^i coefficients (Item 19 H^i = .389, Item 31 H^i = .333) and items 27 and 32 had the strongest H^i coefficients (Item 26 H^i = .527, Item 32 H^i = .527; see Table 27 in Appendix 2).

The Scale H provides test of the measure's overall scalability. A scale is considered strong when estimate H ≥ .50, moderate .40 ≤ H < .50, and weak .30 ≤ H < .40 (Palmgren et al., 2018). This scale had an H of .481 (se = .011) suggesting moderate to strong scalability among the items, indicating that the items collectively form a single Mokken Scale measuring the single construct or latent trait of whānau wellbeing.

Te Pikitia performed well, but the Mokken Scale Analysis suggested that some particular items may not be as psychometrically robust as others or the scale as a whole

Taken together, the evidence suggests the scale conforms to the assumptions of unidimensionality, monotonicity and local independence while flagging a few items as potentially problematic from a statistical point of view. It is good to be aware of these potential issues moving into the next IRT analyses, however, they are not overly concerning as most of the 'problematic' items were intentionally designed to be easier for whānau to complete and performed well in the pilot wānanga. This highlights a potential tension between item quality from practical whānau wānanga and psychometric perspectives.

Item Response Theory Analyses

Item Response Theory analyses show that the items and the scale measure whānau wellbeing

Item Response Theory (IRT) analyses are parametric methods used to describe and visualise associations between response patterns and latent trait levels. In the Te Pikitia context, IRT analyses help us understand how people respond to individual items and the scale as a whole, based on their levels of whānau wellbeing.

Item response patterns should be explained by levels of whānau wellbeing and nothing else

Firstly, the unidimensionality of Te Pikitia was tested parametrically after positive findings from the Mokken Scale Analysis. It was important to gather further evidence that the information from our tool is best explained by whānau wellbeing and no other related constructs or methods-related influences. The unidimensional model showed evidence of strong model fit, suggesting that the items work together to measure a single construct – whānau wellbeing (See Table 16 below for the indices). With these strong results, we decided against exploring the Multidimensional IRT models for the data and focused on the factor analyses to validate scale structure.

Model	X^2	X^2DF	X^2 p-value	CFI	TLI	RMSEA (95% CI)	SRMR
Unidimensional	8334.157	459	<.001	.952	.949	.048 (.044-.052)	.058

(X^2 = chi square test statistic; X^2df = degrees of freedom; X^2 p-value = chi square test p-value; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root-Mean-Square Error of Approximation; CI = Confidence Interval; SRMR = Standardised Root-Mean-squared Residual; this IRT analysis used the Graded Response Model)

Table 16. Fit statistics for the Graded Response Model

Some items were found to be more discriminant and some were more difficult than others

Parameters were calculated for each of the items, providing valuable insights into each item's discrimination ('a' parameter) and difficulty parameter thresholds ('b' parameters). These parameters were essential in understanding how well each item measures the underlying construct of whānau wellbeing and how characteristics of the respondents influence their responses.

The items demonstrated varying levels of item discrimination (see Table 17 below). The 'a' parameter represents item discrimination and a higher value indicates that the item effectively distinguishes between individuals with different levels of the underlying trait. The 'b' parameters represent item difficulty thresholds, with 'b1' noting the shift from response option 1 to 2, 'b2' noting the shift from response option 2 to 3, 'b3' noting the shift from response option 3 to 4 and 'b4' noting the shift from response option 4 to 5. Higher values indicate greater difficulty in endorsing the response category.

Notably, items related to 'Collective Action Capability' (a = 1.918), 'Māori Values Conversion Capability' (a = 2.158), and 'Collective Māoritanga Confidence' (a = 2.054) exhibit higher levels of item discrimination and pose challenges for respondents, particularly in the lowest response categories.

This also has implications for whānau-centred kaupapa Māori practice as it suggests that working together as a whānau, living Māori values and being confidently Māori are big struggles for some whānau. This will be no surprise to practitioners. Conversely, 'Resource Utilisation Capability' (a = 2.143) and 'Housing Needs Fulfilment Capability' (a = 0.975) show greater ease of response, as indicated by the lower item discrimination values.

These results provide valuable insights into the measurement properties of the whānau wellbeing items and their suitability for assessing different facets of whānau wellbeing.

Item	a	b1	b2	b3	b4
1. Moemoeā achievement capability	1.6460	-1.3227	-0.5168	0.2314	1.5381
2. Needs fulfilment capability	2.1745	-1.5619	-0.7085	0.0761	1.0894
3. Challenge response capability	2.1161	-1.7692	-0.8900	-0.1531	0.7836
4. Collective action capability	1.8984	-1.9223	-1.1273	-0.4896	0.2175
5. Communication capability	2.0197	-1.6083	-0.7542	0.0531	1.0076
6. Community connection	1.8702	-1.4101	-0.7064	0.0504	0.9157
7. Intercommunal connection	1.4277	-1.5104	-0.7600	0.1223	1.1418
8. Service connection	1.6461	-1.4852	-0.7795	0.0108	0.9161
9. Sense of belonging	1.5442	-2.1522	-1.7441	-1.3546	-0.8366
10. Connection with Māori people	2.0347	-1.7676	-1.0189	-0.4193	0.3119
11. Connection with hapū and iwi	1.8026	-1.5208	-0.6358	0.0378	0.8737
12. Connection with tīpuna	1.8170	-1.4370	-0.7103	-0.0641	0.7080
13. Connection with te taiao	1.6764	-1.3962	-0.5262	0.2751	1.2424
14. Connection with te reo Māori	1.3971	-1.7277	-0.5070	0.7117	1.8170
15. Connection with tikanga Māori	2.0606	-1.3805	-0.6559	0.2078	1.0483
16. Connection with Māori culture	1.8330	-1.3679	-0.4959	0.4011	1.3363
17. Conflict management capability	1.8127	-1.5022	-0.7659	-0.0334	1.1509
18. Safe and effective discipline capability	1.5439	-2.0750	-1.1290	-0.3856	0.6830
19. Violence denormalisation capability	1.1858	-2.4771	-1.7566	-0.9706	-0.0856
20. Safety roles and responsibilities fulfilment capability	1.9632	-1.8814	-1.1670	-0.5565	0.4427
21. Hauora tinana (physical wellbeing)	1.4485	-1.8465	-0.8800	0.4777	1.7180
22. Hauora hinengaro (mental wellbeing)	1.8966	-1.5377	-0.7974	0.2748	1.4196
23. Hauora wairua (spiritual wellbeing)	1.9139	-1.3208	-0.6901	0.1970	1.1808
24. Hauora whanaungatanga (social wellbeing)	1.9732	-1.7181	-0.9616	0.0069	0.9299
25. Whānau roles and responsibilities fulfilment capability	2.0414	-1.8935	-1.0211	-0.1024	1.0126
26. Leadership capability	2.2485	-1.7465	-0.9291	-0.1830	1.0269
27. Cultural roles and responsibilities fulfilment capability	1.9185	-1.3999	-0.6073	0.0501	0.8850
28. Māori values conversion capability	2.1578	-1.4884	-0.6684	0.0100	0.8850
29. Collective Māoritanga confidence	2.0536	-1.4113	-0.5887	0.2103	1.1468
30. Resource utilisation capability	2.1430	-1.2911	-0.6068	0.1182	1.2416
31. Housing needs fulfilment capability	0.9745	-2.8971	-1.7710	-0.1353	1.4374
32. Manaakitanga capability	2.2532	-1.5964	-1.0416	-0.4412	0.1952
33. Decision making capability	1.9898	-1.7333	-0.8680	-0.1643	0.8142

All values were originally presented in 7dp but are reported here in 4dp for accessibility and presentation purposes.

Table 17. Item discrimination and difficulty parameters

Category Response Curves (CRC)

These curves show how well item response options perform across different levels of a trait, helping to identify item biases.

How do I read these?

- In CRCs, the X axis represents the standardised level of the latent trait - θ. Here, the X axis represents levels of self-reported whānau wellbeing, where 0 marks the average and the other numbers mark the standard deviations from the mean.
- The Y axis represents the probability of endorsing the response option (P(θ)). The coloured lines and their corresponding 'P' labels represent scale response options where 'P1' denotes Te Kore, 'P2', 'P3', and 'P4' the three stages of Te Pō, and 'P5' Te Ao Mārama.

What do they show?

Most items demonstrated appropriate response patterns relative to levels of whānau wellbeing across the response options. This can be seen in how the dark blue 'P1' response curve is most likely to be selected in the presence of lower levels of self-reported whānau wellbeing. The items with abnormal response patterns were to be expected given the findings of the Mokken Scale Analysis (see Appendix 6 for all 33 curves).

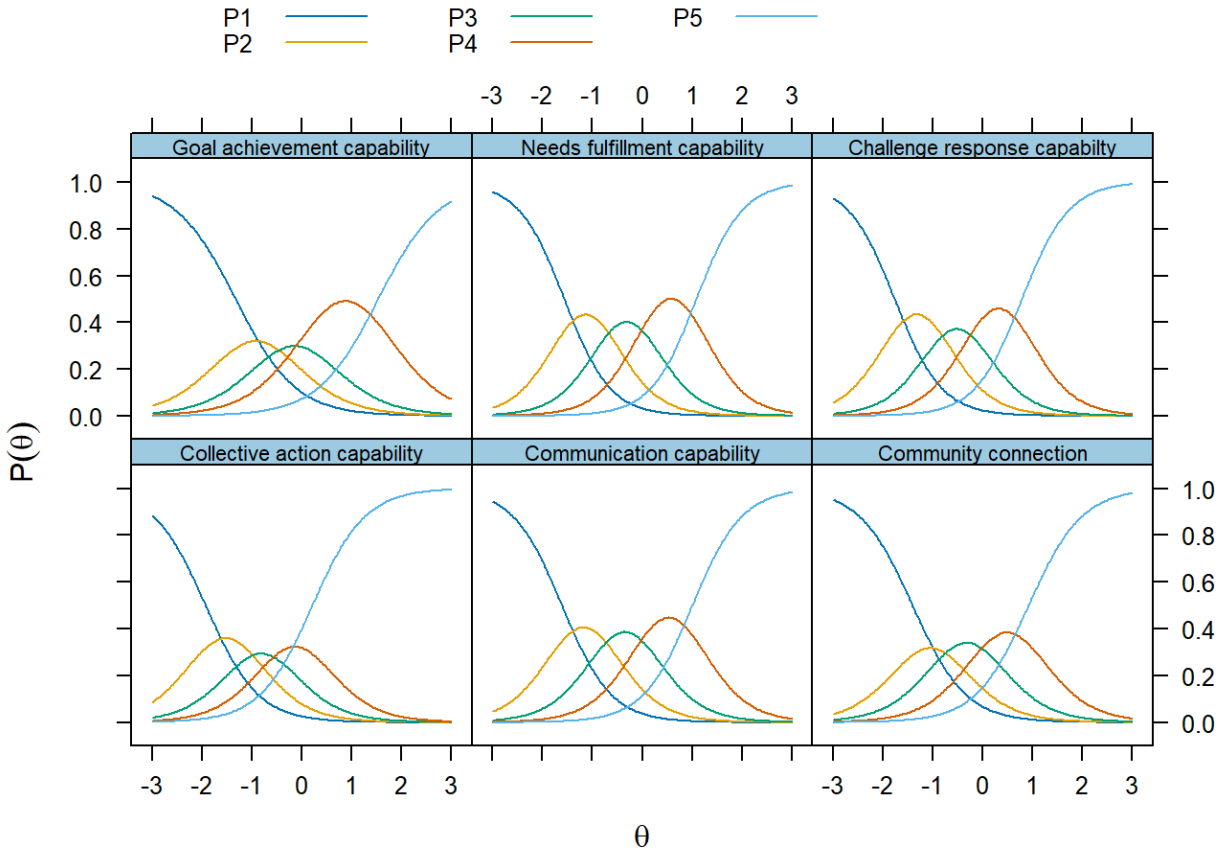


Figure 6. Category Response Curves for six of the items

Item Information Curves (IIC)

These curves display how much measurement information each item provides.

How do I read these?

- In IICs, the X axis also represents the standardised level of the latent trait - θ. Here, the X axis represents levels of self-reported whānau wellbeing, where 0 again marks the average and the other numbers mark the numbers of standard deviations from the mean.
- The Y axis represents the amount of information provided by an item - I(θ). The peak of an item curve indicates the level of self-reported whānau wellbeing at which an item is most informative.

What do they show?

- Most items provided a balanced amount of information distributed across the different levels of whānau wellbeing.
- Some items provided more information at lower levels of whānau wellbeing and some provided more information at higher levels.
- The items that provided low amounts of information were expected as they were designed to be easier for whānau (see Appendix 7 for all 33 curves).

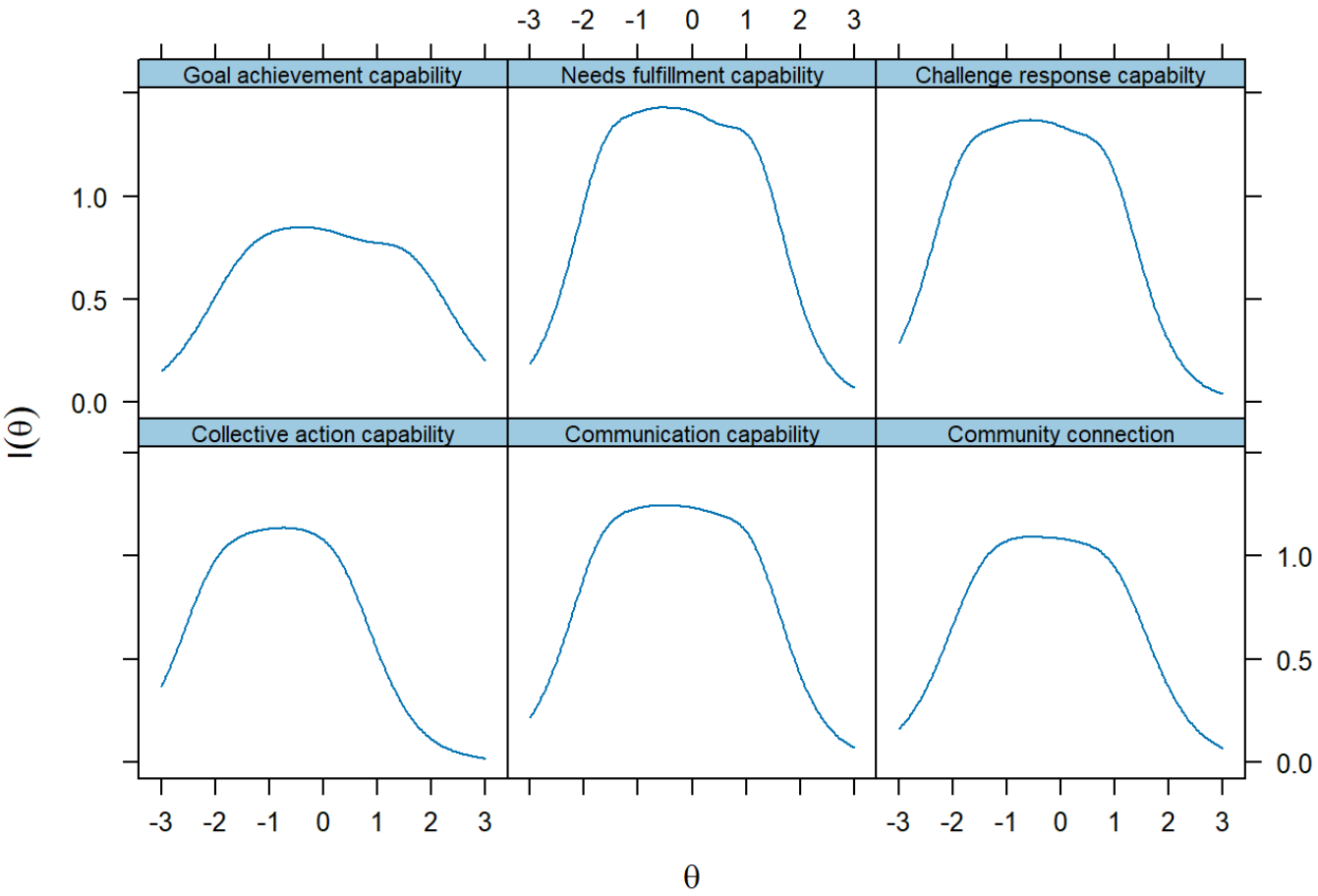


Figure 7. Item Information Curves for six of the items

Scale Information Curve (SIC)

This curve illustrates the overall precision of the measure across the trait continuum.

How do I read this?

- In a SIC, the X axis again represents the standardised level of the latent trait - θ. Here, the X axis represents levels of self-reported whānau wellbeing, where 0 again marks the average and the other numbers mark the numbers of standard deviations from the mean.
- The left Y axis represents the amount of information collectively provided by the items - $I(\theta)$. The position and shape of the curve's peak indicates the level of self-reported whānau wellbeing at which the measure is most informative.
- The right Y axis represents the standard error of the measure at different levels of the latent trait - $SE(\theta)$.

What does it show?

- Together, the items in this scale collectively provide adequate information to measure wellbeing in whānau that sit lower and higher on the whānau wellbeing spectrum.
- The scale is most informative and accurate from the -2 to +1 standard deviation range of whānau wellbeing, which makes it particularly suited to the E Tū Whānau kaupapa.
- Consistent with the E Tū Whānau kaupapa Māori theory of change, Te Ao Mārama is a dynamic state, and so at +2 to +3 standard deviations from the mean, we would expect the scale to be less informative about precise levels of whānau wellbeing.

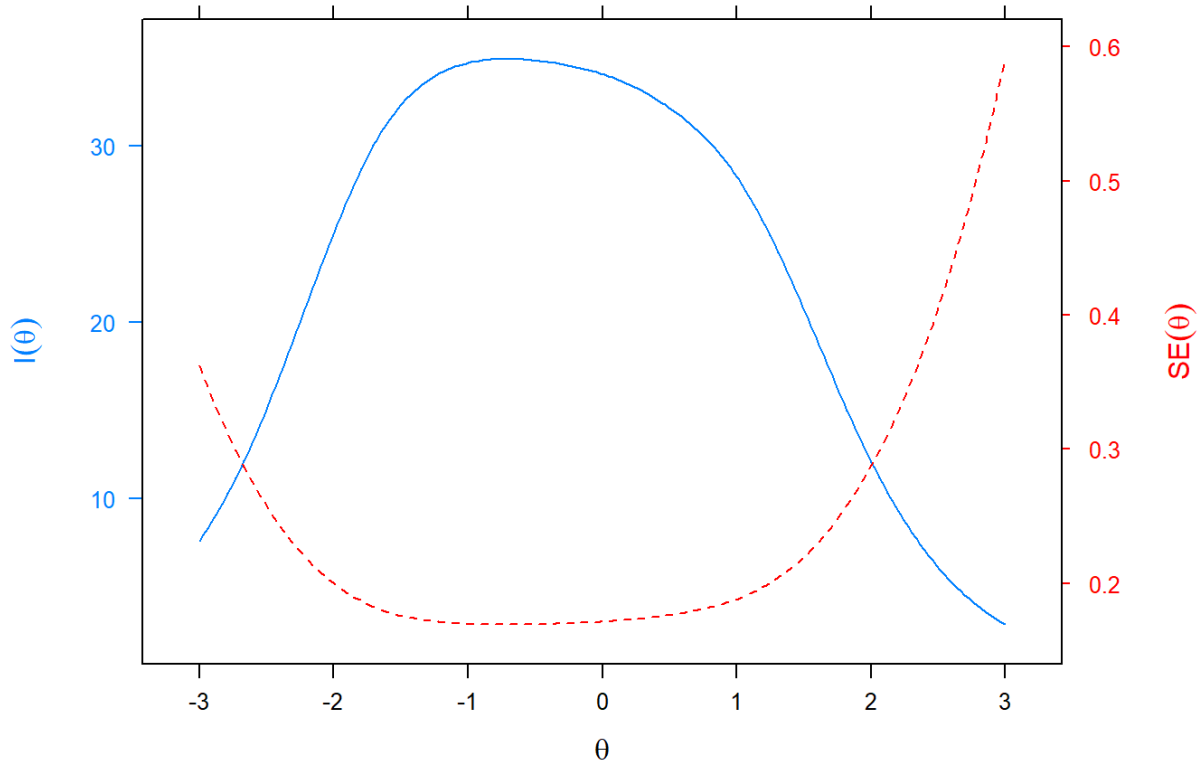


Figure 8. Scale Information Curve

Scale Response Function (SRF)

This curve illustrates the relationship between scores on a measure and the underlying latent trait.

How do I read this?

- In a SRF, the X axis represents the standardised level of the latent trait - θ. Here, the X axis represents levels of self-reported whānau wellbeing, where 0 again marks the average and the other numbers mark the numbers of standard deviations from the mean.
- The Y axis represents the total score of the measure - T(θ).

What does it show?

- The scores of whānau wellbeing from Te Pikitia accurately reflect the corresponding levels of wellbeing of a whānau. This means that those who score low on this measure are likely to have low levels of whānau wellbeing and those who score high on this measure are likely to have high levels of whānau wellbeing.

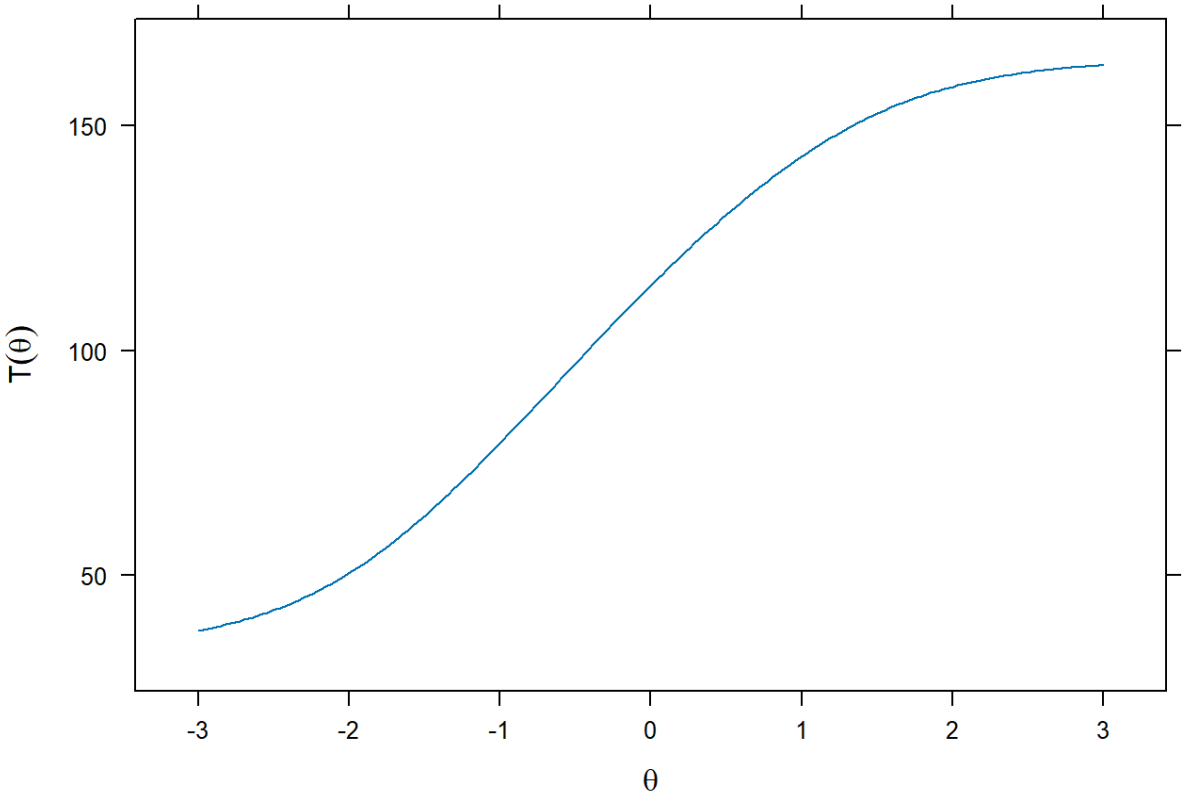


Figure 9. Scale Response Function

Together, what do these IRT results suggest?

- Te Pikitia measures a single construct: whānau wellbeing.
- Te Pikitia accurately measures levels of self-reported whānau wellbeing across the whānau wellbeing spectrum from Te Kore to Te Pō to Te Ao Mārama but loses accuracy at extreme levels.
- Te Pikitia is fit for use by E Tū Whānau as it is most accurate for use with whānau in Te Pō.
- Scores on Te Pikitia may accurately reflect the corresponding levels of whānau wellbeing.

Confirmatory Factor Analysis

Empirical support for a Māori-specific model of whānau wellbeing

Confirmatory Factor Analysis (CFA) is a method used to understand how items relate to constructs that cannot be directly measured, or latent traits. It can assist in understanding how items group together to measure distinct parts of a bigger construct – in our case, the distinct parts of whānau wellbeing.

The measurement tool must be deeply rooted in the cultural and historical context of Māori experiences to be kaupapa Māori. This includes understanding the impacts of colonialism, the process of decolonisation and the ongoing effects of structural injustices. CFA needs to ensure that the tool accurately reflects these realities and does not perpetuate colonial viewpoints or overlook the nuances of Māori experiences.

CFA in this scenario must go beyond statistical validation to incorporate cultural appropriateness. The scales or constructs used to measure wellbeing should resonate with the values, beliefs and experiences of Māori living diverse realities. This involves not only translating concepts into a culturally relevant framework but also ensuring that the constructs themselves reflect indigenous understandings of wellbeing.

The second-order, seven-factor model reflected the aspirations of Māori but did not fit data

The CFA was conducted to see if the seven pou model of whānau wellbeing matched the patterns of responding in the data. The seven-factor model produced poor model fit statistics (See Figure 10). However, the original seven-factor model and associated indicators enabled us to generate high quality items that were unidimensional, as demonstrated by IRT.

The modification indices from this seven-factor model suggested a three-factor configuration of items. These findings sparked a series of discussions within the research team and with one of the E Tū Whānau Pou about the nature of E Tū Whānau practice.

Data drove us to respecify our model, theory drove us to reconceptualise our model

Respecification refers to the process of adjusting the model to better fit the empirical data. For a CFA, this typically involves modifying, adding or removing certain paths or variables within the model based on the fit indices, to achieve a better fit between the model and the empirical data.

Reconceptualisation on the other hand involves a more fundamental rethinking of the model's theoretical basis. It goes beyond a data-driven approach to merely tweaking the model for better data fit and delves into redefining or reinterpreting the underlying constructs and their relationships based on theory. In our case, taking a He Awa Whiria – Braided Rivers approach to psychometric validation means aligning the model more closely with the principles and perspectives of te ao Māori, ensuring that it not only statistically represents the constructs but also resonates with the cultural and philosophical dimensions of Māori wellbeing.

Based on the collective reflections of the research team, the E Tū Whānau Pou and other members of the leadership team, the items were reconfigured into groups that relate to 1) connections and capabilities within whānau, 2) whānau connections and capabilities in te ao Māori, and 3) social connections and capabilities of whānau in their communities and the wider society and economy (see Figure 10).

This approach aligns methodologically with the deductive nature of Confirmatory Factor Analysis (CFA), where theory guides model development and testing, as opposed to the inductive, data-driven exploration typical of Exploratory Factor Analysis (EFA).

Comparison of path diagrams for second-order, seven-factor model and three-factor models

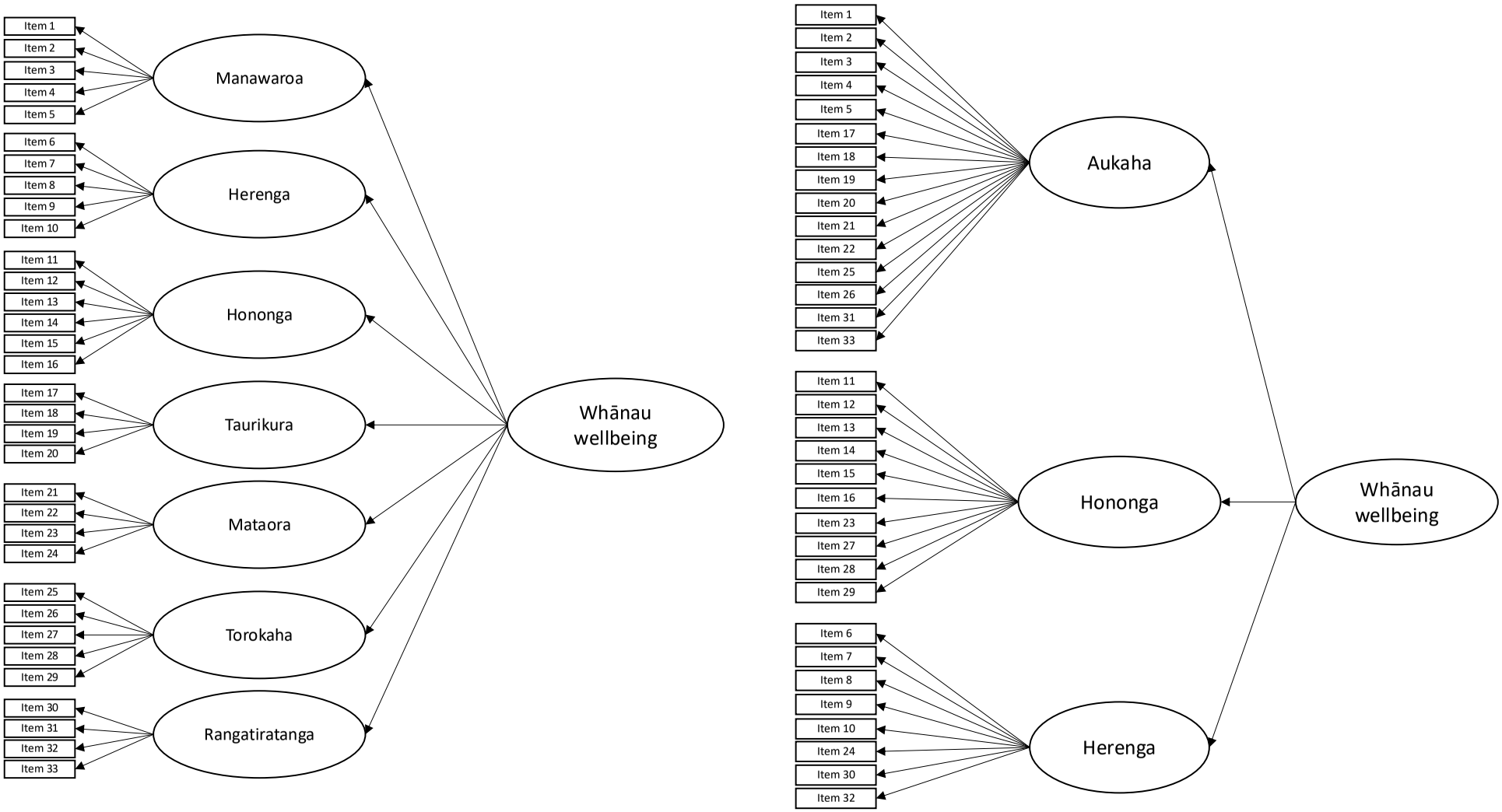


Figure 10. Original seven-factor model inherited from the E Tū Whānau Mahere Rautaki (left); Reconceptualised and respecified three-factor model (right)

The evidence supports the revised theory-driven three-factor model as fitting the data well

A number of configurations were tested; however, Model 4 was selected due to its standout fit statistics (see Table 18 below). All item loadings for Model 4 were above .50 (see Table 27 in Appendix 2).

The model fit indices fell within acceptable ranges according to conventional cut-off thresholds (Hooper et al., 2008), indicating a good model fit:

- Comparative Fit Index (CFI) > .950.
- Root-Mean-Square Error of Approximation (RMSEA) < .060.
- Standardized Root-Mean-Square Residual (SRMR) < .080.

Model number	Model description	X^2	X^2df	CFI	RMSEA (90%CI)	SRMR
1	Second-order seven-factor model	1956.625	494	.647	.045 (.043- .047)	.127
2	First-order seven-factor model	1650.984	474	.716	.041 (.039 -.043)	.123
3	First-order three-factor model	3190.898	493	.869	.108 (.106 -.110)	.072
4	Second-order three-factor model	3190.898	492	.958	.061 (.059 -.063)	.040

(X^2 = chi square test statistic; X^2df = degrees of freedom; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; CI = confidence interval; SRMR =standardised root-mean-squared residual; Scaled X^2, X^2df, CFI, RMSEA and SRMR statistics are reported (WLSMV estimator) to account for ordinal data)

Table 18. Fit indices for CFAs assessing the model fit of Te Pikitia

The reconceptualised theoretical model is a better fit with E Tū Whānau practice

The three-factor model was supported by the E Tū Whānau leadership team and kaumātua. It aligns closely with the actual indigenous practice of E Tū Whānau. An issue with the seven outcomes was that, while it clearly articulated the aspirations of whānau Māori and was based on the existing evidence, practice was more focused on whānau strength, reconnection with culture and connections with society and resources.

If our work improved outcomes for indicators like economic empowerment, it did so indirectly as a second-order effect of our whānau-centred approach. The data showed that these are coherent factors of whānau wellbeing, providing additional empirical support for the E Tū Whānau approach. These results were aligned with components of the E Tū Whānau logo to create the new model of whānau wellbeing – Te Tohu o te Whānau.

Multigroup Confirmatory Factor Analysis

One tool, many diverse Māori experiences and understandings of whānau wellbeing

Multigroup Confirmatory Factor Analysis (MGCFA) is a method used in psychometrics to compare how consistently a set of survey or assessment items performs for different groups – *invariance*. MGCFA can be used across cultural groups to test for cross-cultural invariance and within cultures to test consistent performance for different subgroups or conditions.

The confirmatory factor analysis provided strong empirical support that the 3-factor model of whānau wellbeing was a valid Māori-specific model. However, just because it works for Māori in general, it does not mean that the tool works equally well for subgroups of Māori who may experience and understand whānau wellbeing differently. MGCFA was therefore used to test for invariance of this 3-factor whānau wellbeing model for subgroups of Māori and to identify any sources of measurement bias.

The application of MGCFA to the model was theoretically informed by Tā Mason Durie's concept of *ngā matatini Māori – diverse Māori realities*. Demographic questions were included in the online survey that enabled us to test for invariance across five factors that serve as proxies for diverse Māori realities (as reported in Table 19 below):

1. Age (rangatahi, pakeke and kaumātua).
2. Gender (tāne and wāhine).
3. Urban-rural (ever rural and never rural).
4. Te reo Māori (five capability-level groups each for speaking and understanding).
5. Household income (five income-level groups).

Three ascending levels of invariance were tested:

- **Configural invariance** to test whether the same 3-factor structure (Aukaha, Hononga and Herenga) model of whānau wellbeing fits the data across subgroups.
- **Metric invariance** to test whether the relationships between the observed variables (responses to the items on the 5-point ordinal scale) and their underlying latent constructs (Aukaha, Hononga or Herenga) are consistent across subgroups.
- **Scalar invariance** to test if the benchmark for the scale is consistent across subgroups, so mean scores can be compared.

Invariance across these three levels would indicate that the tool measures whānau wellbeing equitably across these cultural and socioeconomic within-group differences in te ao hurihuri (the contemporary world).

Non-invariance would indicate that different measurements of whānau wellbeing for subgroups living diverse Māori realities may be caused by how the tool works, rather than actual differences in levels of wellbeing. Identifying sources of bias in the results of the MGCFA would enable us to make modifications to the tool to remove these biases.

Evidence of invariance suggests the tool is equitable, responsive to diverse Māori realities

Conventional psychometric thresholds (Putnick & Bornstein, 2016) were used to test the statistical evidence of non-significant change (i.e., statistically significant invariance):

- $\Delta CFI < -.01$
- $\Delta RMSEA < .015$
- $\Delta SRMR < .015$.

The MGCFA provides strong statistical evidence that the tool invariantly measures whānau wellbeing across diverse Māori realities. For each proxy of diverse Māori realities, there was strong statistical evidence of configural, metric and scalar invariance.

We continued to utilise the He Awa Whiria – Braided Rivers model of inter-epistemic dialogue to validate the tool. Applications and interpretations of statistical techniques are never culturally neutral or completely independent of the subjectivities and positionalities of the researchers and participants. Each MGCFA was applied and interpreted against the background of Aotearoa New Zealand history and kaupapa Māori theory, further validating the tool from both scientific and kaupapa Māori perspectives.

These findings provide assurance that for the tested differences within whānau (e.g. generational) and across whānau (e.g., rural and urban) the tool equitably measures whānau wellbeing and meaningful and valid comparisons can be made.

This finding of measurement invariance is an encouraging sign that the tool measures constructs consistently across diverse Māori realities. However, further research, including culturally-specific qualitative analyses, is essential to understand its equitability and responsiveness more fully.

Age model

From a psychometrics perspective, age can significantly influence how participants interpret and respond to survey or assessment items, impacting the validity and comparability of the results across different cohorts. Age cohorts often have varied life experiences and circumstances and are at different developmental stages, which can lead to differences in worldview and how they understand and relate to the constructs being measured and the language being used.

From a kaupapa Māori perspective, the potential for generational differences in experiences and understandings of whānau wellbeing is even more profound. This is because of the significant political, legal, economic, technological, social and cultural changes that have occurred in Aotearoa New Zealand, as well as global developments. These have impacted Māori generations differently.

Kōhanga reo (Māori language pre-school), kura kaupapa Māori (Māori language primary school), whare kura (Māori language secondary school) and whare wānanga (Māori institutions of higher learning) emerged from kaupapa Māori struggles for re-indigenisation in the modern context. More broadly, language and cultural revitalisation, the settlement of historical grievances through the Waitangi Tribunal, the reconstruction of the Māori economy, political mobilisation and shifts in governance and policy are changing the world in ways that are experienced generationally and which are formative of generations' identity and wellbeing *as Māori*.

Rangatahi born into the 'Kōhanga Reo generation' are, by the strategic design of their parents' and grandparents' generations, going to experience the world and their identities, values and wellbeing in the world as Māori differently. Generational differences may also manifest as the transmission of intergenerational trauma and the accumulation and intensification of alienation, marginalisation and dispossession. This situation is particularly acute for survivors of abuse in State care and their descendants.

Generational invariance is also important in the context of Māori demography. The Māori population has higher proportions of children and youth and a lower proportion of elderly people than the general population. The younger age structure and higher birth rates for Māori mean that Māori population growth rates will continue to outpace general population growth rates.

INVARIANCE TEST	GROUP NAME	GROUP DEFINITION	NUMBER OF PARTICIPANTS
AGE	Rangatahi	Aged 16-34	733
	Pakeke	Aged 35-54	534
	Kaumātua	Aged 55+	218
GENDER	Tāne	Identified as tāne	353
	Wāhine	Identified as wāhine	1116
URBAN-RURAL	Ever rural	Has lived rurally	613
	Never rural	Never lived rurally	872
SPEAK TE REO MĀORI	1	Reported being able to speak “No more than a few words or phrases”	374
	2	Reported being able to speak “Not very well”	465
	3	Reported being able to speak “Fairly well”	352
	4	Reported being able to speak “Well”	157
	5	Reported being able to speak “Very well”	137
UNDERSTAND TE REO MĀORI	1	Reported understanding “No more than a few words or phrases”	275
	2	Reported being able to understand spoken te reo Māori “Not very well”	329
	3	Reported being able to understand spoken te reo Māori “Fairly well”	452
	4	Reported being able to understand spoken te reo Māori “Well”	218
	5	Reported being able to understand spoken te reo Māori “Very well”	211
HOUSEHOLD INCOME	1	Less than $30,000 per year	333
	2	$30,000 - $50,000 per year	305
	3	$50,000 - $100,000 per year	463
	4	$100,000 - $150,000 per year	218
	5	More than $150,000 per year	166

Table 19. Group characteristics and details for each demographic

We used MGCFA to ensure accurate and meaningful interpretations and measurements across generations by clustering the age brackets into three culturally relevant generational groups within whānau: rangatahi, pakeke, and kaumātua. The kaumātua age bracket was extended from 65+ to respondents 55+ to maintain a large enough group for the analyses. While tamariki participated in the pilot wānanga with the consent of their parents, they did not participate in the survey.

We found statistical evidence of configural, metric and scalar invariance across our age groupings.

	N	X^2	X^2df	CFI (Δ)	RMSEA (90%CI, Δ)	SRMR (Δ)
Configural model	1485	2692.829	1476	.922	.041 (.038-.043)	.042
Metric model		2155.386	1536	.960 (.038*)	.029 (.026-.031, -.012*)	.047 (.005*)
Scalar model		2246.512	1596	.958 (-.002*)	.029 (.026-.031, <.001*)	.048 (.001*)

(Δ indicates a change in value; Scaled X^2, X^2df, CFI, RMSEA, and SRMR statistics are reported (WLSMV estimator) to account for ordinal data. *Indicates invariance)

Table 20. MGCFA results for age groups

Gender model

A MGCFA of gender identity is important because, in psychometrics, gender identity can influence how participants interpret and respond to survey or assessment items. From a kaupapa Māori perspective, experiences and understandings of whānau wellbeing can vary by gender identity.

Wāhine Māori are overrepresented in the survey sample with 1116 wāhine and 353 tāne, while a further 16 participants identified with other gender identities, including transgender, non-binary and self-identified genders. However, for statistical analysis, this third group is too small to draw valid inferences. This issue is discussed further in the Limitations section.

We chose to continue with the MGCFA using tāne and wāhine groups as there is a strong theoretical rationale for doing so. It also has important practical implications for the E Tū Whānau kaupapa, which has a strategic focus on the Priority Action Areas of Tāne Ora and Wāhine Ora (E Tū Whānau, 2020).

In developing Te Pikitia a te Whānau, we were critically conscious of the *Mana Wāhine Kaupapa Inquiry*, which was hearing outstanding claims. Wai 2700 claims of Tiriti breaches extended across many fields of Crown policy, practice, acts and omissions, both historical and contemporary, and of related legislation, service provision and State welfare. These were alleged to have adversely affected the social, economic, cultural and spiritual wellbeing of wāhine Māori, as well as their access to leadership roles. Wāhine Māori are:

- twice as likely as other women in Aotearoa New Zealand to experience violence
- the most likely to be the victims of crime and to experience multiple victimisations
- five times more likely to have their children uplifted by the State than non-Māori
- burdened by the experience of multiple and intersecting forms of oppression
- the most systematically incarcerated indigenous women in the world
- important community leaders, healers and mobilisers
- leaders in whānau, hapū and iwi
- leaders of kaupapa Māori movements and institutions, including E Tū Whānau
- whare tangata – sacred creators and harbourers of life within whānau and hapū, linking the past with the present and the future

- whare mātauranga – conservators and transmitters of knowledge.

Tāne Māori experience distinct forms of alienated gendered subjectivity, with implications for violence and wellbeing. Data indicate that tāne Māori are:

- incarcerated and held on remand at significantly disproportionally higher rates (relative to the proportion of the general population who are not Māori) (Ara Poutama Aotearoa Department of Corrections, 2024)
- more likely than non-Māori men to be unemployed (Tūwharetoa Māori Trust Board, 2024)
- likely to be paid 16% less than Pākēhā / European men across all industries (Iusitini, Meehan, & Pacheco, 2024)
- expected to die younger than non-Māori men in Aotearoa New Zealand (Statistics NZ, 2021)
- 1.7 times more likely to die from cancer than non-Māori men in Aotearoa New Zealand (Men's Health Week Te Wiki Hauora Tāne, 2023)
- very likely to be involved alongside their whānau in growing their own fruit and vegetables (Statistics NZ, 2018)
- very likely to gather traditional Māori food with their whānau (Statistics NZ, 2018)
- very likely to work alongside their whānau to care for Māori sites of traditional importance (Statistics NZ, 2018).

Tāne ora and wāhine ora are complementary from a Māori perspective.

To test for invariance, the MGCFA must separately and sensitively analyse the responses of tāne and wāhine Māori to indicate that it reflects these gendered realities and perspectives. The measures must be structured (configural invariance), interpreted (metric invariance) and benchmarked (scalar invariance) invariantly for tāne and wāhine.

Statistical evidence of configural, metric and scalar invariance was found across tāne and wāhine groupings.

	N	X^2	X^2df	CFI (Δ)	RMSEA (90%CI, Δ)	SRMR (Δ)
Configural model	1485	2114.875	984	.943	.040 (.037-.042)	.038
Metric model		1608.875	1014	.970 (.027*)	.028 (.026-.031, -.012*)	.041 (.003*)
Scalar model		1649.618	1044	.969 (-.001*)	.028 (.026-.031, <.001*)	.041 (<.001*)

(Δ indicates a change in value; Scaled X^2, X^2df, CFI, RMSEA, and SRMR statistics are reported (WLSMV estimator) to account for ordinal data. *Indicates invariance)

Table 21. MGCFA results for gender groups

Urban – rural model

The urban-rural divide is another factor that can, in psychometrics, influence interpretations and responses to survey and assessment items. From a kaupapa Māori perspective, the urban-rural divide holds particular significance due to the historical and ongoing impacts of colonisation, migration patterns and socio-economic changes in Aotearoa New Zealand. The urbanisation of generations of Māori after World War II was one of the most significant transformations of te ao hurihuri for Māori. The rapid pace of the twentieth century urbanisation of the Māori population is thought to be one of the fastest and most dramatic demographic shifts of its kind globally. The process had the effect of weakening traditional Māori identities and whānau, hapū and

iwi social structures by integrating Māori into the settler-colonial political economy as individuals and households.

Whānau, hapū, iwi and hapori Māori have multiple experiences and understandings of the urbanisation process that are both the causes and consequences of diverse Māori realities. This complexity has engendered new ways of being Māori in te ao hurihuri.

Differences within and between urban and rural Māori include:

- the extent to which whakapapa connections to whānau, hapū, iwi, tīpuna, marae, whenua and te taiao were maintained over generations
- the extent to which connections with Māori culture and language were weakened by individual survival strategies of mimicry and government policies of assimilation
- the construction of modern Māori identities, (counter-)cultures and social structures
- the reach of the State into the lives of individualised Māori and levels of intervention and institutionalisation by the welfare, health and justice systems
- the provision of and access to health and social services and economic opportunities
- how relationships with Pākehā populations, other Māori and later waves of migrant and refugee populations were experienced and understood.

Transformations to the economic structure and functioning of urban and rural life through long cycles of industrialisation and deindustrialisation and changing patterns of international trade and finance have also had combined and unequal impacts on the lives and livelihoods of Māori.

In our survey, we included two key relevant demographic questions: one about growing up in an urban or rural environment and one about currently living in an urban or rural environment. These responses were combined into 'ever rural' (including those who selected growing up rurally and those who reported currently living rurally) and 'never rural' (those who had never lived rurally) groups. The MGCFA of urban and rural Māori was applied to the survey data to ensure that the tool is equitable and responsive to one of the most significant dimensions of diverse Māori realities.

Statistical evidence of configural, metric and scalar invariance was found across these urban-rural groupings.

	N	X^2	X^2df	CFI (Δ)	RMSEA (90%CI, Δ)	SRMR (Δ)
Configural model	1485	2292.267	984	.933	.042 (.040-.045)	.038
Metric model		1662.048	1014	.967 (.034*)	.029 (.027-.032, -.013*)	.041 (.003*)
Scalar model		1690.911	1044	.967 (<.001*)	.029 (.026-.031, <.001*)	.041 (<.001*)

(Δ indicates a change in value; Scaled X^2, X^2df, CFI, TLI, RMSEA, and SRMR statistics are reported (WLSMV estimator) to account for ordinal data. *Indicates invariance)

Table 22. MGCFA results for urban - rural groups

Te reo Māori model

Following the completion of MGCFAs across age, gender and urban-rural dimensions of the diverse realities of Māori populations, the next critical step was to conduct a MGCFA focusing on te reo Māori capability. From a kaupapa Māori perspective, the ability to speak and understand te reo Māori is hypothesised to influence how participants interpret and respond to items about whānau wellbeing.

As oral cultures, in both pre-colonial times and in te ao hurihuri, ngā iwi Māori use reo-ā-iwi (reo unique to iwi) to enact most of their cultural practices and transmit their ways of life intergenerationally. The phrase *te reo me ōna tikanga*, meaning *the language and its cultural practices*, reflects the intrinsic link between the diverse languages and cultures of ngā iwi Māori.

Te reo Māori is pivotal in conserving and transmitting ancestral knowledge through various traditional media like wānanga (learning), pūrākau (legends or narratives), whakataukī (proverbs of unknown origin) and whakatauākī (proverbs of known origin), whaikōrero (formal speech), waiata (songs), karakia (incantations) and karanga (welcoming calls). Other traditional modes of encoding and transmitting meaning across time and space include visual and tactile media like whakairo (carving), raranga (weaving) and moko (tattoo).

During colonisation, te reo Māori and traditional practices were suppressed through social and legal sanctions, including physical discipline. Suppression created generational divides, with the adage that it takes one generation to lose a language and three generations to revitalise it as a living language.

Key components of kaupapa Māori movements to decolonise and re-indigenise have centred on te reo Māori revitalisation, highlighted by landmark developments such as the:

- WAI11 te reo Māori claim and related Waitangi Tribunal claims
- establishment of kōhanga reo, kura kaupapa Māori, whare kura and whare wānanga
- ongoing evolution of Māori media, particularly Māori radio
- formal recognition of te reo Māori as an official language
- institutional and strategic evolution of the Crown's Te Tiriti obligations to te reo Māori
- 'renaming and reclaiming' of spaces, including buildings, streets and cities and natural features such as rivers and mountains known as ancestors.[1]

From a kaupapa Māori perspective on psychometrics, experiences and understandings of whānau wellbeing can be influenced by the ability to speak and understand te reo Māori. This can result in the tool performing differently depending on levels of speaking and understanding ability.

We collected ordinal data on self-reported levels (five) of te reo Māori speaking and understanding capability. We constructed two variants of the MGCFA model, one for speaking and one for understanding ability. For each, there were five groups based on ability level.

Statistical evidence of configural, metric and scalar invariance was found for both the speaking and understanding groups.

[1] For a complete timeline, see https://teara.govt.nz/en/te-tai/te-mana-o-te-reo-maori-timeline

	N	X^2	X^2df	CFI (Δ)	RMSEA (90%CI, Δ)	SRMR (Δ)
Speaking						
Configural model	1485	3304.149	2460	.949	.034 (.031-.037)	.045
Metric model		3138.099	2580	.966 (.017*)	.027 (.023-.030, -.007*)	.057 (.012*)
Scalar model		3339.990	2700	.961 (-.005*)	.028 (.025- .031, .001*)	.059 (.002*)
Understanding						
Configural model	1485	3261.593	2460	.953	.033 (.030-.036)	.046
Metric model		3190.513	2650	.964 (.011*)	.028 (.025 - .032, -.005*)	.059 (.013*)
Scalar model		3406.688	2700	.959 (-.005*)	.030 (.027 - .033, .002*)	.061 (.002*)

(Δ indicates a change in value; Scaled X^2, X^2df, CFI, RMSEA, and SRMR statistics are reported (WLSMV estimator) to account for ordinal data. *Indicates invariance)

Table 23. MGCFA results for te reo Māori groups

Income bracket model

Household income is a key indicator of socioeconomic status (SES), which is a consistent and reliable predictor of a multitude of life outcomes and experiences. SES, as represented by income level, is pervasively relevant to research in the social and behavioural sciences. As a proxy for SES, participants with different household income levels might interpret and respond to items differently based on their experiences and perspectives from their status and subject position in the socioeconomic structure.

From a kaupapa Māori perspective, the prevailing mainstream socioeconomic structure, and the status and position of subjects in it are racialised and gendered. Research consistently finds that incomes are benchmarked to Pākeha men. Tāne and wāhine Māori and men and women of other racialised population groups earn less, on average, when other factors are held constant (Cochrane & Pacheco, 2022).

While our survey question about household income level only asked about current income, the long-term effect on understandings and experiences of wellbeing and responses to items is likely more profound. Persistent disadvantage is the ongoing, often intergenerational, experience of low SES. Individuals, whānau and hapori facing persistent disadvantage may have limited access to resources and opportunities and low capabilities. Participants who are persistently disadvantaged might report lower levels of wellbeing due to the material reality of economic hardship on their lives, rather than actual levels of capability and connection.

Wealth and income disparities and persistent disadvantage are rooted in historical and structural injustices. Adaptive preferences, on the other hand, describe how our preferences and expectations are shaped by our circumstances, often as a coping mechanism for adjusting to injustice. A critical issue in the human development and capabilities approach literature is that people living in persistent disadvantage or who are socially and economically marginalised may adjust their wellbeing aspirations and expectations downwards. Adaptive expectations would hypothetically alter how these groups interpret and respond to items were they not inclusive of diverse lived experiences and unequal subject positions in existing social structures.

We collected ordinal data on (five) self-reported levels of household income. Five groups of participants were constructed based on their household income level.

Strong statistical evidence of configural, metric and scalar invariance was found.

N	X^2	X^2df	CFI (Δ)	RMSEA (90%CI, Δ)	SRMR (Δ)
Configural model1485	3422.438	2460	.955	.036 (.033-.039)	.047
Metric model	3258.839	2580	.968 (.013*)	.030 (.027 - .033, -.003*)	.059 (.012*)
Scalar model	3496.701	2700	.963 (-.005*)	.032 (.028 - .035, .002*)	.061 (.002*)

(Δ indicates a change in value; Scaled X^2, X^2df, CFI, RMSEA, and SRMR statistics are reported (WLSMV estimator) to account for ordinal data. *Indicates invariance)

Table 24. MGCFA results for income groups

Interpretation of MGCFA results

The MGCFA results, adhering to conventional psychometric thresholds, provide empirical evidence that the tool measures whānau wellbeing invariantly across diverse Māori realities. For each proxy of diverse Māori realities there was strong statistical evidence of configural, metric and scalar invariance.

The psychometric validation of the tool applied the He Awa Whiria – Braided Rivers model, emphasising the inescapable qualitative dimensions of quantitative research and ensuring that kaupapa Māori theory informed the data analysis and interpretation of the results.

From both conventional psychometric and kaupapa Māori perspectives, we can have some confidence that the 3-factor whānau wellbeing model is not only Māori-specific in aggregate but invariant for Māori whose realities are shaped by both indigeneity and the forces of te ao hurihuri.

Latent Profile Analysis

There are three distinct profiles in response patterns that emerge from the data

Latent Profile Analysis (LPA) is a method used to group people into categories based on how they respond to survey items. It assists in understanding the types of responding patterns to a set of items and 'who' makes up those respondent groups. LPA is a useful tool for categorising individuals into subgroups and can provide insights into the heterogeneity within a population.

LPA assumes that there are unobserved or hidden groups or classes within the population and it seeks to identify these groups by examining patterns of responses on multiple observed variables (e.g., survey items or test scores). Individual participants are then assigned to one of these latent profiles or classes based on their patterns of responses.

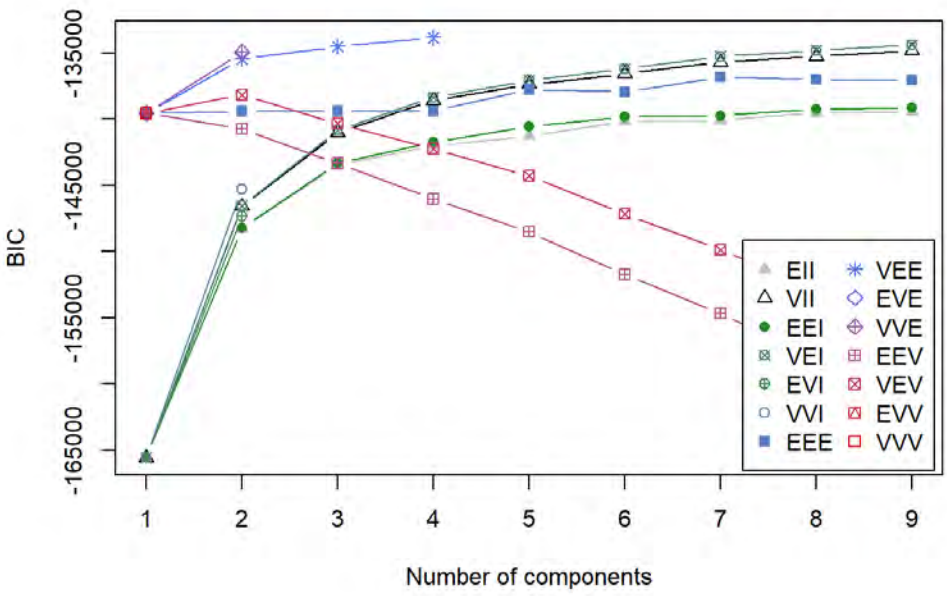


Figure 11. Bayesian Information Criterion plot

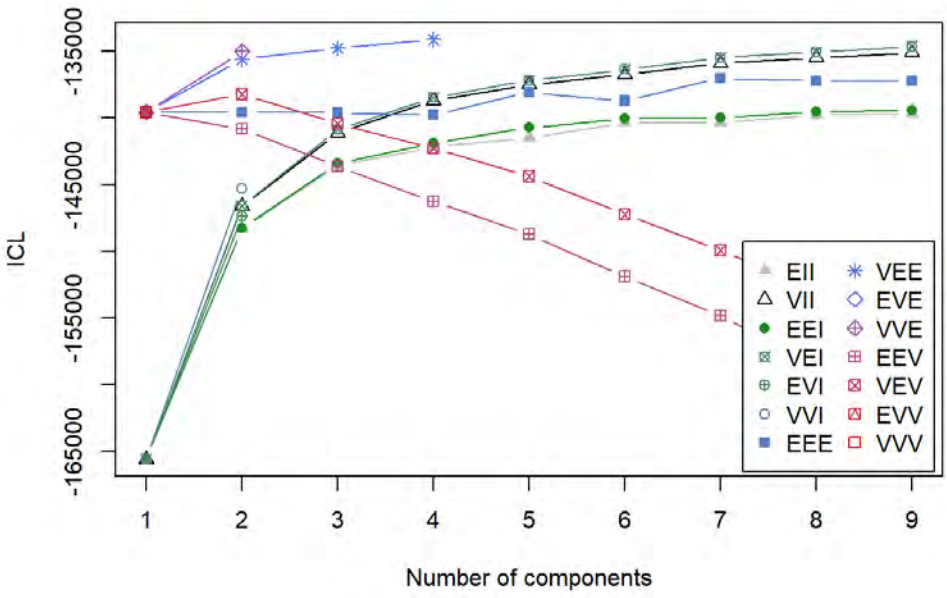


Figure 12. Integrated Classification Likelihood plot

LPA was conducted to identify distinct profiles of whānau wellbeing scores. The Bayesian Information Criterion (BIC) and the Integrated Classification Likelihood (ICL) were employed to identify the optimal model fit. The BIC values indicated that the best-fitting LPA model was achieved with three profiles, as evidenced by the lowest BIC score of -134,522.

Subsequently, the ICL values were examined, further supporting the suitability of the selected model. The ICL value of -134,773.9 aligned with the findings from the BIC, supporting the three-profile LPA model.

These results underscore the robustness and consistency of the model choice, with the BIC and ICL criteria converging on the conclusion that a three-profile model best captures the underlying structure of the data.

	VEE, 4	VEI, 9	VEE, 3
BIC	-133861.9	-134392.5409	-134521.9775
BIC diff	0.0	-530.6883	-660.1249

Table 25. Best Bayesian Information Criterion values

Profile X1: Low Whānau Wellbeing (n = 625)

Participants in Profile 1 exhibited relatively lower levels of whānau wellbeing scores. The average score for this profile was quite central (M = 3.06) with substantial variability (SD = 1.60). This profile represents individuals who reported experiencing relatively lower levels of overall whānau wellbeing.

Profile X2: Medium Whānau Wellbeing (n = 611)

Profile 2 consisted of participants with relatively moderate levels of whānau wellbeing scores. The average score for this profile was moderately higher than profile 1 (M = 3.41) still with considerable variation (SD = 1.07). These individuals demonstrated a medium level of wellbeing.

Profile X3: High Whānau Wellbeing (n = 199)

Participants in Profile 3 reported high levels of whānau wellbeing. The average score for this profile was considerably higher than the other profiles (M = 4.46), with a lot less variability in responses (SD = .66). This group represents individuals who experienced elevated levels of overall whānau wellbeing.

To better understand the response profiles, demographic information was explored.

An Analysis of Variance (ANOVA) was conducted to examine the differences in means between profiles and items. The results revealed significant differences in profile means ($F = 801.63$, $p < .001$), indicating that the three identified profiles (high, medium and low responding) are statistically significantly distinct.

Additionally, significant differences were found between the items ($F = 10.62$, $p < .001$), emphasising that individual items also contributed to the distinctions among profiles. These findings underscore the importance of considering the variability within and between profiles and items in understanding the nuanced nature of whānau wellbeing.

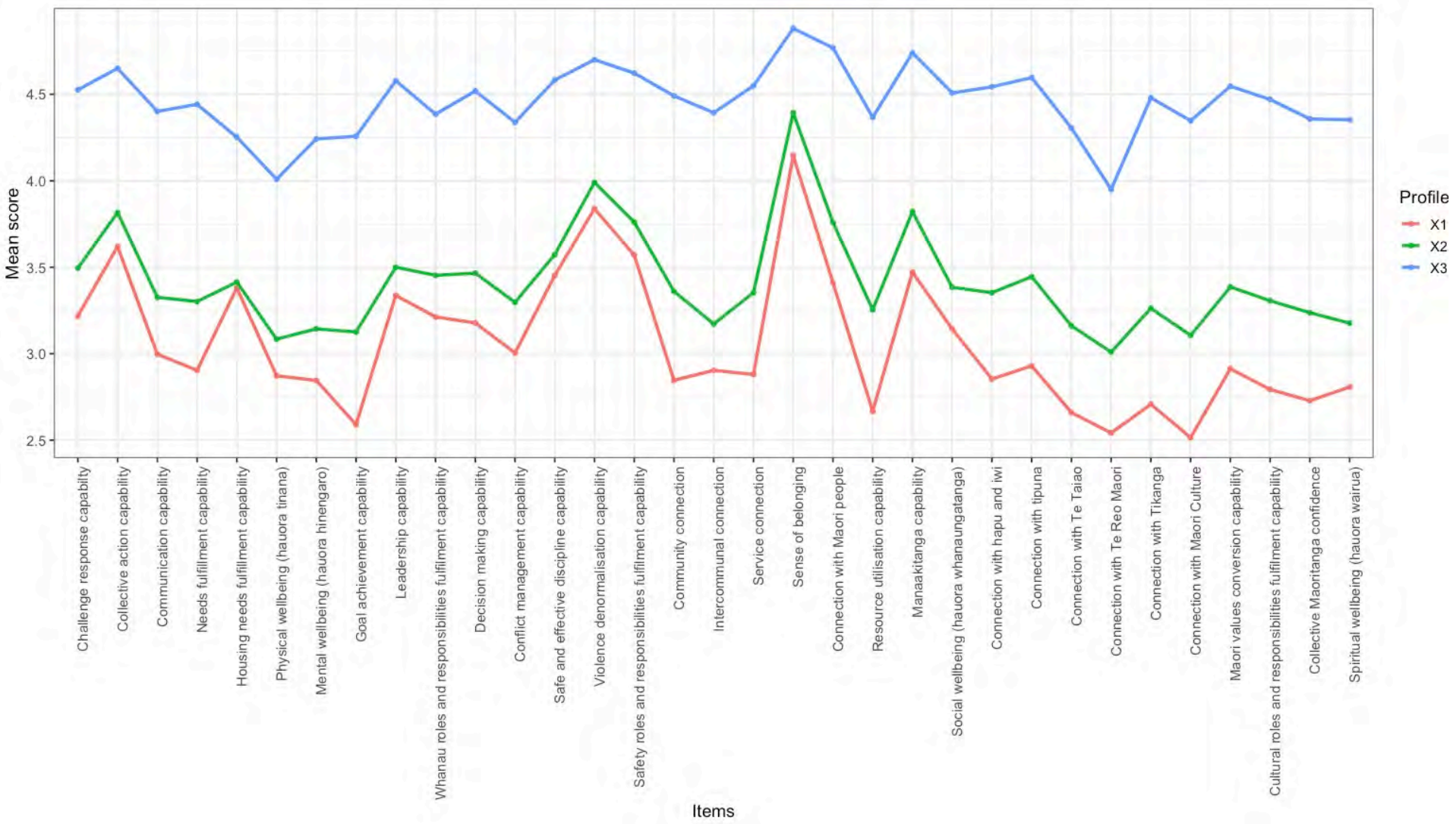


Figure 13. Latent profile scores for items grouped into Aukaha, Herenga and Hononga

Age

Profile 1 was largely comprised of younger people between the ages of 16 and 34. This suggests that rangatahi typically self-report lower levels of whānau wellbeing. In contrast, Profile 3 tended to be a lot older with most members being between the ages of 34 and 64.

Income

Profile 1 tended to contain people who belonged to the lower combined household income brackets. Membership to Profile 3 became more prominent as the income brackets increased. Together, this suggests that whānau with lower household incomes are most vulnerable to lower scores of whānau wellbeing.

Spoken te reo Māori

Profile 1 was greatly overrepresented for those who reported being able to speak “no more than a few words or phrases” in te reo Māori. A large proportion of those who reported being able to speak te reo Māori “well” and “very well” belonged to Profile 3. This links a greater ability to speak te reo Māori with higher whānau wellbeing scores.

Rural / never rural

Opposite trends were observed for those who lived rurally and for those who never lived rurally (urban). A greater proportion of people belonging to Profile 3 either grew up or currently live rurally. In contrast, a greater proportion of people belonging to Profile 1 grew up and currently live in urban contexts. This links ever-living rurally with higher scores of whānau wellbeing.

Overall

Together, the findings from this LPA evidence the fact that there are diverse Māori realities and that there are inequities in whānau wellbeing across these. The identification and demographic breakdown of Profile 1 reinforces the importance of targeting resources at urban Māori youth who have low household incomes and have limited ability to speak te reo Māori, as they have the lowest reported levels of whānau wellbeing.

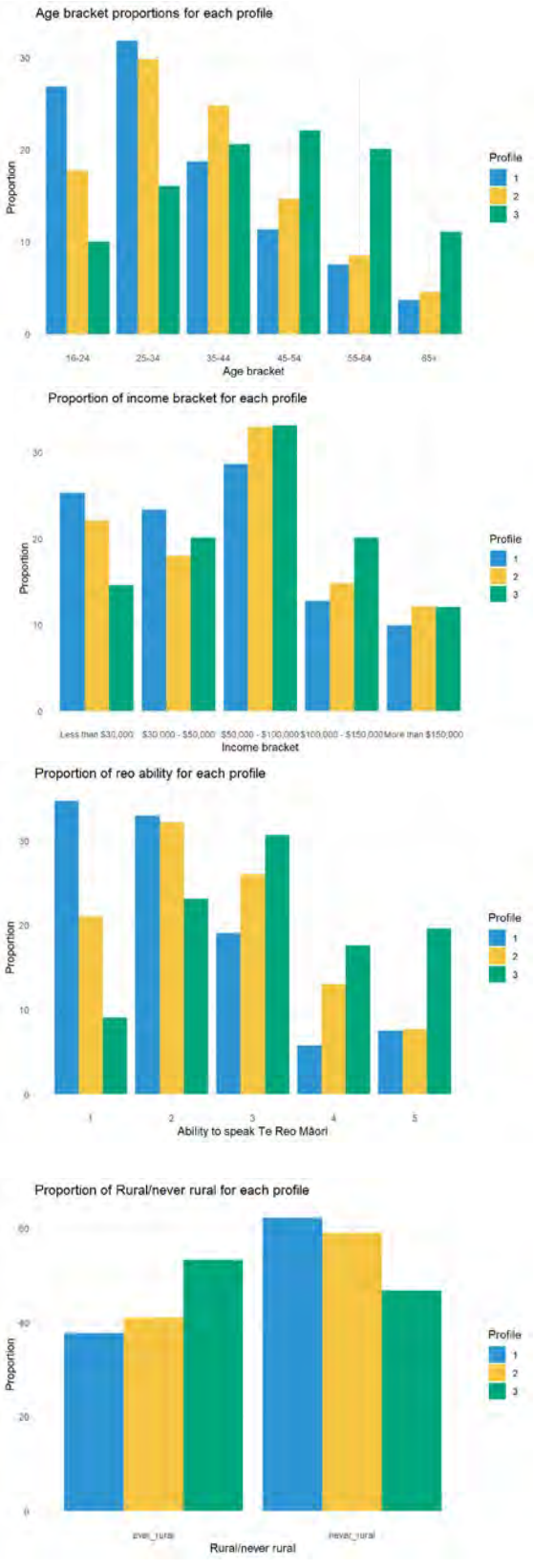


Figure 14: Demographic exploration by profile

Outcomes of the validation process

Te Pikitia a te Whānau is culturally and practically robust

The combined data and learnings from the pilot whānau wānanga and community partner wānanga, in addition to feedback and collaboration with the Pūkenga panel, E Tū Whānau Pou, E Tū Whānau leadership and E Tū Whānau workers provide strong support for the tool being robust from te ao Māori and practice-based perspectives. These insights support the notion that Te Pikitia is an appropriate, beneficial, culturally relevant, effective, impactful and valid wānanga tool.

Te Pikitia a te Whānau is psychometrically robust

The combined results of the Mokken Scale Analysis, Item Response Theory Analyses, Confirmatory Factor Analysis, Multigroup Confirmatory Factor Analysis and Latent Profile Analysis provide strong empirical evidence validating Te Pikitia as a measurement tool for self-reported whānau wellbeing by Māori individuals. While limited by current psychometrics, these empirical results using individual-level data about whānau following the method of Te Kupenga provide a level of confidence that whānau-level measurements are also robust.

Te Pikitia a te Whānau met our markers of success

Criteria	Specific meaning	Source of evidence	Achieved
Content validity	Te ao Māori content validity.	Pilot whānau wānanga, community partner wānanga	✓
Construct validity	Scores are consistent with the unique reality of the whānau.	Pilot whānau wānanga, Latent Profile Analysis	✓
Structural validity	The data structures reflect the multidimensionality of holistic, integrated whānau wellbeing.	Confirmatory Factor Analysis, Multigroup Confirmatory Factor Analysis	✓
Item validity	Items measure what they are designed to measure.	Cognitive interviews, pilot whānau wānanga, Mokken Scale Analysis, Item Response Theory Analyses	✓
Tool reliability	Scores are stable over time.	Pilot whānau wānanga, cognitive interviews, community partner wānanga	✓
Interpretability	Item and test scores have a qualitative meaning.	Pilot whānau wānanga, cognitive interviews	✓
Pedagogicality	Critical consciousness raising.	Pilot whānau wānanga, cognitive interviews, community partner wānanga	✓
Simplicity	A psychometrically valid and powerful tool to measure whānau outcomes that is easy to use, simple to understand and readily enables interpretation of results.	Pilot whānau wānanga, cognitive interviews, community partner wānanga	✓

Table 26. E Tū Whānau markers of success, evidence sources and achievement

Applications, implications and limitations

Main ideas

- Te Pikitia a te Whānau is a wānanga-based whānau wellbeing tool that contains a psychometric measure, a new model of whānau wellbeing and a range of activities designed to uplift the wellbeing of whānau.
- The tool is designed to measure the effectiveness of whānau-centred approaches and interventions, not to measure or explain every factor that contributes to the wellbeing of whānau.
- Te Pikitia a te Whānau can be used to facilitate wānanga in a variety of contexts.
- The creation of this tool has various implications for the community, policy and programmes looking to uplift the wellbeing of whānau.

Applications

Te Pikitia wānanga can be facilitated in a number of ways, across multiple contexts, and in a variety of formats

Inside the facilitation guide, there are instructions for how to conduct the wānanga with an external facilitator and for how to self-facilitate the wānanga as a whānau. Also included are options for structuring the wānanga. Depending on the amount of time, resources and whānau availability, the whānau may wish to split the wānanga across different days, spread it across multiple sessions, and / or only engage with specific kōrero and activities from the wānanga.

Te Pikitia was designed to measure changes in the wellbeing of whakapapa whānau collectives, however, through the pilot testing it was also found to be effective when used with kaupapa whānau. E Tū Whānau and its community partners work with a variety of kaupapa whānau, as its strategies are implemented across the following four Priority Action Areas:

- Hapori development
- Whānau strength
- Tāne ora / Wāhine ora
- Rangatahi development

Te Pikitia can be used in these kaupapa whānau contexts by facilitating wānanga with separate groups of tāne, wāhine, and / or rangatahi. These groups can collectively respond, based on how they might function as a whānau, or they can respond based on their own respective whānau journeys.

Whānau-centred intervention by practitioners

Te Pikitia a te Whānau is a unique tool as it places the power of assessing and addressing wellbeing in the hands of whānau. This approach promotes self-determination, enabling whānau to define, measure and work towards their own wellbeing goals as they understand and define them. This is consistent with the E Tū Whānau goal to support the realisation of the E Tū Whānau moemoeā: “Te mana kaha o te whānau!’.

Te Pikitia is a tool that can be used by a diverse range of practitioners who work to strengthen whānau. The measure and accompanying activities can be used in a variety of contexts and by the likes of Māori service providers, clinicians, social workers and researchers.

Implications

Monitoring and evaluating the results of whānau-centred approaches

Te Pikitia a te Whānau is the newest addition to the E Tū Whānau suite of monitoring, evaluation, research and learning resources following the recently released E Tū Whānau Tikanga Rangahau and Te Whakaoreore Aromatawai Hāpai ki te Hapori (The Community Mobilisation Assessment Tool). Together, these three new tools enable E Tū Whānau to gather innovative and robust kaupapa Māori qualitative and quantitative evidence of its impact within whānau and communities in Aotearoa New Zealand.

We are confident that Te Pikitia can be used to equitably evaluate policies and programmes that aim to improve wellbeing outcomes for whānau. Differences in levels of self-reported whānau wellbeing measured by the tool can be used to inform policy and programme implementation for different groups and in different contexts. For example, if we observe patterns of Herenga being stronger in urban environments and Hononga stronger in rural environments, policies and programmes can be adapted to maximise impact.

Differences in levels of self-reported whānau wellbeing can also be tracked over multiple points of time to provide insights as to the growth of whānau and how their capabilities and connections may grow and / or fluctuate. This can help guide whānau planning and decisions about which services to invite in, providing a more focused pathway to long-term development.

Te Tohu o te Whānau reaffirms E Tū Whānau practice

The structure of Te Tohu o te Whānau reflects the indigenous practice of E Tū Whānau and reaffirms the focus on the priorities of building whānau capability and connections with te ao Māori and with the wider society and economy. The operationalisation of whānau wellbeing into these three measurable factors means that there is value in revising the E Tū Whānau theory of change and logic model in the next iteration of the Mahere Rautaki (Framework for Change) 2019 – 2024. Combined with the results of the kaupapa Māori theory-based evaluation of E Tū Whānau, our findings enable E Tū Whānau to reaffirm existing strategies and focus more intently on evidence-based activities that have a measurable impact on whānau wellbeing.

The findings of the Latent Profile Analysis reaffirm rangatahi development as an ongoing priority action area for E Tū Whānau in future iterations of the Mahere Rautaki. Young, urban, poor, and culturally disconnected Māori are most vulnerable to reporting lower levels of whānau wellbeing. This is important to know for establishing funding priorities and for targeting programmes. These findings highlight the importance of targeting rangatahi and supporting them to positively (re)connect to te reo Māori, tikanga Māori, Māori values, their hapū and iwi and te taiao (nature).

The powerful positive impact of the pilot wānanga on whānau demonstrates the importance of E Tū Whānau continuing to use wānanga as a core strategy for change. E Tū Whānau now has an opportunity to fund, train and support community partners to deliver Te Pikitia a te Whānau as both an intervention and as a measurement tool for evidencing impact.

This research demonstrates the importance of taking holistic and nuanced approaches to uplifting whānau wellbeing that acknowledge the diverse social, cultural, economic, political, ecological and environmental realities lived by Māori. This calls for localised action that caters to the specific contexts and corresponding needs of whānau.

Ideas for other indigenous researchers

The development of Te Pikitia has global implications for other indigenous researchers exploring new and more culturally appropriate processes for measuring wellbeing in their communities. We expect the collective whānau wānanga approach to quantitative data collection will be an applicable method for many other

indigenous communities. We encourage our indigenous relations to utilise their own culturally relevant collective dialogical traditions to change the way quantitative data is generated and collected when conducting research with their communities.

Limitations

Te Pikitia a te Whānau may not be appropriate for all whānau

This wānanga addresses real issues that impact the wellbeing of whānau. This includes topics related to conflict, cultural connection, safety and violence. Although all the kōrero in this wānanga are designed to be strengths-based, non-judgemental and uplifting, some whānau may still find discussing some of these issues challenging or distressing. Te Pikitia was designed to be used by E Tū Whānau kaimahi and community partners who are expert wānanga facilitators and have deep understandings of the whānau they work with.

To help ensure this tool is used safely and appropriately, proper guidance and instruction have been released alongside Te Pikitia. In addition, the facilitation guide encourages whānau who are interested in self-facilitating a wānanga to reflect upon whether it is the right time to engage in these kōrero. Whānau are encouraged to look through the items in Kete Tuarua and activities in Kete Tuatoru and make informed decisions as to whether they can safely discuss these issues as a collective.

Te Tohu o te Whānau does not account for all determinants of whānau wellbeing

It is important to remember that Te Tohu only refers to the internal capabilities, connections and functioning of the whānau. These must be considered in the context of broader systems and external factors that arise from other forms of social, economic, cultural and environmental marginalisation. We acknowledge that our whānau capabilities approach provides insights to only a part of the bigger picture of whānau wellbeing.

Financial constraints limited the number of pilot wānanga

In developing Te Pikitia, we were able to conduct only three pilot wānanga. This was due to financial constraints, as funding the wānanga was resource intensive. These three wānanga provided valuable qualitative insights into the wānanga process and interesting quantitative insights into the differences between individual and collective scores. However, the limited number of wānanga will not have fully captured the diversity of perspectives and experiences of whānau when using the tool in the wānanga context. This highlights the preliminary nature of this research and the importance of conducting additional whānau wānanga so that the tool can be further strengthened. Further wānanga will also help us understand how certain dynamics influence this wānanga process.

The underrepresentation of tāne in the survey data

The survey data used to empirically test and validate Te Pikitia did not reflect actual population gender distributions, as there was approximately only one male for every three females in our sample. This skew in gender was unsurprising given the significant role wāhine Māori play in holding whānau and wider Māori communities together. The overrepresentation of wāhine in survey data has also featured in other recent Māori scale development research (Fox et al., 2023; Greaves et al., 2021; Matika et al., 2020). Future studies should take this into account when aiming for a more balanced representation of genders, to ensure a comprehensive understanding of whānau wellbeing within the community.

Te Pikitia was not tested and validated with survey data from Māori who live overseas

Our survey data was analysed for invariance across rural groupings but not for those who live / grew up overseas. A significant proportion of Māori now live outside of Aotearoa New Zealand, the vast majority of whom reside in Australia. There are patterns of both permanent overseas settlement and remigration but the numbers are difficult to estimate (Te Puni Kōkiri, 2015). Te Pikitia a te Whānau is a wānanga designed for use in

Aotearoa New Zealand by whānau Māori who participate in the E Tū Whānau kaupapa. It is also hoped to be used more widely to support kaupapa Māori and enable the evaluation of the effectiveness and equity of wellbeing policies over time for Māori.

The survey excluded non-resident Māori from participating. Future work could be done to test and refine the Te Tohu o te Whānau measurement model with a sample of Māori that includes Australian or overseas representation to test for invariance across modern state borders. This could support kaupapa Māori initiatives in Australia and other countries and support whānau-centred approaches in Aotearoa New Zealand where whānau live transnational lives, with some members living or moving between countries.

The dimensionality of our IRT model

For this preliminary report, we utilised a unidimensional Item Response Theory (UIRT) model when exploring the quality of items in Te Pikitia. The strong model fit for the unidimensional model coupled with the team's limited time and resource constraints, in the context of our more practical research objectives, led us to leave the multidimensional IRT exploration for the later journal articles that we intend on publishing about the development and validation of this tool.

The unexplained variance in our unidimensional model could indeed have been better understood by incorporating another one or two dimensions; however, we are content with the insights we were able to obtain from the unidimensional model for the time being. The primary objectives of this preliminary research were to assess the measure's practical application and to use psychometric techniques to strengthen and better understand how our items work together and individually contribute to the overall measurement of whānau wellbeing. We believe that the MSA, UIRT, CFA, MGCFA and LPA analyses provided sufficient insights to meet these objectives.

Need for advancements in the field of psychometrics

The research design we used for developing and validating Te Pikitia was greatly influenced by what statistical methods we knew and understood to be available. We searched for analyses that could handle whānau-level data that was not the product of multiple individual responses and operated at the collective whānau-level unit of analysis. After exploring the literature, consulting psychometricians, statisticians and quantitative research experts, we emerged empty handed. The advice we received on numerous occasions was to primarily validate the tool with a sample of Māori individuals and then pilot the tool with a small number of whānau using the collective wānanga methods.

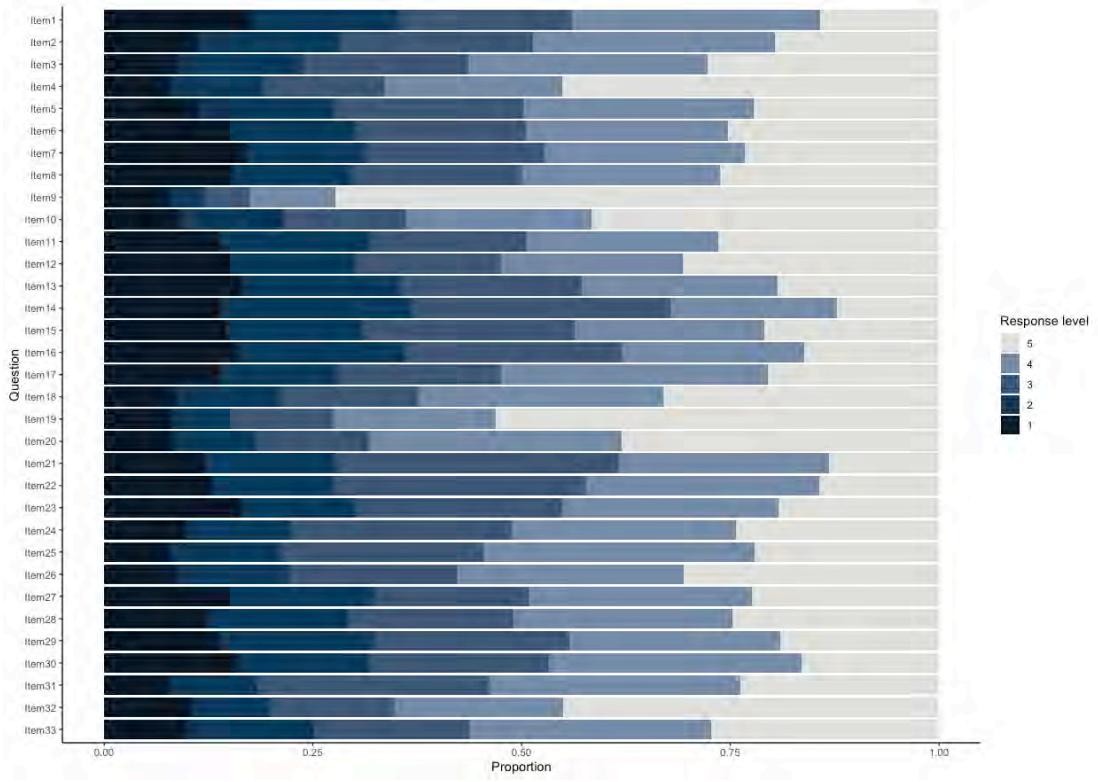
Our moemoeā (dream) is the development of Indigenous psychometrics which would typically focus on collective and relational phenomena, advancing the statistical theory, methods and programming packages required to perform analyses on collective-level data generated by Indigenous practices like wānanga.

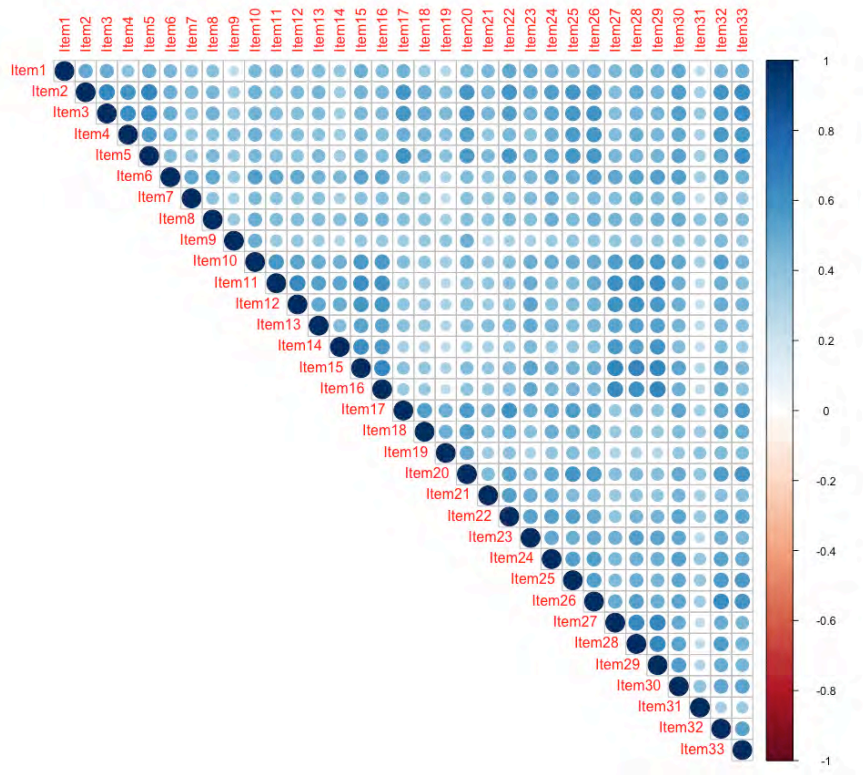
Taken together

These limitations highlight the preliminary nature of the research. Much can be learnt from the limitations of this research in relation to sampling, budgets and the capacity for current psychometric paradigms to respond to the needs of collective measurement approaches. Continued support to further develop and refine Te Pikitia a te Whānau will ensure it continues to evolve as a valuable and culturally relevant tool for assessing and uplifting the wellbeing of whānau Māori.

APPENDICES

APPENDIX 1: Te Pikitia item-response frequency plot / inter-item correlation plot





APPENDIX 2: Te Pikitia Item H coefficients, factor loadings and centrality statistics

Item	H^i (SE)	λ	Mean	Mode
1. Moemoeā achievement capability	.457 (.015)	.700	3.05	4
2. Needs fulfilment capability	.519 (.013)	.811	3.29	4
3. Challenge response capability	.517 (.013	.807	3.52	4
4. Collective action capability	.489 (.015)	.769	3.84	5
5. Communication capability	.503 (.013)	.791	3.33	4
6. Community connection	.489 (.013)	.742	3.29	5
7. Intercommunal connection	.417 (.016)	.631	3.22	4
8. Service connection	.452 (.015)	.684	3.31	5
9. Sense of belonging	.451 (.020)	.678	4.35	5
10. Connection with Māori people	.511 (.014)	.783	3.75	5
11. Connection with hapū and iwi	.481 (.014)	.791	3.30	5
12. Connection with tīpuna	.478 (.014)	.780	3.38	5
13. Connection with te taiao	.466 (.014)	.737	3.10	4
14. Connection with te reo Māori	.436 (.015)	.696	2.94	3
15. Connection with tikanga Māori	.510 (.013)	.829	3.19	3
16. Connection with Māori culture	.496 (.013)	.798	3.02	3
17. Conflict management capability	.481 (.014)	.757	3.31	4
18. Safe and effective discipline capability	.448 (.016)	.694	3.66	5
19. Violence denormalisation capability	.387 (.018)	.609	4.02	5
20. Safety roles and responsibilities fulfilment capability	.505 (.014)	.785	3.80	5
21. Hauora tinana (physical wellbeing)	.436 (.016)	.656	3.12	3
22. Hauora hinengaro (mental wellbeing)	.494 (.014)	.762	3.16	3
23. Hauora wairua (spiritual wellbeing)	.485 (.016)	.771	3.18	4
24. Hauora whanaungatanga (social wellbeing)	.501 (014)	.752	3.43	4
25. Whānau roles and responsibilities fulfilment capability	.511 (.014)	.781	3.48	4
26. Leadership capability	.527 (.013)	.809	3.58	5
27. Cultural roles and responsibilities fulfilment capability	.493 (.013)	.835	3.24	4
28. Māori values conversion capability	.519 (.013)	.808	3.34	4
29. Collective Māoritanga confidence	.513 (.013)	.830	3.17	4
30. Resource utilisation capability	.515 (.013)	.774	3.15	4
31. Housing needs fulfilment capability	.333 (.013)	.503	3.51	4
32. Manaakitanga capability	.527 (.013)	.805	3.80	5
33. Decision-making capability	.502 (.014)	.782	3.48	4

H^i (SE) = Item scalability coefficient (Standard Error); λ = Factor loadings for the first-order three-factor model (Model 4)

Table 27. Item label and corresponding values

APPENDIX 3: Pilot wānanga methods

Sampling

Finley Johnson recruited the whānau for the pilot wānanga from his own extended networks.

Participants

Wānanga One

A whānau of eleven took part in this wānanga, comprised of:

- 2x pēpi
- 5x rangatahi
- 3x pakeke
- 1x kaumātua

Wānanga Two

A whānau of four took part in this wānanga, comprised of:

- 3x rangatahi
- 1x pakeke

Wānanga Three

A whānau of seven took part in this wānanga, comprised of:

- 3x rangatahi
- 2x pakeke
- 2x kaumātua

Materials

In each pilot wānanga, whānau were given a bag containing:

- Information sheets
- Consent forms
- Kete Tuatahi booklets
- Kete Tuarua booklets
- Kete Tuatoru booklets
- A Pou diagram poster
- A2 card for the Kete Tuatoru story activity
- A2 card for the Kete Tuatoru moemoeā activity
- A goal-planning booklet
- Pens
- Metallic markers
- Coloured markers
- A copy of the interim research report

Procedure

The three pilot wānanga were completed over the course of a Saturday, starting at around 9:00 am and finishing at around 6:00 pm. Below is a rough outline of how the wānanga played out. There was variation between wānanga as to how the day unfolded, as whānau were able to tweak the programme to suit their needs. All of the wānanga were conducted in the living rooms of hired accommodation, since there were

whānau members who had to travel to participate. Individual responses for comparison were only able to be gathered in the first two wānanga.

09:00 – Fill out consent forms
09:30 – Kete Tuatahi
10:00 – Kete Tuarua: Individual survey
10:30 – Morning tea
11:00 – Kete Tuarua: Collective survey
12:00 – Kete Tuarua: Collective survey
01:00 – Lunch
02:00 – Kete Tuatoru: Charts and Affirmations
03:00 – Afternoon Tea
03:30 – Kete Tuatoru: Whānau Timeline
04:00 – Kete Tuatoru: Whānau Moemoeā
05:00 – Kete Tuatoru: Whānau Goals
06:00 – Dinner
07:00 – Feedback on wānanga

APPENDIX 4: Pilot wānanga scores

Item	W1 Individual	W1 Collective	W2 Individual	W2 Collective
Moemoeā achievement capability	(1+2+2+2+3+4+4+4)/8 = **2.75**	1	(2+5+2+1)/4 = **2.5**	2
Needs fulfilment capability	(2+1+4+3+5+5+4+4)/8 = **3.5**	4	(3+3+3+4)/4 = **3.25**	3
Challenge response capability	(4+3+5+4+4+1+3+4)/8 = **3.5**	5	(3+3+3+4)/4 = **3.25**	4
Collective action capability	(3+5+5+5+5+5+3+5)/8 = **4.5**	5	(4+5+2+4)/4 = **3.75**	4
Communication capability	(4+5+5+4+3+1+3+3)/8 = **3.5**	3	(2+3+3+4)/4 = **3**	4
Community connection	(5+3+5+5+5+5+4+5)/8 = **4.63**	5	(3+3+4+5)/4 = **3.75**	4
Intercommunal connection	(3+4+5+3+5+1+3+5)/8 = **3.63**	2	(5+4+3+4)/4 = **4**	4
Service connection	(5+1+5+5+4+1+4+4)/8 = **2.63**	5	(1+4+1+1)/4 = **1.75**	1
Sense of belonging	(5+5+5+5+4+5+4+5)/8 = **4.75**	5	(5+5+5+5)/4 = **5**	5
Connection with Māori people	(5+5+5+5+4+1+4+5)/8 = **4.25**	5	(5+1+3+3)/4 = **3**	3
Connection with hapū and iwi	(1+5+4+2+1+1+4+3)/8 = **2.62**	2	(1+2+1+2)/4 = **1.5**	2
Connection with tīpuna	(2+2+4+4+4+1+3+5)/8 = **3.13**	3	(2+2+3+3)/4 = **2.5**	2
Connection with te taiao	(2+2+4+4+3+1+3+2)/8 = **2.13**	1	(2+1+3+1)/4 = **1.75**	2
Connection with te reo Māori	(5+2+4+5+4+1+3+4)/8 = **3.5**	5	(2+2+2+2)/4 = **2**	3
Connection with tikanga Māori	(3+4+5+3+2+1+3+4)/8 = **3.13**	4	(1+3+2+3)/4 = **2.25**	3
Connection with Māori culture	(4+2+5+4+2+1+3+5)/8 = **3.25**	3	(2+2+1+2)/4 = **1.75**	2
Conflict management capability	(3+3+4+5+3+4+3+2)/8 = **3.38**	5	(3+5+2+4)/4 = **3.5**	4
Safe and effective discipline capability	(4+5+5+4+4+5+3+4)/8 = **4.25**	5	(5+3+2+3)/4 = **3.25**	5
Violence denormalisation capability	(5+5+5+4+5+5+5+5)/8 = **4.88**	5	(5+5+4+5)/4 = **4.75**	5
Safety roles and responsibilities fulfilment capability	(3+5+4+5+5+5+4+2)/8 = **4.13**	5	(5+3+4+4)/4 = **4**	5
Hauora tinana (physical wellbeing)	(3+5+4+4+3+3+3+3)/8 = **3.5**	3	(3+1+3+2)/4 = **2**	2
Hauora hinengaro (mental wellbeing)	(4+2+5+4+1+1+4+4)/8 = **3.13**	5	(3+3+2+2)/4 =**2.25**	4
Hauora wairua (spiritual wellbeing)	(5+2+5+4+4+5+4+5)/8 = **4.25**	5	(2+2+2+1)/4 = **1.75**	3
Hauora whanaungatanga (social wellbeing)	(4+4+5+4+5+5+4+3)/8 = **4.25**	5	(4+1+4+1)/4 = **2.5**	4

Item	W1 Individual	W1 Collective	W2 Individual	W2 Collective
Whānau roles and responsibilities fulfilment capability	(2+4+4+3+3+3+4+3)/8 = **3.25**	3	(4+5+2+3)/4 = **3.5**	4
Leadership capability	(4+4+5+4+5+5+3+4)/8 = **4.75**	5	(4+5+4+4)/4 = **4.25**	5
Cultural roles and responsibilities fulfilment capability	(3+2+5+4+2+3+3+3)/8 = **3.13**	5	(1+1+1+1)/4 = **1**	4
Māori values conversion capability	(4+3+4+4+3+5+3+5)/8 = **3.88**	5	(2+2+2+1)/4 = **1.75**	2
Collective Māoritanga confidence	(3+4+4+5+4+2+4+4)/8 = **3.75**	5	(1+1+2+1)/4 = **1.25**	2
Resource utilisation capability	(4+5+4+4+5+2+4+3)/8 = **3.88**	5	(2+4+2+4)/4 = **3**	5
Housing needs fulfillment capability	(5+5+5+3+4+5+4+4)/8 = **4.38**	4	(3+3+3+3)/4 = **3**	3
Manaakitanga capability	(4+3+5+5+5+1+3+3)/8 = **3.63**	5	(4+5+5+2)/4 = **4**	5
Decision-making capability	(3+3+5+5+3+5+2+2)/8 = **3.5**	5	(3+3+4+3)/4 = **3.25**	5

Table 28. Individual and collective scores for pilot wānanga 1 (W1) and pilot wānanga 2 (W2)

APPENDIX 5: Online survey methods

Data security

All of the data extraction (from the online survey platform), processing, cleaning, and analysing was completed with a government-issued laptop on secure Ministry of Social Development servers.

Materials

Survey data was collected using the SurveyMonkey platform.

The Mokken Scale Analysis, Item Response Analyses, Factor Analyses and Latent Profile Analyses were all conducted using R software (R Core Team, 2023). Parameters were estimated using the Weighted Least Squares Mean and Variance (WLSMV) estimator.

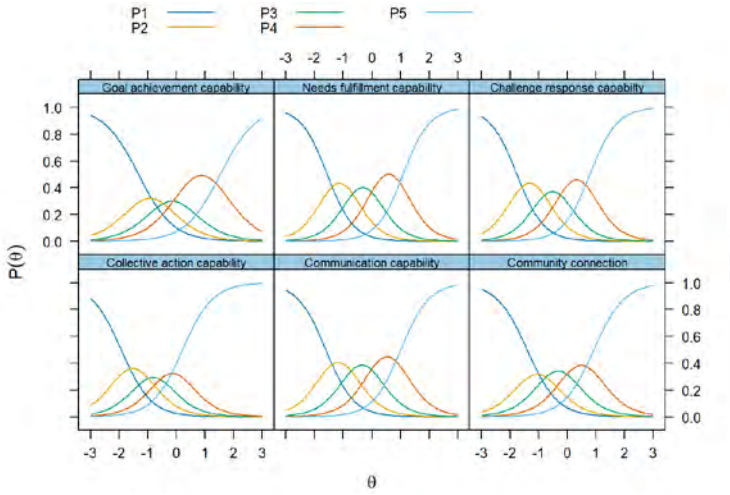
Data Cleaning

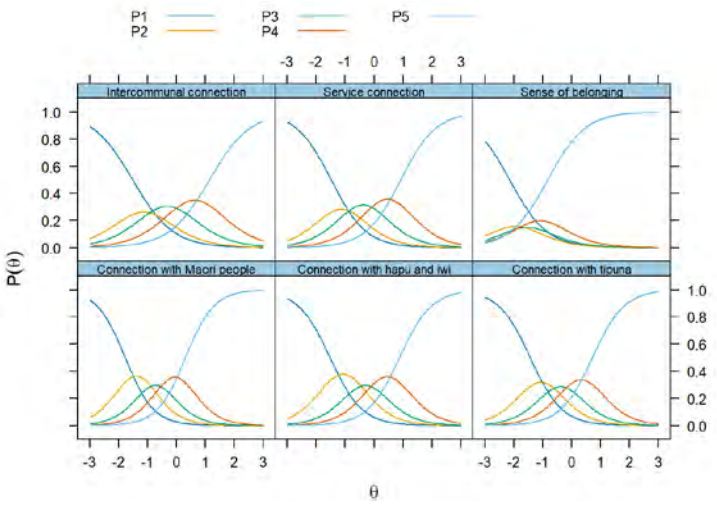
The raw data was manually cleaned for straight liners and false responses. This process involved calculating total scores for respondents, sorting the cases by total score from low to high and identifying the cases that responded using only one response option (33 – all 1s, 66 – all 2s, 99 – all 3s etc.). Once these straight liners were identified, we then compared their item responses with the demographic information they provided at the start of the survey. This was an important step as we expected to see some respondents genuinely scoring all 1s. It would be understandable for someone to be frequently responding in Te Kore if they also reported having a low family income, were of a gender minority and had lived experience with gangs and prisons. We, for example, flagged cases that in the demographics reported not knowing their hapū or iwi, having low incomes and low ability to speak te reo Māori, but scored all 5s for connection to hapū and iwi, te reo Māori and economic independence later on in the survey. We ended up identifying and deleting 13 cases that we believed to be false, which left us with 1485 cases in our final dataset.

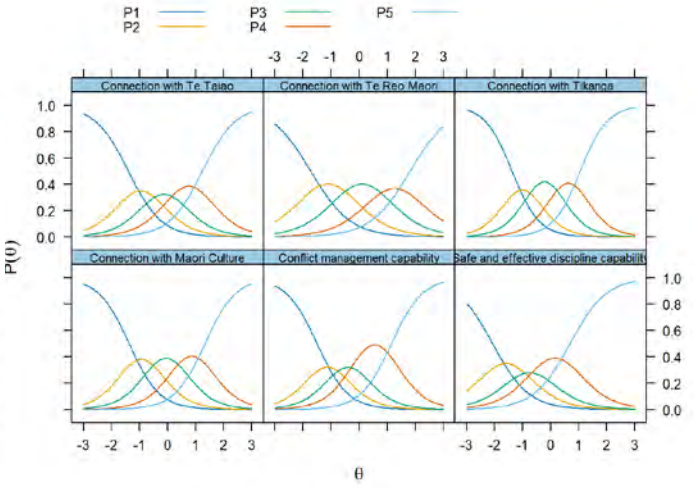
Procedure

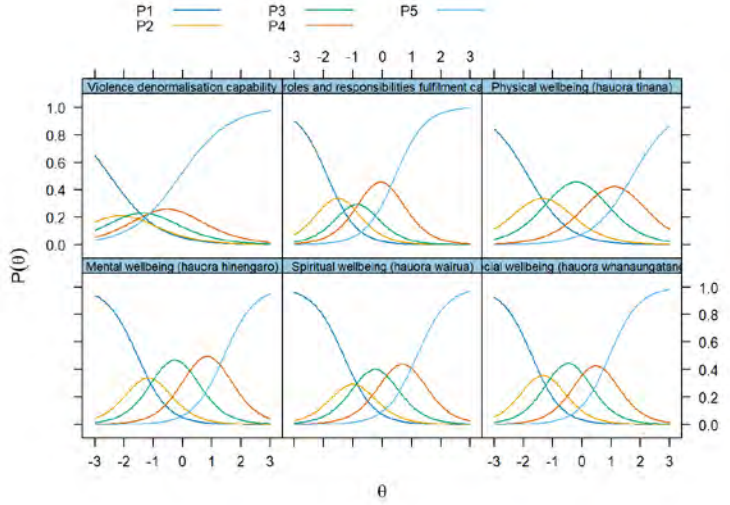
Participants were invited to complete an online survey that would take roughly 10-15 minutes to complete. They were largely recruited through the E Tū Whānau and research team's extended networks. To reach these networks, the survey link was shared via email, and text message. Participants were first presented with a range of demographic questions and all those who disclosed being under the age of 16, did not identify as Māori, and did not consent to partake in the research were redirected to the end of the survey. All participants who completed the survey were emailed a $30 supermarket voucher as a koha. Responses were collected from the 11th to the 21st of July 2023.

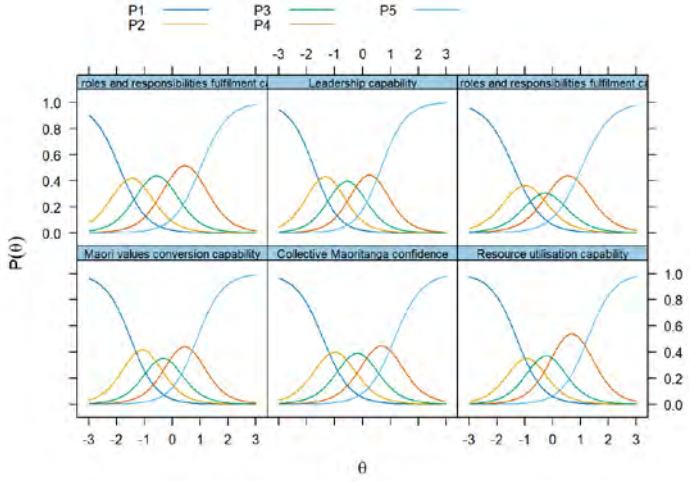
APPENDIX 6: Category characteristic curves

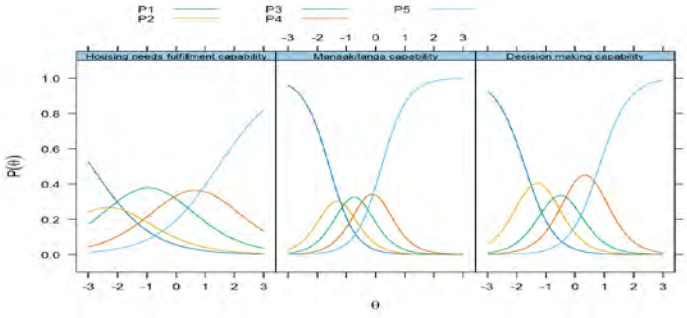




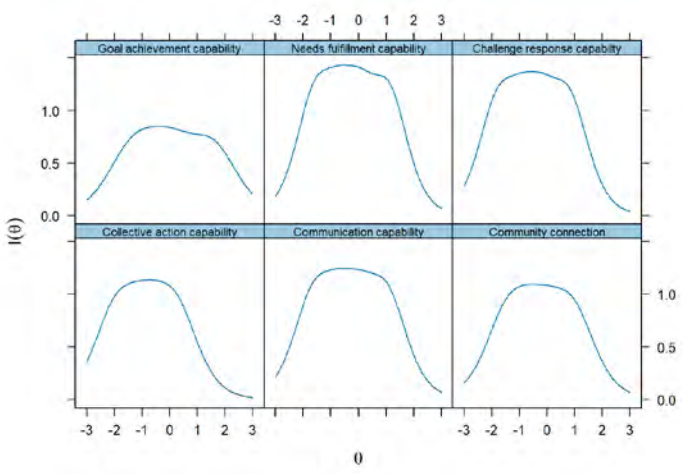


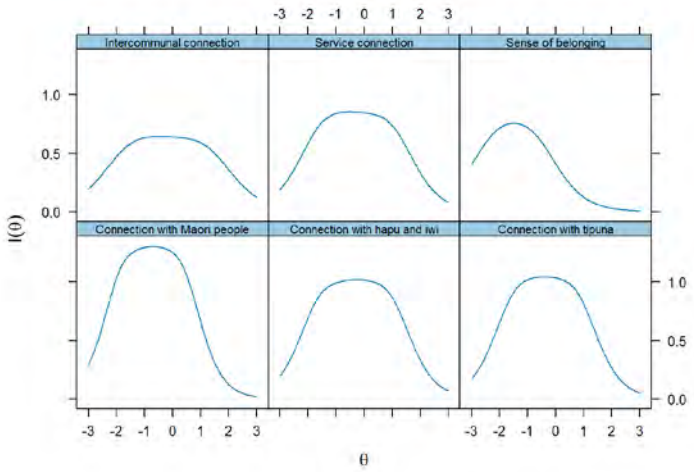


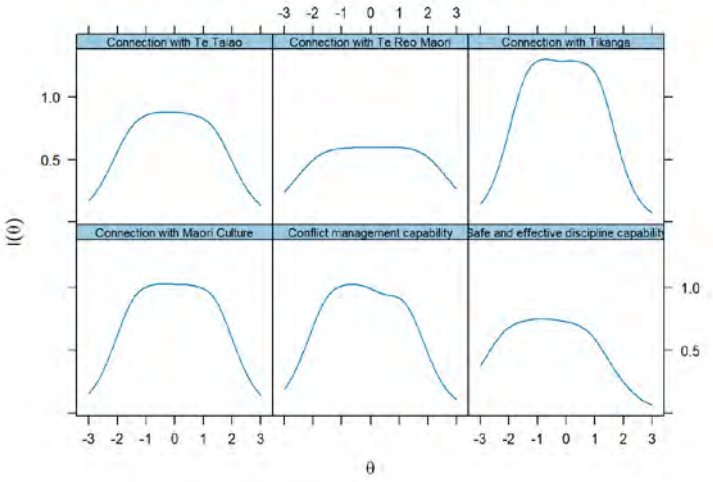


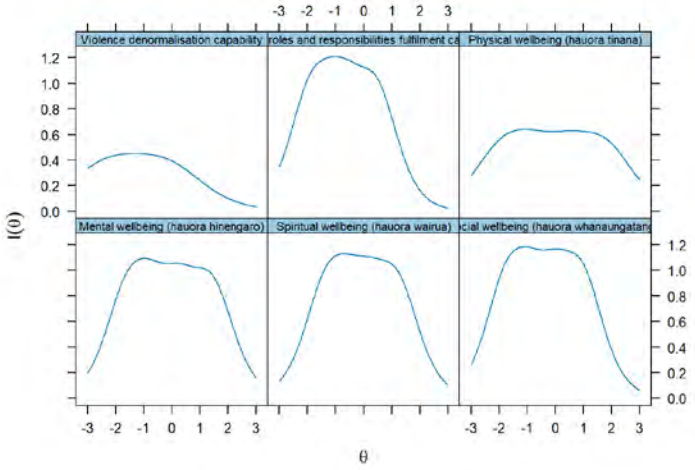


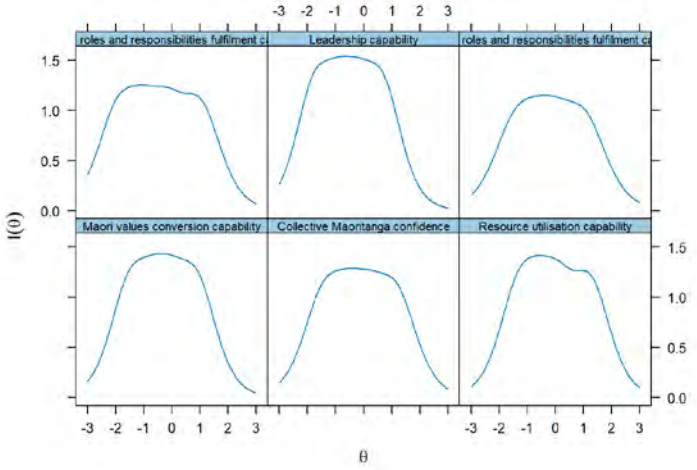
APPENDIX 7: Item information curves

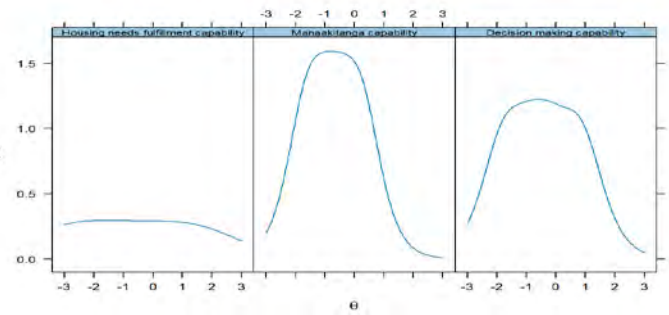












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