Distributional Issues in Well-Being: A Case Study of New Zealand

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Abstract

It is now widely accepted that well-being is inherently multidimensional and that relying solely on economic indicators such as Gross Domestic Product or income fails to capture the comprehensive nature of human well-being. New Zealand is recognised as a global leader in well-being policy, exemplified by initiatives such as the first Well-being Budget and the national multidimensional well-being framework. However, existing measures remain insufficient in fully capturing the distributional aspects of well-being across different population groups. This thesis examines distributional issues in well-being in New Zealand through two studies. The overall objective is to assess the distribution of well-being across different demographic groups and to investigate the influence of cultural identity on individual life satisfaction. In the context of New Zealand's diverse society and significant indigenous Māori population, this thesis aims to identify which populations are most vulnerable to well-being deprivation and to inform policies that promote more equitable well-being outcomes.

Given that the existing research in New Zealand remains limited in exploring the distributional aspects of well-being, a multidimensional well-being index was constructed at the individual level using Categorical Principal Component Analysis (CATPCA). This composite index encompasses eight domains of well-being and is used to analyse the distributional patterns across population groups. The findings reveal pronounced disparities: Māori and Pacific peoples are considerably more likely than other groups to experience low well-being across multiple domains and are among the most vulnerable to well-being deprivation, which calls for more group-focused and culturally responsive policy interventions.

Indigenous Māori have historically faced systemic inequalities that have undermined their well-being, while their distinct cultural identity has fostered resilience. The second study examines the relationship between cultural identity and life satisfaction. Using pooled ordinary least squares (POLS) regression and Oaxaca-Blinder decomposition, it analyses differences in life satisfaction between Māori and European New Zealanders. The analysis confirms that Māori report lower life satisfaction on average than Europeans. The Oaxaca-Blinder results attribute this gap partly to differences in socioeconomic resources and partly to unexplained factors, suggesting the presence of structural influences beyond observable characteristics. Cultural identity emerges as a crucial factor, with a stronger connection to Māori identity being associated with higher life satisfaction. However, existing studies suggest that broader structural factors can also contribute to these disparities. The analysis suggests the need for policy interventions that target cultural and structural factors. Strengthening Māori-centred frameworks, such as He Ara Waiora, while addressing systemic barriers in housing, healthcare, and income equality, is crucial. Policies should provide equitable opportunities for Māori to translate their cultural assets into tangible improvements in life satisfaction.

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor used artificial intelligence tools or generative artificial intelligence tools (unless it is clearly stated, and referenced, along with the purpose of use), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

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Disclaimer: The results presented in this thesis are not official statistics. They have been produced for research purposes using data from the Integrated Data Infrastructure (IDI), which Stats NZ manages. The IDI is a large research database that contains de-identified microdata on individuals and households, integrating information from government agencies, Stats NZ surveys, and non-government organisations (NGOs). The data covers various life events, including education, income, benefits, migration, justice, and health.

This research is based solely on individual-level data from the IDI. Any discussion of limitations or weaknesses pertains to the use of the IDI for statistical analysis and does not reflect the quality or reliability of the original data sources. For more information about the IDI, please visit Stats NZ:

https://www.stats.govt.nz/integrated-data/integrated-data-infrastructure/

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Chapter 1. Introduction

With its rich cultural heritage and the unique influence of Māori traditions, the New Zealand government has long aspired for a "better life for all" (The NZ Treasury, 2016; 2022; McLeod, 2018). This ambition led to the development of the Living Standards Framework (LSF), a set of well-being indicators designed to provide a more holistic approach to national progress. The LSF reflects New Zealand's commitment to measuring well-being beyond traditional economic metrics, making it the first and only country to implement a well-being budget. However, despite these efforts, significant disparities persist. According to OECD (2022) data, New Zealand ranks 29th among 45 countries in terms of income inequality as measured by the GINI coefficient[1], yet it has the 5th highest household net adjusted disposable income among 41 nations. These statistics indicate that, although the economy has expanded, well-being remains unevenly distributed across population groups.

The 2022 Well-being Report (The Treasury, 2022) acknowledges the uneven distribution of well-being, but does not explicitly address well-being inequality. The report highlights that Māori consistently experience lower well-being outcomes across key domains, including income, material hardship, health, and housing. In addition, Māori report higher and increasing rates of psychological distress and discrimination, coupled with lower levels of trust in key government institutions compared to non-Māori (p.62). These disparities raise important questions about the effectiveness of existing policies in translating the goals of the LSF into meaningful improvements in well-being. Despite the ambition to create a more equitable society, the persistent gap in well-being indicators suggests a disconnect between policy aspirations and the lived experiences of individuals.

To address these challenges, the New Zealand government has implemented several programmes to enhance well-being and reduce inequalities. The third Well-being Budget (Government of New Zealand, 2021) allocated funding specifically to mitigate disparities, and the Treasury's 2022 Well-being Report emphasised ongoing efforts to systematically monitor well-being gaps among diverse groups. Māori-specific policies, including the Māori Language Act (2016), He Ara Waiora (The Treasury, 2024a), and Te Tiriti o Waitangi provisions (Te Kāhui Tika Tangata, n.d.), aim to protect cultural identity and promote economic and social equity. Institutions such as the Waitangi Tribunal (Waitangi Tribunal, n.d.) and specialised courts like the Rangatahi and Pasifika Courts (Rangatahi & Pasifika Courts, n.d.) provide culturally responsive legal avenues, while initiatives like Whānau Ora (Office of the Auditor-General, 2015; Whānau Ora, n.d.) offer holistic, Māori-led approaches to health and social support. Despite these interventions, disparities remain entrenched, suggesting that the current policy frameworks may not sufficiently address the root causes of well-being inequality.

Thus, even though New Zealand ranks highly in global well-being assessments, significant gaps remain in measuring well-being and analysing disparities across different population groups. The current framework

[1] In the Wellbeing Report (2022), the Treasury points out that these comparisons come with a dose of uncertainty due to data limitations.

(Living Standards Framework (LSF) Dashboard) provides disaggregated well-being indicators, but does not integrate them into a single, comparable measure. This fragmented approach makes it difficult to assess overall well-being disparities across population groups or track changes over time. Furthermore, while studies acknowledge disparities in well-being, there is no systematic measure of how these disparities evolve across ethnic, regional, socioeconomic, and gender groups.

In the first study, "Multidimensional Well-being in New Zealand: Exploring Inequality," we address these shortcomings and contribute to the literature in the following ways. First, we construct a multidimensional measure of well-being, utilising New Zealand's General Social Survey (GSS) data for 2014 to 2021 and 20 indicators from eight of the Treasury's LSF domains. The index is weighted through Categorical Principal Component Analysis, and we conduct sensitivity analyses on normalisation, weighting, and aggregation methods to test the robustness of the multidimensional index and its ability to capture New Zealanders' well-being. The study concentrates on five key demographic groups. Second, the study analyses the disparities across different population groups using different spread measures and Mosaic plots, which allows for visualising the distribution of well-being that shows group proportions in a stacked bar chart.

The results show that civic engagement, governance, income, and education are the domains that explain most of the variance in well-being, indicating their importance to individual well-being. However, all the dimensions in the multidimensional index significantly contribute to the well-being of people. Additionally, the results indicate that multidimensional well-being is not equally distributed across New Zealand's population groups, with substantial inequality in well-being. People most at risk of being deprived (the bottom 20%) are more likely to live outside Auckland and Wellington in the North Island. They are of Māori descent, females, people over 64, New Zealand-born individuals, and those with secondary education as their highest qualification. In contrast, people who score highest in well-being (the top 20%) are predominantly Auckland and Wellington residents, Asian and European ethnicities, males aged 35-64, migrants, and degree holders. Policy recommendations to address this inequality are suggested.

The second study, "Cultural Identity and Life Satisfaction: A Case Study of New Zealand Māori vs Europeans," explores the relationship between cultural identity and life satisfaction among Māori and European populations. Existing research often treats Māori cultural resilience qualitatively, without establishing a robust empirical link between cultural identity and well-being disparities. Furthermore, Māori well-being research has used culturally specific constructs, which limit the ability to compare well-being outcomes across ethnic groups. Existing research also does not decompose the differences in life satisfaction among cultural groups in New Zealand, nor does it make sufficient distinctions between endowment effects (differences in resources such as income, education, or employment) and coefficient effects (structural differences in how these resources contribute to life satisfaction). Therefore, in the second study, we address these gaps in the literature. Drawing on data from the New Zealand General Social Survey (GSS), the study employs pooled ordinary least squares (POLS) regression and the Oaxaca-Blinder decomposition method to analyse the factors contributing to these

disparities. Specifically, it focuses on two research questions: i) How does the relationship between cultural identity and life satisfaction compare between Māori and European populations in New Zealand? ii) To what extent does the difference in life satisfaction across the two groups result from differences in observed endowments (e.g., cultural identity, income, education, employment) compared to differences in the returns to these endowments? Unlike previous studies, this research incorporates a cultural identity variable that applies to both Māori and Europeans, providing a broader understanding of how cultural identity influences well-being.

The results show that cultural identity plays a significant role in the well-being of both Māori and European populations in New Zealand. Existing literature suggests that systemic inequalities continue to drive disparities in life satisfaction. While cultural identity is a resilience factor, it cannot fully mitigate the structural barriers facing Māori. Therefore, there is a need for policy intervention to address the economic, social, and institutional disadvantages that contribute to these disparities, while strengthening cultural identity as a mechanism for well-being.

Based on the previous, it is clear that understanding well-being requires a multidimensional approach that considers economic, social, cultural, and psychological factors. In New Zealand, where both indigenous and non-indigenous populations coexist within a diverse social fabric, well-being research must account for cultural identity alongside systemic disparities. This thesis integrates two complementary studies that explore these dimensions: the measurement of multidimensional well-being and the role of cultural identity in life satisfaction. Together, the two studies provide a more comprehensive perspective on well-being in New Zealand, and offer insights into how policies can be refined to reduce inequalities.

The contribution of this thesis lies in its dual approach to well-being analysis. By integrating cultural identity and multidimensional well-being frameworks, this research challenges the limitations of existing well-being measurement tools and offers a more holistic perspective on inequality. The development of a multifaceted well-being index addresses the current gap in policy analysis by providing an aggregated measure that facilitates direct comparisons across demographic groups. This enables an assessment of disparities over time and provides policymakers with an empirical basis for designing interventions that more effectively target the well-being of vulnerable populations.

The emphasis on cultural identity as a determinant of life satisfaction further strengthens the argument that well-being cannot be assessed solely through economic or social indicators. This study offers robust empirical insights into its influence on well-being by employing a quantifiable and comparative measure of cultural identity. The findings extend conventional economic models by suggesting that cultural resilience may enhance life satisfaction, even among individuals facing socioeconomic disadvantage. The analysis shows that cultural identity alone does not account for the observed disparities in well-being, pointing to the relevance of broader structural and economic contexts. Based on these new insights, policy can be adapted to specifically address the problems related to cultural identity, while also addressing economic-related challenges.

Beyond New Zealand, this research has broader implications for other multicultural societies grappling with well-being disparities. As nations increasingly recognise the limitations of Gross Domestic Product (GDP) focused policy models, integrating multidimensional well-being and cultural identity measures offers a blueprint for more inclusive and equitable policy frameworks. The findings contribute to global discussions on well-being measurement and provide valuable insights for governments seeking to create policies that foster social cohesion while addressing systemic inequalities.

This thesis advocates for policy change that goes beyond acknowledging disparities to addressing and eliminating them. Although contemporary well-being frameworks extend beyond GDP, persistent inequalities for Māori and other vulnerable groups demonstrate that incremental adjustments are insufficient. Effective progress requires a coordinated approach that strengthens cultural resilience and tackles structural disadvantages in economic and institutional settings through coherent, system-wide reform.

We distinguish policy content from policy processes. The content layer specifies multi-domain goals and instruments. The process layer specifies how evidence moves through the stages of agenda setting, design, implementation, and evaluation. Chapter 3 primarily advances the content layer by locating clustered shortfalls. Chapter 4 primarily advances the process layer by separating the Māori and European mean gap into an explained component and an unexplained component, which helps prioritise agenda items and instrument choice.

The remainder of this thesis is structured as follows: Chapter 2 presents the literature review, outlining the theoretical foundations and empirical studies relevant to well-being and inequality. The next section serves as a prelude to the first manuscript, outlining the main objectives. Chapter 3 contains the first manuscript, "Multidimensional Well-being in New Zealand: Exploring Inequality". Then, the prelude to the second manuscript, describing the main objectives, follows. Chapter 4 is the second manuscript titled "Cultural Identity and Life Satisfaction: A Case Study of New Zealand Māori vs Europeans". Chapter 5 provides a synthesis of the main findings and discusses implications for future research and policy. Chapter 6 offers concluding remarks.

Chapter 2. Literature Review

2.1 Introduction

Understanding well-being requires an interdisciplinary approach that accounts for subjective and objective measures. This chapter reviews the existing literature on well-being, its theoretical foundations, and measurement approaches, with a particular focus on the relationship between inequality and well-being. It also explores the role of cultural identity in shaping well-being outcomes, emphasising the experiences of Indigenous populations, particularly Māori in New Zealand. The chapter begins by examining fundamental concepts of subjective and objective well-being, hedonism, eudaimonism, and the capability approach. It then explores multidimensional well-being frameworks, indicating their advantages over unidimensional measures. Subsequently, it discusses well-being inequality, distinguishing between vertical and horizontal disparities, and reviews empirical studies on the distribution of well-being. The chapter then focuses on New Zealand, analysing national well-being metrics such as the Living Standards Framework (LSF) and specific social disparities. Finally, it explores cultural identity as a determinant of well-being. It examines Māori well-being within historical and structural contexts, emphasising the challenges and resilience strategies unique to Indigenous communities. This comprehensive review provides the foundation for the study's methodological approach and research objectives.

2.2 Theoretical Foundations of Well-being

2.2.1 Defining Well-being: Subjective vs. Objective Approaches

The study of human well-being has undergone significant growth; however, no universally accepted definition has emerged. It is now generally accepted that well-being is multidimensional (Dodge et al.,2012); therefore, many attempts to define well-being have focused on its dimensions rather than its definition (Ryff & Keyes, 1995; Forgeard et al., 2011; Ryff, 1989a and 1989b; Thomas, 2009, as cited in Dodge et al., 2012). Subsequently, researchers, philosophers, and psychologists define well-being differently, often referred to as wellness, quality of life (QoL), or generally feeling well (Dodge et al., 2012; Alatartseva & Barysheva, 2015; Western & Tomaszewski, 2016).

Given these diverse perspectives, scholars have broadly classified well-being into two major aspects: objective and subjective. Objective well-being is the socioeconomic representation of someone's life, which is easily observable and measurable. In contrast, subjective well-being is an internal perspective, encompassing the personal feelings, attitudes, and beliefs of each individual (Sirgy et al., 2006).

2.2.2 Hedonic vs. Eudaimonic Well-being

The concept of well-being is grounded in two distinct philosophical perspectives: 1) hedonism and 2) eudaimonism.

The term 'hedonism' is derived from the Greek word ἡδονή (hēdonē), meaning pleasure, which is a branch of moral philosophy that considers pleasure as the most important intrinsic good. Hedonism emphasises

happiness, pleasure, and the avoidance of pain (Adler & Seligman, 2016; Mathias et al., 2024; Moore, 2013; Ryan & Deci, 2001; Weijers, n.d.). In the hedonistic framework, pleasure is generally understood as the experience of positive sensations or the absence of pain and discomfort. Consequently, this approach considers pursuing pleasure as the primary motivation for human action.

A prominent hedonistic utilitarian, Jeremy Bentham (1789), argued that maximising pleasurable experiences enhances well-being while minimising painful experiences reduces it. Economists recognise utility theory as the modern descendant of Bentham's calculus (Mongin & d'Aspremont, 1998; Read, 2004; Sirgy *et al*., 2006). In Bentham's discourse, happiness is defined as pleasure, and the absence of pain is considered the ultimate good. Related terms like 'welfare' describe how a person is faring, whether positively or negatively, while 'happiness' in classical utilitarianism is conceptualised as the balance between positive and negative experiences in an individual's life.

The eudaimonic tradition, as outlined by Rogers (1961), Ryff (1989a, 1989b), and Waterman (1993), underscores the importance of positive psychological functioning and human development. Eudaimonia, a term first introduced in Aristotle's ethical treatises, denotes the character traits necessary for living life to its fullest potential. Aristotle posited that there is widespread consensus that the terms 'eudaimonia' (happiness) and 'eu zên' (living well) refer to the ultimate goal for humans. The Greek term 'eudaemon' has two elements: 'eu,' meaning 'well,' and 'daimon,' meaning 'divinity' or 'spirit'. Aristotle believed that the ultimate intrinsically valuable end for humans is happiness. Among his various statements, he defined happiness (eudaemonia) as 'to live well and to do well' (Tatarkiewicz, 1976, p.4).

This concept involves realising one's true potential and developing personal virtues, achieved through pursuing virtue and rationality while living in harmony with one's nature as a rational being. Unlike hedonism, which emphasises happiness derived from sensory pleasure, eudaimonia offers a deeper form of happiness gained through meaningful activities, personal growth, and pursuing one's values and goals. Eudaimonia focuses on the fulfilment that comes from living a virtuous life and achieving one's potential, rooted in the pursuit of authenticity, meaning, virtue, and growth.

In brief, hedonism is about doing what feels good, while eudaimonia is about doing what is right (Dodge et al., 2012; Crisp, 2021; Kraut, 2022).

While these two perspectives primarily address subjective and psychological aspects of well-being, subsequent approaches have expanded the concept to incorporate objective and structural dimensions, as discussed below.

2.2.3 Expanding Well-being Measurement: The Capability Approach

Objective well-being can be described as encompassing the level and stability of income, living conditions, access to education, the quality of the social and natural environments, safety and security, and the ability to exercise social and civil rights and meet needs. Furthermore, these factors are quantified and assessed to evaluate the general conditions of life, societal progress, and policy effectiveness. Objective well-being aims

to provide a more standardised approach to assessing welfare, independent of personal biases and interpretations (Alatartseva & Barysheva, 2015).

The objective dimensions of well-being are a concept profoundly influenced by the foundational work of Amartya Sen in the realm of welfare economics (Western & Tomaszewski, 2016). Sen's work underpins this viewpoint, particularly his perspectives on poverty and inequality measurement, as well as the subsequent broadening to encompass the capabilities essential for a good life (Sen, 1992, 1999). The core of Sen's Capability Approach is that a capability should be evaluated based on the set of real opportunities (well-being freedom) rather than the actual achievement of an individual (well-being achievement) (Sen, 1993). Sen refutes the narrow view that development is measured solely by Gross Domestic Product (GDP) or the increase in GDP per capita. Instead, he transforms the development paradigm into one that promotes the expansion of people's capabilities (Sen, 1984). This work distinguishes between economic growth and economic development, leading to the creation of the United Nations' Human Development Index (HDI) in 1990.

The advancement of data science has facilitated the accessibility of a vast amount of data and an expanded array of modelling techniques for research. Consequently, a third approach, combining subjective and objective perspectives, has emerged and is increasingly recognised in both academic and policy research. The mixed-dimensional approach has gained attention in academic literature and government research and is discussed in the next section.

2.2.4 From Theory to Policy Application: Linking Well-being Research and Policy Processes

Building on the capability approach, which situates well-being within a policy-relevant framework, it is important to distinguish between public policy and policy making, as both influence how evidence on well-being is incorporated into practice. Public policy refers to a set of state-led actions and decisions developed collaboratively with other societal actors within specific contexts. Policy making, by contrast, refers to the procedural mechanisms through which evidence, preferences, and power are translated into specific actions. It encompasses agenda setting, problem framing, option design, adoption, implementation, and evaluation, and relies on structured interactions among researchers, policymakers, and citizens (Tonon, 2022).

In this thesis, Chapter 3 contributes to policy content by identifying multidimensional shortfalls in well-being at the individual level, while Chapter 4 contributes to policy processes by disentangling the portions of life satisfaction differences explained by observable characteristics from those linked to differential returns to those characteristics.

Understanding these links between theory and policy practice provides a conceptual bridge to the next section, which discusses how well-being can be measured across multiple domains using a multidimensional approach.

2.3 Multidimensional Well-being

2.3.1 Justification for a Multidimensional Approach

As discussed in the previous sections, well-being has been approached from both subjective and objective perspectives. While subjective measures capture individuals' perceptions and experiences, and objective indicators reflect observable living conditions, each perspective alone provides an incomplete picture of human welfare. To overcome these limitations, recent scholarship has increasingly adopted a multidimensional approach that integrates both subjective and objective dimensions to capture the full complexity of human flourishing.

Well-being is therefore understood as a multidimensional concept that encompasses various facets of human flourishing. Several scholars (e.g., Diener et al., 2009; Stiglitz, Sen, & Fitoussi, 2009) (see also Stiglitz et al., 2018a; Stiglitz et al., 2018b) emphasised the importance of going beyond one single domain and suggested that various domains should be incorporated when defining well-being. These domains encompass the economic, psychological, social, environmental, and other relevant areas.

Subjective well-being (SWB) is insufficient to understand well-being comprehensively. Life satisfaction, a key component of SWB, is not an objective experience, making the accuracy of respondents' reports uncertain (Schwarz, 1999; Schwarz & Strack, 1991). Life satisfaction has also exhibited short-term fluctuations in natural settings (Kahneman & Krueger, 2006; Suh, Diener, & Fujita, 1996). These limitations underscore the insufficiency of relying exclusively on SWB measures. Nevertheless, it is posited that these limitations may be mitigated when averaged across representative population samples (Kahneman & Krueger, 2006). Therefore, a multidimensional approach to well-being is necessary to capture its full complexity and provide a more accurate assessment of it.

Some researchers advocate measuring well-being through economic and social indicators such as income, housing, and employment (Diener et al., 2009). Nevertheless, researchers in the field of well-being are apprehensive that such objective measures may not adequately reflect individuals' emotional experiences and perceptions of life. For instance, despite having wealth, education, and good health, some individuals may still grapple with high levels of anxiety, misery, and unhappiness (Deaton, 2013).

Multidimensional well-being circumvents the need for a universal consensus on a singular ultimate good, such as income, wealth, or happiness (Stiglitz, Sen, & Fitoussi, 2009; Stiglitz et al., 2018a; Stiglitz et al., 2018b). In diverse societies, reaching a consensus on a single dimension of well-being is impossible. When applied to the consideration of prosperity and social progress, the capability approach offers an additional benefit: it deters policymakers from depending on incorrect assumptions about human nature in their policymaking (Sen, 1977; Sen, 1993; Robeyns, 2016). This approach considers societal and community interactions, the values we hold dear, and the governmental and societal support necessary for individuals, particularly those who are disadvantaged, to thrive (Robeyns, 2016).

2.3.2 Global Examples of Multidimensional Well-being Models

Recognising the limitations of single-dimensional measures, various global frameworks have been developed to assess well-being compositely (OECD, n.d.; Stiglitz et al., 2018a; Stiglitz et al., 2018b). The OECD's Better Life Index incorporates economic and social dimensions, including income, jobs, education, health, environmental quality, and life satisfaction (OECD, n.d.). Similarly, Bhutan's Gross National Happiness (GNH) framework integrates psychological well-being, cultural resilience, time use, and community vitality, shifting the focus beyond material prosperity (Ura et al., 2012). The most famous and widely applied of these is the United Nations Human Development Index (HDI) (UNDP, n.d.), which combines life expectancy, education, and income to measure national well-being. The application of comprehensive multidimensional well-being frameworks has become a growing trend worldwide.

2.3.3 Empirical Studies of Unidimensional vs Multidimensional Well-being

Some studies comparing different measurement frameworks indicated that a singular focus on economic indicators, such as GDP, income, or life satisfaction, does not fully account for disparities in well-being.

For example, Ruggeri et al. (2020) analysed well-being across 21 countries by constructing a composite index from ten dimensions. Their results indicate that one-dimensional measures (e.g., life satisfaction) can obscure critical differences in well-being outcomes. For example, older adults showed lower well-being on the multidimensional index than one would infer from life satisfaction data, and countries with identical average life satisfaction displayed markedly different well-being profiles across specific domains.

Kern et al. (2015) empirically tested Seligman's PERMA model (five well-being domains) in adolescent students, challenging the sufficiency of one-dimensional well-being measures. Factor analysis revealed four distinct positive well-being factors (covering most PERMA components) and two ill-being factors (depression and anxiety) rather than one overall well-being factor. Each domain showed unique correlations with other variables (e.g., life satisfaction, hope), demonstrating that a single aggregate score would overlook differences in well-being.

In summary, viewing individuals as multidimensional beings enables governments to thoroughly evaluate the potential impacts of their policies thoroughly, ensuring a holistic and pragmatic approach to promoting well-being. We endorse this perspective and employ our research's Multidimensional Well-Being (MWB) framework.

2.4 Well-being Inequality

2.4.1 Vertical vs Horizontal Inequality

The conventional economic measure of income inequality has been recognised as a limited way of evaluating disparities in human well-being. Well-being, a multidimensional concept encompassing a range of domains such as health, education, and personal relationships, is not governed by the same redistributive policies as income. Accordingly, several scholars have argued that measures of well-being inequality are more accurate

and comprehensive indicators of well-being distribution than income and wealth measures (Helliwell et al., 2016).

Inequality can be divided into vertical inequality and horizontal inequality. Vertical inequality refers to the difference between individuals or households in a given society, reflecting the distribution of well-being across the socioeconomic spectrum. It indicates the gap between the affluent, who have a higher standard of living, and the marginalised, who are at the lower end of the well-being continuum. Horizontal inequality refers to the disparities in well-being among different groups within a society, which are distinguished by non-economic attributes such as race, ethnicity, religion, gender, age, and migration status. Unlike vertical inequality, horizontal inequality focuses on variations in economic and social outcomes among groups with shared identities or characteristics. This form of inequality is crucial for identifying and addressing systematic biases[2] and discrimination that hinder equitable societal development (Deere et al., 2018).

Our study will examine inequality in well-being in New Zealand, both vertically and horizontally. Vertical inequality is often the focus of attention, but it can obscure systemic differences between population groups. For example, gender-based household inequality is a manifestation of horizontal inequality. Following Abdallah et al. (2017), we define well-being inequality as the difference in life experiences within and between population groups.

2.4.2 Empirical Studies on Well-being Inequality

Several studies have examined the relationship between subjective well-being (happiness or life satisfaction) and inequality. The subsequent discussion presents select empirical evidence on this subject.

Decancq (2011) compared global well-being inequality measurement using separate dimension-by-dimension and combined multidimensional approaches. The study utilises data from 86 countries spanning the period 1980-2010, encompassing income (GNI per capita), health (life expectancy), and education (years of schooling) indicators. It contrasts unidimensional analysis with a multidimensional Gini coefficient extension. The results show that while the dimension-by-dimension approach shows divergent trends - decreasing income inequality and increasing health inequality - the multidimensional approach shows an overall decrease in well-being inequality. However, this result is highly sensitive to the weighting scheme and aggregation method. Decancq (2011) concluded that the multidimensional approach provides a more comprehensive view of global well-being inequality, suggesting convergence over time, but emphasises the need for robust methodology in these measurements.

Greco et al. (2020) argue that GDP is an inadequate measure of well-being and propose the OECD Better Life

[2] Systemic inequality is a term used to describe the deeply embedded and institutionalized inequalities that exist within society, which consistently favour some groups over others. These inequalities are perpetuated by policies and practices across key institutions such as the legal, educational, and governmental sectors, often based on discriminatory ideologies. Factors such as race, gender, sexual orientation, and socioeconomic status are critical determinants of an individual's potential for success within these systems. While vertical inequality, which refers to disparities within a hierarchical structure, is often emphasized, it fails to account for systemic inequalities among different population groups. For instance, one important aspect of household inequality is the unequal distribution of resources between genders, which discusses broader issues of horizontal inequality in society.

Index (BLI) as a multidimensional alternative. They examine the discrepancy between societal priorities and country-level performance within the BLI framework, as well as its implications for multidimensional well-being assessments and democratic quality. The authors employed a multidimensional spatial model to map countries into an Euclidean space, where each dimension corresponds to a distinct aspect of well-being. They utilise BLI data, which includes 24 variables across 11 topics and 130,710 individual preferences from respondents in 36 countries, collected on the OECD website. The preferences are used to compute weights that generate personalised BLI scores. Descriptive statistics on individual ratings shed light on perceived trade-offs between well-being dimensions. The authors also introduced a method for measuring well-being loss by computing the distance between an individual's ideal well-being mix and the actual mix provided by policymakers. They find a significant negative correlation between societal loss at the country level, resulting from mismatches between societal priorities and policy outcomes, and indicators of overall well-being and democracy quality.

Ruggeri et al. (2020) examined the multidimensional nature of well-being, arguing against the use of single measures or economic indicators, such as GDP, to assess well-being and advocating for a more comprehensive approach. Their research seeks to provide a nuanced understanding of individual and societal well-being, explore the interplay of different well-being dimensions across countries, and draw policy implications from a multidimensional analysis. Utilising data from the European Social Survey (ESS) rounds of 2006 and 2012, which include approximately 40,000 individuals per year from 21 countries, the study examined over 50 items related to psychological, social, and community well-being, as well as measures of psychological distress. Through factor analysis, the researchers constructed a composite measure called Multidimensional Psychological Well-being (MPWB), using confirmatory factor analysis (CFA) to calculate and standardise factor scores for comparison. The results revealed significant variations in well-being across the 21 countries, with Denmark scoring the highest and Bulgaria the lowest. MPWB scores correlate significantly with national averages of life satisfaction and other indicators of well-being. Upon conducting demographic analysis, it was observed that the MPWB scores were lower among women, individuals of older age groups, the unemployed population, and those with less education.

Jenkins (2020) critically examines methods suitable for distributional comparisons of ordinal data, contrasting them with those used for cardinal data, such as income. He critiques standard practices for summarising well-being distribution, such as means or standard deviations, due to their sensitivity to scale choice. Instead, he proposes using dominance checks and appropriate indices for ordinal variables. Using data from the World Values Survey, Jenkins compares life satisfaction levels and inequalities in New Zealand with those in Australia, the UK, the USA, and South Africa. He finds that while some countries exhibit apparent differences in life satisfaction distributions, rankings are inconsistent across different methods, and small sample sizes limit statistically robust conclusions. Examining life satisfaction trends in New Zealand, Jenkins notes a slight, statistically insignificant decline in average life satisfaction and inequality between 1998 and 2011. He also observes that individuals aged 60 and above report higher life satisfaction than younger groups, though these

differences are not statistically significant. Jenkins advocates for appropriate methods for ordinal data comparisons and calls for access to larger datasets for more robust analysis. He emphasises the need for methods that respect the ordinal nature of subjective well-being data and calls for further research and development of statistical tools in this area (Jenkins, 2020).

Ovaska and Takashima (2010) examined the factors contributing to inequality in well-being among nations. They explore whether a nation's average self-reported well-being (SWB) conceals significant internal disparities. The study focuses on income inequality and institutional quality, utilising data from up to 72 countries with diverse economic and socioeconomic characteristics. Data are drawn from the World Happiness Database, incorporating World Value Survey (WVS) waves 2, 3, and 4 (1990-2001), as well as independent national quality-of-life studies. Key findings indicate that income inequality is positively correlated with happiness inequality, while political freedom, particularly the right to vote, is negatively associated with happiness disparities. Economic freedom is negatively related to life satisfaction inequality, suggesting that greater economic freedom reduces disparity. Health inequality, measured by the standard deviation of self-rated health, is a critical factor in both happiness and life satisfaction inequalities, with improvements in health equality reducing well-being disparities. The authors conclude that economic growth alone does not guarantee equitable benefits for all individuals. They argue that policies aimed at income redistribution, improving access to healthcare, and promoting economic and political freedoms are essential in mitigating well-being inequality (Ovaska & Takashima, 2010).

Becchetti, Massari, and Naticchioni (2014) used data from the German Socioeconomic Panel (GSOEP) and employed a decomposition methodology to analyse the factors contributing to changes in happiness inequality. Key findings indicate that happiness inequality trends are primarily driven by composition effects rather than changes in the returns to happiness determinants. Increased education levels significantly reduce happiness inequality, while higher unemployment rates contribute to its rise. Contrary to expectations, the increase in income inequality does not significantly affect happiness inequality, although a rise in average income reduces it. Demographic changes, such as a growing middle-aged population share and a decline in the share of individuals with savings accounts, also contribute to happiness inequality. The study utilises two periods (1992-94 and 2005-07) with 24,560 and 34,339 observations, respectively, and measures life satisfaction on a 0-10 scale. The average happiness score in Germany decreased from 6.955 to 6.790, while happiness inequality increased, with variance rising by 7.9% and the Gini index by about 7%. Covariates considered include age, income, income inequality, relative income, education, marital status, having children, employment status, saving status, and house ownership. Using an extended Oaxaca-Blinder decomposition methodology, the study dissects the total change in happiness inequality into composition and coefficient effects, further decomposing these into individual covariate contributions. The authors suggest that policies that enhance education and improve labour market conditions are crucial for reducing happiness inequality and potential social tensions. This paper also suggests that economic growth does not necessarily translate to equitable distribution of well-being. (Becchetti et al., 2014).

Phan and O'Brien's (2019) study comprehensively analyses multidimensional well-being inequality in Vietnam, applying Amartya Sen's capability approach to examine well-being beyond income and consumption. Using data from the Vietnam Household Living Standards Survey (VHLSS) from 2002 to 2008, their research discusses the importance of a multidimensional framework for assessing well-being. Employing polychoric principal component analysis (PCA) to handle both cardinal and ordinal variables exposes multiple facets of well-being inequality. Key findings include that the first principal component explained 48.1% of the total variance, with strong correlations between well-being and asset indicators. Asset ownership, education level, and health measures like sanitation and water quality are significant dimensions of well-being. Despite a general increase in well-being over the study period, inequality remained stable after an initial rise from 2002 to 2004. The paper's regional analysis explores different trends. Inequality decreased in the Southeast and Central Highlands but increased in the Northern Mountainous region.

In their study, Stevenson and Justin Wolfers (2009) investigate the downward trend in happiness among American women over the past 35 years. Despite advancements in several indicators of well-being—such as narrowing gender wage disparities, heightened educational achievements, and enhanced control over fertility, there has been a decline in women's self-reported contentment. Utilising data from the GSS and Eurobarometer surveys, the researchers employ statistical techniques to chart happiness trends by gender, considering demographic and socioeconomic variables. This decline is evident across various demographic categories, encompassing working and stay-at-home mothers, diverse age cohorts, and varying educational attainment levels.

Stevenson and Wolfers (2008a) also explore the evolution of self-reported happiness and its inequality in the U.S. from 1972 to 2006. The study addresses how happiness levels have changed across different demographic groups. Using data from the General Social Survey (GSS), which includes approximately 1,500 to 4,500 respondents per year, the authors examine self-reported happiness categorised as "very happy," "pretty happy," and "not too happy." Adjustments were made for question order effects and demographic oversamples. The methodology utilises the ordered probit regressions to estimate trends in well-being. Stevenson and Wolfers (2008a) find that while overall happiness levels have remained unchanged, happiness inequality has declined since the 1970s. The black-white happiness gap has narrowed, and the gender gap has disappeared. However, happiness disparities based on education have widened.

Stevenson and Wolfers (2008b) examine the relationship between self-reported happiness, life satisfaction, and income across countries over time. They analyse cross-sectional data from over fifty countries, likely using surveys such as the General Social Survey (GSS) and the World Values Survey. They consider key variables, such as subjective well-being measures and income, while controlling for demographic factors (age, gender, education, and marital status) and economic indicators (income levels, income inequality, and employment status). They apply some models, including ordered probit regression for ordinal happiness data and a Hicks demand function for happiness, to assess income effects. They also use a household production function framework to model happiness as dependent on multiple inputs. Their findings show a positive association

between income and happiness between countries. However, they find mixed evidence on the long-term impact of income changes, suggesting that other factors play a role. Stevenson and Wolfers observe that the strength of the income-happiness relationship varies across countries. They also discuss the effects of habit formation and adaptation, which suggests that rising income does not lead to sustained increases in happiness due to shifting expectations.

Veenhoven (2005) explores inequality in happiness within countries. He traced the historical context of happiness studies and discussed the shift from early comparative studies to present-day data encompassing 90 nations. The focus moves from average national happiness levels to the inequality among citizens, suggesting that happiness inequality may better indicate societal inequity than income disparities. Veenhoven introduces 'Inequality-Adjusted Happiness' (IAH), an index combining both the level and equality of happiness. The study finds that, contrary to common belief, inequality in happiness has decreased in most modern societies. Detailed research questions addressed include methods for measuring happiness inequality, potential conflicts between increasing happiness and equality, the role of happiness inequality as an indicator of societal inequity, and trends in modern societies. The data comes from the World Database of Happiness, which includes 2,310 surveys across 116 nations, providing time-series data for over 20 years for some 15 nations. He evaluated various dispersion statistics to measure happiness inequality, with the standard deviation identified as the most appropriate measure.

Dutta and Foster (2011) examine the distribution of happiness in the United States over nearly four decades. The research addresses key questions on how happiness distribution has changed from 1972 to 2010, the trends in happiness inequality during this period, and the impact of gender, race, and region on happiness distribution—using data from the General Social Survey (GSS) across 28 years and the data from self-reported happiness levels categorised as "Very Happy," "Pretty Happy," or "Not Too Happy", encompassing 49,433 responses. Methodologically, they employ dominance-based methods and median-centred inequality measures suitable for ordinal data, and they develop new approaches to address issues related to the ordinality of happiness data. Additionally, they decompose happiness inequality by gender, race, and region using the Allison-Foster method. Their study finds that happiness inequality decreased from the 1970s through the 1990s, with the 1990s experiencing the lowest levels of happiness inequality. However, there was a slight increase in inequality in the 2000s. Gender analysis finds that women typically had higher happiness inequality than men, but this gap has reduced over time. The findings also indicate that happiness inequality among Whites was not necessarily lower than among Blacks.

In our study, we refer to the methodology used by Rossouw and Greyling (2021) to construct a multidimensional composite well-being index and analyse factors contributing to well-being inequality. The authors address several research questions: how a multidimensional measure compares inequalities in South Africa between 2008 and 2017, which factors relate to well-being inequality during these periods, and whether changes in well-being inequality are mainly attributable to differences in endowments or coefficient effects. Rossouw and Greyling (2021) utilise data from the National Income Dynamics Survey (NIDS) panel dataset,

which covers five waves from 2008 to 2017. They focus on adults aged 18 and older who participated in waves one and five, applying design weights for representativeness and panel weights to adjust for attrition. They construct their composite well-being index using objective and subjective indicators across economic and non-economic domains. They then normalise these indicators using the minimum-maximum method and adopt equal weighting with linear aggregation, supplementing their approach with sensitivity analyses that explore alternative methods. Key variables in the index include education (highest level attained), material well-being (actual household expenditure per person), housing quality (a composite measure based on rooms per person, access to piped water, electricity for cooking, and flush toilet), employment status, trust (strength of social networks), personal security (exposure to theft and burglary), life satisfaction (measured on a subjective scale), and self-assessed health.

Rossouw and Greyling's (2021) study investigates disparities in social well-being across 30 African countries, comparing these disparities to income inequality. Using data from sources such as the World Bank, the United Nations, the African Development Bank, and the Global Economy database from 2006 to 2016, a composite social well-being index (SWI) was constructed in accordance with the OECD's guidelines, incorporating normalisation and equal weighting indicators. The paper's research questions include identifying social well-being disparities, determining influencing factors, and assessing whether the well-being gap is due to endowment or coefficient effects. They utilised the Recentered Influence Function (RIF) regression method and Blinder–Oaxaca decomposition technique to analyse the data. Key findings indicate that while social well-being inequality is high, it is less pronounced than income inequality. Employment, gender equality, exports, CO^2 emissions, population density, public protests, capital investment, and internet access have a significant influence on well-being inequality. The gap between countries with higher and lower social well-being is primarily due to the endowment effect, indicating differences in the countries' characteristics.

Van Praag (2011) investigated the concept of subjective well-being (SWB) and its correlation with inequality in well-being, emphasising the role of reference groups. Van Praag (2011) suggests that SWB is influenced by both individual characteristics (e.g., age, health, income) and the attributes of an individual's reference group. The reference groups are crucial to comprehensive SWB, as individuals gauge their well-being against others, and this comparison process shapes their perception of inequality. The paper argues that a comprehensive definition of well-being inequality must account for the referencing process, which is modulated by the frequency of individuals' comparisons and the extent of social transparency. Van Praag (2011) introduces a reference-extended model to integrate inequality in happiness or SWB into happiness studies and advocates for an expanded happiness paradigm that includes a new research agenda dedicated to quantifying the referencing process. Although the paper does not present an empirical application due to the absence of suitable data, it recommends developing new survey questionnaires that incorporate questions about reference groups to gather the necessary data for empirical analysis.

Decancq and Lugo (2012) developed multidimensional well-being indices, focusing on dimension weighting. They noted that their indices could provide a more comprehensive assessment of societal well-being than

single indicators, such as income. Their study proposes a flexible framework for measuring well-being and categorises weighting approaches into data-driven, normative, and hybrid methods. Societal achievement distributions drive data-driven methods; normative methods are based on value judgments, while hybrid (composite) methods integrate both approaches. Although the paper does not present original data, it critically reviews eight distinct weighting approaches: frequency-based weights, statistical weights, most favourable weights, equal or arbitrary weights, expert opinion weights, price-based weights, stated preference weights, and hedonic weights, discussing their advantages and disadvantages. The authors emphasised the importance of weight selection, as it determines trade-offs between different well-being dimensions. They also show the importance of robustness and sensitivity analyses due to the absence of a universally accepted theoretical framework.

2.5 Well-being in the New Zealand Context

2.5.1 The Living Standards Framework (LSF) and National Well-being Metrics

New Zealand's Living Standards Framework (LSF) is a multidimensional framework for well-being that integrates various domains into public policy (The Treasury, 2021, October 28). Its purpose is to support high-quality, evidence-based policy advice to improve New Zealanders' well-being. The LSF operationalises well-being through national well-being domains (the LSF Dashboard) that monitor outcomes across multiple domains of current well-being and track intergenerational sustainability through four capital stocks (natural, human, social, and financial/physical capital). The LSF was explicitly inspired by the OECD's well-being framework (as used in the OECD's Better Life Index). Otherwise, the LSF framework includes an additional dimension, 'Cultural Capability and Belonging', which is not included in the OECD framework. This difference reflects the unique cultural context of the country. In practice, the LSF informs policy formulation by guiding government priority setting (e.g., advising on the priorities of the Wellbeing Budget) and underpinning the mandatory reporting on well-being, thereby institutionalising a well-being perspective in New Zealand governance.

2.5.2 Empirical Studies on Well-being Inequality in New Zealand

Government side in the Treasury's Well-being report, the government define subjective well-being as "Subjective well-being refers to how people experience and evaluate different aspects of their lives" (The Treasury, 2022, p.40) and describes subjective well-being as having three dimensions: overall life satisfaction, meaning and purpose in life; and negative affect balance (whether people experience more negative than positive emotions) (The Treasury, 2022). Subjective well-being is measured by asking about life satisfaction, happiness, and a sense of fulfilment (The Treasury, 2016).

A few studies have specifically investigated well-being patterns in New Zealand.

Grimes and White (2019) examine which groups in New Zealand are less likely to be digitally included and explore the relationship between digital inclusion and well-being. Utilising data from four large-scale surveys—New Zealand Crime and Victims Survey (NZCVS), New Zealand Electoral Survey (NZES),

Programme for International Student Assessment (PISA), and Programme for the International Assessment of Adult Competencies (PIAAC)—the analysis identifies groups with low internet access through regression analysis to explore the relationship between internet access and various well-being indicators. Key findings indicate that people in social housing, individuals with disabilities, Pasifika and Māori ethnicities, residents of larger rural towns, older adults, and the unemployed are among those with low internet access. Conversely, those with internet access exhibit higher well-being and more prosperous social capital outcomes. For adolescents, increased weekday internet use outside of school is associated with decreased subjective well-being, with no positive association observed beyond approximately two hours of daily use.

Dickinson and Morrison (2022) investigate how the distribution of subjective well-being within local communities affects individual subjective well-being and how social support, social engagement, and community connection can moderate these effects. Utilising data from the 2014 New Zealand Quality of Life Survey, which surveyed 5,277 people on various aspects of life satisfaction and well-being, the study analyses life satisfaction, city of residence, demographics (sex, age group, ethnicity, employment status, education, and personal income), social support, social isolation, and sense of community. Well-being inequality was measured using the standard deviation of life satisfaction at the world level. Employing ecological and individual models, the study examines the relationship between average life satisfaction and the distribution of life satisfaction within electoral wards, as well as the moderating effects of social support, social engagement, and a sense of community. Key findings show a strong negative correlation between individual subjective well-being and the degree of subjective well-being inequality within the community. However, social support and a sense of community mitigate these adverse effects, while lower social engagement exacerbates the impact of well-being inequality.

Each of these studies provides a different perspective on New Zealand's well-being. The Treasury report provides a framework for measuring and tracking how New Zealanders feel about their lives. Grimes and White (2019) demonstrate the importance of digital connectivity in sustaining well-being and civic inclusion. Meanwhile, Dickinson and Morrison (2022) highlight the social nature of well-being and explore how the well-being of those around us and our own circumstances can impact our personal well-being.

2.6 Cultural Identity and Well-being

2.6.1 Defining Cultural Identity in Well-being Research

Scholars have long debated the definition and role of culture in shaping individual and societal well-being. Scholars such as Hofstede (1980) and Schwartz (1994) view culture as a quantifiable variable, emphasising the measurable aspects of cultural values. In contrast, Geertz (1973), Triandis (1972), and Schein (2010) emphasise the role of culture in cognition, social norms, and group behaviour, noting its interpretive and subjective qualities. Despite more than a century of research, a universally accepted definition of culture remains elusive. Early anthropological studies by Tylor (1871) and Kroeber and Kluckhohn (1952) reviewed and synthesised definitions of culture, many of which describe it as learned by members of society. However, capturing the intricacy of culture within a singular definition has proven challenging. Jahoda (2012) argues for

pragmatic, context-specific use of the term rather than a strict definition.

Frierson et al. (2010, p.75) define culture as "a cumulative body of learned and shared behaviour, values, customs, and beliefs common to a particular group or society. In essence, culture is a predominant force shaping who we are". This aligns closely with the Ministry of Social Development's (MSD) description of culture in The Social Report (2016) as the “customs, practices, languages, values and worldviews that define social groups such as those based on nationality, ethnicity, region or common interests" (MSD, 2016, p.175).

Together, these definitions emphasise culture's collective and dynamic nature due to its role in shaping identity and influencing well-being. In this study, cultural identity (CI) is conceptualised as an individual's ability to be themselves within New Zealand society, reflecting how people can express their identity and values. This interpretive measure aligns with MSD’s framing of cultural identity as important for people’s sense of self and belonging, and with recent New Zealand wellbeing frameworks that stress belonging and the ability to express identity. As The Social Report (2016) notes, cultural identity contributes to overall well-being by supporting a sense of belonging, valuing diversity, and enabling people to pass cultural traditions to future generations. Thus, Frierson et al.'s (2010) definition complements the operationalisation of CI in this research, linking cultural belonging to broader measures of well-being in New Zealand's multicultural context.

2.6.2 Cultural Identity and Life Satisfaction

Cultural identity directly influences well-being by fostering a sense of belonging and security. It influences how individuals perceive their lives and the decisions they make. The ability to live authentically, to be oneself without pressure to conform to another identity (Smith, 2018, p. 18), is a crucial aspect of well-being. A strong sense of belonging and connection to one’s culture and place enhances well-being (MSD, 2016, p. 175; Smith, 2018, p. 18). Identifying with a specific culture provides individuals with a framework to connect with their community, supporting positive outcomes in areas such as health and education (MSD, 2016, p. 175). CI also facilitates access to social networks, which serve as sources of support, shared values, and collective aspirations. These networks are instrumental in breaking down barriers and fostering trust among people, a phenomenon often referred to as "social capital"(Smith, 2018, p. 7). CI strengthens individual and collective well-being by reinforcing social cohesion and providing emotional and practical support.

CI holds varied meanings and influences across ethnic groups, deeply intertwined with historical, cultural, and social contexts. For Māori, CI is intrinsically tied to collective identity, language, ancestral lands, and tikanga, which is foundational to hauora and linked to life satisfaction (Moewaka Barnes & McCreanor, 2019). In contrast, for New Zealand Europeans, CI is often articulated through national symbols and narratives of bicultural nationhood; attitudes toward bicultural policy and national identity are structured by historical representations and policy preferences (Sibley & Liu, 2007, 2012).

Among the Indigenous peoples of New Zealand, Māori hold a distinct cultural heritage rooted in enduring relationships with their ancestral lands. Core values embedded in te ao Māori (the Māori worldview) include whanaungatanga (social connectedness), manaakitanga (care), and kaitiakitanga (environmental guardianship)

(Hudson et al., 2010; Te Ara: Kaitiakitanga; Te Aka Māori Dictionary, whanaungatanga,(n.d.)). Te Kupenga 2013 instead *measures* Māori cultural wellbeing across four domains: wairuatanga, tikanga, te reo Māori, and whanaungatanga (Te Kupenga, Stats NZ, 2013). These values are strengthened through traditional practices such as marae gatherings, rituals, and the use of te reo Māori, which foster identity, social cohesion, and collective wellbeing (Te Kupenga, Stats NZ, 2013; Moewaka Barnes & McCreanor, 2019).

Over time, however, historical and ongoing pressures have disrupted these cultural connections. Land alienation through confiscation, the Native Land Court, and later government purchasing undermined Māori sociocultural stability and access to whenua (Boast, 2015; Waitangi Tribunal, 1997). These processes produce environmental, cultural, and economic challenges that weaken the material and cultural sustainability of Māori communities (Moewaka Barnes & McCreanor, 2019). For a broader context on the economic history of Māori and the consequences of land loss, see Easton (2020). Links between Māori cultural identity and attitudes relevant to socioeconomic outcomes are shown in Houkamau and Sibley (2019).

Despite government efforts such as New Zealand's endorsement of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) in 2010 and the establishment of the Declaration Working Group (DWG) in 2019 (Declaration Working Group, 2019), persistent disparities remain for Māori. For instance, the national unemployment rate was 3.3% in the June 2022 quarter, while Māori unemployment was 5.5% (Stats NZ, 2022b). These economic inequalities are compounded by negative media portrayals and wider public discourse that reinforce stereotypes and contribute to social and economic marginalisation. Nairn and McCreanor (1991) provide foundational evidence on Pākehā discourse, and Moewaka Barnes et al. (2012) document patterned anti-Māori themes in news coverage; Borell et al. (2009) speak to entrenched privilege rather than media content specifically, so it should be cited for structural advantage rather than for news framing.

2.7 Māori Well-being and Cultural Resilience

2.7.1 Historical and Structural Barriers to Māori Well-being

Māori have long endured historical and structural barriers to their well-being. Colonisation in the nineteenth and twentieth centuries dispossessed Māori of large areas of land. Māori freehold land today is about 1.4 million hectares, approximately 5 per cent of New Zealand's land area (Te Puni Kōkiri, 2021). Beyond the loss of land, traditional Māori social structures, including iwi and hapū governance systems, were undermined by the Native Land Court's individualisation of title, which facilitated alienation and weakened tribal authority (Te Ara, 2017). Settler institutions and laws replaced Indigenous frameworks, thereby disrupting Māori authority and community cohesion and laying the foundation for systemic inequality (Waitangi Tribunal, 1997).

These injustices were compounded by the neoliberal economic reforms of the 1980s, often called Rogernomics. The reforms were introduced amid high inflation, large external imbalances, and a heavily regulated economy (The Treasury, 1998; Brash, 1996). While the reforms contributed to lower inflation and a later period of falling unemployment, especially from the mid-1990s (Brash, 1996). However, this reform disproportionately harmed

Māori and Pacific communities. For instance, the Māori unemployment rate exceeded 15%, while the unemployment rate for New Zealanders of European descent dropped below 5%. Government policy changes in the same period further exacerbated socio-economic challenges for Māori. In 1991, amid a deep recession, the government introduced severe welfare reforms (notoriously known as the "Mother of All Budgets"). Basic social benefits were significantly reduced, including substantial cuts to family benefits. Māori incomes had fallen to 73% of those of Europeans, and Māori remained overrepresented in low-skilled, precarious work. Despite some educational advances, few have transitioned into stable, well-paying jobs. Treaty settlements offered only partial redress for land dispossession, often neglecting urban Māori (Lashley, 2000).

As protection and regulation diminished, industries employing large numbers of Māori, such as manufacturing and freezing works, were among the most severely affected, exacerbating income inequality (Chatterjee, Podder, & Mukhopadhaya, 2003; Te Ara, 2012a, 2012b). Concurrent cuts to welfare benefits, which shifted public housing assistance from income-related rents to a cash supplement in 1992, weighed heavily on Māori due to their existing socioeconomic disadvantages (Te Ara, 2011; MSD, 2002). Far-reaching restructuring in the 1980s thus magnified disparities in employment, education, and healthcare. Subsequent system reforms emphasised primary health care and whānau-centred approaches but often arrived after prolonged underinvestment in culturally congruent services (Ministry of Health, 2000; King, 2001; Ministry of Health, 2002). Many Māori relocated away from their communities to seek work, weakening ties to whenua and community practices central to identity (Stillman, 2008). Although policy frameworks acknowledged equity, cause-specific trends are mixed: absolute gaps in cardiovascular mortality narrowed for some groups after the 1990s, whereas suicide disparities did not consistently narrow (Tobias et al., 2009; Disney et al., 2017; New Zealand Parliament, 2021).

Systemic inequities extend beyond economic disadvantage, arising from a layered interplay of historical, social, and institutional forces. While extensive literature details discrimination across health, education, income, and social domains (Reid et al., 2014; Dulin et al., 2011; Houkamau et al., 2017; Wolfgramm et al., 2020; Tobias et al., 2009; Podder & Chatterjee, 2002; Lashley, 2000; Ryks et al., 2018; Hamley et al., 2025; Waa et al., 2017), the specific influence of neoliberal reforms is less frequently addressed and from the outset of colonisation, land seizures, the suppression of te reo Māori, and the dismantling of Māori socioeconomic structures created deep-seated inequities (Wolfgramm et al., 2020). Over time, market-oriented policies magnified these injustices, pushing Māori into low-wage, unstable work and perpetuating income disparities. Educational systems often neglect Māori values (Reid et al., 2014; Wolfgramm et al., 2020), and inequalities in healthcare, marked by higher rates of preventable illnesses and disproportionate mortality (Dulin et al., 2011), reflect ongoing systemic racism and limited access to equitable services. Discrimination is further perpetuated by underrepresentation in policy decisions and more severe outcomes in the criminal justice system. Consequently, colonisation and subsequent reforms continue to influence every facet of Māori life, entrenching inequalities and diminishing life satisfaction.

2.7.2 Māori-Centric Well-being Frameworks

Despite encountering substantial socioeconomic obstacles, Māori have steadfastly preserved their cultural identity through the conservation of language, adherence to traditional customs, and active engagement in community activities. This robust cultural resilience is evident in the provision of emotional support and the promotion of collective well-being, underpinned by values such as whanaungatanga (belonging), manaakitanga (care), and kaitiakitanga (stewardship). These cultural facets serve to alleviate some of the detrimental effects of systemic inequalities, thereby providing a buffer against socioeconomic disadvantages and enhancing their well-being (Ryks et al., 2018; Wolfgramm et al., 2020; Hamley et al., 2025; Waa et al., 2017; Houkamau et al., 2017).

Māori cultural identity and community connections can buffer some of the impacts of systemic inequities and provide resilience to adverse effects on life satisfaction, but they cannot overcome disparities (Houkamau et al., 2017). Resilience is defined as the capacity of individuals or communities to maintain or restore their positive functioning in the face of adversity (Fleming & Ledogar, 2008). For Indigenous peoples such as Māori, cultural resilience specifically refers to the ability to retain, adapt, and pass on cultural practices, identities, and values despite challenges such as colonisation or systemic discrimination. This supports collective well-being and ensures cultural continuity (Awatere et al., 2019). Treasury's wellbeing reporting notes that frameworks grounded in mātauranga Māori, including He Ara Waiora, can foster resilience, yet inequities in income, education, and access to care continue to limit life satisfaction (McLeod, 2018; The Treasury, 2022).

Alongside these historical and socioeconomic dimensions, several conceptual frameworks underscore the importance of cultural identity in shaping Māori well-being. Durie's (1998) Te Whare Tapa Whā model, which describes taha wairua (spiritual), taha whānau (family), taha hinengaro (mental), and taha tinana (physical) as the four corners of Māori health, is a well-known example (see also He Ara Waiora (The Treasury, 2018) and Te Kupenga survey (Stats NZ, 2013). Although these frameworks offer rich conceptual insights, most remain predominantly qualitative or policy-oriented, with limited empirical studies that decompose the life satisfaction gap between Māori and non-Māori.

Many Māori-centred frameworks have indicators that are not easily generalisable for use with the broader population. For example, the Te Kupenga survey (Stats NZ, 2013) collects information on how often people visit a marae, how well they speak te reo Māori, and what iwi they affiliate with—all of which are specific to the Māori cultural context. He Ara Waiora (The Treasury, 2018) uses values such as manaakitanga (care) and whanaungatanga (relationships) to measure well-being. Durie's Te Whare Tapa Whā model (Durie, 1998) defines health in terms of four interconnected dimensions from a Māori perspective, which often require culturally relevant measures (e.g., wairua or spiritual well-being questions). Although these indicators are important for capturing Māori cultural identity, they can reduce comparability when applied to other groups without modification.

One thing that can be established with certainty is that cultural identity plays a crucial role in shaping well-

being, particularly among the Māori population. A Māori-centered framework rooted in *te ao Māori* offers pathways for improving well-being through cultural revitalisation and relational values. Dimensions captured in Te Kupenga include *wairuatanga* (spirituality), *tikanga* (customs and practices), *te reo Māori*, and *whanaungatanga* (relationships) (Stats NZ,2013). These approaches complement more conventional models, such as New Zealand's Living Standards Framework (LSF), by highlighting dimensions unique to Māori that focus on collective and spiritual well-being, rather than solely on economic metrics.

Notwithstanding these important conceptual and theoretical contributions, quantitative research that decomposes the life satisfaction gap between Māori and non-Māori (characteristics vs coefficients) is scarce. The few empirical studies of Māori well-being include limited measures of cultural identity or do not use decomposition methods to show how endowments (observable differences) and coefficients (returns on those differences) contribute to inequalities in well-being. Our study addresses this scarcity by employing the Oaxaca-Blinder technique to investigate whether and how cultural identity influences the life satisfaction gap between Māori and non-Māori.

2.8 Transition: Implications for measurement and methods

Building on the literature, this thesis proceeds on two tracks. First, it operationalises a multidimensional well-being index that integrates economic and social indicators in both objective and subjective domains with specific attention to demographic groups. Second, it estimates life satisfaction models using a cultural-identity scale and applies the Oaxaca-Blinder decomposition to attribute the Māori–European happiness mean gap to the explained component and the unexplained component. The explained component summarises the share of the gap associated with observed covariates, while the unexplained component captures differences in returns to characteristics and the intercept. This structure links measurement to policy by locating where shortfalls cluster and indicating whether gaps arise from observed composition or from group differences in how attributes translate into outcomes. The next chapter details the index design and data, followed by the modelling and decomposition strategy.

Prelude to Multidimensional Well-being in New Zealand: Exploring Inequality

Understanding well-being has expanded beyond a traditional unidimensional measure of economic performance, such as the Gross Domestic Product, to a more holistic, multidimensional approach that considers the various domains that impact people's lives. New Zealand is a global leader in this regard, with the development of the Living Standards Framework and Well-being report in 2018, the world's first Well-being Budget in 2019, and quadrennial well-being reports that commenced in 2022. However, there is a lack of a comprehensive individual-level multidimensional well-being index and an analysis of well-being inequality in New Zealand.

We constructed a multidimensional well-being index for New Zealanders and evaluated its distribution across various demographic groups. The motivation for this research stems from the shortcomings of current well-being measures, which focus solely on the dashboard approach, as seen in the Treasury's endeavours. Utilising data from the New Zealand General Social Survey (GSS) spanning 2014 to 2021, this study introduces a well-being index comprising 20 indicators across eight domains. Then, we employed Categorical Principal Component Analysis (CATPCA) as the primary multivariate method. Subsequently, the indicators were weighted and aggregated to derive the comprehensive multidimensional well-being index. The variables contributing the most to the variance in the multidimensional well-being index include a feeling of safety at home at night, labour force status, personal income level, ability to pay bills on time, and income sufficiency.

Our study investigated disparities in well-being by analysing data using a set of statistical measures for inequality. These include the interquartile range (IQR), standard deviation, and coefficient of variation. We examined key demographic characteristics, including ethnicity, gender, age, geographic location, and migration status. The Mosaic graph facilitates visualisation and a better understanding of the results. Our findings reveal that inequalities exist in well-being, with Māori, women, older individuals, and those with lower educational attainment experiencing well-being deprivation disproportionately. Māori and Pacific peoples are overrepresented in the lowest quintile. At the same time, individuals of European and Asian descent, university degree holders, and those residing in urban centres such as Auckland and Wellington are more likely to be in the highest quintile. Gender disparities are also evident, as women exhibit lower well-being scores despite reporting higher life satisfaction. Moreover, regional inequalities persist, with individuals on the North Island, particularly outside major urban centres, exhibiting higher deprivation levels.

Chapter 3. Multidimensional Well-being in New Zealand: Exploring Inequality

Abstract

The New Zealand (NZ) government, a global leader in well-being policy, introduced the Well-being Budget in 2019 to provide a 'better life' for all. However, despite recognising the multidimensional nature of well-being when formulating policies, NZ lacks a measure of well-being. Therefore, we aim to construct a multidimensional well-being index at the individual level to determine distributional patterns across NZ and identify groups with lower well-being levels requiring intervention. To construct our individual-level multidimensional well-being index, we use Categorical Principal Component Analysis as weighting and data from the NZ General Social Survey (2014–2021). The index, which comprises 20 indicators across eight domains, is used to measure the distribution of well-being among five demographic groups. We found the presence of well-being inequality within various demographic groups. The results indicate that people living in other areas of the North Island (for example, Northland, Bay of Plenty, and Gisborne), those of Māori descent, females, individuals over 64 years of age, those born in NZ rather than migrants, and those with secondary school as their highest educational attainment are most susceptible to multidimensional well-being deprivation. Our findings can assist policymakers and other stakeholders in directing future targeted well-being initiatives aligned with social justice and equity principles to succeed in providing a 'better life' for all.

Keywords: Multidimensional well-being; inequality; categorical principal component analysis; Mosaic plots; New Zealand

JEL Codes: I31; J14; J18

Additional Information

This thesis follows the APA referencing style. The first paper, *Multidimensional Well-being in New Zealand: Exploring Inequality*, has been submitted to New Zealand Economic Papers and is currently under peer review (Submission ID: 258825743).

3.1 Introduction

Recognising the country's diversity, including Māori, the Treasury uses the multidimensional Living Standards Framework to guide policy. Since 2016, it has aimed at "working towards higher living standards for New Zealanders" (The Treasury, 2016, p. 4). A 2018 ministerial statement promised "a better life for all our people" (Beehive, 2018). The 2022 wellbeing report emphasised "raising living standards for all people in Aotearoa New Zealand" (The, 2022, p. 15). The 2025 long-term insights briefing extends this commitment to "lift the living standards of everyone" and secure "a better life for all generations to come" (The Treasury, 2025, p. 2).In pursuit of the goal of a "better life for all", the National Financial Budget was transformed into a Well-being Budget in 2019. Despite pioneering this approach, the country still grapples with substantial income and wealth disparities among demographic groups (Government of New Zealand, 2020, 2021; The Treasury, 2022). The OECD's latest data indicates that New Zealand experiences higher income inequality compared to most European nations (OECD, 2022b). The 2021 Well-being Budget's focus on income inequality rather than well-being inequality may appear misaligned with its foundational intent of 'all live better' (Government of New Zealand, 2021). The lack of research on individual multidimensional well-being in New Zealand poses a challenge for the government, obscuring the distribution of well-being and the imperative to address inequality in this area.

Veenhoven (2007) emphasises the importance of happiness distribution over income disparity, aligning with the New Zealand government's view of well-being as an overall measure of quality of life. Ruggeri et al. (2020) contend that public policy should be informed by a multidimensional well-being measure that extends beyond mere income or life satisfaction, thereby capturing the intricate nature of well-being.

Inequality is associated with reduced social functioning, cohesion, health, and increased societal distress (Stiglitz, 2012). It undermines trust in institutions, promotes political and social instability, and generates social divisions (Stiglitz, 2012). Wilkinson and Pickett (2009) show that social problems such as mental illness, obesity, and teenage pregnancy are more prevalent where income distributions are more unequal. Inequalities also affect opportunities, reduce social mobility, and prevent the achievements of the hardworking and talented. Given these impacts, capturing the multidimensionality of well-being is essential for accurately measuring inequality, offering a more nuanced view than income inequality alone. The academic shift towards examining well-being inequality reflects this understanding (Becchetti et al., 2014; Stevenson & Wolfers, 2008; Dutta & Foster, 2011).

Academics and the government have conducted previous research on well-being inequality in New Zealand. The New Zealand Treasury developed a multidimensional well-being framework to roughly categorise individuals into high, middle, and low well-being levels (McLeod, 2018)[3]. However, this coarse measure of

[3] The different indicators they used compared to our work include material well-being index, mental and physical health indices, mould and cold issues in housing conditions, contact with friends and family, discrimination experiences, crime victimization, and neighbourhood crime. However, these indicators aren't consistent across all four General Social Surveys.

individual well-being does not aggregate into a single measure that can be used to explore the distribution of well-being and inequality, or investigate the drivers of differences in well-being. Three studies (Grimes et al., 2023; Dickinson & Morrison, 2022; Jenkins, 2020) focused on well-being distribution, but they only used a single indicator of life satisfaction (subjective well-being) instead of a multidimensional concept of well-being (see section 2.2 for more details).

First, this study presents a new composite multidimensional well-being measure for New Zealand, a developed nation renowned for its well-being policies through the Living Standards Framework and the world-first Wellbeing Budget (OECD, 2023). It integrates economic and non-economic domains, along with objective and subjective indicators, to identify areas for policy intervention. Second, using Mosaic plots, we apply this measure to micro-level data, revealing the well-being distribution and inequality across demographic groups.

Utilising New Zealand's General Social Survey (GSS) for 2014 to 2021, we construct our well-being measure using 20 indicators from eight of the Treasury's Living Standards Framework domains. We use Categorical Principal Component Analysis (CATPCA) and concentrate on five key demographic groups, which allows us to visualise the distribution of well-being using Mosaic plots that show group proportions in a stacked bar chart. We conducted sensitivity analyses on normalisation, weighting, and aggregation methods to test the robustness of the multidimensional index and its ability to capture New Zealanders' well-being.

Our analysis reveals pronounced gaps in multidimensional well-being across demographics. The results show that civic engagement, governance, income, and education are the domains that explain most of the variance in well-being, indicating their importance to individual well-being. However, all the dimensions in the multidimensional index significantly contribute to the well-being of people.

Our study reveals that multidimensional well-being is not equally distributed across New Zealand's population groups, indicating substantial inequality in well-being. People who are most at risk of being deprived (the bottom 20%), live outside Auckland and Wellington on the North Island, are of Māori descent, are females, people over 64, New Zealand-born individuals, and those with a secondary education as their highest qualification. In contrast, people who score highest in well-being (the top 20%) are predominantly Auckland and Wellington residents, Asian and European ethnicities, males aged 35-64, migrants, and degree holders.

In light of our findings, policymakers should focus on policies that can improve public trust in the government and its institutions, strengthen social security, increase efforts to combat crime, and provide social support for those unable to enter the labour market as full-time employees. More specifically, policies should target the demographic groups prevalent in the bottom 20% of multidimensional well-being, aiming to correct the distribution through measures such as gender equality, which will provide an equal chance for all children to attain a tertiary education.

The remainder of the paper is organised as follows. Section 3.2 provides a literature review on the measurement

of well-being, existing composite indices, and well-being inequality. The data and selected variables are discussed in section 3.3. The methodology is outlined in section 3.4, followed by the results and analysis in section 3.5. The paper concludes with section 3.6.

3.2 Case study and literature review

3.2.1 Well-being in New Zealand

New Zealand's population was approximately 5.33 million as of 31 March 2025, with a per capita net-adjusted disposable income of US$39,024, ranking fifth among 41 OECD countries as of December 2021 (Stats NZ, 2025, May 15; OECD, 2024). The nation's average household net wealth is US$514,162, exceeding the OECD average of US$323,960, ranking it seventh overall. New Zealanders report a life satisfaction score of 7.3 out of 10, surpassing the OECD average and placing the country tenth (OECD, 2022b). However, New Zealand is ranked 23rd out of 35 OECD countries in terms of income inequality, as measured by the Gini coefficient (OECD, 2022c). New Zealand was the first country to introduce a Well-being Budget, and the New Zealand Treasury argues that traditional economic indicators, such as GDP, do not provide a complete picture of wellbeing (Te Tai Waiora, The Treasury, 2022, p. 17). The government defines well-being as the quality of life or living standards, aiming for a better life for individuals and society (The Treasury, 2018b). This definition includes subjective well-being, which encompasses life satisfaction, life meaning, and happiness (Stats NZ, 2022b).

The Treasury's Living Standard Framework (LSF) was established to incorporate well-being indicators into policy development, considering both economic and non-economic factors. However, it falls short of providing a comprehensive analysis of individual multidimensional well-being, offering only broad categories without a nuanced, weighted analysis (McLeod, 2018; The Treasury, 2016). Studies on happiness inequality in New Zealand, such as Dickinson and Morrison (2022), indicated that subjective well-being inequality is more closely associated with local levels rather than larger spatial units. Grimes et al. (2023) examine more than one hundred World Values Survey country waves. They find that when a large share of respondents report very low life satisfaction, each person in the sample records a lower personal life satisfaction score on the zero-to-ten scale. The authors explain this pattern through social comparison, noting that awareness of widespread hardship lowers individual well-being. Jenkins (2020) applies ordinal dominance tests to World Values Survey data and shows that New Zealand has a wider lower tail of life satisfaction than several peer countries, highlighting why distributional analysis, rather than national averages, is crucial. Despite ongoing studies, the absence of detailed micro-level well-being measures continues to impede precise assessment.

3.2.2 Measuring well-being

Well-being is measured using various approaches, broadly classified into objective and subjective well-being (OECD, 2013). Objective well-being uses statistical indicators such as GDP, crime rates, and educational attainment (Sirgy *et al.*, 2006; Diener & Suh, 1997). Subjective well-being (SWB), defined as how individuals

evaluate their own lives, is typically measured through surveys that ask about life satisfaction, happiness, and other evaluative judgments (Diener, n.d.; The Treasury, 2016).

Life satisfaction, a standard measure of SWB, is the cognitive evaluation of one's life and is typically assessed on a scale ranging from 0 to 10. The New Zealand Treasury and the OECD employ life satisfaction as a metric for SWB (Diener, n.d.; The Treasury, 2016). However, social policies often integrate social, economic, and SWB measures to construct a comprehensive understanding (Veenhoven, 2007; Diener & Suh, 1997).

Measuring well-being involves both objective questions, such as income and sanitary conditions, and subjective questions, like perceived safety and trust (Veenhoven, 2002). This dual approach provides a more comprehensive picture of well-being, acknowledging that both objective and subjective measures offer unique insights (Diener & Suh, 1997).

Given the multidimensional nature of well-being, constructing a composite multidimensional measure is necessary for the development of public policy (Stiglitz et al., 2009; Boarini & d'Ercole, 2013). This enables an assessment of people's achievements and opportunities to lead fulfilling lives (Sen, 1993; Deaton, 2013). The New Zealand government supports this perspective, arguing that a multidimensional framework is more appropriate for guiding public policy (The Treasury, 2016).

3.2.3 Existing composite indices

Composite indices measure well-being across multiple domains. The Human Development Index (HDI) combines life expectancy, education, and income (United Nations, 2022). In contrast, the OECD Better Life Initiative also incorporates subjective dimensions, such as life satisfaction, alongside income, housing, and community factors (OECD, 2013; OECD, 2022a). The Social Progress Index measures social and environmental progress through a set of indicators (Social Progress Imperative, 2022).

Taken together, these examples demonstrate why policymakers and researchers are increasingly relying on composite indices and set the stage for considering their practical advantages. Composite indices “summarise complex or multi-dimensional issues in view of supporting decision-makers” and “make it easier to interpret trends than analysing many separate indicators” (OECD & EC-JRC, 2008, p. 8). In this study, such aggregation (i) supports within-country comparisons across population groups, (ii) allows policymakers to track progress over time, and (iii) presents multidimensional evidence in a format that non-specialists can readily understand. Yet, the handbook notes that indices designed for a single nation are not suitable for strict cross-country ranking and must be interpreted with that limitation in mind.

3.2.4 Measuring well-being inequality

Well-being inequality can be measured using various statistics. Kalmijn and Veenhoven (2005) suggest several measures, such as the standard deviation and interquartile range, to quantify the happiness distribution

dispersion. They argue that analyses should focus on dispersion rather than central tendency, which has influenced subsequent studies, such as Helliwell et al. (2019).

Research on well-being inequality remains limited, with studies often focusing on subjective well-being measures, such as happiness or life satisfaction. Veenhoven (2005) found a decrease in life satisfaction dispersion among European countries. Stevenson and Wolfers (2008) noted that greater gender equality reduced happiness inequality, but increased disparities were associated with higher education attainment.

Becchetti *et al.* (2014) and Firpo, Fortin, and Lemieux (2009, 2011) employed decomposition techniques to examine happiness inequality in Germany. Their findings indicated that labour market conditions and demographic shifts significantly impacted the distribution of happiness. They propose that education and economic factors play a crucial role in this context. Enhancement in performance can contribute to a reduction in inequality and increase happiness.

Dutta and Foster (2011) found that happiness inequality varied across gender, race, and region in the US, with greater inequality among females and less among black people compared to white people. Tomaselli, Fordellone, and Vichi (2021) found higher levels of well-being in the northern and some central regions of Italy. Pinar (2019) noted improvements in European well-being, but persistent disparities in material well-being. Rossouw and Greyling (2021) build a composite well-being index for 30 African countries and use a Blinder–Oaxaca decomposition. They identified that demographic factors increased multidimensional well-being inequality in South Africa, with most of these changes attributed to coefficient effects —lower returns to endowments such as employment, gender equality, and internet access.

In conclusion, the studies discussed in section 3.2.4 either focused on subjective well-being measures, or analysed countries that do not emphasise well-being through a Well-being Budget. Therefore, our study fills this gap by developing a comprehensive multidimensional well-being measure and applying it to New Zealand, a leader in well-being policy, to determine whether multidimensional inequality exists and provide actionable policy insights for decision-makers.

3.3 Data and selected variables

3.3.1 Data

We use the General Social Survey (GSS) dataset from Statistics NZ. The GSS is a biennial household survey that provides cross-domain well-being data, covering New Zealand residents but excluding individuals under 15 (Stats NZ, 2018). The average number of respondents per wave is approximately 8,000, totalling 28,002 over four survey years (2014-2021).

We pool the data from all waves to increase the sample size, enhancing statistical power and robustness. Despite having data from four waves, only 58 individual IDs are repeated, resulting in an unbalanced dataset. The primary goal is to construct a multidimensional well-being index for New Zealand rather than to analyse

temporal changes. Pooling data enables more detailed subgroup analyses and introduces greater variation, providing a comprehensive understanding of the differences in well-being between demographic groups.

We created social-demographic profiles for five population groups: gender (male and female), migrants (NZ-born and migrants), age groups (15-34, 35-64, over 65), ethnic groups (European, Māori, Pacific, Asian, Middle Eastern, and others), and demographic regions. Additionally, we comprehensively analysed the changes observed across four consecutive survey years, spanning from 2014 to 2021. Supplementary Information A, Table A1 illustrates the population distribution within each group.

3.3.2 Selection of variables

Our framework is based on the Treasury's Living Standards Framework (LSF), which comprises 12 domains adapted from the OECD's Better Life Index to capture New Zealand's unique characteristics (The Treasury, 2018a, 2021). We selected the 2018 version of the LSF to ensure consistency in variables across all four waves. Although the Treasury revised the database every two years and introduced new variables in the 2021 GSS to align with the revised 2021 LSF, some variables were absent in the previous three datasets, and some questions changed in the 2021 GSS.

We excluded the Environment, Time Use, Jobs and Earnings[4], and subjective well-being (SWB) domains for specific reasons, hence, the model should be read as a data-constrained approximation rather than an exhaustive taxonomy. The Jobs and Earnings domain was excluded due to a high percentage of missing values. This is not problematic, as different demographic groups value this domain differently. For instance, employment may not be relevant to the well-being of individuals over 65 and retired, who comprise 24.76% of our sample. However, to mitigate the impact of this exclusion, we included closely related variables such as income, labour force status, and social networks as proxies for this domain. The Environment and Time Use domains were excluded due to the absence of consistent data across the four time periods under investigation. Data for the Environment domain is unavailable for 2014 and 2016, and the Time Use variable does not exist for all periods under consideration.

In alignment with Smith (2018) and the Treasury (2018b), we view SWB as an overarching term that evaluates individuals' lives, rather than as a separate domain to be aggregated. Therefore, we use life satisfaction as a key independent variable to test the correlation between our multidimensional well-being index and other measures of well-being, thereby further validating our approach.

Subsequently, the eight domains and 20 indicators selected include the following:

[4] The Jobs and Earnings domain, instead of concentrating solely on employment status, places greater emphasis on job availability and quality. Job availability signifies an individual's ability to work if they desire to, whereas job quality refers to the satisfaction, safety, and fulfilment offered by a position.

1. Civic Engagement and Governance: Following Deaton (2013), Stiglitz *et al.* (2009), and Smith (2018), we argue that civic engagement is crucial because unjust treatment by society or institutions can erode trust, limit access to opportunities, and marginalise individuals. This domain includes two indicators: (a) trust in people and (b) trust in institutions.
2. Cultural identity is represented by self-recognition: Cultural identity refers to how people feel free to be themselves and self-recognised in New Zealand. This variable aligns with the view that culture is "a cumulative body of learned and shared behaviour, values, customs, and beliefs common to a particular group or society. In essence, culture is a predominant force shaping who we are." (Frierson et al., 2010, p. 75) and with the Ministry of Social Development's definition of culture as the "customs, practices, languages, values and world-views that define social groups such as those based on nationality, ethnicity, region or common interests" (MSD, 2016, p. 175). Considering New Zealand's multicultural nature and the unique role of Māori culture, we view cultural identity as particularly vital to the nation's well-being.
3. Health: Good health is a crucial factor influencing the length and quality of people's lives (Stiglitz *et al.*, 2009). Healthy domains enable people to enhance their well-being and engage in various personal and social activities that contribute to their overall well-being (Durand, 2015). In this study, we use self-reported health status.
4. Housing: Access to quality housing is crucial for meeting individuals' essential needs. Housing impacts health, SWB, access to public services, jobs, and social connections. This domain includes two indicators: (a) housing conditions, and (b) house crowding[5] (Goodyear *et al.*, 2011).
5. Income and living conditions: This domain includes three indicators: income level, income sufficiency (enough income and pay bills on time), and paid work. Income measures the economic resources people can use to meet their needs and protect against risks. Indicators of sufficient income and timely bill payments address the limitations of total income measures.
6. Knowledge and skills: Individuals' knowledge and skills may directly contribute to their well-being and potentially enable them to influence other aspects of their lives positively. Individuals with higher education levels tend to exhibit improved health, reduced unemployment risk, increased social connections, and heightened political engagement. The highest qualification is an appropriate objective indicator for this domain.
7. Safety: Safety from crime and violence is vital for well-being. Feeling unsafe negatively affects well-being, whether the threat is real or perceived. This domain includes two indicators: (a) feeling safe at home alone at night, and (b) feeling safe walking home alone at night.

[5] The reason for selecting crowding as an indicator lies with NZ researchers being concerned about issues of crowded households in recent years. In particular, crowding has been associated with adverse health outcomes for extended periods. Research indicates that the prevalence of communicable diseases transmitted through close contacts, such as meningitis and bacterial pneumonia, escalates significantly in densely populated areas. In a Statistics New Zealand Working Paper, authors clearly state that 'crowding has detrimental effects, regardless of cultural attitudes towards how space is used within a household' (Goodyear et al., 2011, p. 48).

8. Social connections: Positive interactions with others and social groups provide a sense of belonging. This domain includes two indicators: (a) partnered status or (b) loneliness.

Before discussing the dataset further, it is important to note that all data presented in this study were released and adjusted in strict compliance with New Zealand's confidentiality laws (STATISTICS ACT 1975) and Statistics New Zealand's requirements. These adjustments do not affect the study's findings or the resulting policy advice. Due to confidentiality regulations, the direct disclosure of small sample sizes is not permitted. Therefore, Table 3.1, which shows the descriptive statistics of the variables in the composite multidimensional index, only explains the treatments applied to each variable without providing detailed individual numbers.

Table 3.1 Descriptive statistics of indicators used in the composite well-being index

Indicators	Scale	Mean	Min	Max	Mode
General trust of people	0-10	6.77	0	10	8
Institutional trust in the police	0-10	7.73	0	10	8
Institutional trust in the education system	0-10	6.85	0	10	8
Institutional trust in the media	0-10	4.72	0	10	5
General impression of the court	0-10	6.67	0	10	8
General impression of parliament	0-10	5.26	0	10	5
General impression of the health system	0-10	6.79	0	10	8
Highest qualifications	0-10	3.62	0	10	4
Labour force status	0-2	1.60	0	2	2
Personal income level	12-26	19.22	12	26	16
Enough income	11-14	12.70	11	14	13
Pay bills on time	1-3	2.80	1	3	3
House conditions	1-5	3.85	1	5	4
House crowding level	1-5	4.15	1	5	5
Self-reported health ranking	1-5	3.50	1	5	4
Feeling of safety at home at night	0-5	4.14	0	5	4
Feeling of safety walking alone at night	0-5	3.12	0	5	4
Self-recognition	1-5	4.33	1	5	5
Loneliness	1-5	4.35	1	5	5
Partnered	Single=0 Partnered=1	0.54	0	1	1
Material well-being index	0-20	14.222	0	20	20
Household income level	2-16	12.116	2	16	15
Life satisfaction	0-10	7.68	0	10	8

Source: Author's computations utilising the GSS datasets

After variable selection, descriptive statistics were calculated, and the missingness rate for each variable was specified. We followed the methods for treating missing data in surveys, as discussed by Mirzaei *et al*. (2022). All our variables had low missingness (less than 1%). Using Little's test (Little, 1988; Li, 2013), we found that

the data are Missing Completely at Random (MCAR), indicating that the missingness is independent of the observed variables. Therefore, we used single-value imputation to address missing data. To preserve the original case count, we used plausible observed values from the respective variables (Pigott, 2001). For variables, we selected the median category (neutral value, represented as '3' on a scale of 1 to 5) for imputation. This ensures that scale changes do not affect the relative position within the distribution (Allison & Foster, 2004). For variables where the median value was unavailable or inappropriate, such as when the average score ranges from 0 to 10, but is skewed towards 8 despite a median of 5, we used mode value imputation, as the mode best represents the central tendency. If a variable lacked a mode or neutral value (e.g., gender or migrant status), we deleted those individuals from the data.

We also reversed the direction of specific variables to guarantee[6] that a higher value represents a better outcome. Our data are dichotomous and ordered. Given the differing scales of the variables, we created a summary of the variables presented in Supplementary Information A, Table A2, which outlines the treatments applied to each variable, including listwise deletion, imputation, and redirection. Notably, we did not alter the scale of any variable; therefore, the original scale of all variables remains unchanged.

3.4 Methodology

3.4.1 Constructing the multidimensional well-being index

In constructing the multidimensional well-being index for New Zealand, we followed the methodology in the 'Handbook on Constructing Composite Indicators' (OECD, 2008) and the work done by Chiappero-Martinetti and Roche (2009).

First, guided by the LSF, we select the domains and indicators within each domain (see section 3.3.2) that can likely explain the multidimensional well-being of New Zealanders.

3.4.1.1 Multivariate method

Multivariate analysis seeks to explain the relationships and interactions among variables. Some techniques, such as Principal Component Analysis (PCA) and Factor Analysis (FA), summarise high-dimensional data by extracting a smaller set of latent components, which can be utilised to comprehend the data structure of our composite well-being index. Other multivariate methods focus on modelling dependence structures without necessarily reducing dimensionality, for example, Structural equation modelling (SEM), Multivariate analysis of variance (MANOVA), and K-means clustering.

3.4.1.2 Exploratory analysis

We used categorical principal component analysis (CATPCA) for our categorical data rather than principal

[6] See Supplementary Information A, Table.A3.

component analysis (PCA) or factor analysis (FA)[7]. Before applying CATPCA, we used Bartlett's sphericity test and the Kaiser-Meyer-Olkin (KMO) test to assess sampling adequacy. A KMO of at least 0.60 is considered adequate for factor analysis or PCA (Kaiser, 1974; Kaiser & Rice, 1974). Bartlett's test checks if the correlation matrix is an identity matrix. If statistically significant, it indicates that the variables are suitable for (CAT) PCA methods.

3.4.1.3 Weighting method

CATPCA handles nonlinear relationships and mixed measurement scales, assigning category quantifications through optimal scaling (Linting *et al.*, 2007). Using various combinations of selected indicators, we ran CATPCAs to determine the best fit. Closely related indicators loaded on the same components, and eigenvalues measured the total variance explained. The largest possible variance guided our selection of final indicators.

3.4.1.4 Aggregation

We chose CATPCA for objective weighting, based on variance explained rather than subjective evaluations (Decancq & Lugo, 2012; Booysen, 2002). If the first component lacks explanatory value, subsequent components are considered (Nicoletti *et al.*, 2000) — components with eigenvalues greater than one were extracted (Cliff, 1988; Kaiser, 1992). Factor loadings were squared and scaled to obtain intermediate composite indices (ICI) (Greyling & Tregenna, 2017). Each component was weighted based on explained variance, with the first component carrying the most weight.

We used linear aggregation, which allows high scores in one dimension to offset lower scores in another (Dobbie & Dail, 2013). Linear aggregation assesses each indicator's marginal contribution, simplifying the methodology (OECD, 2008). Indicator values were multiplied by their weights and summed to derive the overall index, which has defined minimum and maximum values.

3.4.1.5 Sensitivity and robustness analysis

We conducted sensitivity analyses on normalisation, weighting, and aggregation methods to test robustness. We normalised indicators using min-max and standardisation methods, assigned equal weights, and used linear aggregation. We then calculated Pearson correlation coefficients between our index and alternative indices, considering our index robust if the correlation was strong, positive, and significant (Jordá *et al.*, 2015).

We validate our index by correlating it with other well-being measures, including life satisfaction, household income level, and the material well-being index[8]. Significant positive correlations indicate our index accurately

[7] Because the well-being index is formative. Its indicators construct the concept rather than reflect a single hidden trait. That is, factor analysis would mis-specify the measurement model. FA assumes the items are manifestations of one (or more) latent factors and therefore works best with continuous, interval-scaled variables whose shared variance is driven by that latent factor. In contrast, CATPCA for categorical indicators, simply derives weights from the observed variables themselves and makes no reflective-factor assumption, making it the appropriate choice for a formative composite.

[8] The material well-being index is developed by New Zealand's Ministry of Social Development. It has 24 items and provides direct

represents well-being in New Zealand (Groh *et al.*, 2010).

3.4.2 Well-being inequality measures and comparison

Statistical measures of dispersion, such as variance, standard deviation, coefficient of variation, and interquartile range (IQR 90-10), are most useful when measuring inequality in ordered variables (see also Ovaska & Takashima, 2010; Clark *et al.*, 2014). Subsequent findings are used to derive similar inequalities for specific sums of dependent random variables, such as sums over finite individuals without replacement (Hoeffding, 1994). We employed these dispersion measures to evaluate inequality in multidimensional well-being and adjusted them to reflect mean values for comparison purposes.

3.4.3 Well-being dispersion and inequality between groups

Upon computing the individual multidimensional well-being index, we examined the distribution of well-being in the sample using descriptive statistics (median, variance, and interquartile range (IQR)).

Well-being inequality refers to the differences in individuals' life experiences within a population or across groups (What Works Well-being, 2023). We use Mosaic plots to explore well-being inequalities across gender, migrants and non-migrants, regions, ethnicity, and age groups. Mosaic plots are stacked bar charts that display group data percentages (Hartigan & Kleiner, 1981) and are used to visualise n-way contingency tables (Friendly, 1994, 2000; Theus & Lauer, 1999). Bars on the horizontal axis represent quintiles of the well-being score, with the vertical length showing the percentage composition of the demographic groups within each quintile. Larger coloured areas indicate larger proportions.

We define 'multidimensional well-being deprivation' as a disadvantageous position within the well-being distribution, following Townsend's (1987) definition of deprivation as a state of disadvantage relative to the local community or broader society (Salmond *et al.*, 2006). If well-being inequality is low, the proportional intervals in the colour blocks for each demographic group should not be saliently noticeable.

3.5 Results

3.5.1 CATPCA results

As discussed in section 3.4.1, before applying CATPCA, we assessed the sampling adequacy using Bartlett's sphericity test and Kaiser-Meyer-Olkin (KMO). The overall KMO is 0.841, surpassing the minimum threshold of 0.5, indicating the indicators' suitability for CATPCA. Bartlett's test of sphericity is significant with a p-value of 0.000, rejecting the null hypothesis and confirming that the indicators are intercorrelated and suitable for CATPCA. Table B1 in Supplementary Information B presents these results.

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information on living conditions that households encounter daily. Higher material well-being scores represent higher material well-being (and lower material hardship). The household income level indicator is deemed a traditional income measure of well-being (Perry, 2017).

After validating the indicators, we conducted the CATPCA analysis. Each of the 20 indicators functions as a component in the PCA model, resulting in 20 components. Table B2 in Supplementary Information B displays the eigenvalues, representing the variance contribution of each component. The first component has the largest eigenvalue, accounting for most of the variance.

Components with an eigenvalue greater than one were extracted, as suggested in section 3.4.1. A scree plot (Supplementary Information B, Figure B1) was also generated to confirm the number of components to be extracted. Five components with eigenvalues greater than one were extracted, explaining 55.24% of the total variance. After selecting the components, they were rotated to obtain the rotated matrix. Table B3 in Supplementary Information B presents the initial and rotated total variance explained by the eigenvalues.

The rotated factor loading matrix is presented in Table 3.2. The highest factor loading for each component (in bold) corresponds to a together-common-concept group. As a result, we labelled and named the components as shown in Supplementary Information B, Table B4.

Table 3.2 Rotated matrix of component loadings

Indicators	Comp1	Comp2	Comp3	Comp4	Comp5
General trust of people	0.281	-0.002	0.052	0.078	0.113
Institutional trust of the police	0.357	-0.020	0.055	-0.063	0.089
Institutional trust of the education system	0.409	-0.001	-0.069	-0.016	0.034
Institutional trust of the media	0.389	-0.006	-0.038	-0.037	-0.088
General impression on the court	0.407	0.046	-0.020	-0.005	-0.006
General impression on the parliament	0.408	0.048	0.025	-0.029	-0.102
General impression on the health system	0.354	-0.082	-0.016	0.065	-0.013
Highest qualifications	0.063	0.453	0.087	-0.001	-0.194
Labour force status	-0.029	0.553	-0.072	0.087	0.078
Personal income level	-0.046	0.523	0.072	0.063	0.035
Enough income	-0.003	0.183	0.486	0.007	0.021
Pay bills on time	0.007	0.022	0.616	-0.040	-0.062
House conditions	-0.018	-0.234	0.424	0.130	-0.108
Household crowding	-0.063	0.006	0.339	-0.210	0.297
Self-reported health ranking	0.048	0.084	0.123	0.249	0.008
Feeling of safety at home at night	-0.046	-0.042	0.010	0.641	-0.028
Feeling of safety walking alone at night	-0.041	0.137	-0.172	0.588	0.027
Partnered	0.038	0.238	-0.112	-0.177	0.583
Self-recognition	0.034	-0.140	0.089	0.232	0.299
Loneliness	-0.011	-0.116	-0.051	0.119	0.620

Source: Author's calculations based on the GSS datasets

The first component, 'Civic and Governance,' represents trust in people and institutions and perceptions of

government effectiveness, accounting for 18.3% of the total variance. The second component, 'Income and Education,' accounts for 10.6% of the variance. The third component, 'Material Living Conditions,' is 9.4%, while the fourth component, 'Health and Safety,' constitutes 8.9%. The fifth component, 'Cultural Identity and Social Connection,' explains 7.4% of the total variance.

3.5.2 Aggregation of the multidimensional well-being index

First, the square factor loadings were calculated to aggregate the index and divided by the unity sum (Table 3.3). Each component was one unit. Second, the total percentage of variance explained was calculated. Third, the ICI was conducted, and the weight of each component in the multidimensional well-being index was calculated. The fourth column in Table 3.3 was calculated using the squared factor loadings divided by the unity sum. The factor loading for each indicator was derived from the rotated matrices. We calculated the square of each factor loading and summed them within each component to obtain the unity sum. For example, in component 2, we first calculated each indicator's squared factor loading: 0.205 for education, 0.306 for the labour force, and 0.274 for personal income. Then, we added these three numbers to obtain the unity sum of 0.785. Finally, the square of the factors loading was used to divide 0.785, which equals 0.262 (0.205/0.785), 0.39 (0.306/0.785), and 0.349 (0.274/0.785).

Columns five and six in Table 3.3 are derived from Table B3 in Supplementary Information B, which displays each component's total explained variance and eigenvalues. Column seven came from Table B4 in Supplementary Information B, which was calculated as the ratio of the explained variance of each component to the total extracted variance. For example, the explained variance of component 2 was 10.6%, and the total explained variance of the 5 components was 55.24%. Therefore, component 2 in column seven equalled (10.6/55.24) * 100% = 19.26%. Column eight is the weight of each indicator, which was calculated by multiplying the squared factor loadings by the total percentage of explained variance. After calculating the weight of each indicator, we employed linear aggregation to obtain the multidimensional well-being index for each individual. The variable with the highest weight is the individual's perception of safety at home at night, followed by their current work status. The third highest weighting is whether individuals can pay their bills on time. This indirectly summarises the domains that contribute most to the variance.

Table 3.3 Construction of a multidimensional well-being index

Components	Indicators	Rotated factor loadings	Squared factor loadings, scaled to unity sum	Total % of explained variance of data	Eigenvalue	Total % of explained variance of extracted components	Weight in multidimensional well-being index
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	General trust of people	0.281	0.080	18.3	3.653	0.3306	0.027
	Institutional trust of the police	0.357	0.130				0.043
	Institutional trust of the education system	0.409	0.170				0.056
	Institutional trust of the media	0.389	0.154				0.051
	General impression of the institution on the court	0.407	0.169				0.056
	General impression of institution on the parliament	0.408	0.169				0.056
	General impression of the institution on the health system	0.354	0.128				0.042
2	Highest qualifications	0.453	0.262	10.6	2.127	0.1926	0.050
	Labour force status	0.553	0.390				0.075
	Personal income	0.523	0.349				0.067
3	Enough income	0.486	0.259	9.4	1.875	0.1698	0.044
	Pay bills on time	0.616	0.417				0.071
	House conditions	0.424	0.197				0.034
	House crowded	0.339	0.126				0.021
4	Healthy ranking	0.249	0.076	8.9	1.780	0.1611	0.012
	Feeling of safety at home at night	0.641	0.502				0.081
	Feeling of safety walking alone at night	0.588	0.422				0.068
5	Partnered	0.583	0.418	7.4	1.477	0.1338	0.056
	Self-recognition	0.299	0.110				0.015
	Loneliness	0.620	0.472				0.063

Components	Indicators	Rotated factor loadings	Squared factor loadings, scaled to unity sum	Total % of explained variance of data	Eigenvalue	Total % of explained variance of extracted components	Weight in multidimensional well-being index
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Total				55.24	11.049	1.00	1.000

Source: Author's calculations based on the GSS datasets

We used the respective weights for each indicator to linearly aggregate values and construct a multidimensional well-being index for individuals. The index ranges from 2.297 to 7.981, with no individual achieving the maximum value of 8.16. Table 3.4 provides a statistical overview of individual well-being scores, with New Zealanders averaging a score of 5.692.

Table 3.4 Statistical overview of individuals' well-being index and well-being score

Index	Obs.	Mean	Minimum	Maximum
Well-being index	28002	5.692	2.297	7.981

Source: Author's calculations based on the GSS datasets.

3.5.3 Sensitivity and robustness test of the multidimensional well-being index

We performed a sensitivity analysis by constructing two alternative indices utilising distinct normalisation (minimum-maximum and standardisation methods), equal weighting, and linear aggregation methods. Table B5 in Supplementary Information B displays highly correlated indices, indicating that our multidimensional well-being index is robust to subjective choices regarding normalisation, weighting, and aggregation.

We also correlated our multidimensional well-being index with life satisfaction scores and the material well-being index as an additional (directional-consistency) robustness check. The results are presented in Table 3.5. All indicators are positively and significantly correlated, suggesting that our well-being index behaves as expected across related but distinct constructs (Groh et al., 2010).

Table 3.5 Correlation with other unidimensional indicators

Indicator	Pearson correlation
Life satisfaction	0.321***
Material well-being index	0.414***
Household income level	0.43***

Source: Author's calculations based on the GSS datasets

*** significant at 0.01 level

3.5.4 Disparities and trends in well-being across New Zealand

The distribution of well-being in New Zealand is presented using the interquartile range (IQR), median, and variance. The IQR of 1.052 captures the spread of the middle 50% of the well-being index. The median value of 5.746 is slightly higher than the mean value of 5.691, indicating that this distribution is close to symmetric but slightly left-skewed. The variance of 0.618 suggests a relatively equal distribution across the sample. However, the average well-being index varies across the quintiles, ranging from 4.53 in the lowest quintile to 6.72 in the fifth quintile, indicating a difference in the distribution of well-being that needs to be analysed.

Therefore, as stated in section 3.4.3, we divided the sample into five sociodemographic subgroups: regions,

migrants and non-migrants, gender, ethnicity, age, and sampling years. We calculated well-being scores for each of these subgroups, as well as average life satisfaction scores and a mean material well-being index, to compare and highlight relevant results. Table 3.6 provides a summary of the statistical descriptions.

Table 3.6 shows that Wellington has the highest well-being scores, while Northland, Bay of Plenty, and Gisborne have the lowest (see Figure 3.1). This suggests regional inequalities in well-being.

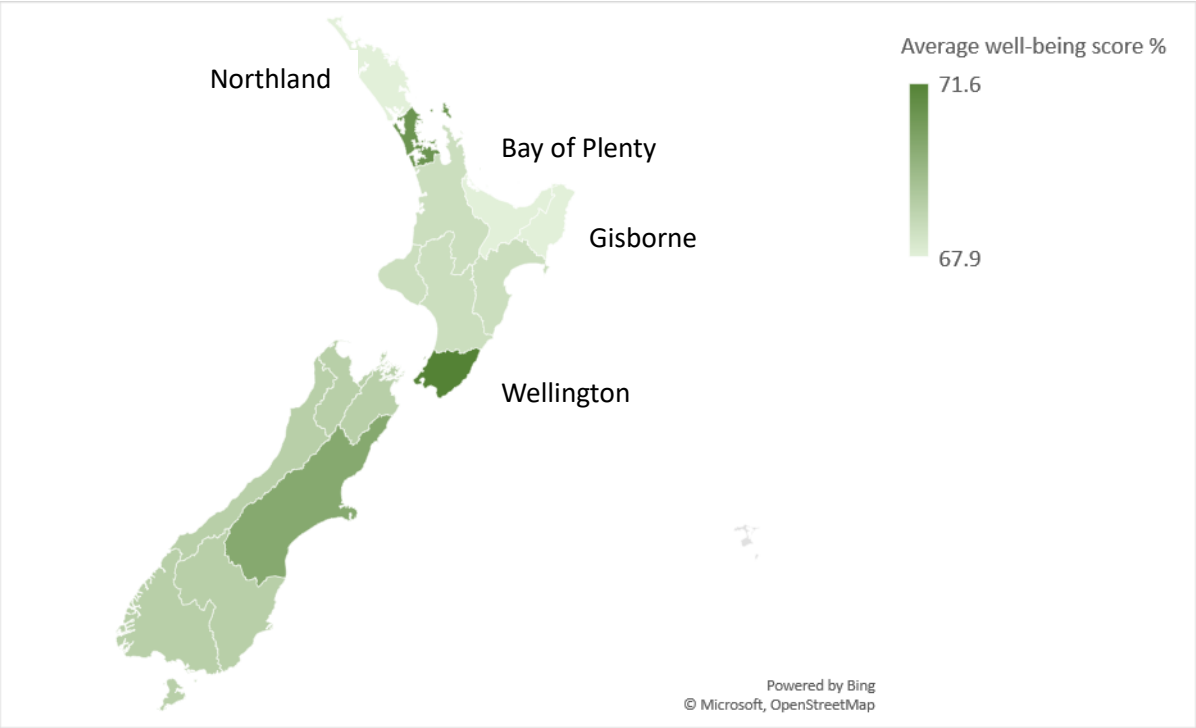

Figure 3.1. Well-being distribution across New Zealand regions

Table 3.6 Well-being scores

Sub-group/waves	Groups/years	Freq.	Average well-being score	Standard deviation	IQR	Average life satisfaction	Average material well-being
Regions	Auckland	6999	5.794	0.779	1.0705	7.651	13.905
	Wellington	3369	5.844	0.794	1.048	7.697	14.383
	Northland Group (Northland, Bay of Plenty, Gisborne)	3621	5.544	0.802	1.07	7.747	13.948
	Rest of North Island	6357	5.589	0.793	1.058	7.694	13.924
	Canterbury	3978	5.737	0.757	1.015	7.619	15.026
	Rest of South Island	3678	5.632	0.740	1.002	7.721	14.587
Migrants	Born in NZ	20811	5.611	0.786	1.052	7.655	14.248
	Migrants	7191	5.926	0.738	1.01	7.765	14.143
Gender	Male	12684	5.829	0.785	1.051	7.651	14.983
	Female	15318	5.578	0.769	1.029	7.71	13.591
Ethnic groups	Asian	2379	6.065	0.680	0.93	7.746	13.924
	European	19614	5.741	0.756	1.008	7.72	14.995
	Māori	2097	5.199	0.818	1.1045	7.535	11.39
	Middles Eastern	231	6.017	0.706	0.9905	7.625	12.944
	Others	2523	5.458	0.809	1.048	7.478	12.973
	Pacific	1158	5.422	0.768	1.053	7.656	9.823
Age group	15-34 (young)	7143	5.618	0.788	1.0545	7.647	12.962
	35-64 (middle)	13926	5.770	0.821	1.107	7.481	13.887
	65-102(senior)	6933	5.610	0.691	0.91	8.127	16.19
Sampling years	GSS2014	8790	5.619	0.791	1.06	7.7	13.892
	GSS2016	8487	5.701	0.785	1.063	7.736	14.449
	GSS2018	7311	5.744	0.782	1.042	7.66	14.015
	GSS2021	3414	5.743	0.774	1.007	7.56	14.95
Total		28002	5.692	0.786	1.052	7.68	14.22

Source: Author's calculations based on the GSS datasets

Furthermore, Table 3.6 indicates that migrants exhibit higher well-being and life satisfaction compared to New Zealand-born individuals. Happiness is a determinant of migration (Hendriks & Burger, 2021), with unhappy people moving to happier places, which increases the happiness of migrants slightly, but does not affect the host communities, thus increasing global happiness. New Zealand's stringent immigration standards, which assess income, skills, health, and age, result in higher well-being scores among migrants. In 2014, 88.2% of recent migrants[9] reported high life satisfaction, compared to 82.2% of longer-term migrants and 82.4% of New Zealand-born individuals (Ministry of Social Development, 2016). This highlights the higher average well-being scores among migrants, which can be attributed to these factors.

Regarding gender differences, males have an average well-being score 3.1% higher than females, and there is greater dispersion, with higher variance and standard deviation compared to females. However, females report higher life satisfaction, averaging 7.71, compared to males at 7.65. Additionally, females' material well-being scores are lower, at 13.591, compared to males' scores of 14.983. Despite lower levels of multidimensional and material well-being, females still report greater happiness than males.

The findings reveal disparities in multidimensional well-being among ethnic groups in New Zealand, with Asians attaining the highest mean score and Māori the lowest. Despite facing the highest material well-being deprivation (9.823), Pacific ethnic groups maintain moderate multidimensional well-being and life satisfaction scores. High unemployment and low earnings may affect their material conditions, but their core values — such as cultural identity and religious beliefs — enhance their overall well-being experience (The Treasury, 2022).

Table 3.6 shows that the 35-64 age group has the highest mean multidimensional well-being score compared to younger and older individuals, while also exhibiting the lowest and most dispersed life satisfaction score (7.481). These results partially align with Stiglitz *et al.* (2009), who found that younger and older people in most developed countries report higher life evaluations than those of prime age. This pattern is in stark contrast to income levels for the same groups. However, some findings deviate from Stiglitz *et al.* (2009), as the senior group not only has the highest subjective well-being (8.127) compared to the average of all subgroups (7.68) but also the highest material well-being (16.19), exceeding the average of 14.22. The disparity in material well-being among age groups is primarily due to fluctuations in the housing market. Since 1980, New Zealand has experienced the most rapid growth in house prices among all OECD countries (The Treasury, 2022). In 2020, New Zealand recorded the highest ratio of housing costs to disposable income among OECD countries (Stephens, 2022, September 9), significantly impacting the youth's ability to afford housing.

Moreover, the multidimensional well-being index results align with Deaton (2008), who suggests that the ageing populations worldwide tend to be more dissatisfied with their lives, except in the wealthiest countries.

[9] Those who had arrived within the preceding five years.

In our study, the higher well-being scores for the 35-64 age group may reflect the influence of factors beyond income, such as health, social connections, strong employment status, and civic engagement. While older individuals report material and subjective well-being, their multidimensional well-being remains moderate. Throughout the four sampling periods, New Zealand's average multidimensional well-being score has remained stable with slight variations: 5.619 in 2014, 5.701 in 2016, 5.744 in 2018, and 5.743 in 2021, indicating a gradual upward trend and modest improvement over the years. However, life satisfaction declined from 7.66 to 7.56 between 2018 and 2021, likely due to the pandemic's impact.

3.5.5 Well-being inequality patterns in NZ

As stated in section 3.4.3, we use Mosaic plots to examine well-being inequalities across five demographic groups: gender, migrants and non-migrants, regions, ethnicity, and age groups.

We transformed the well-being score, originally ranging from 2.297 to 7.981 among 28,002 individuals, into a categorical variable by dividing it into quintiles. This reclassification groups individuals based on their scores' relative position within the overall distribution, from the lowest (first quintile) to the highest (fifth quintile). For example, an individual with a well-being score of 4, falling within the bottom 20% of the distribution, is categorised into the 1st quintile. This approach enables us to examine the relationship between well-being scores and other categorical variables, including gender and ethnicity.

Next, we utilised Mosaic plots to visually represent these relationships between well-being levels and various outcomes and characteristics. The x-axis of the Mosaic plots illustrates the distribution across the five quintiles, created by dividing the total sample into equal portions, each representing 20% of the individuals based on their well-being scores. The number of individuals in each quintile ranged from 5,580 to 5,620. On the x-axis, "1" signifies the lowest 20% of individuals based on their well-being score, while "5" represents the highest 20%. The y-axis displays the percentage composition of each group.

Consequently, the areas shaded in different colours depict the proportions of various groups within each quintile. In the Mosaic plot, we make horizontal comparisons of each coloured block's area across the five quintiles. A larger area of the same colour indicates a higher proportion of that demographic group within a given quintile. According to our definition of inequality, disparities would be shown by varying block sizes of the same colour across all quintiles. The average well-being score for the bottom 20% is 4.53, and 6.72 for the top 20%.

In the absence of well-being inequality or substantial disparity, the area sizes of squares of identical colours should remain relatively consistent across the five horizontal quintiles. However, the Mosaic plots (Figures 3.2-3.6) reveal the presence of multidimensional well-being inequality among various groups[10].

[10] Table B6 in Supplementary Information B delineates the number of various groups of individuals comprising each of the five

Figure 3.2 illustrates the distribution of well-being across ethnic groups. Europeans and Asians comprise a large portion of individuals in the higher quintiles (4th and 5th), suggesting they generally have higher multidimensional well-being scores than other groups. Māori and Pacific individuals are more concentrated in the lower quintiles (1st and 2nd). This pattern indicates that these groups tend to have lower multidimensional well-being scores and are more likely to experience deprivation in multidimensional well-being.

For example, Māori is represented by a yellow square whose size indicates the proportion of Māori in each well-being quintile. The largest yellow square appears in the lowest quintile, meaning there are more Māori in the bottom 20% of the well-being distribution. As we move from the lowest to the highest quintile, the size of the yellow squares decreases, reflecting a progressive reduction in the number of Māori individuals, with the smallest yellow square in the top quintile illustrating minimal representation of Māori in the upper segments of well-being. This pattern suggests that Māori and Pacific Islanders are more likely to be in the bottom 20% quintile, indicative of their widespread distribution in areas of lower well-being scores.

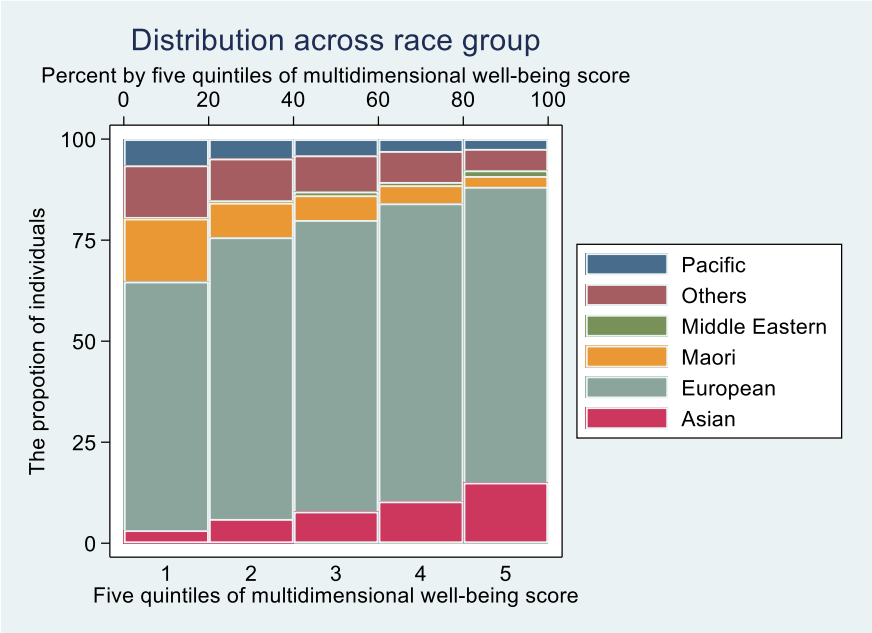

Figure 3.2 The distribution of well-being among racial groups

Figure 3.3 shows the distribution between genders. Females (54.7% of the whole sample) represent a larger proportion in each quintile, especially in the middle and higher quintiles (3rd, 4th, and 5th). This indicates that females are more prevalent across all levels of well-being scores compared to males. However, female representation decreases to 40.96% in the top 20% of well-being scores, and the area size also increases to 64.21% in the bottom 20%. The proportion of males increases in the highest quintile (5th), showing a greater presence at higher well-being levels. However, males are still less represented overall compared to females. In

quintiles, supporting more lucid details.

the lower quintiles (1st and 2nd), males have a smaller representation than females, though the difference is less pronounced than in the higher quintiles. Therefore, this distribution suggests that females are more represented across the well-being spectrum, while males are proportionately more concentrated in the higher quintile. This may point to gender-based disparities in multidimensional well-being, with females more evenly distributed and males potentially more clustered at the higher well-being scores.

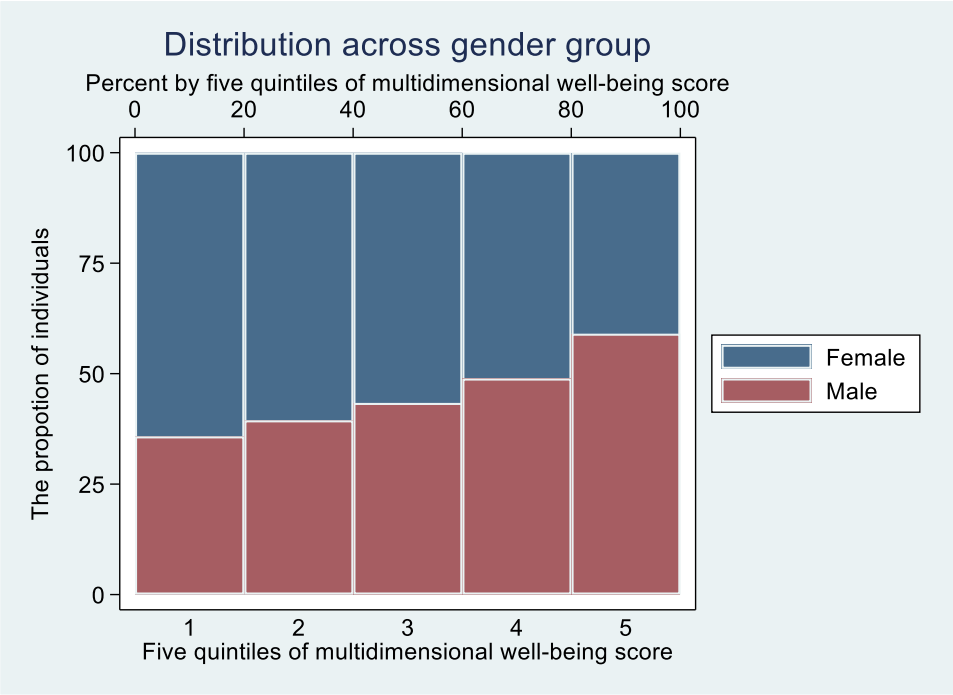

Figure 3.3. The distribution of well-being between males and females

As shown in Figure 3.4, more migrants are represented in the higher quintiles (4th and 5th), indicating that they tend to have higher multidimensional well-being scores compared to individuals born in New Zealand. Conversely, individuals born in New Zealand tend to dominate the lower quintiles (1st and 2nd), indicating an average lower well-being score for this group. As the quintiles increase from 1 to 5, the proportion of migrants steadily increases. In contrast, the proportion of individuals born in New Zealand decreases, showing a clear trend in the distribution of the well-being scores.

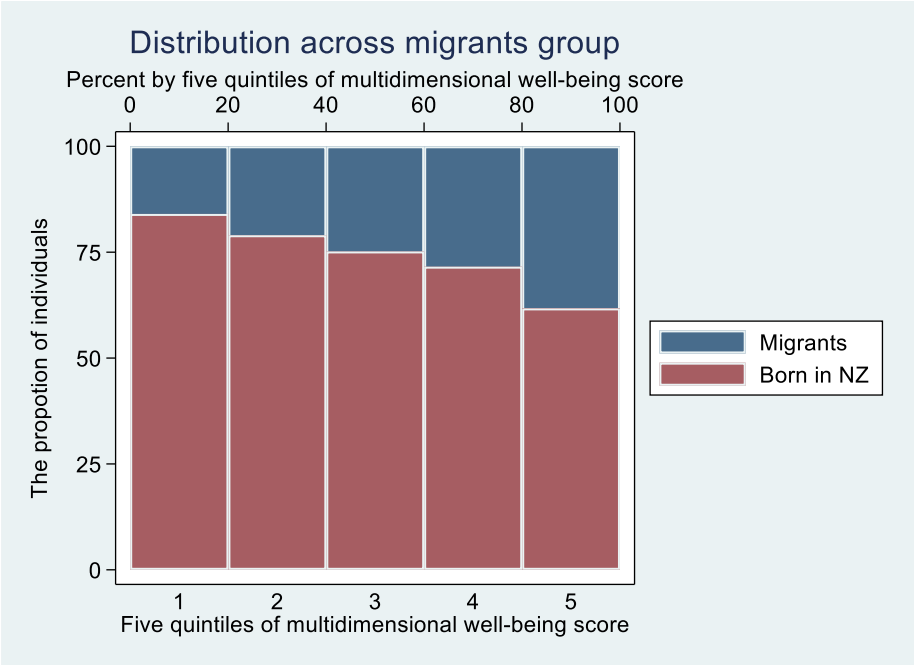

Figure 3.4. The distribution of well-being between migrants and those born in NZ

Figure 3.5 shows regional inequality in well-being. Aucklanders are concentrated in the 5th quintile of well-being, with people from Wellington increasing as we move from the 1st to the 5th quintile of the multidimensional well-being score. People from Northland, Waikato, Bay of Plenty, Gisborne, Hawke's Bay, Taranaki, and Manawatū-Whanganui dominate the lower quintiles (1st and 2nd), suggesting a lower average well-being score for this group.

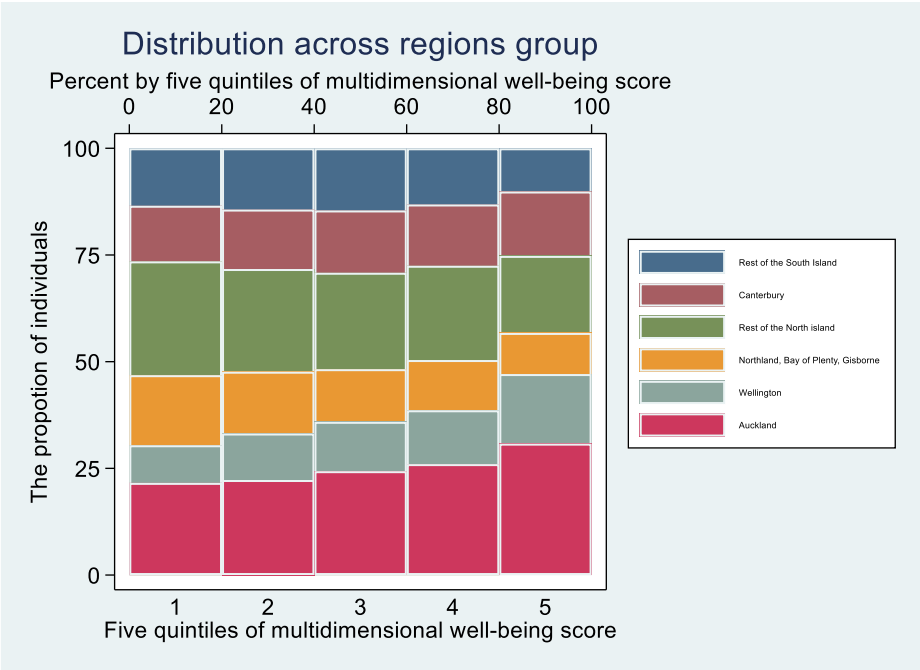

Figure 3.5. The distribution of well-being between regions

Figure 3.6 shows the distribution of well-being by age group. The green squares in the lowest quintile are larger than those in other quintiles, indicating that people under 35 years old are more concentrated in the bottom 20% of well-being scores. The green area decreases as the quintile increases, indicating a left-skewed distribution of well-being among young people and their higher vulnerability to low multidimensional well-being.

Although older adults (aged 64 and over) tend to be more affluent and report higher happiness levels, their well-being scores are not concentrated in the top 20%. In New Zealand, older people tend to have high wealth (net worth) and life satisfaction, but multidimensional well-being includes a range of variables such as health and social relationships. For example, New Zealanders experience more years living with poor health than most other developed countries (The Treasury, 2022).

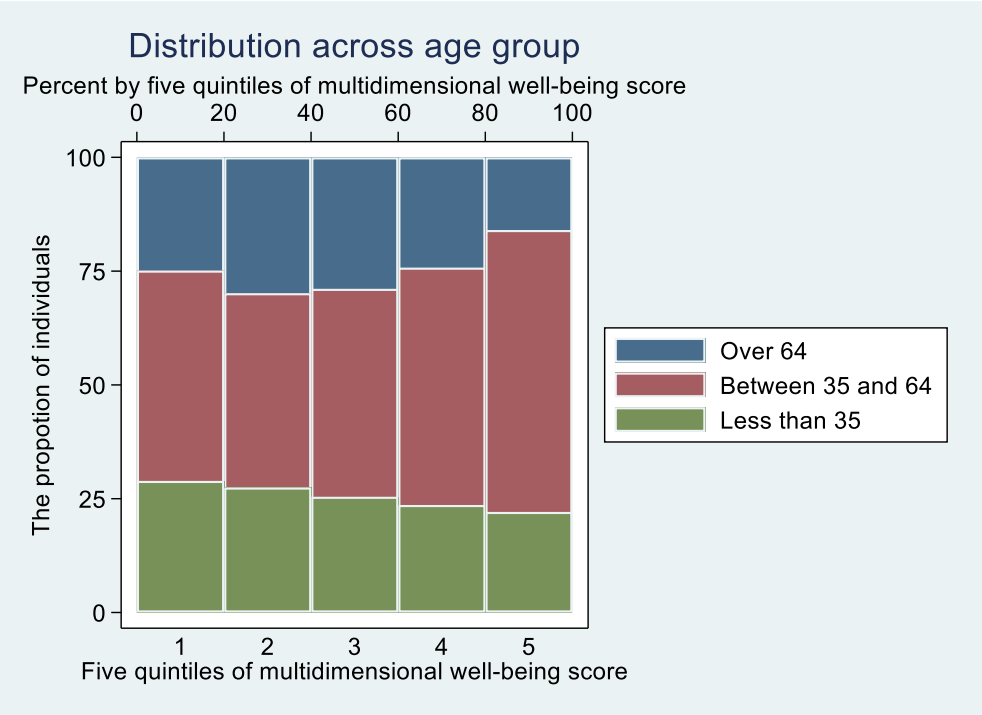

Figure 3.6. The distribution of well-being between age groups

Although not part of the original groups to be analysed, we decided to analyse the relationship between educational attainment and quintiles of well-being scores.

The educational attainment gap between the top and bottom quintiles of well-being scores is clear. The most common educational attainment in the top quintile (5,589 individuals) was a bachelor's degree, with 1,230 individuals having a postgraduate degree and 159 having an academic doctorate. In the bottom quintile (5,619 individuals), only 105 had a postgraduate degree, and few individuals held an academic doctorate; the most common level of education was secondary school education.

Educational attainment is important in promoting well-being by developing skills, confidence, and social networks. On the other hand, poor educational outcomes can have a negative impact on well-being and economic prospects over the course of a person's life. Inadequate education can have long-term effects (The Treasury, 2022). Moreover, higher educational attainment tends to foster skills, confidence, and social networks; however, its contribution to life satisfaction operates mainly through improved health status and household income, and the direct coefficient becomes small or null once these channels are controlled (Jarden et al., 2022). Our findings are consistent with this theory, as respondents with lower levels of education were more likely to be deprived of well-being.

In summary, the Mosaic plots provide evidence that multidimensional well-being is not equally distributed across demographic groups, indicating inequalities in New Zealand. People living in Auckland and Wellington, of Asian and European descent, males, 35–64-year-olds, migrants, and those with a bachelor's degree or a higher qualification are mostly in the top quintile of well-being scores. On the other hand, people living in other parts of the North Island, Māori individuals, females, people under 35 years of age, New Zealand-born individuals, and those with secondary school qualifications are most likely to be deprived of multidimensional well-being and are mostly in the bottom quintile of the well-being scores.

3.6 Discussion

This paper builds a composite, multidimensional well-being (MWB) index that combines objective and subjective indicators and then examines how MWB is distributed across population groups in Aotearoa New Zealand. Three empirical patterns deserve emphasis and interpretation. First, the highest CATPCA loadings on perceived safety, labour-force status, and the ability to pay bills on time signal the centrality of economic security and the local safety environment to overall well-being. That these variables dominate common variation is consistent with the literature: material stability and freedom from exposure to crime shape day-to-day functioning and life chances in ways that ripple through other domains (Kopasker et al., 2018; Marshall et al., 2018). Second, domains tied to institutional context, civic engagement, and governance also explain some variance in the index. This is a possible source of a mechanism where people's interactions with public institutions, their perceptions of responsiveness, and their opportunities to participate directly map into their experienced well-being (Glatz & Eder, 2020). Third, domains such as cultural identity, social connection, and self-reported health contribute less to the explained variance of data. Rather than implying that these domains "matter less," a more cautious interpretation is that measurement issues and indirect pathways may attenuate their direct statistical contribution. Cultural identity is often captured by a small number of items whose meaning can vary across groups; social connectedness may operate through trust and perceived safety; and self-rated health can be co-determined with economic security (Brown et al., 2014; Holt-Lunstad, 2024). In short, these domains may influence MWB through channels already represented in governance and security dimensions, which weakens their loadings in a single pooled factor.

The distributional evidence reinforces this reading. The bottom quintile of MWB is disproportionately composed of residents in parts of the North Island, people of Māori descent, women, those aged 65 and over, New Zealand-born respondents, and those whose highest qualification is secondary school. This pattern blends vertical dispersion (overall spread) with horizontal gaps (between groups). MWB is dispersed overall while also stratified by group. Moreover, it shows that governance and civic engagement exhibit strong associations with MWB, while external statistics document trust gaps and recent declines in confidence across several institutions. Public reporting since 2021 has shown downward shifts in trust across various sectors, including the health system, education, parliament, media, police, and courts. Earlier releases also documented lower trust in parliament among Māori than in the total population, consistent with a persistent, group-specific trust deficit (Stats NZ, 2024, September 25). These external trends help explain why the governance domain carries weight in our index and why group differences emerge in the lower tail of the MWB distribution.

The policy context surrounding employment and income security has also changed. In December 2023, the Fair Pay Agreements framework was repealed, removing a sectoral bargaining channel that had aimed to establish minimum wages in low-wage or low-bargaining-power occupations (New Zealand Legislation, 2023; MBIE, 2023). In 2024, benefit settings for Jobseeker Support were introduced, featuring clearer obligations and tougher consequences for non-compliance through a "traffic-light" system (Work and Income, 2024; MSD, 2024). These shifts plausibly raise perceived instability for some workers and benefit recipients, which aligns with our finding that labour-force status and the ability to meet bills are core to MWB. The Discussion cannot establish causality, but it does highlight how institutional changes in bargaining and benefit administration may propagate into the safety and economic security dimensions that dominate our factor structure.

Gender and ethnicity deserve closer examination. Our results show women are over-represented at the lower end of the MWB index, even though many studies report that women's average life satisfaction is not lower than men's. One possible mechanism can reconcile this pattern (World Happiness Report, 2024). Life satisfaction is an ordinal, global assessment that is sensitive to expectations and social comparisons (Clark, Frijters, & Shields, 2008); an MWB index aggregates concrete constraints in income stability, unpaid care load, flexible work options, and safety.

For Māori, the concentration in the lower tail of MWB, combined with lower confidence in some institutions noted in government and audit reports, points toward a dual constraint: material and institutional. These distributional patterns are observed against a backdrop of long-standing structural inequalities in Aotearoa New Zealand, including disparities in land tenure, education, labour markets, and access to public services.

Two methodological issues temper the interpretation. First, any composite index requires choices about weighting and aggregation. We have mitigated arbitrariness through CATPCA and sensitivity checks, but rankings and gaps can shift under alternative specifications. Sensitivity analysis is therefore not optional but essential. Second, several variables used, such as life satisfaction and perceived safety, are ordinal. Mean

comparisons are sensitive to rescaling. Order-respecting distributional tools, together with decomposition methods that look beyond the mean (e.g., quantiles or inequality indices), provide a clearer view of where in the distribution gaps cluster and which domains contribute most.

Future work may map group differences along the entire distribution of multidimensional well-being (MWB), rather than only at the mean. Mean gaps can be decomposed into characteristics and returns of variables between demographic groups using Oaxaca–Blinder methods. Furthermore, extending this logic to the distribution with recentered influence function (RIF) regressions would attribute differences in quantiles and inequality. This approach is a possible way to show whether governance and safety are most consequential in the lower tail, where deprivation clusters, and whether the returns to education and employment differ systematically across groups (Blinder, 1973; Oaxaca, 1973; Firpo, Fortin, & Lemieux, 2009).

A second possible work is measurement and comparability. The relatively small factor contribution from cultural identity and social connection may be due to measurement noise or indirect pathways. Testing cross-group measurement invariance with multi-group confirmatory factor analysis, and comparing those results to CATPCA-based scores, would clarify whether items function differently across groups and whether corrected scoring alters the apparent role of identity and connection (Meredith, 1993; Putnick & Bornstein, 2016).

A third avenue is causal identification using linked data. Recent institutional changes in New Zealand create quasi-experimental leverage. The repeal of the sectoral bargaining framework in December 2023 and the introduction of a traffic-light obligations system for Jobseeker Support in 2024 provide plausibly exogenous shocks whose effects on MWB dimensions can be studied with modern difference-in-differences and event-study estimators designed for staggered timing and heterogeneous treatment effects (New Zealand Legislation, 2023; Work and Income, 2024; Callaway & Sant'Anna, 2021). Linking survey IDI responses to administrative sources would sharpen measurement of local crime exposure, housing availability, and service access, enabling spatial modelling of whether improvements in safety and service access are reflected in lower-tail MWB for groups that currently cluster there.

3.7 Conclusion

We aim to inform policymakers by measuring multidimensional well-being and determining whether inequalities exist across sociodemographic groups. Therefore, we constructed a composite measure of multidimensional well-being that included economic and non-economic components, as well as objective and subjective indicators. The highest CATPCA loadings are observed for perceived safety, labour force status, and ability to pay bills on time, indicating that these dimensions capture the largest share of explained variance in the wellbeing index.

The domains of *civic engagement* and *governance*, as well as *income* and *education*, explained the most variance in our multidimensional well-being index. In contrast, *cultural identity*, *social connection*, and *self-*

reported health explained the least variance, suggesting they play a lesser role in this measure.

Our results indicate that people living in other areas of the North Island, those of Māori descent, females, individuals over 64 years of age, those born in New Zealand, and those with only secondary school education are most susceptible to multidimensional well-being deprivation, primarily populating the bottom 20% of well-being scores. Therefore, we find clear evidence of inequality in well-being across various demographic groups, including gender, age cohorts, ethnicity, geographic regions, and migrant status.

In light of these results, we recommend that New Zealand policymakers prioritise efforts to increase public trust in government and institutions, particularly in the media and parliament. More specifically, General Social Survey data show that Māori trust in Parliament and the media is lower than that of other ethnic groups (Stats NZ, 2024, September 25). To narrow this gap, we recommend: (i) targeted expansion of Whānau Ora funding to build community-led information channels; and (ii) transparent dialogue on Treaty-related legislation, including a clear explanation of the now-rejected Treaty Principles Bill and any successor proposals. These steps follow OECD (2023) advice, which suggests that meaningful engagement and fairness are key drivers of institutional trust for Māori. Furthermore, it is essential to improve public security, and combating crime is crucial to ensuring the safety and well-being of citizens. Recent policy changes, such as the repeal of Fair Pay Agreements and stricter jobseeker obligations, are likely to weaken employment security for part-time and low-income workers (New Zealand Legislation, 2023; Work and Income, 2024). We therefore recommend restoring targeted wage subsidies, expanding flexible work arrangements, and providing tailored support services for those who are unable to work full-time.

To address gender disparities in multidimensional well-being, it is imperative to reduce the gender wage gap and enhance women's access to economic opportunities. Unfortunately, amendments to the Equal Pay Act, passed in May 2025, halted thirty-three active pay-equity claims and introduced stricter thresholds for new ones, thereby reducing women’s legal avenues to close the wage gap (Van Velden, 2025). Given pronounced well-being disparities among minority groups, particularly the Māori and Pacific communities, targeted interventions are necessary. These could include culturally responsive education programs, equitable access to affordable housing, and fostering economic opportunities to boost income levels and reduce unemployment rates in these communities. A more inclusive society can support the well-being and prosperity of all New Zealanders.

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Supplementary Information A

Table A1. Demographic characteristics of the sample of New Zealanders

n = 28002		Sample size	% of Sample
Years	GSS2014	8790	31.39
	GSS2016	8487	30.30
	GSS2018	7311	26.12
	GSS2021	3414	12.19
Gender	Male	12684	45.30
	Female	15318	54.70
Migrants	Born in NZ	20811	74.31
	Migrants	7191	25.69
Age groups	15-34	7143	25.51
	35-64	13926	49.73
	65-102	6933	24.76
Ethnic groups	European ethnicity	19614	70.04
	Māori ethnicity	2097	7.49
	Pacific ethnicity	1158	4.14
	Asian ethnicity	2379	8.5
	Middle Eastern / Latin American / African ethnicity	231	0.82
	Other ethnicities[11]	2523	9.01
Regions	Auckland	6999	24.99
	Wellington	3369	12.03
	Northland Group (Northland, Bay of Plenty, Gisborne)	3621	12.93
	Rest of the North Island	6357	22.70
	Canterbury	3978	14.21
	Rest of the South Island	3,678	13.13

Source: Author's computations utilising the GSS datasets

[11] In the New Zealand survey, respondents may belong to multiple ethnic groups, which sets them apart from most other demographic classifications. Multi-ethnic individuals are categorised within other groups without further detailed distinctions.

Table A2. The process of variable processing

Variables	Listwise deletion	Imputation	Neutral or mode rule	Re-direction
Trust in people	No	Mode	8	No
Trust in institutions (courts, education and health systems, parliament, media, and police)	No	Mode	5 or 8	No
Cultural identity	No	Neutral	3 (sometimes easy, sometimes hard to be themselves in NZ)	Yes
Health rankings	No	Neutral	3 (good)	Yes
Housing conditions	No	Median	3 (some repairs and maintenance needed)	Yes
House crowding	No	Median	3 (no bedroom needed or spared)	No
Labour-force status	No	Median	1 (employed)	Yes
Personal income level	No	Mode	16	No
Enough income	No	Mode	3 (enough money)	No
Pay bills on time	No	Median	2 (once)	Yes
Knowledge	No	Median	4 (secondary education)	No
Feeling of safety at home at night	No	Median	3 (neither safe nor unsafe)	Yes
Feeling of safety walking alone at night	No	Median	4 (neither safe nor unsafe)	Yes
Partnered	No	/	/	No
Loneliness	No	Median	3 (some of the time)	Yes
Life Satisfaction	No	Mode	8	No
Material well-being	No	Mode	20	No
Household income level	No	Mode	15	No
Gender	Yes	No	/	No
Regions	No	No	/	No
Races	No	No	/	No
Migrants	Yes	No	/	No
Age	No	No	/	No
Collected time	No	No	/	No

Source: Author's computations utilising the GSS datasets

Table A3. Variable's description

Variables	Coding	Data Types
Life satisfaction	Based on a scale where 0 is completely dissatisfied, and 10 is completely satisfied.	Ordinal data
Trust in people	Based on a scale where 0 is not trusting people at all, and 10 is trusting people completely.	Ordinal data
Trust in institutions (courts, education and health systems, parliament, media, and police)	Based on a scale where 0 is not trusting institutions at all, and 11 is trusting institutions completely.	Ordinal data
Cultural identity	Based on a scale of individuals recognizing themselves in NZ, where 1 is very hard, and 5 is very easy.	Ordinal data
Health	Based on a scale of individuals' self-reported health status, where 1 is poor, and 5 is excellent.	Ordinal data
Housing conditions	Based on a scale of house conditions, where 1 is poor house conditions, and 5 is good house conditions	Ordinal data
House crowding	Based on a scale of the population living in crowded housing, or those who require one or more additional bedrooms, where 1 is two or more bedrooms needed, and 5 is two or more bedrooms spared.	Ordinal data
Labour-force status	1- unemployed, 2- not in the labour force, and 3 - employed.	Ordinal data
Personal income level	Based on a scale of personal income levels, where 12 is zero income, and 26 is $150,000 NZD or more.	Ordinal data
Enough income	Based on a scale of enough income, where 11 is not enough, and 14 is more than enough.	Ordinal data
Pay bills on time	Based on a scale of paying bills on time, where 1 is more than once not paid, and 3 paying all bills on time.	Ordinal data
Knowledge	The highest completed qualification, 0 is no qualification, and 10 is a doctorate.	Ordinal data
Feeling of safety at home at night	Based on a scale of feeling safe or unsafe at home at night, where 1 is feeling very unsafe, and 5 is feeling very safe.	Ordinal data
Feeling of safety walking alone at night	Based on a scale of feeling safe or unsafe walking alone at night, where 1 is feeling very unsafe, and 5 is feeling very safe.	Ordinal data
Partnered	0 - single, 1 – partnered	Dichotomous data
Loneliness	Based on a scale of the frequency of feeling lonely, where 1 is feeling very lonely all of the time, and 5 is feeling lonely none of the time.	Ordinal data

Source: Author's computations utilising the GSS datasets

Supplementary Information B

Table B1. KMO and Bartlett's test results

Test	Result
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.841
Bartlett test of sphericity	118000
Degrees of freedom	190
p-value	0.000

Source: Author's calculations based on the GSS datasets

Table B2. Eigenvalues explain the total variance

Component	Eigenvalue	Variance accounted for	
		Proportion of variance	Cumulation of variance
Comp1	4.454	22.27%	22.27%
Comp2	2.596	12.98%	35.25%
Comp3	1.505	7.52%	42.77%
Comp4	1.445	7.22%	50.00%
Comp5	1.049	5.24%	55.24%
Comp6	0.952	4.76%	60.00%
Comp7	0.882	4.41%	64.42%
Comp8	0.792	3.96%	68.37%
Comp9	0.758	3.79%	72.16%
Comp10	0.710	3.55%	75.71%
Comp11	0.653	3.27%	78.98%
Comp12	0.636	3.18%	82.16%
Comp13	0.597	2.99%	85.15%
Comp14	0.578	2.89%	88.04%
Comp15	0.498	2.49%	90.52%
Comp16	0.426	2.13%	92.65%
Comp17	0.413	2.06%	94.71%
Comp18	0.396	1.98%	96.69%
Comp19	0.355	1.78%	98.47%
Comp20	0.306	1.53%	100.00%

Source: Author's calculations based on the GSS datasets

Table B3. Initial and rotated total variance explained by eigenvalues

Component	*Initial*		*Rotated*	
	Total eigenvalue	Proportion of variance	Total eigenvalue	Proportion of variance
Comp1	4.454	22.3%	3.653	18.3%
Comp2	2.596	13.0%	2.127	10.6%
Comp3	1.505	7.5%	1.875	9.4%
Comp4	1.445	7.2%	1.780	8.9%
Comp5	1.049	5.2%	1.477	7.4%
Total	11.049	55.24%	11.049	55.24%

Source: Author's calculations based on the GSS datasets

Table B4. Extracted components

Component	Labelled	Indicator	Total % of explained variance of extracted components
1	Civic and Governance	Trust in People, trust in institutions	33.06%
2	Income and educational	Highest qualifications, labour force status, personal income	19.26%
3	Material living conditions	Enough income, pays bills on time, house conditions, house Crowding	16.98%
4	Health and safety	Healthy ranking, feeling of safety at night and with neighbours	16.11%
5	Cultural identity and social connection	Cultural identity, loneliness, and partnered	13.38%

Source: Author's calculations based on the GSS datasets

Table B5. Correlation between alternative well-being indices

Indices[12]	Correlation coefficient
std_equal_linear	0.937***
min_max_equal_linear	0.919***

Source: Author's calculations based on the GSS datasets. *** significant at 0.01 level

[12] std_equal_linear is standardised normalisation, equal weighting and linear aggregation; min_max_equal_linear is min-max normalisation normalisation, equal weighting and linear aggregation.

Table B6. Observations in five quintiles

Group	Subgroup	Percentage of observations				
	quintile	1	2	3	4	5
Gender	Male	35.79%	39.44%	43.38%	48.93%	59.04%
	Female	64.21%	60.56%	56.62%	51.12%	40.96%
Race	Asian	3.26%	6.00%	7.83%	10.39%	15.03%
	European	61.49%	69.72%	72.12%	73.77%	73.16%
	Māori	15.60%	8.52%	6.11%	4.50%	2.68%
	Middles Eastern	0.43%	0.59%	0.91%	0.80%	1.40%
	Others	12.77%	10.34%	8.95%	7.66%	5.31%
	Pacific	6.52%	4.82%	4.02%	2.94%	2.42%
Regions	Auckland	21.58%	22.29%	24.34%	26.02%	30.81%
	Wellington	8.81%	10.88%	11.58%	12.63%	16.32%
	Northland, Bay of Plenty, Gisborne	16.40%	14.47%	12.33%	11.78%	9.66%
	Rest of the North Island	26.66%	24.06%	22.57%	22.11%	18.04%
	Canterbury	13.03%	13.93%	14.58%	14.35%	15.08%
	Rest of the South Island	13.46%	14.36%	14.58%	13.17%	10.14%
Age groups	less than 35	28.90%	27.49%	25.42%	23.61%	22.11%
	between 35 and 64	46.21%	42.71%	45.68%	52.14%	61.94%
	over 64	24.89%	29.85%	28.90%	24.25%	15.94%
Migrants	born in NZ	84.03%	78.99%	75.17%	71.57%	61.73%
	Migrants	15.97%	21.01%	24.83%	28.43%	38.27%

Source: Author's calculations based on the GSS datasets

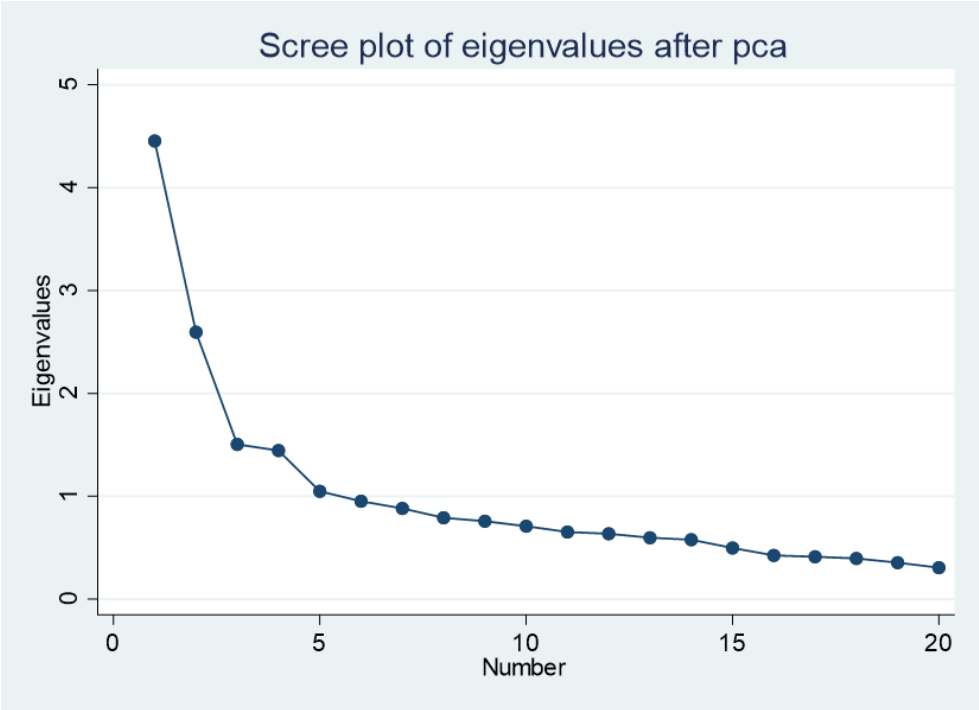

Figure B1. Scree plot

Source: Author's calculations based on the GSS datasets

Prelude to cultural identity and life satisfaction: a case study of New Zealand Māori vs Europeans

New Zealand is a multi-ethnic country where a rich blend of diverse cultures has contributed to its flourishing society. However, disparities persist between New Zealand's indigenous people (Māori) and other population groups, such as Europeans, not only in economic outcomes but also in life satisfaction. These disparities are deeply ingrained because of systemic inequalities rooted in colonisation, neoliberal economic reforms, and institutional racism.

While governmental policies have sought to promote Māori cultural identity and autonomy through initiatives such as Te Reo Māori revitalisation programmes, the Waitangi Tribunal, and He Ara Waiora, socioeconomic and well-being disparities persist. Māori culture is distinctive and deeply rich, and previous research has consistently demonstrated that cultural identity plays a crucial role in well-being, particularly in multi-ethnic societies where historical inequalities persist. Therefore, our study investigates the relationship between cultural identity and life satisfaction among Māori and European populations in New Zealand, focusing on how cultural identity relates to life satisfaction.

Prior studies have explored disparities in well-being, using economic indicators often based on income. These cannot adequately reflect the cultural aspects of well-being. Additionally, many current cultural identity indicators are explicitly tailored for Māori, making them less effective for comparative studies across different groups. This study addresses this gap by utilising a cultural identity variable applicable to Māori and European populations, alongside indirect income measures that better reflect Māori cultural values.

We used data from the New Zealand General Social Survey (GSS) spanning 2014 to 2021. Then, we employed a pooled ordinary least squares (POLS) regression to investigate the relationship. Subsequently, we used the Oaxaca-Blinder decomposition method to decompose the difference in life satisfaction across Europeans and Māori. The decomposition framework distinguishes between endowment effects (differences in observable characteristics such as income, education, and health) and coefficient effects (differences in returns to these characteristics) to ascertain whether disparities arise from resource availability or structural factors. The aim is to identify the limiting factors and provide policy recommendations for improving life satisfaction among Māori.

Our findings indicate that cultural identity has a positive influence on life satisfaction. Despite strong cultural ties and resilience mechanisms, Māori experience lower life satisfaction than Europeans. The key drivers of these disparities encompass material well-being, income sufficiency, and health. Furthermore, the general trust level among Māori is notably lower, adversely impacting their engagement with institutions and their perceptions of fairness.

Chapter 4. Cultural identity and life satisfaction: a case study of New Zealand Māori vs Europeans

Abstract

Despite substantial governmental efforts to promote Māori culture and autonomy, Māori continue to face socioeconomic and health disparities and have lower life satisfaction compared to Europeans. Drawing on data from the New Zealand General Social Survey (GSS), this study employs pooled ordinary least squares (POLS) regressions and Oaxaca-Blinder decomposition methods to analyse the relationship between cultural identity and life satisfaction and identify factors underlying the disparities between groups. Unlike previous studies, this research incorporates a cultural identity variable applicable to both Māori and European populations, as well as indirect income measures that align with Māori cultural norms. The findings reveal that cultural identity is significantly and positively associated with life satisfaction and that socioeconomic inequalities remain a significant component of the life satisfaction gap. The study underscores the importance of regional and temporal contexts in understanding these disparities and offers policy recommendations aimed at improving Māori well-being by fostering cultural identity and addressing structural factors, which may reflect unequal resource allocation and the lack of culturally appropriate services. This research contributes to the broader discourse on differences in well-being and cultural identity in multi-ethnic societies.

Keywords: cultural identity; life satisfaction; Oaxaca-Blinder decomposition; Māori; New Zealand

JEL Codes: D63; I31; J15; Z13

Additional Information

This thesis follows the APA referencing style. The second paper, *Cultural Identity and Life Satisfaction: A Case Study of New Zealand Māori vs. Europeans*, has been submitted to *Social Indicators Research* and is currently under peer review (Submission ID: SOCI-D-25-00514).

4.1 Introduction

New Zealand has long acknowledged the distinctive cultural heritage of the Māori, the country's Indigenous population, constituting approximately 17.3% of the national demographic (Stats NZ, 2023b). Over time, the government has undertaken substantial efforts to conserve and advance Māori culture through policies that endorse the use of te reo Māori (the Māori language), traditional practices, the He Ara Waiora (Māori well-being) framework, and tribal autonomy. Such initiatives include the Waitangi Tribunal and the incorporation of Māori perspectives within the national framework (The Treasury, 2018).

Inequalities exist in New Zealand, with Māori having higher mortality rates, lower educational attainment, and being disproportionately represented in precarious low-income employment (Pearson, 2018). The neoliberal economic reforms of the 1980s and 1990s were highly effective in revitalising New Zealand's economy, fostering growth and improving international competitiveness. However, Māori as a community experienced disproportionate disadvantages associated with the costs of the reforms (Public Service Commission, 1998). Chatterjee, Podder, & Mukhopadhaya (2003)) note that Māori communities had reduced access to stable employment, diminished public support, and a loss of connection to ancestral lands when industries were restructured or privatised during the economic reforms. Moreover, these changes also led to a loss of connection to ancestral lands, deepening marginalisation for many Māori communities (Kelsey, 1997). Health reforms during and after the neoliberal era also contributed to inequalities by reducing access to affordable care for Māori, who had already experienced significant health inequalities. This created gaps in well-being and perpetuated socioeconomic challenges for Māori (Lashley, 2000).

While these challenges have disproportionately disadvantaged Māori communities, cultural identity has become crucial in providing meaning. This identity is deeply rooted in collective values, te reo Māori, and community connections, fostering a sense of belonging and empowerment. This helps Māori navigate and, to some extent, mitigate these adversities. These cultural elements enhance well-being and serve as a buffer against challenges (Durie, 1998; Houkamau & Sibley, 2010; Ministry of Social Development, 2016).

For Māori, well-being is intricately tied to collective identity, community relationships, and connections to ancestral land, yet the strength and form of these ties vary across individuals and iwi (Durie, 1998; Houkamau & Sibley, 2010). Despite the benefits associated with cultural identity, disparities in life satisfaction persist between Māori and European populations. These strong cultural foundations have not been sufficient to overcome the barriers they face. According to the 2023 New Zealand General Social Survey, the mean overall life satisfaction score was 7.6 (on a scale of 0–10) for respondents who identified as European and 7.4 for those who identified as Māori (Stats NZ, 2025, May 15).

Given the above, this study addresses the following questions: i) What is the relationship between cultural identity and life satisfaction comparing Māori and European populations in New Zealand? and ii) To what extent does the difference in life satisfaction across the two groups reflect differences in cultural identity,

controlling for other observed characteristics (e.g., income and employment), compared to differences in the returns to these characteristics?

Prior research has explored the role of culture in life satisfaction, i.e., as a factor in well-being. However, many studies employ cultural variables specifically designed for the Māori population, thereby limiting their utility for cross-group comparisons (see section 4.2.3 for full discussion). Furthermore, a significant portion of existing literature still centres on direct income measures, but the Māori view material well-being more holistically, emphasising relationships, manaakitanga (responsibility and reciprocity), and connections to whenua (ancestral land) rather than income alone (Durie, 1998; Houkamau & Sibley, 2010). Moreover, there has been inadequate emphasis on addressing regional disparities and inequalities.

This paper uses a pooled OLS regression to examine the relationship between cultural identity and life satisfaction by comparing Māori and European populations in New Zealand. Furthermore, we use the Oaxaca-Blinder decomposition method to investigate the difference in life satisfaction between these groups, considering both the observed characteristics and the returns of these characteristics, which can be interpreted as structural limitations. The aim is to determine whether cultural identity is one of the limiting factors and provide policy recommendations for improving life satisfaction among Māori.

Unlike previous studies that have used cultural variables specific to Māori, this study uses a cultural identity variable from the nationally representative New Zealand General Social Survey (GSS) that can be applied to both Māori and European populations, allowing for valid cross-group comparisons. This study also uses indirect income measures rather than direct income variables, which are more consistent with Māori culture. Finally, this study includes time and regional effects, situating the results within the broader socioeconomic and cultural context of New Zealand. Previous New Zealand studies focusing on Māori–European differences in life satisfaction seldom controlled for both space and time. Most drew on single-wave cross-sections (Sibley et al., 2011) or added regional dummies without pooling waves (Morrison, 2011). We pool the 2014, 2016, 2018, and 2021 GSS waves (≈ 24,300 respondents) and control for time and region fixed effects using a set of year and regional dummies in our pooled cross-sectional data for all six regions and each survey year. Including these fixed effects reduces the variance associated with unobserved regional and temporal heterogeneity (Helliwell, Huang, & Wang, 2016), thereby refining our estimation of ethnic group differences in life satisfaction.

The results show that cultural identity is significantly and positively associated with the well-being of both Māori and European populations in New Zealand. Additionally, we confirm that even though the life satisfaction gap between Māori and European is rooted in socioeconomic disparities, cultural identity contributes significantly. Therefore, while policy interventions must target material inequalities, including income, housing, and health, they should also foster cultural identity by providing opportunities for Māori to connect with their culture, thereby reducing the life satisfaction gap between Māori and Europeans.

The remainder of the paper is organised as follows. Section 4.2 provides a literature review highlighting key findings and identifying gaps pertinent to cultural identity and life satisfaction. The data and selected variables are discussed in section 4.3. The methodology is outlined in section 4.4, followed by the results and analysis in section 4.5. Section 4.6 provides a detailed discussion of policy implications, while the paper concludes with section 4.7.

4.2 Literature Review

4.2.1 Subjective well-being and life satisfaction

'Well-being' is typically divided into objective and subjective well-being. Subjective refers to personal perspectives, feelings, or opinions based on individual experiences and internal states. This includes an individual's satisfaction and personal perception of happiness. Conversely, the term 'objective' pertains to observable and measurable facts that exist independently of personal feelings or opinions. Examples include income level, birth rate, and death rate (Sirgy et al., 2006).

Diener et al. (1999: 277) defined subjective well-being (SWB) as "*a broad category of phenomena that includes people's emotional responses, domain satisfactions, and global judgments of life satisfaction*"[13].

Diener conceptualises SWB as an individual's evaluation of their own life, which aligns with the definition provided by the NZ Treasury. In the Treasury's well-being report, the definition is noted as follows: "Subjective well-being refers to how people experience and evaluate different aspects of their lives" (The Treasury, 2022, p.40).

While SWB encompasses a comprehensive assessment of one's life circumstances and emotional state, the term 'happiness' is commonly employed in everyday language to denote a transient state of an individual, often manifesting as a feeling of contentment—illustrated when we say, 'You look happy today' or 'I am very happy for you.' In philosophical discourse, however, its definition is typically more expansive, encompassing the quality of an entire life as an umbrella term for all that is good and worthwhile. This broader conception of happiness is often understood as contentment or 'life satisfaction' and is assessed through self-reports or daily questionnaires (Crisp, 2021; Veenhoven, 2011).

SWB is typically assessed using a combination of questions that evaluate life satisfaction, happiness, and a sense of fulfilment. Global measures, which directly ask respondents how satisfied or happy they feel with their lives, have demonstrated validity and reliability across various studies (The Treasury, 2022).

Life satisfaction, a key dimension of SWB, is widely recognised as a reliable and frequently used metric for

[13] Also see: *"Subjective well-being is the scientific name for how people evaluate their lives. People can evaluate their lives in terms of a global judgment (such as life satisfaction or feelings of fulfillment), in terms of evaluating the domains of their lives (such as marriage or work), or in terms of their ongoing emotional feelings about what is happening to them (feeling pleasant emotions, which arise from positive evaluations of one's experiences, and low levels of unpleasant feelings, which arise from negative evaluations of one's experiences)"* (Diener, n.d).

evaluating overall well-being (OECD, 2013)[14]. Surveys commonly ask respondents to rate their satisfaction with life on a numerical scale, such as 0 to 10, where 0 indicates "completely dissatisfied" and 10 indicates "completely satisfied." This approach provides a broad and subjective measure, enabling individuals to consider and consolidate various aspects of their lives into a single, overall evaluation, eliminating the need for analysts to impose external value judgments (Sirgy et al., 2006). Moreover, the wording does not restrict respondents to personal achievements but permits them to weigh any factors, family, whānau, community, and cultural identity, when forming a holistic judgement. This breadth is essential in a Māori context because it allows participants to embed collective well-being within their answers, preserving comparability across ethnic groups while respecting cultural nuances. Numerous studies have widely adopted the use of life satisfaction as a measure of SWB or happiness.

Following the above, this study will also use life satisfaction as a proxy for SWB to explore its determinants and disparities.

4.2.2 Culture and cultural identity

Scholars such as Hofstede (1980) and Schwartz (1994) approach culture as a quantifiable variable, highlighting the measurable aspects of cultural values. In contrast, Geertz (1973) emphasises culture's role in cognition, social norms, and group behaviour, noting its interpretive and subjective qualities. Despite more than a century of research, a universally accepted definition of culture remains elusive. Early anthropological studies by Tylor (1871) and Kroeber and Kluckhohn (1952) suggested that culture includes everything learned by a society's members. However, capturing the intricacy of culture within a singular definition has proven challenging. Jahoda (2012) advocates for understanding culture in specific contexts, emphasising its functional relevance over strict conceptual delineations.

Frierson et al. (2010, p.75) define culture as "*a cumulative body of learned and shared behaviour, values, customs, and beliefs common to a particular group or society. In essence, culture is a predominant force shaping who we are*". This aligns closely with the Ministry of Social Development's (MSD) perspective in their 2016 Social Report, which describes culture as encompassing "*customs, practices, languages, values and worldviews that define social groups such as those based on nationality, ethnicity, region or common interests*" (Ministry of Social Development, 2016, p.175).

Both definitions of New Zealand emphasise the culture's collective and dynamic nature due to its role in shaping identity. In this study, cultural identity (CI) is conceptualised as an individual's ability to be themselves within New Zealand society, reflecting how people can express their identity and values. This subjective measure, supported by MSD, underscores the importance of CI in contributing to a sense of self and social belonging. As the 2016 Social Report noted, CI fosters overall well-being by reinforcing national pride, valuing diversity, and enabling individuals to pass cultural traditions to future generations (Ministry of Social

[14] See: *"…many measures of subjective well-being – such as overall life satisfaction…(OECD, 2013, p. 41)".*

Development, 2016, p.175). Thus, Frierson et al.'s (2010) definition complements the operationalisation of CI in this research, linking cultural belonging to broader measures of well-being in New Zealand's multicultural context.

CI influences well-being by providing a sense of belonging and security, shaping the way people view life and make decisions (Hamley et al., 2025). People with a strong sense of CI can live a good life in ways that are true to their culture. A strong CI connects people to their culture and community, which helps them do well in health, education, and social networks (Waa et al., 2017; The Treasury, 2022). Social networks help people to feel connected to others in their community, receive emotional support, and get help with everyday needs. They also help strengthen social cohesion in communities (Ministry of Social Development, 2016).

For many Māori, CI is closely linked to collective synergies (*Te Kāhui* – collective identity), *whenua* (ancestral land, *Te Ao Turoa*), *te reo Māori,* and *tikanga* (language and customs, *Te Kete Puawai*). Durie's Te Ngāhuru outcome schema identifies these four elements as central contributors to Māori well-being, although their importance differs across individuals and iwi (Durie, 2006). In comparison, European CI is more likely to be based on individual identity and modern institutions, such as the economy and health (Sibley & Liu, 2007, 2012). Indigenous values such as whanaungatanga (social connectedness) and kaitiakitanga (guardianship of the environment) are reinforced for Māori through cultural practices such as marae (meeting ground) gatherings (Stats NZ, 2013). However, historical trauma caused by land dispossession and ongoing inequality has severed many of these cultural connections and undermined the sociocultural stability of Māori communities, creating social, environmental, and economic challenges (Easton, 2020). International efforts such as the adoption of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) have not addressed these differences, with Māori rates of unemployment remaining high (Stats NZ, 2022)[15] and negative representation in the media perpetuating stereotypes and further marginalising Māori (Barnes & McCreanor, 2023).

4.2.3 Māori well-being: Challenges and the role of cultural identity

New Zealand's economic liberalisation since the mid-1980s has transformed its economy, leading to steady growth, low inflation, and reduced unemployment. However, these reforms disproportionately impacted Māori, widening socioeconomic disparities. Lashley (2000) reports that by 1991, Māori incomes fell from 85% of European income in 1976 to 73% in 1991 and rose slightly in 1996. Māori, overrepresented in low-skilled and precarious sectors of the economy, unemployment reached 25% in 1992, compared to 5% for Europeans. Treaty settlements, designed to address historical injustices related to land dispossession, offered only partial redress and often overlooked urban Māori (Lashley, 2000). Moreover, economic reforms diminished Māori incomes and employment prospects, inadvertently eroding their cultural identity. Numerous Māori migrated away from their communities, disrupting cultural connections to whenua (ancestral lands) and weakening

[15] For instance, while the national unemployment rate was 3.3% in the June 2022 quarter, Māori unemployment remained significantly higher at 5.5%, reflecting enduring barriers in the labour market (Stats NZ, 2022).

traditional support systems (Lashley, 2000).

Neoliberal policies also exacerbated inequalities in health and housing. Māori, overrepresented in low-income groups, faced diminished access to essential services following market-based healthcare reforms (Brown & Bryder, 2023). Although strategies such as He Korowai Oranga (Ministry of Health, 2002) aimed to improve Māori health, disparities persist, with Māori experiencing higher mortality rates and greater barriers to care (Tobias et al., 2009). Life-table data reveal progress amid continuing inequality: Māori life expectancy at birth rose from 68 years for males and 73.5 years for females in 1985 to 73.4 and 77.1 years in 2019; the Māori–non-Māori gap peaked at about nine years in 2001–2004 and has since narrowed to roughly seven years (Stats NZ, 2023a; Carter, Blakely, & Soeberg, 2010). Reid et al. (2014) and Houkamau et al. (2017) argue that inequalities compounded by later economic reforms have entrenched disadvantages across income, education, and well-being.

Despite these challenges, Māori have preserved their cultural identity through language, customs, and community engagement, fostering resilience (Waa et al., 2017). This robust cultural resilience[16] is evident in the provision of emotional support and the promotion of collective well-being, underpinned by values such as whanaungatanga (belonging), manaakitanga (care), and kaitiakitanga (stewardship). These cultural facets serve to alleviate some of the detrimental effects of inequalities, thereby providing a buffer against socioeconomic disadvantages and enhancing their well-being (Wolfgramm et al., 2020; Houkamau et al., 2017). However, cultural identity alone cannot eliminate disparities. Treasury reports (The Treasury, 2022; 2024) highlight that while cultural frameworks such as He Ara Waiora guide policy appraisal by asking how initiatives enhance kaitiakitanga (stewardship of all our resources), manaakitanga (care for others), whanaungatanga (relationships), and ōhanga (prosperity), structural inequalities in income, education, and healthcare continue to limit Māori life satisfaction.

For Māori, housing is deeply intertwined with whānau (extended family), whenua (ancestral land), and whakapapa (genealogical ties), serving as a social and cultural anchor rather than merely a private asset. According to Stats NZ (2021a), nine out of ten Māori adults consider engagement with Māori culture at least "a little" important. Notably, Māori living in crowded households or non-owner-occupied dwellings, such as renters, report stronger cultural connections, including detailed knowledge of their pepeha, frequent marae visits, and a higher likelihood of rating cultural engagement as "very important." This suggests that housing disadvantage may foster cultural engagement, strengthening Māori identity and community ties. Consequently, Māori renters' less favourable housing conditions may not lead to lower subjective well-being, as cultural engagement provides a buffer. However, persistent low homeownership rates among Māori have led to adverse

[16] Resilience is defined as the capacity of individuals or communities to maintain or restore their positive functioning in the face of adversity (Fleming & Ledogar, 2008). For Indigenous peoples such as Māori, cultural resilience specifically refers to the ability to retain, adapt and pass on cultural practices, identities and values despite challenges such as colonisation or discrimination. This supports collective well-being and ensures cultural continuity (Awatere et al., 2019).

material outcomes with inter-generational consequences (Waldegrave et al., 2006).

Conceptual models such as Te Whare Tapa Whā (Durie, 1998), He Ara Waiora (Treasury, 2018), and Te Kupenga (Stats NZ, 2013; Cram, 2014) emphasise the role of cultural identity in well-being. However, these frameworks are often qualitative and specific to Māori, limiting direct comparisons with broader populations. While they provide valuable insights, there is a scarcity of quantitative research that empirically decomposes the life satisfaction gap between Māori and Europeans. Our study addresses this gap by applying the Oaxaca-Blinder decomposition to assess whether and how cultural identity may be associated with differences in reported Māori life satisfaction.

4.2.4 Oaxaca-Blinder decomposition

The Oaxaca-Blinder (OB) decomposition was developed in the 1970s by Oaxaca (1973) and Blinder (1973) to dissect wage disparities into components of explained (observable factors) and unexplained (discrimination or unobservable factors) differences. While initially focused on wage gaps, the OB method has been broadened to other socioeconomic outcomes, including subjective well-being (Jann, 2008).

Kieny et al. (2021) examine gender gaps in emotional well-being for adults aged 50+ in low- and middle-income countries, finding that much of the gap is attributable to women's differential health, disability, pain, and socioeconomic status, with some unexplained residual differences remaining.

Helliwell, Layard, and Sachs (2016) decompose national life evaluations from the Cantril Ladder into six factors: GDP per capita, social support, healthy life expectancy, freedom of choice, generosity, and perceptions of corruption. The method yields regression coefficients multiplied by country values to measure contributions, with unquantified residuals representing unknown influences.

Kushnirovich and Sherman (2017) study life satisfaction gaps in Israel, showing that for Israeli-born Arab citizens, unequal returns on resources drive the gap. In contrast, for immigrants from the Former Soviet Union, both lower resource levels and unequal returns are important.

Barrington-Leigh and Escande (2018) use a regression-based weights approach to show that employment, social relationships, and health correlate more significantly with life satisfaction than income or education. Similarly, Rossouw and Greyling (2020) study social well-being across Africa, linking gaps to country-level factors such as employment, gender equality, trade, and environmental quality.

These studies exemplify the OB decomposition's adaptability in examining the influence of socioeconomic factors on subjective well-being. Despite these methodological advancements in well-being-based decompositions, there is still an absence of empirical research that focuses explicitly on Indigenous vs. non-Indigenous differences in subjective well-being, especially using measures of cultural identity as key explanatory variables. Therefore, a gap exists in the literature in terms of applying the OB method to life satisfaction differences between Indigenous and non-Indigenous people, which systematically includes

cultural identity variables.

Following the above, we employ the OB approach to explore if the decomposition of life satisfaction disparities between Māori (Indigenous) and European (non-Indigenous) can shed light on the role of cultural identity in these differences. We specifically assess whether differences in characteristics or the returns to characteristics (coefficients) underpin these life satisfaction disparities and identify the particular factors behind these effects.

4.2.5 Limitations of previous research

From sections 4.2.3 and 4.2.4, we note that numerous conceptual frameworks (e.g., Durie, 1998; McLeod, 2018) highlight the importance of Māori well-being. However, most previous studies have largely consisted of conceptual reviews and theoretical discussions, with limited empirical studies that directly investigate the relationship between life satisfaction and cultural identity. Moreover, existing cultural identity variables are often narrowly defined, focusing primarily on Māori perspectives, thus limiting their applicability to broader populations and hampering comparisons across different demographic groups. Among the frameworks reviewed, only the Treasury's Living Standards Framework (LSF) Dashboard explicitly quantifies how policy inputs relate to well-being outcomes, using a regularly updated set of multidimensional indicators across 12 domains, such as income, health, cultural identity, and social capital (McLeod, 2018). In contrast, the complementary framework, He Ara Waiora, provides culturally informed guidance. However, it does not specifically address the role of cultural identity in life satisfaction disparities, nor does it apply an empirical decomposition method.

In other words, by positioning cultural identity as a central element in our well-being analysis, we can discern the unique role it plays in influencing life satisfaction among various groups. Our study posits that cultural identity not only bolsters life satisfaction but also helps to counteract disparities faced by Māori. Concurrently, we investigate the potential contributions of other determinants, such as economic and social factors, to the observed differences in mean life satisfaction and identify key drivers behind these disparities across different groups.

Empirical analyses utilising the Oaxaca-Blinder decomposition method consistently reveal that lower resource levels and unequal returns on education and labour significantly contribute to wage and poverty disparities. This is particularly evident among Indigenous populations who frequently face chronic poverty and vulnerability to economic shocks (Canedo, 2019; Chong & Ñopo, 2008). In the context of well-being analyses, both observable characteristics and returns have been found to contribute to disparities in subjective well-being. However, few studies have demonstrated how cultural identity itself contributes to explaining how structural and coefficient factors interact to produce unequal outcomes across various socioeconomic dimensions. Such a gap underscores the need for research explicitly decomposing life satisfaction differences between Māori and Europeans, with particular attention to cultural identity as a potential factor.

4.3 Data and variables

4.3.1 Data source

Our analyses use data from the New Zealand General Social Survey (GSS), a biennial survey of individuals aged 15 and older. We include data from the surveys for the 2014, 2016, 2018, and 2021 waves (n = ~ 24300). We did not include earlier waves due to changes in how variables were scaled[17]. The NZGSS permits respondents to select multiple ethnicities. To retain a clear distinction between our groups under investigation, we classify individuals as European when they select only the "European" category and no additional ethnicity, and as Māori-any when they select "Māori" only or select "Māori" and another ethnicity. The reasons for these classifications are listed below:

- European: respondents who selected only European and no additional ethnicity. Europeans serve as the reference population, and restricting it to a single response avoids adding Māori or other minorities into the reference group. This prevents us from blurring the lines between Indigenous and European, which is the focus of the study. Refer to the descriptive statistics in section 4.3.4.
- Māori-any: respondents who selected Māori, either alone or coupled with another ethnicity. We follow policy and scholarly practice in Aotearoa that treat any self-identified Māori heritage as relevant when monitoring Indigenous outcomes (Stats NZ, 2009; Ministry of Health, 2017). Roughly half of all people who select Māori also select another ethnicity, and many have only one Māori grandparent. Therefore, excluding mixed-Māori respondents would remove a sizable share of the Māori population (around 41%) and would erase a large share of Māori heritage and conceal important diversity (Didham & Callister, 2012). Refer to the descriptive statistics in section 4.3.4.

Respondents who identify with the Pacific, Asian, Middle Eastern/Latin American/African (MELAA), or "Other" categories appear in descriptive tables but are excluded from the regression analysis for three methodological reasons. First, these broad labels mask substantial internal diversity; for instance, Indian and East-Asian communities fall under the single "Asian" heading. That is, assuming one cultural identity effect per label would be misleading. Second, once subdivided, each group contributes too few observations for stable coefficient estimates, producing wide confidence intervals. Third, the study's core aim is to investigate the well-documented Māori–European gap recognised in Treaty-related policy (The Treasury, 2022). Concentrating on two analytically coherent groups, therefore, aligns the empirical strategy with the research question while preserving statistical power.

Data were accessed through New Zealand's Integrated Data Infrastructure and analysed in Statistics New Zealand's secure DataLab. All data are subject to the confidentiality provisions of the Statistics Act 1975 and associated protocols that ensure all individuals are anonymised. We cannot provide counts of missing cases due to our confidentiality agreement.

[17] For example, life satisfaction was measured on a 5-point scale in 2012 but was rescaled on a 0–10 scale in 2014.

4.3.2 Data processing

The GSS surveys are recognised for their rigorous data collection processes, which result in low levels of missing data. Among our selected variables, none had more than 1% missingness, except the material well-being index, which had a 1.47% missing rate. Since all variables with missing data were either ordinal or categorical, we followed best statistical practice (Zhou, Aryal, & Bouadjenek, 2024) and imputed missing observations using the mode of each variable. As a robustness check, we also re-estimated our models using list-wise deletion. The results showed negligible changes in the coefficient estimates, and no changes in the significance levels and direction.

Additionally, we reverse-coded variables where needed to ensure that higher values consistently reflect more favourable conditions. For example, the variable "Sufficient Income" was coded initially such that one meant "enough" and four meant "entirely insufficient." We reversed the coding so that higher values now represent greater income adequacy. A full breakdown of data cleaning and recoding procedures is available in Supplementary Information C, Table C1.

4.3.3 Variables

4.3.3.1 Outcome Variable: Life satisfaction

Life satisfaction is measured on a scale from 0 (completely dissatisfied) to 10 (completely satisfied) in response to the question: "How do you feel about your life as a whole?"

4.3.3.2 Selection of covariates

The primary independent variable is cultural identity, measured by the question: "People in New Zealand have different lifestyles, cultures, and beliefs that express who they are. How easy or hard is it for you to be yourself in New Zealand?" Responses range from 1 (very hard) to 5 (very easy). This item now forms part of the cultural capability and belonging domain introduced in the Treasury's 2021 LSF update.

Other control variables include the following:

1. Housing Conditions: Assesses the impact of house quality on well-being, with warm and dry living conditions fostering superior health, particularly for children, in contrast to cold and damp environments (The Treasury, 2021). Measured on a 1–5 scale, indicating dwelling quality.
2. Household Tenure (Categorical): Captures whether an individual is renting (reference group), owns a home, or whether a family trust owns the home. Renting has been linked to higher residential mobility and poorer health outcomes (Stats NZ, 2021a).
3. Health Status: A key determinant of well-being, rated on a 1–5 scale (Stiglitz et al., 2009; Durand, 2015).
4. Loneliness and Partnership Status: Indicators of social connections. Partnership is coded as a

dummy (1 = partnered, 0 = otherwise). Loneliness is rated on a scale of 1–5, indicating perceived social isolation (McLeod, 2018).

5. Age and Age Squared: We include age and its square to capture a potential nonlinear relationship with life satisfaction (Ryff & Keyes, 1995).
6. Labour Force Status (Categorical): Dummy variables indicate categories such as employed, unemployed, or not in the labour force (reference group). For Māori, inequalities such as lower job quality and economic instability may impact how labour force status correlates with life satisfaction (The Treasury, 2022).
7. Material Well-being Index (MWI) and Income Sufficiency: Instead of individual income—often less representative in Māori collective contexts—we employ:
    i. MWI: A non-income metric reflecting living standards (Perry,2017).
    ii. Income sufficiency: Whether an individual perceives their income meets their needs (McLeod, 2018).

    This dual approach acknowledges income inequalities and the fact that Māori may rely on broader whānau resources (Sporle et al., 2002).

    While Smith (2018) advocates disposable income measures, the GSS only collects broad income categories, complicating precise calculations. Aggregating such categories at the household level can inflate the margin of error. Consequently, MWI and income sufficiency better capture economic well-being under these constraints.

8. We include region and time fixed effects to account for structural differences across space and time explicitly. Including these fixed effects, we isolate group differences in life satisfaction while also considering that regional context and temporal dynamics themselves could be important contributors to subjective well-being.

Table C2 in Supplementary Information C lists all variable types and definitions[18].

4.3.4 Descriptive statistics

We pool the four cross-sectional waves to increase the sample size and statistical power, particularly for Māori respondents. Rather than modelling individual changes over time (panel), our focus is on between-group differences, though we include time fixed effects to adjust for wave-specific shocks and contextual influences.

[18] We do not include education in our analyses and justify this decision on theoretical and empirical grounds. A large body of literature has shown that education has a weak or insignificant relationship with subjective well-being once variables such as income and health are controlled for (Powdthavee et al., 2015).Powdthavee et al. (2015) found a negative and significant direct effect of education on life satisfaction in their structural equation modelling of Australian data. They noted that education's contribution to well-being was through indirect effects via income, employment and health outcomes. Jarden et al. (2022) and The Treasury (2022) also found weak or negative correlations between educational attainment (formal qualifications) and subjective well-being across different population groups. This is further compounded for Māori, where historical and structural inequalities have limited the role of education in improving multidimensional well-being (Waa et al., 2017). Our study does not aim to analyse the impact of education. Given these findings, we exclude this variable to focus on determinants with more substantial and more direct associations with life satisfaction.

The total sample consists of 24,300 observations, including 20,268 Europeans and 4,032 Māori.

We present the descriptive statistics in Table C3 in Supplementary Information C, due to the size of the table. However, we will highlight some notable findings below.

The descriptive statistics show some differences in well-being outcomes between European and Māori groups. Life satisfaction is higher for Europeans (Mean = 7.72) than for Māori (Mean = 7.53), with a mode of 8 in both groups. Independent-sample *t*-test comparing Māori and European means shows a mean difference ($t = 5.9$, $p < 0.001$), which indicates that the difference is statistically significant. Both groups exhibit high cultural identity scores, with over half of the respondents in each group choosing the highest category, 5. However, based on the results from the Mann-Whitney U ($z = 7.88$, $p < 0.001$), the difference between the two groups is statistically significant (Europeans, 55.68% vs. Māori, 51.12%). In self-rated health, the most common response among Europeans is category 4 ("very good"), selected by 38.26% of respondents, whereas Māori most often choose category 3 ("good") at 33.56%. For loneliness, coded so that higher values reflect feeling less lonely, about 60.66% of Europeans select the top category 5, compared with 55.65% of Māori.

The results from the economic indicators show that Europeans have a higher level of material well-being (mean = 14.93 vs. 11.67). Sufficient income is most often reported at category 3, chosen by 48.34% of Europeans and 37.95% of Māori. For better housing conditions, 40.73% of Europeans and 39.96% of Māori select category 4. A higher proportion of Europeans own their homes (58%) compared to Māori (36.55%), with 16% of Europeans having family trust property compared to Māori (6.37%), who mostly rent (57%) compared to Europeans (25.7%). Employment is also higher among Europeans (64.05% employed) than among Māori (59.29%), with a higher unemployment rate among Māori (7.22% vs. 2.25%). The regional distributions further illustrate these socioeconomic differences. Māori are disproportionately concentrated in Northland, Bay of Plenty, and Gisborne (24.93%), regions with higher socioeconomic disadvantages. Europeans are more evenly spread across the country, with higher proportions in Canterbury and the South Island, areas associated with higher average life satisfaction scores.

Therefore, the descriptive statistics show that Māori face socioeconomic disadvantages. Although cultural identity is high in both groups, factors may still constrain Māori from freely expressing their identity (Reid et al., 2014). For example, Stats NZ (2013) reported that 32% of Māori respondents "sometimes or often" felt unable to express their culture in public or at work, and in 2021, 28% experienced discrimination when speaking te reo Māori (Stats NZ, 2022b).

4.4 Methodology

This section outlines the methodological approach adopted to investigate the relationship between cultural identity and life satisfaction, specifically contrasting European and Māori populations in New Zealand. Subsequent sections explain the models utilised, the variables' specifications, and the underlying justifications for their incorporation.

4.4.1 Pooled OLS regression

To answer our first research question about the relationship between cultural identity and life satisfaction, comparing Māori and European populations, we utilise a Pooled OLS regression. We treat the dependent variable, life satisfaction, as a continuous variable following the work of Ferrer-i-Carbonell and Frijters (2004), who demonstrated that when using OLS estimations on ordinal data such as life satisfaction, the estimated coefficients and their significance levels are very similar to those obtained from ordered probit or ordered logit models.

To test whether this is indeed true in our analyses, we also estimated an ordered probit model to account for the inherently ordinal nature of life satisfaction (Schröder & Yitzhaki, 2017). We found that the significance and size of the coefficients are similar to those in our POLS estimations, suggesting that treating life satisfaction as continuous does not affect the main findings. Detailed results are available in Supplementary Information C, Table C5.

As mentioned in section 4.3.4, we include both year and regional fixed effects to control for unobserved heterogeneity across time and space. Therefore, the Pooled OLS regression equation is:

$$LS_{it} = \alpha + \beta X_{it} + y_t + \delta_r + \varepsilon_{it} \quad (1)$$

Where LS_{it} is the life satisfaction for individual *i* in time period *t*. α is the intercept, and X_{it} is the vector of independent variables (e.g., income, employment, cultural identity), while β is the vector of coefficients corresponding to X_{it}. Time-fixed effects, capturing period-specific influences (e.g., economic conditions), are represented by y_t and δ_r represents the place-fixed effects, capturing location-specific factors (e.g., regional differences). The error term is ε_{it}.

Cultural Identity is an ordinal variable (levels 1–5), and we use level 1 as the reference. This approach allows for a clear comparison of the effects of different levels of cultural identity on life satisfaction relative to the baseline group. By treating level 1 as the reference, we can isolate the incremental impact of increasing cultural identity and see the varying degrees of self-identification influence well-being outcomes.

The "Year" fixed effect represents survey years 2014, 2016, and 2018, with 2021[19] as the reference year. Regional fixed effects indicate geographic regions, with Auckland as the reference region being omitted.

We used the Generalised Variance Inflation Factor (GVIF) (Fox & Monette, 1992), Spearman's rank correlation (Spearman, 1904), and polychoric correlation (Holgado–Tello et al., 2010) to test for multicollinearity. The results are favourable, indicating no severe multicollinearity is present. We employed the Breusch-Pagan test to detect heteroscedasticity and used robust standard errors as needed. Detailed results are available in Supplementary Information C, Tables C4A–C.

[19] Considering the impact of COVID 19 outbreak, we deem 2021 as reference year.

4.4.2 Oaxaca-Blinder decomposition

Following the work of Rossouw and Greyling (2020), we employ the Oaxaca-Blinder (OB) decomposition technique (Oaxaca, 1973; Blinder, 1973) to decompose the difference in life satisfaction between Māori and Europeans. This will enable us to address our second research question regarding the extent to which the difference in life satisfaction between the two groups reflects differences in observed characteristics (explained component) or differences in the returns to these characteristics (unexplained component).

In other words, the explained component will determine how much of the disparity in life satisfaction can be attributed to group differences in resources and attributes (characteristics) such as income, housing quality, health status, etc. For example, if one group (Europeans) has a higher average income and better housing conditions than the other (Māori), the explained component captures the extent to which these advantages contribute to the higher life satisfaction observed for that group.

In contrast, the unexplained component is related to the returns of these characteristics. For example, even if both groups exhibit similar levels of observable characteristics, Europeans may derive more life satisfaction from this variable, maybe due to structural differences, social norms, discrimination, or unobserved factors. The Oaxaca-Blinder (OB) decomposition provides both an aggregate decomposition (total explained and unexplained effects) and a detailed decomposition (the contribution of each independent variable to the gap).

The following sub-section will illustrate the decomposition technique applied to life satisfaction differences between Māori and Europeans (Rios-Avila, 2020; Firpo, Fortin, & Lemieux, 2018).

The life satisfaction of Europeans (E) is equal to Y^E, Maori's (M) equals to Y^M expressed as follows:

$$Y^E = X_E \beta_E$$

$$Y^M = X_M \beta_M$$

Let X_E and X_M denote observed characteristics of Europeans and Māori, respectively, those related to life satisfaction, such as material level or sufficient income. β_E and β_M are the coefficients of returns on life satisfaction. The differences in life satisfaction between ethnicities is $Y^E - Y^M$. A counterfactual group (C) with Māori characteristics needs to be constructed (X_M) and applied to European returns (β_E). Subsequently, the life satisfaction score of this group is recorded as Y^C. The counterfactual term helps isolate how Māori life satisfaction would change if their characteristics were those of Europeans.

$$Y^C = X_M \beta_E$$

Based on the above, the total difference in life satisfaction can be decomposed as:

$$\boldsymbol{\Delta} = Y^E - Y^M$$

After adding and subtracting the counterfactual term, the equation can be written:

$$Y^{\mathrm{E}} - Y^{\mathrm{M}} = Y^{\mathrm{E}} - Y^{C} + Y^{C} - Y^{\mathrm{M}} = X_{\mathrm{E}}\beta_{\mathrm{E}} - X_{M}\beta_{E} + X_{M}\beta_{E} - X_{M}\beta_{M} = (X_{\mathrm{E}} - X_{\mathrm{M}})\beta_{\mathrm{E}} + X_{\mathrm{M}}(\beta_{\mathrm{E}} - \beta_{\mathrm{M}}) \quad (2)$$

Where, $Y^{\mathrm{E}} - Y^{C} = X_{E}\beta_{E} - X_{M}\beta_{E} = (X_{\mathrm{E}} - X_{\mathrm{M}})\beta_{E}$ is the explained component (E), which captures the part of the gap due to differences in characteristics[20] $(X_{E} - X_{M})$, assuming European returns β_{E}. $Y^{C} - Y^{M} = X_{M}\beta_{E} - X_{M}\beta_{M} = X_{M}(\beta_{E} - \beta_{M})$ is the unexplained (coefficient) term which captures the difference in returns to those characteristics that are valued or converted into life satisfaction, between Europeans and Māori, evaluated using Māori characteristics (X_{M}).

When applied to a linear estimation, the OB decomposition not only divides the outcome differences into explained and unexplained components but also analyses the specific contributions of individual independent variables or sets of variables to these differences. For example, we can examine how much of the ethnic gap in life satisfaction is due to differences in cultural identity or material well-being levels. Similarly, identifying how much of the unexplained gap is associated with differences in the returns to economic factors, age, or health could also provide valuable insights.

The explained contribution of an independent variable X_{k} can be calculated as:

$$E_{k} = (\bar{X}_{k}^{E} - \bar{X}_{k}^{M})\,\beta_{k}^{E} \quad (3)$$

where $\bar{X}_{k}^{E}$ and $\bar{X}_{k}^{M}$ represent the mean values of a variable X_{k} for Europeans and Māori, respectively, and β_{k}^{E} is the coefficient (return) for Europeans.

The unexplained contribution of the same independent variable is expressed as:

$$U_{k} = \bar{X}_{k}^{M}\left(\beta_{k}^{E} - \beta_{k}^{M}\right) \quad (4)$$

where β_{k}^{M} represents the coefficient for Māori.

Determining the contribution of each variable to the explained part of the gap is straightforward, as the total contribution is simply the sum of the individual contributions:

$$E = \sum_{k} E_{k} \quad (5)$$

Similarly, the unexplained component is the sum of the individual unexplained contributions:

$$U = \sum_{k} U_{k} \quad (6)$$

[20] For example, the various level of material index or score of cultural identity.

4.5 Results

4.5.1 Pooled OLS regression

Table 4.1 presents the POLS regression results, investigating the relationship between cultural identity (CI) and life satisfaction among European and Māori populations in New Zealand. Because CI is measured using four dummy variables (CI = 2, 3, 4, 5) in relation to the reference category (CI = 1), each coefficient represents the expected difference in life satisfaction compared to individuals in CI = 1, holding all other factors constant.

We find a significant and positive relationship between CI and life satisfaction for both Māori and European populations in New Zealand. For Europeans, a coefficient of 0.96 for CI = 2 means that individuals in CI = 2 report 0.96 points higher life satisfaction than those in CI = 1. Similarly, a coefficient of 1.86 for CI = 5 suggests that those in the highest cultural identity category report 1.86 points higher life satisfaction than the baseline group (CI = 1). A similar pattern is observed for Māori, where individuals with a stronger cultural identity (CI = 2 to CI = 5) have higher life satisfaction than those in the CI = 1 category.

Although the coefficients are higher for Europeans, a Wald F test ($F = 1.68$, $p = 0.15$) indicates that this difference is not statistically significant. This suggests that cultural identity plays a similarly beneficial role in life satisfaction across both groups.

Apart from our variable of interest, CI, we also see that Māori reported higher life satisfaction in earlier years than in 2021, a period in which Māori experienced larger job losses and poorer health outcomes than Europeans (Stats NZ, 2022b; Stats NZ, 2021b). Therefore, despite the inclusion of time fixed effects, this may reflect external socioeconomic factors or changes in policy environments over time. Apart from cultural identity, Māori in Northland, Bay of Plenty, Gisborne, Wellington, and the remainder of the North Island are associated with higher life satisfaction than Māori in Auckland. These regions also have higher unemployment and lower median wages (Ministry of Business, Innovation and Employment, 2024; Stats NZ, 2025, February 5). The association may therefore reflect offsetting factors such as lower living costs, stronger whānau networks, or lifestyle amenities.

Owning a house or living in a family trust property is positively and significantly associated with life satisfaction for Europeans but not for Māori. This may reflect disparities in access to secure, high-quality housing as well as cultural variation in how housing is valued within extended whānau (family) networks.

Table 4.1. Pooled OLS regression results

Variable	European Coefficient	European RSE	Māori Coefficient	Māori RSE
Cultural Identity (Reference score: 1)				
2	0.96***	(0.34)	0.58*	(0.39)
3	1.30***	(0.31)	0.90***	(0.35)
4	1.62***	(0.31)	1.03***	(0.34)
5	1.86***	(0.31)	1.33***	(0.34)
Years (Reference: 2021)				
Year: 2014	0.10***	(0.04)	0.35***	(0.10)
Year: 2016	0.11***	(0.04)	0.41***	(0.10)
Year: 2018	0.01	(0.04)	0.40***	(0.10)
Regions (Reference: Auckland)				
Wellington Region	0.02	(0.04)	0.26**	(0.10)
Northland, Bay of Plenty, Gisborne Regions	0.10**	(0.04)	0.37***	(0.08)
Other North Island Regions	0.09**	(0.03)	0.33***	(0.08)
Canterbury Region	−0.06*	(0.04)	0.09	(0.12)
Other South Island Regions	0.12***	(0.04)	0.13	(0.11)

Variable	European Coefficient	European RSE	Māori Coefficient	Māori RSE
House Tenure (Reference: Not owned)				
Owned	0.09***	(0.03)	0.02	(0.06)
Family Trust	0.14***	(0.04)	0.02	(0.11)
Labour Force Status (Reference: Not in labour force)				
Unemployed	−0.36***	(0.09)	−0.18	(0.12)
Employed	−0.13***	(0.03)	−0.05	(0.07)
Housing conditions	0.12***	(0.01)	0.09**	(0.03)
Health status	0.41***	(0.01)	0.40***	(0.03)
Partnered status	0.37***	(0.02)	0.26***	(0.06)
Feelings of loneliness (higher = more lonely)	0.36***	(0.02)	0.38***	(0.03)
Sufficient income	0.18***	(0.08)	0.23***	(0.04)
Material well-being index	0.04***	(0.00)	0.03***	(0.01)
Age	−0.06***	(0.00)	−0.03***	(0.01)
Age^2	0.00***	(0.00)	0.00***	(0.00)
Constant	2.16***	(0.33)	2.27***	(0.42)
R^2	0.288		0.254	
Number of observations	20,268		4,032	

Source: Author's calculations using robust standard errors (RSE) to address potential heteroskedasticity.*** p<0.01, ** p<0.05, * p<0.1

Labour force status, material well-being index, and sufficient income collectively capture economic and employment-related factors influencing life satisfaction. For Europeans, being unemployed or employed is associated with lower life satisfaction compared to those not in the labour force. In contrast, it does not hold for Māori. Whereas this finding is consistent with our earlier discussion (section 4.2.2), it does not necessarily mean that labour force status has no impact, but rather that other unobserved factors (e.g., cultural, social, or community support systems) may compensate for economic differences in ways that the model does not capture.

The coefficients for age in both ethnic groups are negative and statistically significant, while the coefficients for age squared are positive and statistically significant but substantially smaller in magnitude. These results indicate a concave (inverted-U) relationship between age and life satisfaction, where life satisfaction decreases modestly from early adulthood to mid-life, then stabilises and slightly increases in later years. The curvature is minimal, as the coefficient for the squared term is substantially smaller than the linear term, approximately two orders of magnitude smaller for Europeans and one order of magnitude smaller for Māori. These findings align with prior evidence suggesting that age effects on subjective well-being are statistically significant but modest in magnitude (Bartram, 2021).

The remaining variables in the model, including housing conditions, health status, partnered status, and feelings of loneliness, are all positively and significantly related to life satisfaction for both Europeans and Māori, in line with the literature.

The ordered probit results presented in Supplementary Information C (Table C5) closely mirror the findings from the pooled OLS model, both in terms of statistical significance and the direction of relationships. This consistency supports the robustness of our results, treating life satisfaction as a continuous rather than an ordered variable, and aligns with the findings of Ferrer-i-Carbonell (2004). This justifies our use of POLS to interpret the results.

4.5.2 Oaxaca-Blinder decomposition analysis

As was discussed in section 4.4.2, the purpose of utilising the Oaxaca-Blinder decomposition technique is to decompose the life satisfaction difference between Europeans and Māori. By doing this, we address our second research question of whether the difference is mainly due to observable characteristics (explained component) or returns to characteristics (unexplained component). More specifically, it will also allow us to determine whether cultural identity contributes significantly to the difference in life satisfaction between our two groups.

Table 4.2 first shows the aggregate decomposition (total explained, unexplained, and interaction components), which is subsequently followed by a detailed decomposition, i.e., the contribution of each independent variable to the gap. From the first section of Table 4.2, we see that the total mean difference in life satisfaction between Europeans and Māori is 0.186 (7.72 vs 7.53), the explained component is 0.47 (observable characteristics), the unexplained component is -0.36 (differences in how characteristics translate into life satisfaction) and the

interaction component is 0.08 (joint effect of characteristics and returns).

The explained component exceeds the total gap, suggesting that if Māori had the same inputs/assets/endowments and characteristics as Europeans, their predicted life satisfaction would be higher than that of Europeans. However, the unexplained component offsets part of this advantage, suggesting that Māori derive lower returns from similar endowments and characteristics.

Table 4.2. Oaxaca-Blinder Decomposition results

	Contribution to life satisfaction	**SE**		
Overall				
European	7.716***	(0.013)	-	-
Māori	7.53***	(0.031)	-	-
Difference	0.186***	(0.033)	-	-
Explained	0.465***	(0.035)	-	-
Unexplained	–0.360***	(0.032)	-	-
Interaction	0.080**	(0.034)		
	Decomposition of the explained component		**Decomposition of the unexplained component**	
Enough Income	0.092***	(0.016)	–0.124	(0.103)
Material Well-being Index (MWI)	0.103***	(0.024)	0.130	(0.094)
Housing Conditions	0.024***	(0.008)	0.144	(0.119)
Health Status	0.096***	(0.010)	0.024	(0.109)
Partnered Status	0.034***	(0.008)	0.048*	(0.026)
Feelings of Loneliness	0.043***	(0.007)	–0.102	(0.157)
Age	–0.433***	(0.091)	–0.654	(0.406)
Age Squared	0.512***	(0.102)	0.240	(0.225)
Not owned house	0.004	(0.015)	–0.035	(0.029)
Owned house	0.002	(0.010)	-0.001	(0.018)
Family trust	0.004	(0.005)	0.004	(0.005)
Not in labour force	0.000	(0.011)	0.028	(0.021)
Unemployed	0.005	(0.012)	–0.007	(0.007)
Employed	0.001	(0.017)	0.007	(0.035)
2014	–0.001	(0.001)	–0.005	(0.015)
2016	0.001	(0.001)	–0.017	(0.014)
2018	–0.001	(0.001)	–0.045***	(0.014)
2021	–0.000	(0.001)	0.027***	(0.008)
Auckland	-0.004**	(0.002)	0.028**	(0.012)
Wellington Region	0.001	(0.002)	–0.008	(0.007)
Northland, Bay of Plenty,	–0.022***	(0.007)	–0.031**	(0.015)

Gisborne Regions				
Other North Island Regions	–0.013***	(0.005)	–0.029*	(0.018)
Canterbury Region	–0.011	(0.09)	0.000	(0.006)
Other South Island Regions	-0.006	(0.007)	0.011*	(0.006)
Cultural Identity 1	0.003*	(0.002)	–0.003	(0.003)
Cultural Identity 2	0.002	(0.002)	–0.000	(0.005)
Cultural Identity 3	–0.006	(0.005)	0.004	(0.018)
Cultural Identity 4	0.005*	(0.003)	0.064*	(0.036)
Cultural Identity 5	0.026***	(0.006)	0.077	(0.057)
Cons	-	-	–0.135	(0.300)

Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

Now, we consider the next section of Table 4.2 and discuss what contributes to the gap in life satisfaction. The positive values in the explained component suggest that Europeans have endowments and characteristics that contribute to higher levels of life satisfaction. We will first consider our control variables before turning to our variable of interest, cultural identity (CI).

We see that economic and material factors (MWI (0.103), income sufficiency (0.092), and housing (0.024)) account for 47% of the explained life satisfaction gap. Additionally, health (0.096) explains another 21%, and together, these characteristics emphasise the foundational role of socioeconomic inequality.

Regional location plays a nuanced role in shaping life satisfaction outcomes between Māori and European populations. The POLS results in Table 4.1 (section 4.5.1) show that Māori living in regions such as Northland, Bay of Plenty, Gisborne, and Other North Island regions tend to report higher life satisfaction than those in Auckland. Here, the Oaxaca-Blinder decomposition in Table 4.2 indicates that the explained component attributed to regional composition is negative for Northland/Bay of Plenty/Gisborne (-0.022) and other North Island regions (-0.013), highlighting that Māori concentration in these areas narrows the overall gap. Conversely, the unexplained component for these regions is also negative (-0.031 and -0.029), showing that Māori gain slightly lower returns compared to Europeans assuming the same characteristics if they live in those regions. Recent labour-market evidence could help us understand this phenomenon. In the year to December 2023, Māori unemployment averaged 8.9% in Northland, 9.3% in the Bay of Plenty, and 7.5% in Gisborne / Hawke's Bay, compared with a national Māori rate of 8.2% and a European rate of 3.3% (Ministry of Business, 2024; Stats NZ, 2025, February 5). Additionally, it might be true that where Māori and Europeans live in the same region, Europeans derive greater benefit from local services and economic opportunities.

The above ties in with the unexplained component (returns to characteristics) in that significant differences are driven mostly by region, reinforcing that region-based life satisfaction is experienced differently across ethnic groups, even when including a regional fixed effect. It suggests that structural or cultural factors make the returns of regions (the liveability of a region) different for Māori and Europeans, even when observable characteristics (explained factors) are controlled for. For example, Auckland (unexplained) 0.028 implies that Māori get higher returns to life satisfaction from living in Auckland than Europeans, possibly due to better

services or urban opportunities.

Partnered status and feelings of loneliness play important but distinct roles in shaping the life satisfaction gap between Māori and Europeans. The results show that partnered status contributes 0.034 to the explained component, accounting for 7.3% of the gap. This reflects that Europeans are more likely to be in a partnered relationship, and being partnered is associated with higher life satisfaction across both groups. However, partnered status as part of the unexplained component is 0.048, indicating that Europeans experience a greater life satisfaction return from being partnered than Māori. This suggests that while relationships enhance the well-being of everyone, they may provide more emotional or economic stability for Europeans, possibly due to broader structural or cultural contexts such as access to joint financial resources, housing, or institutional support.

In contrast, not being lonely, which is positively associated with life satisfaction, contributes 0.043 (9.2%) to the explained component. Māori report lower levels of not being lonely (thus being lonely), and this difference significantly contributes to their lower average life satisfaction. This may be due to the centrality of whanaungatanga (social connectedness) in Māori culture, where relationships are foundational to identity and well-being. When these relational ties are weakened, the impact on well-being can be particularly pronounced. Together, partnered status and not being lonely highlight the important role of social relationships in life satisfaction and show how cultural differences in relational expectations may shape the lived experience of well-being.

Regarding our main variable of interest, cultural identity (CI), we find that the explained portion contributes significantly to explaining the higher levels of European life satisfaction. This is especially true for levels CI=4 and CI=5, where Europeans are more concentrated. The higher concentration of Europeans in the top two cultural identity categories contributes 7.3% to the explained component of the life satisfaction gap, under the assumption of a common coefficient. The unexplained portion of CI=4 is positive (0.064*), suggesting that Europeans still exhibit higher predicted life satisfaction, suggesting that the same cultural identity is returned differently. This asymmetry may arise because European cultural norms align more closely with mainstream institutions, whereas Māori cultural expression faces structural constraints.

In summary, cultural identity widens the gap through two channels: first, the larger share of Europeans reporting higher CI; second, the higher return to CI = 4 for Europeans. Policies that support Māori cultural expression, alongside efforts to reduce material disparities, could therefore narrow the life satisfaction gap.

These results confirm that even though the life satisfaction gap is rooted in socioeconomic disparities, CI contributes significantly. Therefore, while policy interventions must target material inequality, income, housing, and health, they should also foster CI to reduce the life satisfaction gap between Māori and Europeans.

4.6 Discussion and policy implications

Our POLS findings show that cultural identity (CI) is positively associated with the well-being of both Māori and European populations in New Zealand. Although the coefficients were higher for Europeans, we found that the difference was not statistically significant.

The Oaxaca–Blinder decomposition results showed that CI contributes significantly to explaining the higher levels of European life satisfaction. Additionally, measurable differences in material well-being, income, and housing, i.e., socioeconomic disparities, explain most of the observed gap in life satisfaction. As such, addressing the life satisfaction gap requires targeted policies that reduce the socioeconomic inequalities Māori face and promote CI (Tobias et al., 2009).

To address the socioeconomic challenges facing Māori, we propose that the government introduce a targeted Universal Basic Income (UBI) pilot in high-Māori-population regions (e.g., Northland, Bay of Plenty, Gisborne). The feasibility of such trials is recognised in a civil society submission to the Productivity Commission (Basic Income New Zealand, 2023). Research further indicates that cultural engagement aligns positively with Māori well-being, while financial security indicators remain the most consistent correlates (Houkamau & Sibley, 2017; Wolfgramm et al., 2020

). Additionally, the government could increase funding for Māori-led primary healthcare providers and integrate culturally responsive services into all district health boards. The *Hauora* report (Waitangi Tribunal, 2019) records funding inequalities between Māori and mainstream providers and recommends stronger Māori governance in primary care. Studies show that culturally aligned clinics improve access and self-rated health among Māori (Ellison-Loschmann & Pearce, 2006).

Furthermore, our data suggest that Māori living in regions with strong cultural cohesion tend to report higher life satisfaction. While this pattern is not directly tested in our model, it offers contextual support for place-based policy design. Place-based policies can leverage these networks for better outcomes by establishing "Māori Economic Development Zones" in Northland, Gisborne, and Bay of Plenty with tax incentives for Māori-owned businesses. This initiative would support job creation and economic self-determination.

To strengthen CI as a pathway to improve well-being (Durie, 2001; Awatere et al., 2019), the New Zealand government could make Te Reo Māori education compulsory in primary and secondary schools. Additionally, financial incentives could be offered to teachers who become fluent in Te Reo. This could enhance CI and lead to higher life satisfaction among young Māori. The government could also increase funding for language immersion programmes such as kōhanga reo (preschool) and kura kaupapa Māori (Māori-medium schools).

4.7 Conclusion

This study examined the relationship between cultural identity and life satisfaction among Māori and European populations in New Zealand. Our findings indicate the complex and multifaceted nature of well-being

disparities and show that while cultural identity is positively associated with Māori life satisfaction, it does not fully compensate for disparities in income, health, and housing. These challenges manifest in lower material well-being, housing quality, and health outcomes for Māori compared to Europeans.

Our results suggest that cultural identity has a dual association with well-being. For Europeans, higher levels of cultural identity are significantly associated with greater life satisfaction, underlining the value of authenticity and belonging. For Māori, cultural identity is a source of emotional support and the promotion of collective well-being, underpinned by values such as whanaungatanga (belonging), manaakitanga (care), and kaitiakitanga (stewardship). However, the structural barriers they face mean that cultural identity does not fully translate into higher life satisfaction. The analysis underscores the need for policy interventions targeting cultural and structural factors. Strengthening Māori-centred frameworks, such as He Ara Waiora, while addressing barriers in housing, healthcare, and income equality, is crucial. Policies should provide equal opportunities for Māori to translate their cultural assets into tangible improvements in life satisfaction.

Although our evidence is drawn from Aotearoa New Zealand, the findings may prove useful for other countries with Indigenous peoples, such as Australia, Canada, and the United States.

Our study is based on individual responses to questions related to cultural identity, which may fail to capture the collective and relational dimensions central to Māori communities. Future studies should also aim to include a response for community levels and not only individual levels, since Māori cultural identity is deeply tied to whanaungatanga (social connectedness), manaakitanga (care), kaitiakitanga (environmental guardianship) and whenua (land) (Durie, 1998; Thom, 2022; Thom & Grimes, 2022), which are integral to their well-being. The inability of the model to incorporate these collective elements may contribute to the unexplained difference in life satisfaction.

It should also be noted that our analysis makes use of repeated cross-sections using pooled OLS estimations, which identify associations between life satisfaction and our selected variables but cannot prove causation. Consequently, we cannot directly test historical or structural mechanisms (e.g., the legacy of colonisation or systemic racism) that may underlie the observed Māori–European life satisfaction gap. Therefore, our findings provide evidence of disparities only.

Future research could extend the cultural identity analysis to Pacific, Asian, and other multi-ethnic communities. Achieving that goal will require larger or more finely stratified datasets so that estimates for each subgroup attain acceptable precision. Additionally, future research should aim to capture other dimensions of culture beyond cultural identity, enabling a more comprehensive understanding of how various aspects of culture interact with well-being across different groups.

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Supplementary Information C

Table C1. Variable Missingness, Imputation and Coding

Variables	Missingness	Imputation method	Reverse coding
Life satisfaction	0.15%	Mode	No
Cultural identity	0.18%	Mode	Yes
Housing conditions	0.30%	Mode	Yes
Health status	0.07%	Mode	Yes
Partnered status	-	-	No
Feelings of loneliness	0.30%	Mode	Yes
Age and age squared	-	-	No
Labour force status	0.11%	Mode	Yes
Household tenure	0.12%	Mode	No
Sufficient income	0.62%	Mode	No
Material well-being index	1.47%	Mode	No

Table C2. Variable Details

Variables	Details	Data Types
Life Satisfaction	Based on a scale where 0 is completely dissatisfied, and 10 is completely satisfied.	Ordinal data
Cultural identity	This is based on a scale of individuals recognising themselves in NZ, where 1 is very hard, and 5 is very easy.	Ordinal data
Housing conditions	Based on a scale of house conditions, where 1 is poor house conditions and 5 is good house conditions.	Ordinal data
Health status	Based on a scale of individuals' self-reported health status, where 1 is poor and 5 is excellent.	Ordinal data
Partnered	0 - single, 1 - partnered.	Dichotomous data
Feelings of loneliness	Based on a scale for the frequency of feeling lonely, where 1 is all of the time feeling very lonely, and 5 is none of the time feeling lonely.	Ordinal data
Age and age squared.	Age is measured in years, and age squared captures the nonlinear effects of age.	Continuous data
Labour force status	1 - not in the labour force, 2 - unemployed, and 3 - employed.	Categorical data
Household tenure	1 – Not owned house (rent), 2 - owned, and 3 – family trust owned.	Categorical

Variables	Details	Data Types
		data
Sufficient income	Based on a scale of enough income, where 1 is not enough, and 4 is more than enough.	Ordinal data
Material well-being index	Based on a scale of material living standards, where 0 is the lowest and 20 is the highest.	Ordinal data

Table C3. Descriptive Statistics by Ethnicity

Variable / Category	Scale & Categories	Data Type	European	Māori
Life Satisfaction	0–10	Ordinal	Mean: 7.7	Mean: 7.5
	0 = completely dissatisfied; 10 = completely satisfied		Mode: 8	Mode: 8
Cultural Identity	1–5	Ordinal	1: 87 (0.43%) 2: 258 (1.27%) 3: 1932 (9.53%) 4: 6702 (33.07%) 5: 11 286 (55.68%)	1: 30 (0.74%) 2: 99 (2.46%) 3: 582 (14.43%) 4: 1260 (31.25%) 5: 2061 (51.12%)
	1 = very hard; 5 = very easy to identify in NZ		Mode: 5	Mode: 5
Housing Conditions	1–5	Ordinal	1: 288 (1.42%) 2: 849 (4.19%) 3: 4002 (19.75%) 4: 8256 (40.73%) 5: 6879 (33.94%)	1: 111 (2.75%) 2: 324 (8.04%) 3: 1047 (25.97%) 4: 1611 (39.96%) 5: 942 (23.36%)
	1 = poor; 5 = excellent		Mode: 4	Mode: 4
Health Status	1–5	Ordinal	1: 768 (3.79%) 2: 2508 (12.37%) 3: 5769 (28.46%) 4: 7755 (38.26%) 5: 3471 (17.13%)	1: 231 (5.73%) 2: 669 (16.59%) 3: 1353 (33.56%) 4: 1272 (31.55%) 5: 510 (12.65%)
	1 = poor; 5 = excellent		Mode: 4	Mode: 3
Partnered	0–1	Binary (Dichotomous)	Mean (Prop.): 0.55	Mean (Prop.): 0.42
	0 = single; 1 = partnered		(≈55% partnered)	(≈42% partnered)
Feelings of Loneliness	1–5	Ordinal	1: 369 (1.82%) 2: 495 (2.44%) 3: 2427 (11.97%) 4: 4680 (23.09%) 5: 12 294 (60.66%)	1: 90 (2.23%) 2: 162 (4.02%) 3: 570 (14.14%) 4: 969 (24.03%) 5: 2244 (55.65%)

Variable / Category	Scale & Categories	Data Type	European	Māori
	1 = lonely all the time; 5 = never lonely		Mode: 5	Mode: 5
Sufficient Income	1–4	Ordinal	1: 1641 (8.10%) 2: 4605 (22.72%) 3: 9798 (48.34%) 4: 4224 (20.84%)	1: 798 (19.79%) 2: 1218 (30.21%) 3: 1530 (37.95%) 4: 486 (12.05%)
	1 = not enough; 4 = more than enough		Mode: 3	Mode: 3
Material Well-being Index	0–20	Ordinal	Mean: 14.93	Mean: 11.67
	0 = lowest; 20 = highest		Mode: 20	Mode: 15
Age	15-102	Continuous	Mean: 52.8	Mean: 42.7
GSS Years	—	Categorical	n (%)	n (%)
GSS2014	—	—	6177 (30.48%)	1263 (31.34%)
GSS2016	—	—	5838 (28.81%)	1125 (27.90%)
GSS2018	—	—	5901 (29.11%)	1176 (29.17%)
GSS2021	—	—	2352 (11.60%)	468 (11.61%)
Regions	—	Categorical		
Auckland	—	—	4230 (20.87%)	759 (18.82%)
Wellington	—	—	2445 (12.05%)	396 (9.82%)
Northland, Bay of Plenty, Gisborne	—	—	2475 (12.22%)	1005 (24.92%)
Rest of the North Island	—	—	4545 (22.42%)	1305 (32.37%)
Canterbury	—	—	3369 (16.62%)	267 (6.62%)

Variable / Category	Scale & Categories	Data Type	European	Māori
Rest of the South Island	—	—	3204 (15.81%)	300 (7.44%)
House Tenure	—	Categorical		
Not Owned (Rent)	—	—	5208 (25.7%)	2301 (57.07%)
Owned	—	—	11760 (58.02%)	1473 (36.55%)
Family Trust	—	—	3300 (16.28%)	258 (6.37%)
Labour Force Status	—	Categorical		
Not in Labour Force	—	—	6831(33.71%)	1350 (33.48%)
Unemployed	—	—	456(2.25%)	291 (7.22%)
Employed	—	—	12981 (64.05%)	2391 (59.3%)

Table C4A. GVIF results

Variable	Number of Categories	df	Mean VIF	Adjusted GVIF
Regions	6	5	1.498	1.11
House Tenure	3	2	1.5	1.15
Labour Force	3	2	1.445	1.13
Partnered	2	1	1.19	1.09

Table C4B. Spearman's Rank Correlation – For Ordinal Variable

Variable	Life Satisfaction	Cultural Identity	Enough Income	Material Well-being Index	Housing Conditions	Health	Feelings of Loneliness
Life Satisfaction	1.000						
Cultural Identity	0.234	1.000					
Enough Income	0.271	0.173	1.000				
Material Well-being	0.317	0.189	0.606	1.000			
Housing Conditions	0.186	0.092	0.147	0.259	1.000		
Health	0.301	0.192	0.222	0.210	0.110	1.000	
Feelings of Loneliness	0.319	0.174	0.168	0.247	0.098	0.164	1

Table C4C. Polychoric Correlation – For Ordered Categorical Variables

Variable	Life Satisfaction	Cultural Identity	Enough Income	Material Well-being Index	Housing Conditions	Health	Feelings of Loneliness
Life Satisfaction	1.000						
Cultural Identity	0.276	1.000					
Enough Income	0.304	0.223	1.000				
Material Well-being	0.341	0.237	0.646	1.000			
Housing Conditions	0.190	0.124	0.179	0.287	1.000		
Health	0.337	0.234	0.258	0.248	0.130	1.000	
Feelings of Loneliness	0.345	0.236	0.210	0.276	0.120	0.205	1

Table C5. Ordinal Probit Model for Māori and European

Variable	European Coefficient	European RSE	Māori Coefficient	Māori RSE
Cultural Identity (Reference score: 1)				
2	0.325*	0.173	0.304	0.206
3	0.448**	0.165	0.458**	0.181
4	0.620***	0.159	0.533***	0.180
5	0.817***	0.159	0.738***	0.180
Years (Reference: 2021)				
Year: 2014	0.090***	0.025	0.208***	0.057
Year: 2016	0.095***	0.025	0.236***	0.057
Year: 2018	0.020	0.025	0.232***	0.057
Regions (Reference: Auckland)				
Wellington Region	0.016	0.025	0.145**	0.061
Northland, Bay of Plenty, Gisborne Regions	0.077***	0.027	0.234***	0.061
Other North Island Regions	0.076***	0.022	0.210***	0.047
Canterbury Region	-0.03	0.025	0.060	0.073
Other South Island Regions	0.096***	0.025	0.077	0.067
House Tenure (Reference: Not owned)				
Owned	0.054***	0.019	0.012	0.038
Family Trust	0.103***	0.025	0.024	0.072

Variable	European Coefficient	European RSE	Māori Coefficient	Māori RSE
Labour Force Status (Reference: Not in labour force)				
Unemployed	−0.213***	0.053	−0.106	0.071
Employed	-0.124***	0.021	-0.062	0.043
Housing conditions	0.093***	0.010	0.051***	0.018
Health status	0.277***	0.010	0.250***	0.019
Partnered status	0.245***	0.016	0.163***	0.036
Feelings of loneliness	0.234***	0.013	0.224***	0.02
Sufficient income	0.120***	0.012	0.145***	0.024
Material well-being index	0.026***	0.002	0.018***	0.004
Age	−0.038***	0.002	−0.028***	0.006
Age^2	0.000	0.000	0.000***	0.000

Source: Author's calculations using robust standard errors (RSE) to address potential heteroskedasticity.

*** p<0.01, ** p<0.05, * p<0.1

Chapter 5. Discussion

By moving beyond conventional economic indicators, this study emphasises the critical need for a more comprehensive understanding of well-being, one that incorporates not only material conditions but also subjective dimensions. The findings reveal that although New Zealand has made progress in well-being policy, particularly through the Well-being Budget and the Living Standards Framework (LSF), substantial disparities persist, particularly for Māori communities. Addressing these disparities requires a re-evaluation of policy effectiveness, particularly in tackling the structural inequalities that disproportionately affect Māori, in order to genuinely achieve the goals of social equity and inclusive well-being for all.

The construction of a multidimensional well-being index has provided a novel means of assessing well-being inequality across different demographic groups. Previous studies have consistently shown that well-being inequalities extend beyond income to include education, governance, health, and civic engagement. Individuals who are most at risk of multidimensional deprivation tend to be older, female, New Zealand-born, Māori, and those residing in other areas of the North Island. These results indicate that well-being is deeply contextual and requires policy responses that are carefully tailored to the specific needs of different population groups.

A central contribution of this thesis is the examination of cultural identity (using a comparable measure across cultures) as a determinant of life satisfaction. As discussed earlier, cultural identity plays a crucial role in enhancing the resilience of Māori, fostering a sense of belonging and well-being despite structural inequalities. Yet, while cultural identity strengthens community cohesion and individual well-being, it does not on its own address the broader socioeconomic challenges that Māori communities encounter. It should therefore be regarded as a complementary rather than a standalone mechanism for reducing disparities. The Oaxaca-Blinder decomposition analysis shows that, although cultural identity contributes positively to life satisfaction, enduring inequities in income, material conditions, and institutional trust continue to shape differences between Māori and European populations. These patterns highlight the limits of cultural identity as a buffer against structural disadvantage and indicate the need for targeted policy interventions.

From a policy perspective, the findings suggest that well-being strategies should encompass both economic and cultural dimensions. Initiatives to strengthen cultural identity must be combined with structural reforms that narrow socioeconomic gaps. This includes targeted measures to expand access to education, employment, and healthcare, alongside policies that strengthen Māori-led approaches to governance and well-being. The Whānau Ora initiative (Office of the Auditor-General, 2015) illustrates the potential of holistic, culturally responsive interventions that align with Māori values and aspirations. Broadening and reinforcing such frameworks not only improves the impact of well-being policies but also provides a transferable model for culturally responsive approaches in New Zealand and internationally.

The disparities identified in this research carry implications that extend beyond New Zealand. As governments worldwide reconsider the limits of traditional economic indicators in capturing well-being, the integration of

multidimensional measures and cultural identity indicators offers a more inclusive framework that reflects the lived experiences of diverse populations. The approach applied here can also inform research in other countries with Indigenous communities. In Australia, for example, the National Agreement on Closing the Gap recognises cultural connection and land attachment as central determinants of health and well-being (Coalition of Aboriginal & Torres Strait Islander Peak Organisations, 2020). In Canada, the Indigenous Peoples Survey collects information on language, cultural activities, and belonging, while the First Nations Mental Wellness Continuum Framework positions culture at the centre of well-being (Statistics Canada, 2024; Indigenous Services Canada, 2015). The OECD has likewise emphasised Indigenous economic development and well-being within place-based frameworks (OECD, 2019). These examples demonstrate that combining cultural identity measures with distributional analysis can provide a replicable template for Indigenous well-being research, provided that adaptation respects local cultural contexts and measurement comparability.

This thesis also challenges the assumption that incremental policy adjustments are sufficient to reduce disparities in well-being. Although the LSF and Well-being Budget represent advances in policy design, their implementation has not yet produced substantial progress in narrowing inequalities. Achieving durable change requires not only refining these frameworks but also embedding systemic transformations that dismantle the structural barriers constraining equitable outcomes. Policies must therefore move beyond acknowledging disparities and commit to addressing them through sustained and targeted interventions.

5.1 Synthesising contributions across studies

This thesis contributes two complementary studies that align with New Zealand's policy framework. The first study constructs an individual-level multidimensional well-being index that captures key domains of quality of life, aligning with the multidomain focus of the Living Standards Framework and extending its applicability by enabling distributional analysis at the individual level (The Treasury, 2021, 2022). The second study examines the relationships between life satisfaction and cultural identity, first using pooled OLS and then employing the Oaxaca–Blinder decomposition technique. It decomposes the Māori-European mean difference in life satisfaction into components attributable to observed characteristics and unexplained coefficients.

Taken together, these studies convey a coherent diagnostic message. Individuals at the lower end of the composite index are typically characterised by weaker labour market attachment, insecure housing, lower educational attainment, or diminished trust in institutions. Within this context, stronger cultural identification is associated with higher life satisfaction; however, average life satisfaction remains lower for Māori. The results reveal existing descriptive patterns and highlight the importance of monitoring distributional outcomes, as well as cultural and relational domains, within well-being frameworks, without attributing these patterns to specific programmes.

5.2 Positioning within official frameworks and the wider literature

New Zealand's Living Standards Framework and He Ara Waiora acknowledge that flourishing depends on

material resources, institutional settings, relationships, and culture. The findings of this thesis are consistent with this perspective. They quantify the interactions among domains within individuals and demonstrate that cultural identity is closely associated with life satisfaction, along with income, housing, and local conditions (The Treasury, 2018, 2021, 2022). Globally, dashboard and composite approaches have been advocated as means to transcend income-based measures and address distributional issues. In the New Zealand context, this direction is advanced through the individual-level index developed in this thesis (Decancq & Lugo, 2012; Durand, 2015).

The observed correlation between stronger cultural identification and higher life satisfaction aligns with Māori-centred literature. This literature links whakapapa, reo, tikanga, whenua, and whanaungatanga to well-being, while also recognising the constraints that may limit the extent to which cultural strengths translate into positive outcomes (Durie, 1998; Houkamau & Sibley, 2010, 2017; Sibley, Harré, Hoverd, & Houkamau, 2011). More recent evidence regarding whanaungatanga and identity pride within takatāpui communities also suggests that relational and cultural connections are closely intertwined with well-being (Hamley et al., 2025).

5.3 Interpreting the multidimensional well-being index

The categorical principal components approach brings together information across domains that are not directly comparable. The loadings indicate domains consistent with the intention to capture broad well-being rather than a narrow material construct. Distributional views, such as quintile shares and cross-classifications by region and tenure, show where multiple shortfalls cluster. These perspectives are useful for diagnosis and for monitoring change, since policies that reduce the proportion of people experiencing multiple shortfalls may require a different mix of instruments than those aimed at raising overall averages.

The index is an indicator rather than a welfare function. Its purpose is to describe where shortfalls co-occur and how they are shaped by observed characteristics. In this role, it complements official dashboards by providing a person-level distributional view.

5.4 Cultural identity and life satisfaction

The life satisfaction models bring cultural identity into the same frame as socio-economic covariates. The Oaxaca-Blinder decomposition clarifies that the mean Māori-European gap is partly related to differences in observed resources and partly to components that are not captured by those variables. The unexplained in a decomposition is a composite of many influences, including unobserved characteristics, measurement error, and functional form. It is therefore not simply interpreted here as a structural effect. The descriptive association between higher cultural identification and higher life satisfaction is read in conjunction with survey evidence from Te Kupenga on cultural participation and language use, which provides context for the patterns observed in the models (Stats NZ, 2013).

5.5 Methodological and measurement considerations

Treating life satisfaction as approximately cardinal is standard in the economics literature and is supported by evidence that shows results remain broadly stable when comparing linear and ordered response models (Ferrer-i-Carbonell & Frijters, 2004; Schröder & Yitzhaki, 2017). In Chapter 4, the ordered models yield the same qualitative ordering of associations, which reduces concern that the observed patterns are simply an artefact of linearity. The decomposition framework and its notation, presented in Chapter 4, make the accounting transparent and allow discussion of contributions by domain groups.

The harmonised cultural identity scale enables joint modelling and group comparison, while recognising that identity carries context-specific meaning. Māori-centred instruments are rich and detailed, capturing multiple dimensions of identity, but they are not directly comparable across groups. By contrast, the large general surveys used in this thesis include only a few cultural items, which limits depth but allows for cross-group comparison.

Confidentiality protocols in the Integrated Data Infrastructure restrict disclosure of some missingness diagnostics and small cells. This limits what can be displayed in the tails of distributions, but it does not alter the direction of the descriptive patterns documented.

5.6 Policy and monitoring implications

The evidence here is associational, so the most direct use is to guide diagnosis and monitoring. In practice, this means two steps. First, identify groups with a higher probability of multiple shortfalls. Second, track domains that move in relation to life satisfaction once controls are included, such as cultural capability and belonging, institutional trust, safety, and local environmental perceptions. Regular public reporting should include both material indicators and cultural relational indicators, in line with the Living Standards Framework and He Ara Waiora (The Treasury, 2018, 2021, 2022). Cultural identity measures should be treated as standard companions to economic and housing indicators in dashboards. Where rollouts or eligibility rules provide suitable comparisons, adopt evaluation designs that can test programme impact, consistent with guidance on distributional analysis for ordinal well-being data (Jenkins, 2020).

5.7 Limitations

The analyses use repeated cross-sections, which preclude statements about within-person dynamics. The unexplained component in the Oaxaca Blinder decomposition is a composite of various influences, including unobserved characteristics, measurement error, and functional form, and therefore should not be interpreted as an effect. Cultural identity and trust are often measured with a few items in large surveys, which may introduce measurement error or differential item functioning across groups. The sample excludes people younger than 15 years, so child and early adolescent outcomes are outside the scope of this study. In addition, the most recent data used are from 2021 and were collected under pandemic conditions, with an approximately halved sample size relative to earlier waves. New Zealand also experienced further lockdowns in 2022. As a result, the

analysis cannot observe the mid-to-late pandemic effects or subsequent adjustments in well-being.

5.8 Future research

Future work can build on these findings in several ways.

- Linked survey-administrative sources. Where confidentiality allows, linking to records on earnings, benefits, housing assistance, and health use would sharpen measurement of endowments and reduce classical error in covariates.
- Quasi-experimental variation. When eligibility rules or rollouts create natural experiments, differences-in-differences, event studies, or regression discontinuity can assess whether programmes that aim to improve housing stability, raise incomes, or strengthen cultural capability and belonging are followed by movements in the index and in self-reports.
- Measurement development and invariance. Integrate Māori-centred instruments that reflect whakapapa, reo, tikanga, and whenua, and assess measurement invariance and item response models across groups and over time to balance comparability with group-specific meaning.
- Distribution-sensitive tools for ordinal outcomes. Build on methods for ordinal well-being data by using rank-based comparisons and indices tailored to ordinal scales to align distributional statements with appropriate statistical objects (Jenkins, 2020).
- Intersectional mapping. Extend quintile and mosaic views to higher-dimensional cross-classifications, identifying combinations of region, tenure, labour force status, and identity where multiple shortfalls cluster.
- Mixed-method integration. Combine distributional maps with qualitative insights from iwi, hapū, and community organisations to interpret mechanisms and to co-design indicators that reflect local conceptions of a good life.

Chapter 6. Conclusion

Understanding well-being requires a multidimensional perspective that encompasses economic, social, cultural, and psychological factors within the same framework. In Aotearoa New Zealand, where Indigenous and non-Indigenous populations share a diverse social setting, analysis must consider cultural identity alongside structural disparities. This thesis integrates two complementary strands to meet that need: an individual-level multidimensional index that summarises material, institutional, relational, and subjective domains, and comparative life satisfaction models that use a harmonised cultural identity scale with Oaxaca-Blinder decomposition. Taken together, they provide a coherent descriptive view of where multiple shortfalls cluster and how cultural and relational domains co-move with self-evaluations once common socioeconomic controls are included (Decancq & Lugo, 2012; Durand, 2015; The Treasury, 2021, 2022).

This thesis matters because it combines two complementary lenses on well-being in Aotearoa New Zealand. Distribution matters, and shortfalls tend to concentrate among individuals with weaker labour market attachment, insecure housing, lower educational attainment, or lower trust in institutions. Cultural identity is positively associated with life satisfaction among Māori; however, the average life satisfaction of Māori remains lower than that of Europeans. The decomposition separates differences linked to observed resources from components not captured by those variables; the latter, often termed the structural component, represents a blend of unobserved influences and is not interpreted as a single, uniform effect (discrimination). The contribution is therefore methodological and diagnostic: it complements dashboard-style monitoring in international guidance and aligns with the domestic emphasis on distribution, cultural capability, and belonging in the Living Standards Framework and He Ara Waiora, while avoiding claims about programme impact (Decancq & Lugo, 2012; Durand, 2015; The Treasury, 2018, 2021, 2022).

The approach is portable beyond New Zealand. Where surveys include comparable items on material conditions, governance, safety, and cultural connection, and where official dashboards already report across multiple domains, an individual-level composite measure can identify groups overrepresented in the lower tail, and a decomposition can structure discussions about how observed endowments relate to reported evaluations across groups. Interpretation should remain descriptive and context-aware, as cultural identity and institutional trust have local meanings, but the same workflow provides a replicable template for integrating cultural and relational domains into quantitative monitoring alongside income and housing (Durand, 2015; Decancq & Lugo, 2012).

Policy use follows directly. Regular public reporting should track the share of people facing multiple shortfalls and place cultural capability and belonging, institutional trust, safety, and local environmental perceptions alongside income, housing, and employment, consistent with the Living Standards Framework and He Ara Waiora. Evaluation of impact should be reserved for designs that can credibly test changes when rollouts or eligibility rules create suitable comparison groups, in line with guidance for the distributional analysis of ordinal well-being data (The Treasury, 2021, 2022; Jenkins, 2020). In this way, descriptive evidence guides

where to look, while future longitudinal and quasi-experimental studies can assess what works.

Overall, combining an individual-level index with comparative modelling provides a practical route to monitor distributional outcomes, incorporate cultural identity within established policy frameworks, and support policies that aim for fairer and more durable improvements in wellbeing in Aotearoa New Zealand.

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