Experiences of Secure and Precarious Employment Among Older Māori - Data Insights

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Published: September 2023

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ISBN: 978-1-99-110532-5 (Online)

Acknowledgement

The Office for Seniors would like to acknowledge Dr Joanne Allen and Dr Kathie Irwin for their preparation of this report.

Disclaimer: This report was prepared to provide advice and guidance for the direction of the Older Māori and Work research programme. This report is provided ahead of peer review to facilitate discussion and comment on the findings. The work represents the expert opinion of the authors and may contain errors and information that has not yet been accepted or endorsed by the scientific community. All data, analysis scripts, and output files have been archived to support peer review and replication of reported findings. Data are derived from the 2018 wave of the Health, Work, and Retirement survey, conducted as part of MBIE Endeavor-funded project 'Maximising Workforce Participation for Older New Zealanders: Opportunities, Challenges and Prospects'.

Foreword

The Better Later Life - He Oranga Kaumātua Action Plan 2021 – 2024 *He Mahere Hohenga 2021 ki 2024* identifies employment as a priority action area. It includes an action to research age discrimination in the workplace. The Older Workers' Employment Action Plan (OWEAP) *He Mahere Mahi Whakawhiwhi Mahi mō te Hunga Pakeke* is one of seven population action plans that aim to address poor labour market outcomes for specific groups. The OWEAP's focus is on older people at risk of poor labour market outcomes, and older Māori are a priority within this target group.

Building on these strategic priorities, the Office for Seniors (the Office) is developing an Older Māori and Work in Aotearoa New Zealand (*Older Māori and Work*) research programme to help understand the needs and aspirations of this group. This work is being supported by a Project Steering Group (PSG) that provides advice and guidance about the programme's direction.

To help inform the development of *Older Māori and Work*, the Office commissioned a review of peer-reviewed literature on the experiences of Māori in paid and unpaid work (Brazzale, 2022). This review identified that the experiences of work among older Māori are under-researched. Further, while there is a substantial body of research on leaders and experts participating in both paid and unpaid employment, there is little research that reflects the voices of 'ordinary' workers; for example, those working on the frontlines of organisations, in manual labour jobs, insecure work, and lower paid occupations. This is an important gap in representation as workers in these situations may be most exposed to employment, financial, and health-related adversity that characterise precarious employment in later life. A question posed to the PSG was, '*How can the older Māori 'precariat' be supported to fully participate in work and transition to retirement?'.* In response, an initial research question posed by the PSG was, '*What do precarious employment experiences by older Māori workers look like, and what proportion experience these conditions?*'.

This data insights report was proposed to address findings of the initial literature review and research question via secondary analysis of existing data, to characterise employment-related experiences of older Māori in the general population. The project draws upon a contemporary and uniquely comprehensive dataset comprising indicators of work in later life and data provided by a cohort of older Māori drawn from random samples of the national electoral roll and participating in the 2018 wave of the Health, Work, and Retirement longitudinal survey, conducted by Massey University's Health and Ageing Research Team.

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Summary

Employment precarity in later life represents an interaction of personal and employment-related resources and demands that are shaped across a life course and experienced within a broader social and environmental context. The current generation of older Māori entered education and employment at a time when social policy and norms created significant tensions between opportunities for work and financial well-being, and engagement with a traditional Māori cultural identity. A systematic review of the literature on Māori and work indicates that a substantial body of research illuminates the strengths and challenges faced by Māori in leadership and expert roles (Brazzale, 2022). However, little is understood about the experiences and outcomes for workers engaged in lower-paid, blue-collar, insecure, and manual labour roles.

This report highlights the multi-faceted role and contribution of kaumātua in Aotearoa New Zealand, and current efforts to better understand the social, cultural, and economic well-being of Māori. It situates findings in the historical and structural context in which experiences of the current generation of older Māori workers have emerged. The work adopts a person-centred analysis approach to identify and characterise distinct experiences of secure and precarious employment among 810 Māori workers aged 55-82 who responded to the 2018 wave of the Health, Work, and Retirement survey (Allen et al., 2021, 2023). Latent Class Analyses (LCA) were used to identify groups of older workers who share patterns of employment stability (employment arrangements and perceived job insecurity), person-work fit (health-related ability to work, adequate flexible work arrangements, adequate income, expectation of future hardship), and environmental contexts (area-level relative socio-economic deprivation, and urban accessibility).

Four employment profiles were identified (with corresponding proportions in the sample): *Secure inflexible financially-stable* (30.3%); *Inflexible financial-risk* (38.0%); *Highly precarious* (11.8%), and; *Secure high-choice* (19.9%). Employment profiles were predicted by socio-demographic factors of age, gender, education, and working in a manual labour role. Investigating tensions between indicators of traditional Māori cultural identity and employment precarity, results indicate that engagement with a traditional Māori cultural identity was associated with greater employment precarity among older Māori workers today. Implications for research and public policy in reducing experiences of employment precarity for current and future cohorts of older Māori workers are discussed.

Keywords*: Life course theory; Precarious work; Ageing; Cultural identity; Latent Class Analysis*

Introduction

The Role of Kaumātuatanga in Te Tirohanga Māori (The Māori Worldview)

The role and status of kaumātua in Te Tirohanga Māori, the Māori worldview, is one of reverence and authority. To understand the dynamics, several features need to be considered. These include: the creation of the Māori worldview (Royal, 2003); the socio-political context in which Te Tirohanga Māori is located, from creation to the modern context (Williams, 2010); the whānau, hapū and iwi social structure of Māori society (Henare, 1988); and the significance of mātauranga Māori in the diverse realities of Māori society including in Treaty Settlements[1] negotiated between iwi and the Crown.

Kaumātua hold a special place in Māori society. They are esteemed as holders of intergenerational mātauranga-ā-whanau, hapū and iwi: kia Māori, lived Māori knowledge experiences across the generations[2]. The holders of memories of people and events, of unwritten pūrakau, and of times long since gone. They are witnesses to an emerging Aotearoa New Zealand in which race relations were far from the "god-zone" version the rest of the world projected on this country. In October 2020, the documentary *No Māori Allowed* (based on the book *No Māori Allowed – New Zealand's Forgotten History of Racial Segregation* (Bartholomew, 2020)) was screened on national television and met with widespread concern. It revealed a New Zealand few knew.

It was an especially poignant moment late in 2022 when Sir Tipene O'Regan, ONZ, CRNZ, Ngāi Tahu, kaumātua, iwi and Māori leader, was chosen as the Kiwibank New Zealander of the Year. Through the sharing of his life story, a broad audience had the chance to gain insights into the multi-faceted role and contribution of kaumātua in Aotearoa New Zealand: in marae proceedings; as historians; whakapapa repositories; mediators and counsellors; strategists and advocates of Te Tirohanga Māori, based on kaupapa Māori (the political advocacy based on Māori knowledge, methodology and ontology), mātauranga Māori (Māori knowledge) and kia Māori.

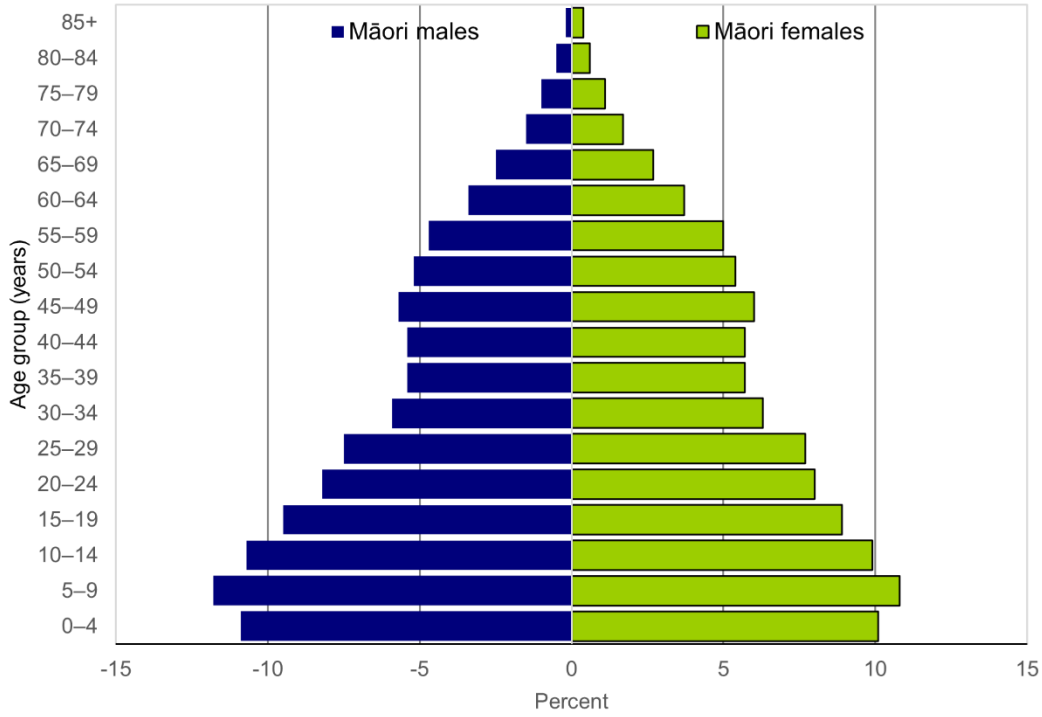
[1] In particular with respect to the status of legal personhood assigned to several natural features: Mounga Taranaki (preliminary signing Mar 31 2023), Te Awa Tupua (Whanganui River Claims Settlemnt Bill 2017), and Te Urewera (Te Urewera Act 2014 No 51 as at 28 Oct 2021, Public Act). See www.legislation.govt.nz for details of the legislation referred to here.

[2] *Kia Māori* was coined by Dr Wayne Ngata, as an expression conveying the meaning of Māori ontology, which was being used as a concept at the IPANZ Hui, Critical success factors for effective use of e-Learning with Māori learners. Critical success factors for effective use of e-learning with Māori learners | Education Counts

The Māori Population

This section introduces unique features of the Māori population, which aim to ensure that the youthful nature of the Māori population is noted so that more useful comparisons with the general New Zealand population can be offered. Many are unaware of how youthful the Māori population is (**Figure 1**). Te Ara Ahunga Ora, the Retirement Commission, has recently reported that Māori comprise only 5.9% of those currently drawing Superannuation payments.

Figure 1. Age distribution of the Māori population by gender, 2018 (Stats NZ, 2020b).



Compare this youthful population structure with the New Zealand population structure, described as an ageing population (**Table 1**), with 17.0% of the non-Māori population aged 65+, compared to just 6.2% of the Māori population. Data from the 2018 Census indicates a median age of 37.4 years for the usually resident population overall but just 25.4 among Māori (Stats NZ, 2020b). These differences reflect, in part, shorter life expectancy among Māori in Aotearoa, with 2017-2019 life tables indicating remaining gaps between Māori and non-Māori life expectancy at birth of 7.5 years for males and 7.3 years for females, and at age 50 of 5.7 for males and 6.2 for females

***Table 1**. Census population, Māori and non-Māori, by age group and gender, 2018.*

	Māori			non-Māori		
Age group (years)	Males	Females	Total	Males	Females	Total
0-14	127,737	121,044	248,787	345,717	449,946	674,616
15-24	67,848	66,396	134,244	250,092	301,287	484,983
25-49	114,327	123,633	237,960	655,953	799,443	1,331,766
50-64	51,051	55,548	106,596	373,905	447,282	765,642
65+	22,053	26,199	48,255	310,872	382,242	666,915
Total	383,019	392,820	775,836	1,936,539	2,380,197	3,923,919

Note: Due to rounding, individual figures in this table do not sum to give the stated totals and may differ slightly from other published figures - source: 2018 Census, Statistics New Zealand (Stats NZ, 2020b).

Beyond demographic factors, profiles of what Māori living as Māori looks like are important and specific to whānau, hapū and iwi. Tatauranga Aotearoa Stats NZ has developed a research tool, Te Kupenga, to provide an overall picture of the social, cultural, and economic well-being of Māori (Te Kupenga, 2018). These 2013 and 2018 postcensal surveys of adults (aged 15 years and over) of Māori ethnicity and/or descent provide insights into the degree to which Māori engage the Māori Cultural Infrastructure in their lived experience of being Māori in a contemporary context. Te Kupenga provides statistics on aspects of Māori cultural well-being, including wairuatanga (spirituality), tikanga (Māori customs and practices), Te reo Māori (the Māori language) and whanaungatanga (social connectedness). More dynamic programmes continue to be developed to increase the relevance of available data on Māori wellbeing. For example, data from publicly available sources and government administrative datasets have been collated, managed, and summarised at iwi-level through the iwi data platform Te Whata (Te Whata, n.d.).

Māori are Treaty Partners

Understanding the significance of Māori as Tiriti / Treaty partners in Aotearoa NZ is important in any public policy research. The foundations of the machinery of government were built in the wake of the signing of Te Tiriti / The Treaty 1840. As a consequence, reporting, research and examination of Māori outcomes of public services needs to be historically situated and grounded in structural analysis.

Structural analysis accounts for the role of the machinery of government (policy, legislation and regulation) in shaping the life chances (access to power and opportunity) and lifestyles (language, culture and identity) of Māori (Irwin, 1989b). At an individual level, Māori had little agency to escape the impact of government policy, legislation and regulation in their lives.

Te Tiriti / The Treaty

The document regarded as a founding document in the nation-building story of Aotearoa New Zealand has two versions: Te Tiriti ō Waitangi, the version written in te reo Māori,

and, The Treaty of Waitangi, a version written in English. The te reo Māori version is not a translation of the English version.

Te Tiriti ō Waitangi is written from an inside / out position, in which Te Tirohanga Māori, the Māori worldview, is the central point of reference, and mātauranga Māori, Māori knowledge, the natural cultural context used to narrate the story and core propositions being communicated. This is the language version that most rangatira Māori signed, as versions of the document were taken around the country. The English document expresses critical concepts using language not synonymous with those used in the te reo version. This has created ongoing debates over, for example, sovereignty and rangatiratanga, which the Waitangi Tribunal is now charged with mediating.

Public Policy - Māori Outcomes

The tension between Māori Development and public policy needs to be considered in research of this kind. Mātauranga Māori as a body of knowledge is place-based and culturally read from "the bottom up", from the whenua, to marae, to whānau, hapū and iwi. Public policy is typically read from "the top down", addressing matters at a national level and tracking how they trickle down to impact citizens at an individual level.

For over a century, official government policy in Māori Affairs was known as assimilation. Assimilation was designed to encourage Māori to give up their language and culture in favour of the English language and culture: becoming Europeans by giving up being Māori (Calman, n.d.). Early education policy channelled Māori towards industrial training and away from academic education. Little wonder then that the labour market outcomes for older Māori, who lived through the influence of this policy period, are what they are (Irwin, 2022).

Older Māori, aged 65 and over, were just entering the compulsory schooling system in Aotearoa NZ in 1960 when Māori Affairs policy changed from assimilation to integration. The change was notified in the *1960 Annual Report of the Department of Māori Affairs (Hunn, 1961).* Their parents and elders would have been educated under the influence of assimilation, and their labour market outcomes negatively influenced by it. This is not a history that public servants are well educated about. The ability to think critically about the system, then, is hampered by a lack of knowledge about its foundations. It is particularly important to read this paper in its socio-political context.

Older Māori and work

A systemic review of peer-reviewed research addressing Māori and employment (Brazzale, 2022) indicates a substantial body of research on Māori in leadership roles and fields requiring high expertise. These works provide insight into unique experiences, contributions, and challenges in these roles for Māori. For example, Māori professionals in fields of nursing (Huria et al., 2014; Moyle, 2016), social work (Moyle, 2016), and science (Haar & Martin, 2022) highlight a "cultural double shift" undertaken as they are

called to adopt roles as both cultural and professional experts at work. While qualitative research indicates these meaningful but under-supported roles contribute to burden, burnout, and turnover in the workplace, little is known about the medium-to-long-term professional and financial outcomes for these workers. Similarly, despite work indicating Māori as more likely to be employed in service and sales roles, as plant and machinery operators and assemblers, and elementary occupations and to be exposed to greater health related-risks within the same roles (Denison et al., 2018), Brazzale (2022) indicated a significant gap in the literature, with little research focusing on the experiences of older Māori workers in lower paid, blue collar, insecure and manual labour roles. Understanding the needs and experiences of these groups was highlighted as crucial in efforts to address challenges faced by older Māori in work, and to understand how current and future generations of older workers may be supported to participate in work and be financially secure in later life.

Identifying precarious employment

Scholars have defined employment precarity as representing employment situations that are 'uncertain, unpredictable and risky' (Kalleberg, 2009) and an accumulation of unfavourable circumstances in an employment situation (Julià et al., 2017). Quality of employment has been characterised in terms of employment security (e.g., contractual security, temporariness, underemployment, or holding multiple jobs), income inadequacy (income level), and lack of worker's rights and protections (e.g., unionisation, social security, regulatory support and workplace rights), with the significance of these factors varying with broader labour market contexts (Kreshpaj et al., 2020).

Recognising that features of employment and/or personal situations arise in various combinations to characterise the quality/precarity of an employment situation, researchers have adopted typological approaches to identify distinct profiles of employment quality and employment precarity (**Appendix A**. Populations and indicators assessed in prior mixture models of employment precarity). In quantitative population-based studies of employment precarity, mixture models present a person-centred analysis method, identifying distinct groups of individuals who share patterns of endorsement across multiple indicators to characterise employment situations. These models enable researchers not only to characterise distinct experiences of employment among working adults but to examine how these may be associated with important outcomes for workers and how they are distributed across countries (Julià et al., 2017).

Table S1 (**Appendix A**. Populations and indicators assessed in prior mixture models of employment precarity charts samples, indicators and conclusions of prior research using mixture modelling to identify groups of workers who share distinct experiences of employment 'quality', 'security', or 'precarity'. These large population-based survey

studies identify 2-8 typologies, with membership of these groups predicted by socio-demographic factors such as age, gender, education, race, and occupation. While research in Aotearoa New Zealand has explored impacts of self-rated job insecurity on employee experiences such as burnout (Douglas, Haar, & Harris, 2017), anxiety and depression (Haar & Brougham, 2022), and turnover intentions (Brougham & Haar, 2020), no research that we are aware of has explored typologies characterising the diverse factors that shape experiences of employment security-precarity in this country.

Perhaps importantly for older workers, little consideration has been given in this body of work internationally to life-course perspectives on employment precarity. Studies employing mixture models have generally assessed employment typologies among general adult population samples with mean ages in the 30s, and have employed indicators primarily related to employment conditions rather than personal circumstances that may influence the precarity of these conditions [although relevant mixture models have incorporated subjective ratings of job security (i.e., Bazzoli et al., 2022; Cho, 2020; Naranjo et al., 2021; Choi et al., 2021) and adequacy of income or financial security (i.e., Bazzoli et al., 2022; Blustein et al., 2020; Cho, 2020)]. Age-related factors influencing decisions to withdraw from the workforce for older workers may be found among predictors of early retirement, with personal factors such as greater financial security, poor physical and mental health, and social factors such as perceived pressure to retire and socially normative ages of retirement (Topa et al., 2018). However, these studies have considered health as an external factor associated with profiles of employment quality or precarity (Blustein et al., 2022; Cho, 2020; Peckham et al., 2019; Van Aerden et al., 2017) rather than a factor characterising precarity of employment. Models considering not only aspects of employment conditions but age-related factors driving workforce withdrawal may provide a better understanding of experiences of employment precarity in later life.

Precarious employment in later life

Lifespan person-environment fit perspectives on work in later life (Zhan et al., 2019) acknowledge that not only employment conditions but their interaction with the resources and motivations of the worker undertaking employment (e.g., health, economic, and skill related factors) as experienced in the environment (e.g., availability and quality of jobs in their local area, associated infrastructure, economic pressures) may render a given employment situation as precarious. Within these frameworks, decisions/capacities to remain in or exit a work situation represent an ongoing evaluation of the relative fit of the individual in work vs non-work environments, with reference to both current and perceived future needs and opportunities (Zhan et al., 2019).

Such person-environment fit perspectives imply that consideration of both employment conditions and personal resources and motivations for work are needed to understand

the precarity of an employment situation. Such interactions are reflected in organisational research on health-related 'workability', which indicates that the impact of health on work may be best understood in terms of the impact of an individual's physical and mental health capacities on their ability to perform a given work role (Ilmarinen & Rantanen, 1999). The potential for not only individuals but for human resource management (HRM) policies and practices to improve person-(work)environment fit are recognised, with organisational case studies indicating ways in which employers may adapt work to address specific issues for older workers (Kooij et al., 2014; Kooij & Van De Voorde, 2015), e.g., ergonomic tools, reduced workload, hours, additional leave, flexible working hours/location, health checks, job redesign, lateral job movement, career planning, skill development, and training.

Importantly, lifespan perspectives on work acknowledge that workers' resources and motivations to engage in work in later life, and the kinds of work in which they are employed, reflect the accumulation of resources throughout the life course. Such models necessitate recognition that supports maintaining and developing resources in earlier life, directly impact experiences of employment precarity in later life. In Aotearoa New Zealand, such models must acknowledge the cultural and historical contexts in which older Māori workers have engaged in education and employment across their life course as influencing outcomes in later life.

Current research

In the current research, data from the 2018 wave of the Health, Work and Retirement survey (Allen et al., 2021, 2023) was used to examine: 1) experiences of employment precarity among older Māori workers, 2) its socio-demographic predictors, and 3) the association of employment precarity with engagement with traditional Māori cultural identity. In light of the employment conditions, personal resources, and environmental factors that may influence the precarity of employment in later life, a mixture modelling approach was used to identify and characterise distinct groups of older workers who share similar patterns of endorsement across objective and subjective indicators. As in prior models (**Appendix A**. Populations and indicators assessed in prior mixture models of employment precarity), we employ indicators of employment contract type and perceived job insecurity, additionally incorporating indicators of health-related workability, adequacy of flexible work arrangements, adequacy of current income, and a future-focused indicator of anticipated future financial problems. While not previously observed in the employment precarity literature utilising mixture models (**Appendix A**. Populations and indicators assessed in prior mixture models of employment precarity), the current models include indicators of relative area-level socio-economic deprivation and urban accessibility. These latter factors are included to reflect the potential impact of environments on the nature and availability of work, access to amenities, and

employment opportunities. To identify groups at particular risk of precarious employment, we assess whether employment group membership (e.g., precarious work) is associated with socio-demographic characteristics of age, gender, education and holding a manual labour occupation. Additionally, in light of recognised challenges to engagement in education and employment experienced by older Māori workers of today, we examine the association between employment precarity in later life and current engagement with a traditional Māori cultural identity.

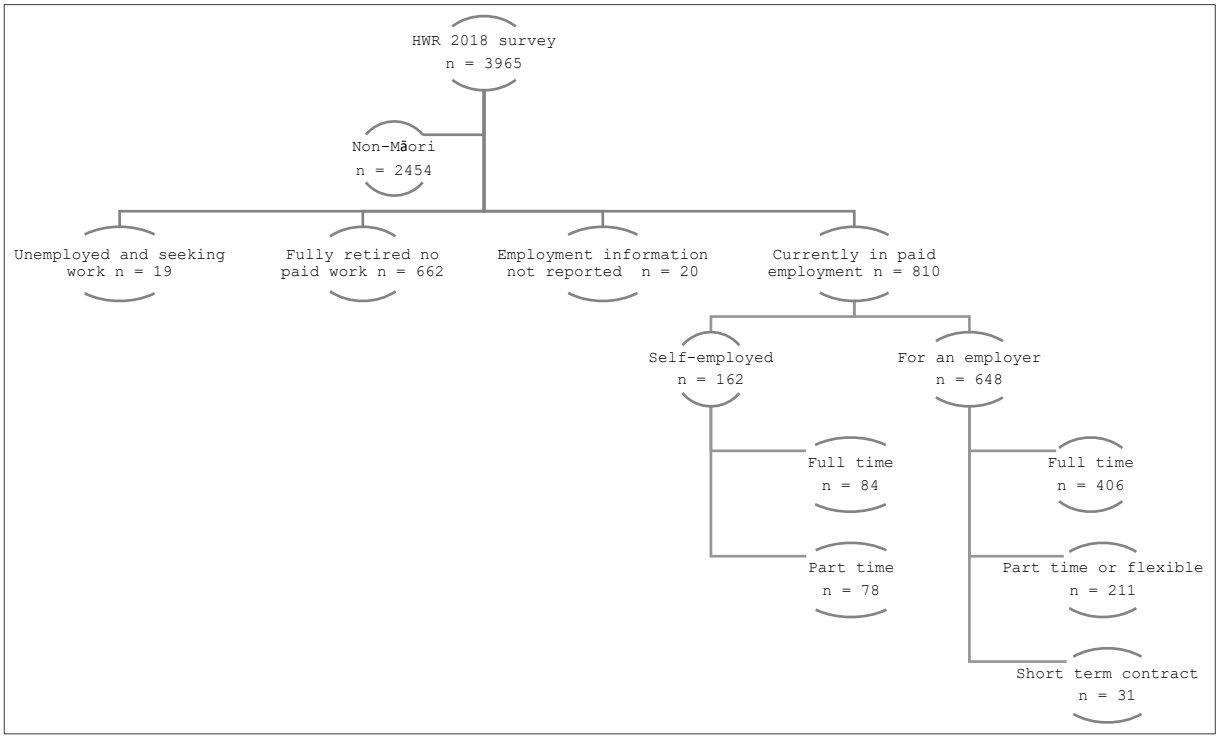
Method

Participants in the Health, Work, and Retirement survey

The core of the Health, Work and Retirement study (Allen et al., 2021, 2023) is a national longitudinal postal survey collecting data on employment, health, well-being, and socio-economic indicators among individuals aged 55+ in Aotearoa New Zealand. Beginning in 2006, the postal survey has been conducted every two years by Massey University's Health and Ageing Research Team. Study participants are drawn from large random samples of older adults listed on the national electoral roll, oversampling people of Māori descent. New random samples are regularly drawn and recruited to the study to ensure representation of younger-older adults as existing cohorts age. Data collection was approved by the Massey University Human Research Ethics Committee [SOA 20/07].

Respondents were considered for inclusion in the current analyses if they reported Māori ethnicity and/or were indicated as being of Māori descent on the national electoral roll and were in paid employment at the time of survey. A flow chart illustrating respondent inclusion/exclusion is presented in **Figure 2**. Of the *n* = 3965 respondents to the 2018 HWR survey, *n* = 1511 reported Māori ethnicity and/or were indicated as being of Māori descent on the national electoral roll and *n* = 810 of this group reported being in paid employment at the time of survey.

Figure 2 *Flow chart illustrating participant inclusion criteria and employment among respondents to the 2018 Health, Work and Retirement (HWR) survey.*



Measures

Indicators of employment precarity in later life

Employment type. Current employment type was indicated by asking respondents to nominate the situation that best described their current employment situation from a list: '*Full-time paid work, for an employer*', '*Part-time paid work, for an employer*', '*Full-time self-employed paid employment*', '*Part-time self-employed paid employment*', '*Flexible work schedule negotiated with employer*', '*Project or contract work (short term and full time)*', or '*Project or contract work (short term and part-time)*', as well as non-employment options of '*Fully retired, no paid work*', '*Full-time homemaker*', '*Full-time student'*, ' *Unable to work due to health or disability issue*', or '*Other (Please specify)*'[3]. Due to the small number of responses, respondents indicating full-time (n = 12) or part-time (n = 19) short-term project or contract work were collapsed into a single group, and respondents indicating having a flexible schedule negotiated with an employer (n = 22) were combined with those indicating part-time paid work for an employer (n = 189).

Health-related ability to work. The impact of health on workers' current and anticipated future ability to work in their current job role was assessed using a shortened version of the Work Ability Index (WAI: Ilmarinen, 2006) designed for use in large-scale surveys (Schouten et al., 2016). The shortened version of the WAI includes seven indicators: *current ability to work compared with lifetime best* (scored 0-10), *ability to work considering the physical demands of the job* (scored 1-5), *ability to work considering the mental demands of the job* (scored 1-5), *estimated impairment in the role due to illness or injury* (scored 1-6), *mental resources* (scored 1-4), *sick leave in the past year* (scored 1-5), and *estimated ability to work two years from now* (scored 1-7). Total scores were calculated with reference to developer instructions and range 6-42, with higher scores indicating greater health-related ability to work. Analyses of shortened WAI scores associated with the risk of long-term absence from work due to injury or illness in samples of manual and non-manual workers from the Netherlands suggest that scores 30-35 indicate risk equal to the population risk, and scores > 35 lower than the population risk (Schouten et al., 2016).

Perceived job insecurity. Respondent's rating of their job security was assessed using a single item from the Effort-Reward Imbalance Scale (Siegrist et al., 2004). Item *'My job security is poor*' was rated on a five-point scale ranging '*Strongly disagree'* to '*Strongly agree'*.

[3] To improve readability of **Figure 2**, category '*Fully retired, no paid work*' comprises cases endorsing '*Fully retired, no paid work*', '*Full-time homemaker*', '*Full-time student*', '*Unable to work due to health or disability issue*', and '*Other*' where specified text responses did not indicate paid employment or job-seeking, but were not considered uninformative (where text responses were considered uninformative, respondents were coded as 'Employment information not reported').

Inadequate flexible work arrangements. In assessing flexible work arrangements (FWAs) available to workers in their current job role, respondents were first provided with a list of 19 workplace policies and practices relating to workers' ability to influence when, where, and how their work is accomplished (Pitt-Catsouphes & Smyer, 2012). Participants were then asked to rate the adequacy of flexible work arrangements in their workplace in responses to item '*To what extent do you have access to the flexible work options you need to fulfil your work and personal needs?*' on a four-point scale ranging '*to a great extent*', '*to a moderate extent'*, '*to a limited extent*', or '*not at all*'.

Immediate financial insecurity. Current financial insecurity was assessed by a single item from the Economic Living Standard Index (ELSI-SF: Jensen et al., 2005). Participants rated the adequacy of their current income in response to the item '*How well does your total income meet your everyday needs for such things as accommodation, food, clothing and other necessities?*' on a four-point scale of '*More than enough*', '*Enough*', '*Just enough*', or '*Not enough*'.

Future financial insecurity. Perceptions of future financial insecurity were assessed by a single item from the Living Standards Capabilities for Elders scale (LSCAPE: Breheny et al., 2016), on which respondents are asked to indicate how well statements about their standard of living reflect their situation. Item '*I expect a future without money problems*' on a five-point scale ranging from '*Definitely true for me*' to '*Not true for me at all*'.

Area-level socioeconomic deprivation. Area-level socioeconomic deprivation, as measured by the New Zealand Deprivation Index (NZDep18), was geocoded to respondent's area of residence at the meshblock level. NZDep18 (Atkinson et al., 2021) combines variables from the 2018 census reflecting eight dimensions of socioeconomic deprivation within a geographical area, including proportions of individuals with no internet access at home, low income, unemployment, low qualifications, non-home ownership, single parent families, low living space, and dwelling condition. Scores nationally are divided into deciles (range 1-10), with higher scores indicating higher relative levels of socioeconomic deprivation. NZDep deciles are employed in the current research as a proxy for employment-related costs, opportunities, and resources within the local area.

Urban area. Urban vs non-urban area of residence was geocoded to participants in concordant meshblocks. Urban areas were classified with reference to the Urban-Rural Index 2018 (Stats NZ, 2018) and its divisions within the Urban Accessibility Index (Stats NZ, 2020a). For the current analyses, areas classified in the Urban-Rural index as Large, Major, or Medium urban areas were categorised as 'urban' areas, and small urban areas, rural areas, and rural settlements were classified as 'non-urban' areas.

Socio-demographic characteristics and risk factors

Socio-demographic factors assessed as predictors of employment precarity among older workers included respondent age, gender, education, and occupation. As normative retirement age and financial capacity to retire represent key determinants of early retirement (Topa et al., 2018), age categories were classified as *55-64* and *65+* to reflect dominant age of receipt of NZ Super. Highest educational qualification was classified as '*No qualifications*', '*Secondary qualifications'*, '*Post-secondary/trade'*, or '*Tertiary*' education. Assessing occupation, respondents reported their current occupation by selecting one of eight skill-based Australian and New Zealand Standard Classification of Occupation (Australian Bureau of Statistics, 2022) categories that best described their role: Labourer (e.g., cleaner, food packer, farm worker); Machinery operator/driver (e.g., machine operator, store person); Technician/trades worker (e.g., engineer, carpenter, hairdresser); Sales worker (e.g., insurance agent, sales assistant, cashier); Clerical/administrative worker (e.g., administrator, personal assistant); Community or personal service worker (e.g., teacher's aide, armed forces, hospitality worker, carer); Professional (e.g., accountant, doctor, nurse, teacher); Manager (e.g., general manager, farm manager), or; Other. Responses were dichotomised as indicative of *manual labour* (i.e., labourer, machinery operator/driver) or *non-manual labour* roles (i.e., technician/trades worker, sales worker, clerical/administrative worker, community or personal service worker, professional, manager, or other).

Māori cultural identity and participation

Introductory comments highlight the potential for the cumulative/enduring effects of colonisation on participation in traditional Māori societies. While any measure of cultural identity will be reductionist, researchers have worked to assess a broad construct of Māori cultural identity and participation to support assessment in health, education, and social research contexts, suitable for administration across a broad range of communities. In the current work, seven indicators representing a single latent factor of traditional Māori cultural identity and participation (MCI), as presented in *Best Outcomes for Māori: Te Hoe Nuku Roa* (Cunningham et al., 2002, 2005), were administered. This measure was developed to assess how a person is part of and engages with te ao Māori (the Māori world) at a point in time, using items assessing self-identification as Māori, knowledge of Māori language, knowledge of whakapapa, whānau associations, marae participation, interests in ancestral land, and contact with Māori people. Items included responses to questions: '*Do you identify as Māori*?' (0 *No* - 1 *Yes*); '*How would you rate your overall ability with Māori language?*' (0 *None* – 5 *Excellent*); '*How many generations of your Māori ancestry can you name?*' (0 '*1 generation'*, 1 '*2 generations*', 2 '*3 generations*', or 3 '*more than three generations'*); '*In terms of your involvement with your whānau, would you say that your whānau plays…*' (3 '*A very large part in your life*',

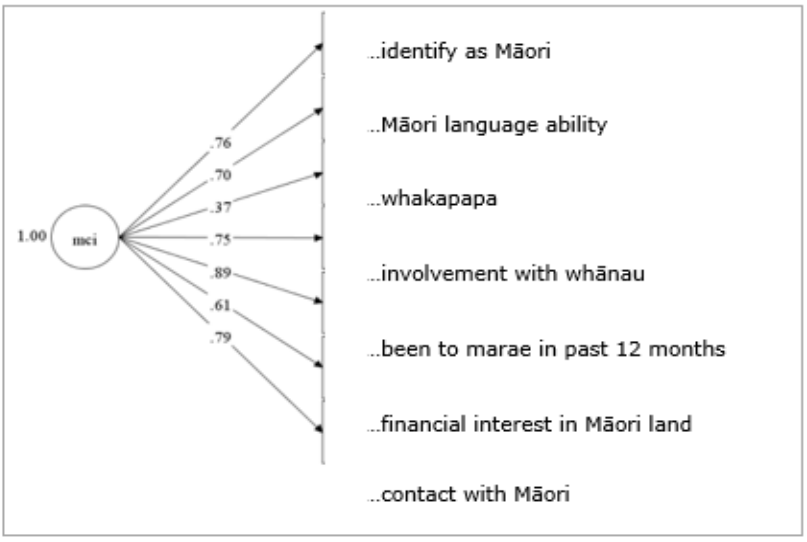
2 '*a large part in your life*', 1 '*a small part in your life*', 0 '*a very small part in your life'*); '*How often have you been to a marae over the past 12 months?*' (0 '*Not at all*', 1 '*Once*', 2 '*A few times*', 3 '*Several times*', 4 '*More than once a month*'); '*Do you have an interest in Māori land as an owner, part or potential owner or beneficiary?*' (1 '*Yes'*, 0 '*No'* 0 '*Not sure*'); and '*In general, would you say that your contacts are with?*' (3 '*Mainly Māori*', 2 '*Some Māori*', 1 'Few Māori' or, 0 'No Māori').

Responses were coded such that higher scores indicated greater MCI. Observed items were modelled as indicators of a single latent variable representing cultural identity and participation. Confirmatory Factor Analyses was used to assess the construct validity of the proposed one-factor model. Analyses were conducted using Mplus version 8.8, and a weighted least square mean and variance adjusted (WLSMV) estimator used to acknowledge the ordinal nature of model indicators. Acceptable model fit was suggested by Comparative Fit Index (CFI) values close to or greater than 0.95, Standardized Root Mean Square Residual (SRMR) values less than or equal to 0.08, and a Root Mean Square Error of Approximation (RMSEA) value less than or equal to 0.08 (Hu & Bentler, 1999). Survey weights were applied as described below in the **Analysis** section.

To best characterise experiences of MCI among older Māori, a model was developed using all available data from the 2018 survey. Of the *n* = 1511 respondents of Māori ethnicity and/or Māori descent, *n* = 1424 (94.2%) responded to one or more indicators of MCI and were included in the analysis. Covariance coverage ranged 0.912-0.950. Indicators of model fit suggested excellent fit of the model to the data [$\chi^2(14) = 18.580$, $p = 0.182$; CFI = 0.999; SRMR = 0.018; RMSEA = 0.015 (90%CI 0.000-0.032), p = 1.000]. Standardised factor loadings for indicators of the cultural engagement factor are presented in

Figure *3*. Factor scores (mean = -0.049, SD = 0.677) were saved for use in secondary analyses.

Figure 3 *Standardised factor loadings for indicators of Māori cultural identity and participation (n = 1424).*



Analysis

To account for biases associated with survey response, data for all respondents to the 2018 Health, Work, and Retirement (HWR) survey were weighed to reflect probability of response by age, gender, Māori-descent, and area-level socio-economic deprivation relative to the original random samples drawn from the national electoral roll. For respondents who reported Māori ethnicity and/or descent, a calibration factor was then applied to adjust weighted data to reflect the age and gender profile of 2018 Māori resident population estimates. Population pyramids illustrating age, gender, and area-level socio-economic deprivation of unweighted and weighed survey data are presented in **Appendix B, Figure S1**. Weighted responses to questions regarding general health and income adequacy by Māori respondents aged 55-82 to the 2018 HWR survey and Māori respondents aged 55-84 from the 2018 General Social Survey are presented in **Appendix B, Figure S2-S3**. Figures indicate that respondents in the HWR represent a good spread of responses across indicators; however, they report better health and somewhat greater income adequacy compared to 2018 General Social Survey (GSS) respondents.

Mplus version 8.8 and a weighted least square mean and variance adjusted (WLSMV) estimator were used for all analyses. All cases that met inclusion criteria had data on five or more indicators of employment precarity. Eighty percent of cases had complete data on all items, 16.1% had one missing item, and 1.7% were missing 2-3 items. In light of the low levels of missing data on model variables, use of muti-item scales of health-related ability to work, and availability of auxiliary variables, twenty multiply imputed (MI) datasets, including indicators of employment precarity, socio-demographic risk factors, and auxiliary variables, were generated using Bayesian estimation to reduce biases associated with missing data[4]. Auxiliary variables included indicators of self-rated

[4] The use of mixture models, such as Latent Class Analysis (LCA), with Multiple Imputation remains an area of ongoing research due to a lack of well-established methods for aggregating estimates, and the assumption of distinct sub-populations implied in the use of LCA. LCA models based on MI data generated from item-level data and auxiliary variables were used in preference to those based on Full Information Maximum Likelihood

material well-being (Jensen et al., 2005), physical and mental health (Ware et al., 2002), sensory difficulties, falls, health service use, life satisfaction, quality of life, job satisfaction, and job stress, intentions to retire soon, experiences of effort and reward in the workplace (Siegrist et al., 2004), use of flexible work arrangements, and informal caregiving for health reasons or childcare.

A series of Latent Class Analyses (LCA) were used to identify and characterise subgroups of individuals who share distinct patterns of employment, person-job fit, and environmental indicators of employment precarity. The optimal number of groups was determined with reference to group size, group interpretability, Entropy and Average Posterior Probabilities of group separation, and the sample-size adjusted Bayesian Information Criterion (SABIC). A minimum group size, representing at least 50 cases or 5% of the sample, was used in conjunction with the interpretability of emerging groups. Entropy and average posterior probability values of 0.40, 0.60, and 0.80 were considered to represent low, medium, and high group separation (Clark & Muthén, 2009). Sample-size adjusted Bayesian Information Criterion was used to indicate model fit, with reference to the change and plateau of values with the increasing number of groups.

Following the identification of the optimal number of groups, conditional LCA models were estimated to assess the association of employment precarity group membership with socio-demographic risk factors (age, gender, education, manual labour occupation) using the AUXILIARY R3STEP logistic regression procedure (Vermunt, 2010). In a final model, the logistic regression procedure was used to assess the association of group membership with Māori cultural identity and participation when the effects of age, gender, education, and occupation were held constant.

(FIML) methods which are limited to LCA model variables and WAI total scores from cases with complete data on all WAI items. Sensitivity analyses, evaluating the consistency of solutions based on FIML methods and across 20 MI datasets (not reported), were conducted to assess the validity of the reported models based on MI datasets and the aggregation of estimates across MI datasets.

Results

Socio-demographic characteristics and indicators of employment precarity

Summary statistics for socio-demographic characteristics of the current sample of Māori aged 55-82 in paid employment (n = 810) are presented in **Table 2**.

Table 2 *Socio-demographic characteristics of older Māori workers responding to the 2018 Health, Work, and Retirement survey (n = 810).*

Demographics	Overall
Age (mean, SD)	62.3 (5.4)
%55-59	37.6
%60-64	34.0
%65-69	17.2
%70+	11.1
Receiving NZSuper or Veterans' pension	
%No	78.0
%Yes	25.5
Gender	
%Tane/male	49.3
%Wahine/female	50.5
%Gender diverse	0.1
Highest level of qualification	
%No quals	26.1
%Secondary	28.3
%Post secondary/Trade	28.9
%Tertiary	16.7
Marital status	
%Married or de facto	74.1
%Not married or de facto	25.9
Household composition	
%Living alone	13.5
%Living with partner only	46.2
%Living with whanau/family	35.1
%Flatmates, boarders, or others	5.2
Homeownership (current residence)	
%Owned without mortgage	37.7
%Owned with mortgage	37.4
%Owned by whanau/family or in whanau/family trust	7.8
%Rental or other arrangement	14.5
%State, council or Kaumātua housing	2.7
Occupation	
Manual labour	22.0
Non-manual labour	78.0

Note: *Summary statistics based on multiple imputed and survey-weighted datasets*.

Socio-demographic factors indicate that around 70% of the sample were under age 65, with 1.8% of this group receiving a NZ Super or Veteran's pension. Approximately equal proportions of tāne and wāhine were working in later life, and this was consistent for those aged 55-64 (48.3% tane, 51.6% wahine) and 65+ (52.1% tane, 47.9% wahine; $\chi^2(1) = 0.86$, $p = 0.326$). Around three-quarters of workers were in a married or *de facto* relationship, and around 80.3% lived with a partner or whānau/family, with smaller proportions living alone or with others. Similar proportions of older Māori workers owned

their homes with and without a mortgage, with smaller proportions living in houses owned by whanau or private or public rental housing. Around 22% of workers were employed in a manual labour occupation. A breakdown of occupational roles in the weighted observed data is presented in **Table 3.**

Table 3 *Proportion of respondents by occupation group (n = 730)*

Occupation	%
*Labourer	12.3
*Machinery operator or driver	9.9
Sales worker	7.6
Clerical or administrative worker	12.8
Community or personal service worker	10.8
Technician or trades worker	13.8
Professional	20.1
Manager	11.4
Other	1.3

*Notes: Summary statics based on survey-weighted observed data; * occupations considered to reflect manual labour roles.*

Summary statistics for indicators of precarious employment in the sample are presented in **Table 4**. Regarding employment stability, around half of the workers in the sample were working full-time for an employer, around a quarter were working part-time/flexible hours for an employer, and a fifth indicated they were self-employed. Just 3% reported that they were engaged in short-term project or contract work. Almost half strongly disagreed with the statement that their job security was poor. When rating indicators of person-job fit, on average, workers reported high health-related ability to work, with 89.4% displaying WAI scores previously found to indicate workers with equal to or less than the population risk for long-term absence from work due to injury or illness in the Netherlands (scores 30+). Around 58% of the sample reported that, to a great or moderate extent, they had adequate access to Flexible Work arrangements (FWAs) in light of their needs. Regarding financial security, 24.9% of workers reported that their current income was more than enough to meet their everyday needs, and 22.3% reported that they anticipated a future without money problems.

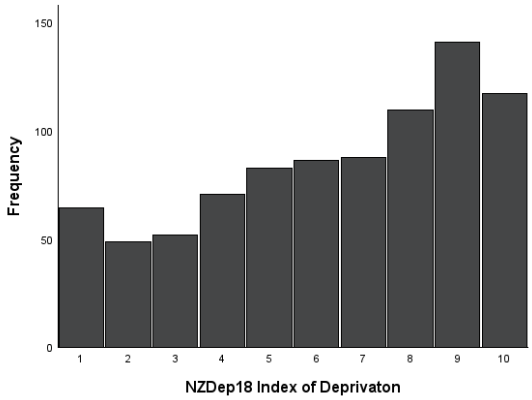
Finally, geocoded indicators of the geographic and socio-economic environment in which older workers live suggest that around three-fifths of older workers lived in urban areas, and 37% resided in areas categorised in the first (lowest) five deciles of relative socio-economic deprivation in the country (**Figure 4**).

Table 4 *Summary statistics for indicators of precarious employment in the overall sample of older Māori workers (n = 810)*

Indicators	Overall
Employment stability	
Current employment type	
% Short-term contract	2.9
%Self-employed	19.6
%Part-time/flexible for employer	25.0
%Full-time for employer	52.5
Poor job security	
%Strongly disagree (1)	46.6
% (2)	22.8
% (3)	14.4
% (4)	7.8
%Strongly agree (5)	8.7
Person-job fit	
Health-related ability to work in current role: WAI (mean, SD)	36.52 (5.19)
Access to adequate FWAs	
%To a great extent	28.5
%To a moderate extent	29.2
%To a limited extent	24.7
%Not at all	17.6
Current income adequate for needs	
%More than enough	24.9
%Enough	47.8
%Just enough	19.9
%Not enough	7.4
Anticipate future without money probs	
%Definitely true (1)	22.3
% (2)	22.9
% (3)	26.8
% (4)	14.4
%Not true at all (5)	13.7
Area-level factors	
Urban accessibility	
%Non-urban	38.5
%Urban	61.5
Area-level relative deprivation index: NZDep18 (mean, SD)	6.35 (2.81)

Note. Summary statistics based on multiple imputed and survey-weighted data; FWAs, flexible work arrangements.

Figure 4 *Histogram of NZDep18 decile of relative area-level socio-economic deprivation (n = 810), summary based on survey-weighted data.*



Profiles of precarious employment

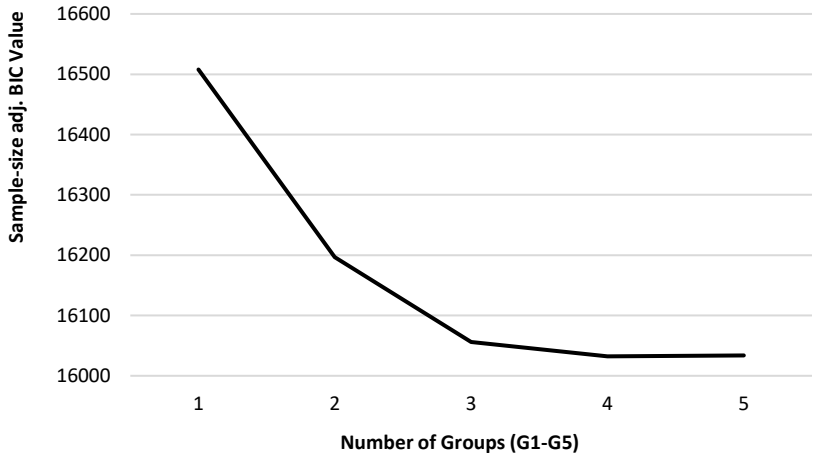
One (G1), two (G2), three (G3), four (G4), and five-group (G5) LCA models were estimated to identify sub-groups of workers who shared distinct patterns of response across indicators of employment precarity. Fit statistics and group proportions based on most likely group membership are presented in **Table 5**. Change in SABIC values, illustrated in **Figure 5,** indicate improvements in model fit with the estimation of the two-group and three-group models, with a four-group model having the minimum SABIC value overall. Estimation of the five-group model indicated a slight decline in model fit and emergence of a very small group representing 1.2% of the sample – this model was not further investigated.

Table 5 *Fit statistics and proportions indicating the optimal number of groups representing employment security/precarity among older Māori workers responding to the 2018 Health, Work, and Retirement survey from Latent Class Analyses (n = 810).*

Fit statistics	**G1**	**G2**	**G3**	**G4**	**G5**
Log-Likelihood value	-8219.07	-8022.594	-7915.289	-7866.450	-7830.103
No. estimated parameters	22	43	64	85	106
Information criteria					
SABIC	16507.820	16196.611	16055.952	16032.223	16033.48
Entropy		0.889	0.758	0.732	0.778
Av. Posterior Probabilities range		0.924-0.977	0.847-0.911	0.846-0.959	0.802-0.956
Group membership (most likely)					
G_1	810 (100%)	113 (14.0%)	520 (64.2%)	246 (30.3%)	9 (1.2%)
G_2		697 (86.1%)	108 (13.3%)	308 (38.0%)	203 (25.1%)
G_3			183 (22.6%)	95 (11.8%)	110 (13.6%)
G_4				161 (19.9%)	158 (19.5%)
G_5					330 (40.8%)

Note. Results based on 20 multiple imputed sets and weighted data; LCA models highly consistent across imputation runs – fit statistics represent averages over all imputations; SABIC = Sample-size adjusted Bayesian Information Criterion.

Figure 5 *Plot of Sample-size adjusted Bayesian Information Criterion from Latent Class Analysis models of employment precarity among older Māori workers.*



Item response proportions and standardised mean item responses by group for the G2, G3 and G4 models are presented in **Table 6**. Overall, inspection of most likely group membership for individuals (**Table 5**) and item response characteristics across the two, three and four-group models (**Table 6**) indicate that new groups generally emerged from larger homogenous groups based on multiple indicators of employment precarity. The two-group model (G2) resulted in improved model fit (ΔSABIC = 311.209) compared to the one-group model, indicating the presence of distinct groups of workers representing 14.0% ($G2_1$) and 86.1% ($G2_2$) of the sample. Entropy and posterior probability values indicated that the groups displayed a high average group reliability. Inspection of indicators by group (**Table 6,** illustrated **Appendix C Figure S4**) suggested that group membership was driven by differences across multiple indicators of employment precarity. The smaller emerging $G2_1$ group displayed smaller proportions of full-time employees, greater proportions in part-time and short-term employment and were more likely to report job insecurity. Regarding person-job fit, this group was less likely to endorse having access to adequate FWAs and an average health-related ability to work around 1.5 to 2 standard deviations below the sample mean. In terms of finances, this group were more likely to report that their current income was just enough or not enough to meet their basic needs, and more likely to anticipate future financial problems. Regarding area-level factors, on average, this group resided in areas with higher-than-average relative socio-economic deprivation. However, groups displayed similar proportions residing in urban and rural areas. This group was tentatively labelled as '*Highly precarious*'.

A three-group model (G3) resulted in improved model fit compared to the two-group model (ΔSABIC = 140.659) and provided medium group reliability with high average group separation, with groups representing 64.2% ($G3_1$), 13.3% ($G3_2$), and 22.6% ($G3_3$) of the sample. The $G3_2$ group comprised a subset of members of the smaller $G2_1$ from the two-group model (96% retained group membership), with the emerging $G3_1$ and $G3_3$ groups representing a split of members of the $G2_2$ group. Inspection of indicators by group (**Table 6,** illustrated **Appendix C Figure S5**) suggested these groups displayed distinct patterns of responses to indicators of employment precarity. Inspection of response probabilities for the smaller group ($G3_3$) indicated they were most commonly self-employed and perceived high job security. Regarding person-job fit, three-quarters of group members reported adequate access to FWAs, with standardised indicators of health-related ability to work around half a standard deviation above the overall sample mean. In terms of financial resources, they were most likely to indicate more than enough income and anticipate a future without money problems. In contrast to the sample overall, in which around 3/5 respondents lived in urban areas, this group were equally likely to live in urban or non-urban locations and reside in areas with

lower-than-average relative socio-economic deprivation. This group was tentatively labelled as '*Secure, high-choice*'.

A four-group solution (G4) indicated the presence of groups representing 30.3% ($G4_1$), 38.0% ($G4_2$), 11.8% ($G4_3$), and 19.4% ($G4_4$) of the sample. The G4 model saw a relatively small improvement in model fit over the three-group model (ΔSABIC = 23.729) and provided medium group reliability with high average group separation (**Table 6,** illustrated **Figure 6**). While membership of workers in the *Highly precarious* ($G3_2$/$G4_3$) and *Secure high-choice* ($G3_3$/$G4_4$) groups was largely maintained in the four-group model, the emerging $G4_1$ and $G4_2$ profiles represented a split of the $G3_1$ group, with an additional 18.2% of the *Highly precarious* $G3_2$ group moving to the $G4_2$ group, and 12.4% of the *Secure high-choice* $G3_3$ group moving to the emerging $G4_1$ group.

The newly emerging $G4_1$ and $G4_2$ groups displayed comparable levels of access to adequate FWAs, health-related ability to work, area-level deprivation indices and urban residence. Both displayed a majority working full-time for an employer ($G4_1$ 81%; $G4_2$ 62%), although around 19% of the $G4_1$ group were in part-time or flexible work for an employer (i.e., 99.8% working full- or part-time for an employer), and 26% of the $G4_2$ group in part-time work for an employer and 11.4% self-employed. In addition to differences in employment types, the emerging groups differed on perceptions of job and financial security, with the $G4_2$ group reporting lower job security, lower current income adequacy, and lower future financial stability. This group was labelled '*Inflexible, financial-risk*'. Compared to other profiles, the $G4_1$ group reported levels of perceived job security, current income adequacy, and future financial stability ratings comparable to those in the *Secure high-choice* group ($G4_4$), however overall, they reported less adequate access to FWAs and higher proportions living in urban areas. This group was labelled '*Secure inflexible financially-stable*'.

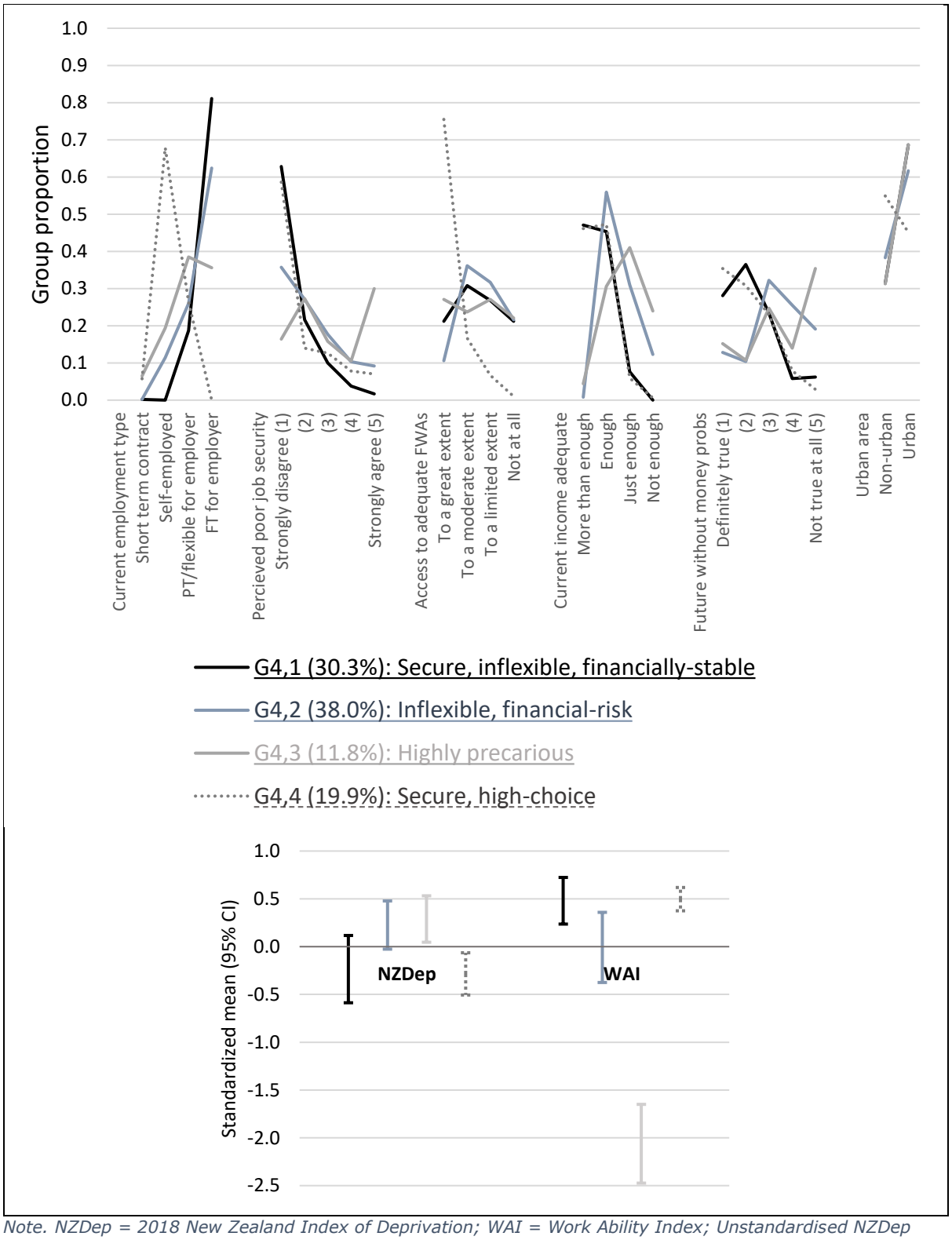
In light of improvements in model fit, the emergence of new groups differing on multiple indicators, and the broad interpretability of groups, the four-group solution, G4, was retained as the optimal model of employment precarity among the current sample of older Māori workers. The tentative group names remained descriptive of groups and were retained in the final model. Group differences are illustrated in **Figure 6**.

Table 6 *Sample proportions and averages by most likely group membership (n = 810).*

	Model									
	G1	$G2_1$	$G2_2$	$G3_1$	$G3_2$	$G3_3$	**$G4_1$**	**$G4_2$**	**$G4_3$**	**$G4_4$**
Name	Overall	Highly precarious	-	-	Highly precarious	Secure high-choice	**Secure inflexible financially-stable**	**Inflexible, financial-risk**	**Highly precarious**	**Secure high-choice**
Sample %	100%	14.0%	86.1%	64.2%	13.3%	22.6%	**30.3%**	**38.0%**	**11.8%**	**19.9%**
Current employment type										
Short term contract	0.029	0.052	0.025	0.016	0.057	0.045	**0.002**	**0.002**	**0.065**	**0.057**
Self-employed	0.196	0.183	0.198	0.066	0.217	0.524	**0.000**	**0.114**	**0.194**	**0.679**
Part-time/flexible for employer	0.250	0.351	0.233	0.233	0.363	0.231	**0.187**	**0.260**	**0.385**	**0.264**
Full-time for employer	0.525	0.414	0.545	0.685	0.363	0.199	**0.811**	**0.624**	**0.356**	**0.000**
Poor job security										
Strongly disagree	0.466	0.162	0.519	0.468	0.154	0.638	**0.628**	**0.357**	**0.164**	**0.586**
.	0.228	0.270	0.221	0.252	0.269	0.141	**0.216**	**0.271**	**0.273**	**0.140**
.	0.141	0.175	0.135	0.149	0.165	0.104	**0.100**	**0.177**	**0.158**	**0.126**
.	0.078	0.120	0.070	0.074	0.126	0.060	**0.038**	**0.103**	**0.105**	**0.078**
Strongly agree	0.087	0.273	0.055	0.057	0.286	0.056	**0.017**	**0.092**	**0.300**	**0.070**
Health-related ability to work WAI, mean (SD)	0.000 (1.000)	-1.801 (0.660)	0.313 (0.660)	0.205 (0.653)	-1.891 (0.653)	0.528 (0.653)	**0.429 (0.645)**	**0.011 (0.645)**	**-2.038 (0.645)**	**0.482 (0.645)**
Access to adequate FWAs										
To a great extent	0.285	0.215	0.297	0.113	0.250	0.757	**0.212**	**0.106**	**0.271**	**0.755**
To a moderate extent	0.292	0.255	0.298	0.351	0.253	0.157	**0.308**	**0.361**	**0.237**	**0.167**
To a limited extent	0.247	0.292	0.239	0.306	0.279	0.075	**0.268**	**0.317**	**0.271**	**0.067**
Not at all	0.176	0.238	0.165	0.230	0.218	0.010	**0.212**	**0.216**	**0.221**	**0.010**
Current income adequate for needs										
More than enough	0.249	0.029	0.287	0.201	0.031	0.497	**0.471**	**0.008**	**0.044**	**0.461**
Enough	0.478	0.335	0.503	0.524	0.310	0.451	**0.453**	**0.559**	**0.306**	**0.473**
Just enough	0.199	0.407	0.162	0.209	0.423	0.046	**0.076**	**0.310**	**0.410**	**0.059**
Not enough	0.074	0.229	0.047	0.065	0.236	0.005	**0.000**	**0.123**	**0.240**	**0.006**
Anticipate future without money probs										
Definitely true	0.223	0.140	0.237	0.179	0.142	0.385	**0.281**	**0.128**	**0.152**	**0.354**
.	0.229	0.085	0.254	0.230	0.092	0.302	**0.365**	**0.104**	**0.107**	**0.308**
.	0.268	0.267	0.268	0.286	0.264	0.221	**0.234**	**0.322**	**0.247**	**0.231**
.	0.144	0.170	0.139	0.173	0.153	0.061	**0.058**	**0.255**	**0.140**	**0.079**
Not true at all	0.137	0.339	0.102	0.132	0.349	0.031	**0.062**	**0.191**	**0.354**	**0.029**
Urban area										
Non-urban	0.385	0.316	0.397	0.350	0.324	0.509	**0.314**	**0.383**	**0.313**	**0.549**
Urban	0.615	0.684	0.603	0.650	0.676	0.491	**0.686**	**0.617**	**0.687**	**0.451**
Area-level socio-economic deprivation NZDep18, mean (SD)	0.000 (1.000)	0.282 (0.993)	-0.049 (0.993)	0.035 (0.987)	0.275 (0.987)	-0.245 (0.987)	**-0.163 (0.974)**	**0.207 (0.974)**	**0.291 (0.974)**	**-0.300 (0.974)**

Note. Proportions for ordinal variables represent aggregate predicted probabilities across 20 imputations; bold text indicates optimal profile; ^ standardised scores; FWAs = flexible work arrangements; WAI = Work Ability Index; NZDep18 deciles treated as a standardised continuous variable with no impact on models generated compared to ordinal specification.

Figure 6 *Sample proportions (top) and estimated means (lower) for indicators by G4 group membership.*



Note. NZDep = 2018 New Zealand Index of Deprivation; WAI = Work Ability Index; Unstandardised NZDep means: $G4_1$ = 5.9, $G4_2$ = 6.9, $G4_3$ = 7.2, $G4_4$ = 5.5; Unstandardised WAI means: $G4_1$ = 38.7 (95% CI, 37.6, 39.9), $G4_2$ = 36.6 (95% CI,34.8, 38.4), $G4_3$ = 25.9 (95% CI, 23.8, 28.1), $G4_4$ = 39.0 (95% CI, 38.4, 42.0).

Socio-demographic risk factors for employment precarity

The multinomial logistic regression procedure was used to assess the relationship between socio-demographic factors and membership of the four employment groups, with risks for those in the *Secure inflexible financially-stable*, *Inflexible financial-risk,* and *Highly precarious* groups compared to those in the *Secure high-choice* employment group when other variables in the model are held constant. Results reported in

Table 7 indicate that group membership was associated with age, gender, education, and employment in a manual labour role. Those aged 65+ were less likely to be in the *Secure inflexible financially-stable* and *Inflexible financial-risk* groups compared to the *Secure high-choice* employment group. Wahine workers were more likely to be in the *Secure inflexible financially-stable* and *Inflexible financial-risk* groups compared to the *Secure high-choice* employment group. Relative to those with a university qualification, those with no educational qualifications were more likely to be in the *Inflexible financial-risk* employment group compared to the *Secure high-choice* employment group. Finally, when other variables in the model are held constant, workers in manual labour roles were more likely to be in the *Highly precarious* employment group compared to the *Secure high-choice* employment group.

Table 7 *Socio-demographic factors by employment group (%) and adjusted odds ratios from the multinomial logistic regression model assessing socio-economic predictors of employment precarity among older Māori workers (n = 808).*

	$G4_1$ Secure inflexible financially-stable %	**$G4_2$ Inflexible, financial-risk %**	**$G4_3$ Highly Precarious %**	**$G4_4$ Secure high choice %**	**$G4_1$ vs $G4_4$[REF]** AOR (95% CI)	**$G4_2$ v $G4_4$[REF]** AOR (95% CI)	**$G4_3$ v $G4_4$[REF]** AOR (95% CI)
Age							
Under 65	74.8	77.3	66.8	58.6	[REF]	[REF]	[REF]
65+	25.2	22.7	33.2	41.1	**0.44 (0.24, 0.79)**	**0.35 (0.18, 0.66)**	0.70 (0.34, 1.43)
Gender							
Tane/male	44.8	45.7	57.4	58.8	[REF]	[REF]	[REF]
Wahine/female	55.2	54.3	42.6	41.2	**1.99 (1.06, 3.73)**	**2.22 (1.17, 4.21)**	1.51 (0.73, 3.10)
Education							
University	24.3	11.0	8.7	20.6	[REF]	[REF]	[REF]
Post-secondary/trade	24.9	29.1	29.2	34.6	0.55 (0.25, 1.23)	2.36 (0.82, 6.76)	1.76 (0.57, 5.50)
Secondary school	33.0	27.2	18.0	29.1	0.87 (0.38, 2.01)	2.19 (0.74, 6.50)	0.99 (0.26, 3.71)
No qualifications	17.8	32.7	44.0	15.7	0.77 (0.27, 2.22)	**5.93 (1.80, 19.48)**	3.80 (0.98, 14.76)
Occupation							
Non-manual labour	83.6	75.5	56.3	86.8	[REF]	[REF]	[REF]
Manual labour	16.4	24.5	43.7	13.2	1.33 (0.54, 3.31)	1.68 (0.70, 4.02)	**4.45 (1.75, 11.35)**

Note. AOR (95% CI) - Adjusted odds ratio with 95% confidence interval; cases identifying as gender diverse not included in logistic regression model; analyses based on survey-weighted and multiply imputed datasets; bolded AOR estimates indicate estimates statistically significant at an $\alpha = 0.05$.

Cultural identity and participation

A subsample of n = 770 older workers included in the primary analysis also provided data on indicators of Māori cultural identity and participation (MCI). Factor scores representing the latent cultural identity and participation construct for this subsample (*weighted* m_w= 0.02, sd_w = 0.63) were included in the multinomial logistic regression model predicting membership of employment profiles, with socio-demographic factors included as covariates in the model. Results indicated that when other variables in the model are held constant, greater MCI was associated with increased odds of belonging to the *Inflexible financial-risk* and *Highly precarious* employment profiles compared to the *Secure high-choice* employment profile (**Table 8**). **Table 9** summarises MCI measure indicators by employment group, illustrating that the *High precarity* group endorsed the highest levels of MCI across all seven indicators.

Table 8 *Mean Māori cultural identity and participation (MCI) factor scores by employment group and adjusted odds ratios from the multinomial logistic regression assessing the association of MCI with employment precarity profiles (n = 770).*

	$G4_1$ Secure inflexible financially-stable	**$G4_2$ Inflexible, financial-risk**	**$G4_3$ Highly precarious**	**$G4_4$ Secure High-choice**	**$G4_1$ vs $G4_4$[REF]** AOR (95% CI)	**$G4_2$ v $G4_4$[REF]** AOR (95% CI)	**$G4_3$ v $G4_4$[REF]** AOR (95% CI)
MCI factor score	-0.02	0.08	0.19	-0.15	1.36 (0.77, 2.39)	**2.01 (1.15, 3.67)**	**2.83 (1.45, 5.55)**

Note. AOR = adjusted odds ratio; AORs associated with age, gender, education and occupation not reported; cases identifying as gender diverse not included in logistic regression model; estimated based on survey-weighted and multiple imputed datasets; bolded AOR estimates indicate estimates statistically significant at an α = 0.05.

Table 9 *Summary of Māori cultural identity (MCI) indicators by employment precarity group (n = 770).*

	$G4_1$ Secure inflexible financially-stable	**$G4_2$ Inflexible, financial-risk**	**$G4_3$ Highly precarious**	**$G4_4$ Secure High-choice**
Identify as Māori (yes)	79.6%	84.7%	86.6%	74.4%
Māori language (good, very good or excellent)	13.1%	16.7%	30.6%	11.9%
Can name more than 3 generations	54.8%	49.8%	62.0%	51.9%
Whānau plays a large or very large part in participant's life	61.9%	65.0%	72.1%	49.1%
Been to a marae at least once in the last year	68.1%	72.6%	78.6%	55.1%
Has a financial interest in Māori land	59.7%	59.4%	66.0%	57.7%
Has contact with some or mainly Māori	65.3%	69.3%	73.1%	56.6%

Note. Estimates represent the average of observed survey-weighted proportions for most-likely group membership across 20 imputed datasets; items dichotomised in line with standard reporting of the MCI indicators (Stevenson, 2004).

Discussion

This study used a person-centred analysis approach to identify four distinct profiles of employment precarity among a general population sample of older Māori workers. This work expands on international studies, that have identified typologies based on employment conditions in general population samples, to additionally consider lifespan person-environment fit perspectives to characterise employment precarity. Beyond contractual arrangements and perceived job security, the work considers the adequacy of flexible work arrangements and current income in light of needs, as well as indicators of health-related ability to work and anticipated future financial security when characterising employment precarity in later life. Two indicators of environments were also considered, with both the urban accessibility and relative socio-economic deprivation of areas providing some differentiation between the most and least precarious employment profiles. Secondary analyses indicate that employment profiles were associated with socio-demographic risk factors of age, gender, education, and work in a manual labour occupation. Finally, to acknowledge the social and political context in which older Māori workers of today have engaged with education and employment across their later life course, we analysed an association of employment precarity in later life with engagement with Māori cultural identity (MCI). In line with well-documented pressures between obtaining equal access to education and employment opportunities and maintaining/developing MCI for Māori workers of this generation, results indicate that less precarious employment in later life was associated with lower MCI.

Profiles of precarious employment

In the current sample, the smallest profile was labelled *Highly precarious* (11.8% of the sample). This group was characterised by a combination of employment conditions and personal resources, indicating a group working in insecure, unsuitable work with high financial pressure to continue. This group reported relatively low participation in full-time employment for an employer, low perceived job security, low work flexibility relative to needs, poor health-related ability to work, lowest ratings of current income, greatest concerns about future money problems and, on average, living in areas of greater relative socio-economic deprivation compared to the sample overall. Notably, while other groups reported average levels of health-related ability to work, average scores for the *Highly precarious* group were in ranges indicating 10% risk of long-term absence from work due to injury or illness in other populations (Schouten et al., 2016). While risks associated with WAI scores have not been evaluated in the New Zealand context, findings provide some idea of the level of health-related difficulties experienced by this group as they engage in their current work roles.

The employment profile representing the lowest precarity in the current sample was labelled *Secure high-choice* (19.9% of the sample). This profile was characterised by a

predominance of workers who were self-employed or in less than full-time hours for an employer. They generally reported high job security, adequate work flexibility, high health-related ability to work, and perceived security in current and future finances. On average, this group lived in areas with relative socio-economic deprivation lower than average for the sample and were unique in having a majority of members who lived in non-urban areas (55%, compared to 31-38% in other profiles). Identified as a group with high stability, autonomy, and choice in employment, this group was selected as the most-secure profile among older Māori workers and used as the reference group when assessing socio-demographic risk factors associated with membership of other employment groups.

Of the remaining two employment profiles, the *Secure inflexible financially-stable* (30.3% of the sample) profile displayed job security, financial security, and health-related workability comparable to the *Secure high-choice* group. However, where no members of the *Secure high-choice* profile worked full-time for an employer, this group were almost exclusively working for an employer (81% full-time and 18.7% part-time/flexible hours). This group also reported a greater unmet need for flexible work, with around 48% reporting that arrangements were limited or wholly inadequate. Overall, while potentially pressured by non-work related needs and commitments, this profile represents workers experiencing relatively low precarity in employment.

The final and largest profile, *Inflexible financial-risk* (38.0% of the sample), worked full-time (62.4%) or part-time/flexible hours for an employer (26.0%) or were self-employed (11.4%). This group reported mixed experiences of job insecurity, with greater job insecurity reported only by the *Highly precarious* group. This group endorsed the greatest unmet need for flexible work arrangements, with 53.3% reporting that current arrangements were limited or wholly inadequate. While most reported that their current income was 'enough' to meet their basic needs, they were among the least confident in a future without money problems. This group reported health-related ability to work comparable to the *Secure high-choice* and *Secure inflexible financially-stable* profiles. However, membership of this profile was characterised by residence in areas with higher relative socio-economic disadvantage than those in the *Secure high-choice* profile. Overall, this profile represented older Māori workers with variable job security, good health-related ability to work in their current roles, a need for greater flexibility in working conditions and economic pressures to continue working. This profile represented workers at risk of precarity, displaying a combination of employment and person-work fit factors, which may render workers vulnerable to health-related or financial shocks or increased personal needs or responsibilities not accommodated by their employment.

Socio-demographic drivers of precarious work

The current work examined associations between employment precarity profiles and socio-demographic risk factors previously associated with experiences of social inequalities. In the current sample, 28.3% of older Māori workers were aged 65+, half identified as wahine/female, 26.1% had no formal qualifications, and 22.0% worked in manual labour roles. When risk factors were mutually adjusted, those in the *Secure inflexible financially-stable* and *Inflexible financial-risk* groups were less likely to be aged 65+ or to be tane/male compared to workers in the *Secure high-choice* group. However, those in the *Highly precarious* group did not differ in age or gender from those in *Secure high-choice* employment. Regarding education, those with no qualifications were more likely to be in the *Inflexible financial-risk* group compared to workers in the *Secure high-choice* group. Finally, those in the *Highly precarious* group were more likely to be employed in manual labour occupations compared to the *Secure high-choice* employment group.

While the cross-sectional design of the current research cannot provide information on transitions between employment profiles or transitions *out* of the workforce over time, associations of socio-demographic risk factors with employment precarity profiles are informative. Association with age may indicate longer working lives among workers in the *Secure high-choice* and *High precarity* profiles. However, the disparities in person-job fit experienced by these profiles suggests that motivations for continuation likely differ. Much organisational research on supporting workers in later life focuses on the specific needs and motivations of workers who have a choice in the decision to remain in or exit the workforce. However, continued work in the *Highly precarious* group may represent the limited choices faced by workers with significant health-related pressures to leave work but who are financially unable to. Indeed, the *Highly precarious* profile was the only group displaying low health-related ability to work in later life, suggesting that those experiencing poor health-related ability to work who *can* transition to more suitable work, or who are financially able to retire, likely do. This lack of choice in the face of need is potentially central to identifying older adults in precarious employment situations. Future research may more explicitly assess employment transitions over time and motivations for employment among these four groups.

While the current research only assessed the association of *current* occupation with employment precarity profiles, the increased likelihood of employment in a manual labour role among those in *Highly precarious* employment likely reflects the life-long accumulation of skills and health conditions and the current health-related demands of these roles. Around 44% of those in the *Highly precarious* profile were employed in a manual labour role (compared to 22% of the sample overall). This finding aligns with concern regarding the physical health and financial well-being of workers in manual

labour occupations, with current results further characterising a group of older workers in which these experiences co-occur. Past research indicates that older Māori workers are not only more likely to be in roles hazardous to health, but also more likely to be exposed to health hazards in these roles than their non-Māori colleagues (Denison et al., 2018). Lifespan perspectives on person-environment fit suggest that supporting health outcomes and reducing the health-related demands at work represent meaningful targets for reducing employment precarity among older Māori workers. Age-related HRM policies and practices may be effective in supporting workability and motivations for work among older workers (Kooij et al., 2014; Kooij & Van De Voorde, 2015), however reducing health-related impacts of manual labour roles for workers at earlier ages also presents a direct way to support workability, as people approach and enter older ages. Additionally, support for training and opportunities for employment in roles with lower demands on health may increase participation in work with greater person-(work)environment fit in later life, thus lowering employment precarity among older workers. Similarly, when other socio-demographic factors were held constant, current results indicated an increased likelihood of no educational qualifications among those in the *Inflexible financial-risk* group. Supporting opportunities (and reducing barriers) for education and training for workers of all ages may be one meaningful way to support older workers to obtain financial security in later life.

A note on self-employment in later life

Other studies examining employed precarity using mixture models (**Table S1, Appendix A**) have frequently excluded self-employed participants, or have analysed profiles among self-employed separately from those who work for an employer. In identifying profiles of 'employment quality' among general population samples of wage earners in the United States, Peckham et al. (2019, 2022) analysed self-employed workers in a separate Latent Classes Analysis, finding self-employed workers (~13% of all wage earners) to be divided into '*skilled contractors'* (~5% of all wage earners) and '*job-to-job'* workers (~8% of all wage earners). The groups identified by Peckham et al. were similar across several indicators of employment quality, including highly non-standardised working arrangements, irregular hours, low protections at work, high control over their schedules, good opportunities to develop, and low probabilities of experiencing harassment. However, where *'skilled contractors'* were characterised by very high wages, long/excessive hours, and a high level of autonomy at work, '*job-to-job'* workers were characterised by low income, low hours, and low autonomy at work. In the current study, self-employed workers were assessed within the broader group of older workers (representing 19.6% of the sample), with these employment arrangements considered an indicator of employment precarity. Current results indicated that self-employed older workers represented a majority in the *Secure high-choice*

profile (perhaps most analogous to Peckham et al.'s '*skilled contractors*'), with smaller proportions observed within the *Inflexible financial-risk* and *Highly precarious* profiles. While the current work provides no information on the types of businesses this group undertake or their career paths, results similarly suggest that older self-employed persons and entrepreneurs represent a substantial yet heterogeneous minority of older workers. While such enterprise may be associated with high employment security in later life, this trajectory is not assured. Efforts to support entrepreneurial activities, knowledge and business performance may be one way governments may support older workers with marketable skills to secure a good later working life as self-employed contractors or entrepreneurs.

Māori cultural identity

Introductory statements of the current report outline both the obligation and necessity for public policy and research to focus on outcomes for Māori. Under policies of assimilation and integration, current generations of older Māori and their parents entered education and employment during periods in which Māori people faced significant barriers to opportunities enjoyed by other New Zealand children and adults. To examine the potential relationship between engagement in Māori culture and employment precarity in later life, our final analysis tested the association of experiences of employment precarity among older Māori workers with an established measure of Māori cultural identity (MCI). Compared to the *Secure high-choice* group, membership of the *High precarity* and *Inflexible financial-risk* profiles was associated with higher MCI. There was no significant difference in MCI between those in the *Secure high-choice* and *Secure inflexible financially-stable* employment profiles. These findings indicate higher Māori cultural identity among those experiencing greater employment precarity in later life. Current results align with what may be expected in light of well-documented barriers to opportunities for education and employment for Māori of this generation and their ancestors since colonisation. Reducing barriers between Māori cultural engagement and education/employment opportunities may improve outcomes for future generations of older Māori workers. Social and policy efforts of recent decades have been made to protect and support engagement with Māori culture by Māori and non-Māori citizens in education (reviewed below), and meaningful efforts continue to improve workplaces for all stakeholders through the integration of bicultural policies and Māori cultural training (e.g., Hohaia, 2016).

While findings align with known historical and structural barriers to achieving good education and employment outcomes for Māori, there are limitations and alternative interpretations of current findings. The single-factor measure of MCI used in the current research displayed excellent fit to the data, with indicators representing a set of theoretically-grounded indicators of a traditional Māori cultural identity at a specific point

in time. Designed to be broadly applicable to a range of peoples, the measure of MCI is limited as it does not capture aspects of Māori cultural identity that may be uniquely relevant to iwi/hapu/individuals or reflect less traditional expressions of Māori cultural identity. Further, while cultural identity may be understood to develop and evolve across a life course, this does not preclude that engagement with a Māori cultural identity may have varied throughout the life course and that the levels of MCI observed among older workers reflect recent, rather than early-life, developments. Similarly, while the current interpretation of the association between MCI and late-life employment precarity rests on race-related social and structural barriers as limiting factors in engagement with MCI and education/employment outcomes, the current design cannot rule out the presence of another unobserved third factor driving associations between MCI and employment precarity.

Creating Better Māori Outcomes

Clarence Beeby took over the role of Director of Education on 1 May 1940, and had a major influence on the introduction of ideas about equality of opportunity in educational policy in this country (Barrington & Beaglehole, 1972). So, when he shared with a group of academics at Massey in the early 1980's that he had dedicated one of the books he worked on to the Minister of Education from Ruatoria, he was asked why. He told the story of an innovative, rural, secondary school initiative that he launched in Tikitiki, on the East Coast: it was a District High School, one of only three such District High Schools to be trialled (Irwin, 1989a; pp 18-20).

After a period of time, officials advised him that enrolments at the school were low. Ngāti Porou whānau were still sending their youth away to the Māori boarding schools. Beeby asked his officials to organise a hui in Ruatoria so that he could meet the iwi to discuss this. The Hui was duly organised and Beeby travelled to the Coast. After the welcoming protocols for the evening were completed, Beeby addressed the Hui. He spoke about how significant the innovation was and asked why Ngāti Porou still sent their youth away to be educated.

An elderly kaumātua stood to speak in response. His main question to Beeby focused on Beeby’s own education. He asked Beeby what subjects he studied at school. The new, innovative, local secondary school offered Ngati Porou youth woodwork, metalwork, home economics. Not an academic curriculum but a vocational one - in the view of Ngāti Porou they had been offered a second-class education.

Beeby responded to the question asked of him: Classics; Latin; Maths; English ... The old man spoke again: Yes. And look where your education got you! Beeby dedicated the book to the old man because he said the kōroua taught him more about consultation over policy that night than any officials ever had. The government had offered Ngāti Porou a second-class education option and the iwi saw straight through it.

Such leadership from iwi, changes in government policy, and the impact of urbanisation in the 1950's and 60's, which saw many Māori leave rural tribal estates to work in the cities, contributed to opening up more opportunities for Māori to access secondary education. The flow-on effect of that increased access has taken decades to become apparent.

Māori Medium Education, English Medium Education

The activism of what is known as the Māori Renaissance, from the mid-1970's on, has led to the creation of what is now referred to as Māori medium education, which is comprised of a suite of options from early childhood to tertiary education, which are contributing to transformed schooling options and enhanced labour market participation for Māori. The children of the kōhanga reo in the 1980's are now in their late thirties and early forties. Bilingual, bicultural, these Māori adults are leaders in their professional and business fields. Their achievements are showing that the patterns of successful Māori school outcomes are creating new Māori labour market outcomes.

Education which is culturally authentic makes a difference to labour market participation. The Families Commission reported the trends now being created in this regard in Whanau: Yesterday, Today, Tomorrow (Irwin et al., 2010). In a Keynote Address delivered at an NZQA Symposium at Te Papa honouring Dr Ranginui Walker in June 2010, Mereana Selby, CEO of Te Wānanga o Raukawa, used Ministry of Education data to report the performance of nine wharekura / Māori Secondary Schools on NCEA L 1–3 (Selby, 2010). The results, shown in **Table 10**, in the Māori Medium Education options were stronger than those reported as the national average.

Table 10 *Performance of Māori in secondary schools compared with national averages.*

NCEA Level	Wharekura Results	National Average
1	97	71
2	94	76
3	93	70

In *Ngā Haeata o Aotearoa 2019*, the Ministry of Education reported that Māori in Māori medium education continue to have higher rates of attainment compared to Māori in English medium (Ministry of Education, 2020):

> *The proportion of Māori school leavers with NCEA Level 3 or UE has increased significantly over the past 10 years. Māori school leavers in Māori medium education continue to have higher rates of attainment compared to the rates for Māori school leavers in English medium education and for all learners. In 2018, the proportion of Māori school leavers in Māori medium education that attained NCEA Level 3 or above was 59% compared to 34% for Māori school leavers in English medium education and 54% for all school leavers.*

Te Kāhui Karauna

Research and data at the iwi level are being called for to enable whānau, hapū, and iwi to explore development opportunities at levels which resonate with mātauranga Māori through the Māori Cultural Infrastructure, which promote strength-based approaches to health and wellbeing.

Iwi Leaders are highly active in this data sovereignty space. An independent Charitable Trust, Te Kāhui Raraunga Charitable Trust, was established in 2019 'to lead action required to realise the advocacy of the Data Iwi Leaders Group (DILG)'. In October 2019, Te Kāhui Raraunga signed a Mana Ōrite Agreement with Stats NZ. The purpose of the agreement is "to work together with iwi-Māori to realise the potential of data to make a sustainable, positive difference to outcomes for iwi, hapū, and whānau" (StatsNZ 2020c). On May 26, 2023, Te Kāhui Raraunga launched its Māori Data Governance Model (Te Kāhui Raraunga, 2023). The report of the model notes the following key features (Kukutai, 2023):

> *Māori data is a taonga that requires culturally grounded models of protection and care. The model provides guidance for the system-wide governance of Māori data consistent with the governments responsibilities under Te Tiriti o Waitangi (Te Kāhui Raraunga, 2023).*

In the Aotearoatanga, nation-building, project, the context, settings, and impact of Whanake Māori, Māori Development, are changing across a broad government, NGO and private sector landscape. The changes have been more pronounced since at least the mid-1970's (Irwin et al., 2013). Those changes are creating transformed Māori outcomes which are already being reported.

Strengths, limitations, and future directions

A review of existing literature on the experiences of older Māori and work (Brazzale, 2022) identified little research investigating the experiences and voices of 'ordinary' workers. A strength of the current research is the availability of data from a general population sample of older Māori workers who have provided detailed indicators of employment conditions and person-(work)environment fit in later life. Evidenced by the spread of responses across socio-demographic, economic, geographic, and employment-related factors, the Health, Work and Retirement study design has supported observations of a substantial cross-section of older Māori workers in the community.

Comparisons of shared indicators of self-rated health and adequacy of income with the 2018 General Social Survey (**Appendix B**. Generalisability of findings) suggest that the current sample of older Māori may under-represent adults experiencing poor health and, to a lesser degree, inadequate income. While older workers (a relatively healthy group, receiving income) may be less impacted by these biases, caution is needed in generalisation of the relative size of employment precarity groups – specifically, current

findings may under-report the proportion of older Māori in *Highly precarious* or *Inflexible financial-risk* profiles (characterised by low income and/or poor health). One significant limitation is that current findings are limited to experiences of older Māori who have been able to maintain employment into later ages. Future work may better understand experiences of employment precarity in later life by surveying younger workers and their employment transitions over time, as well as the experiences of those not in the workforce.

A central tenant of public health research is the ability to replicate results, particularly in exploratory models such as those presented here. However, current findings are necessarily limited to a single birth cohort at a point in time. Life course experiences of the employment, personal, and broader socio-economic conditions of older workers today will inevitably change for future generations, and thus characterisations of employment precarity and proportions of workers impacted may vary. Such changes may be evident in the post-COVID-19 pandemic period (e.g., acute barriers to employment for older adults, reduced perceptions of job security, enhanced implementation of flexible work arrangements, and increasing costs of living). However, long-term societal changes may reduce experiences of employment precarity for older Māori workers of the future. As previously described, core initiatives supporting education outcomes for Māori from the early 90s, such as Te Kōhanga Reo, Kura Kaupapa Māori, and Māori Medium Education, and establishment of tertiary institutions offering degree courses with an emphasis on Māori language and culture, have reduced barriers to education, careers, and cultural engagement. However, there are also causes for concern for future generations, as housing costs increase and rates of home ownership decrease, such that these workers may face increased financial pressures to continue to work into later ages. Current models highlight the importance of converging factors on person-environment fit, such as job insecurity, health-related workability, and financial wellbeing, as central to defining employment precarity among older workers and introduce a life course person-environment fit framework through which employment precarity among future cohorts may be considered.

Conclusions

This report has been prepared to support a discussion of pathways for improving outcomes for older Māori workers. Understanding the combinations of employment and personal situations that define employment precarity in later life is key to reducing inequalities among older workers and supporting work participation among older adults. While delineation of employment situations based on employment quality may be sufficient to understand the nature of jobs undertaken by this demographic, we argue that definitions incorporating lifespan perspectives of person-employment fit, better reflect the employment precarity experienced by workers in later life. The current work identified groups of workers with distinct experiences of employment in later life, most of which featured some challenges to suitable employment and retirement (i.e., job insecurity, unmet need for flexible work arrangements, poor health-related ability to work, financial need). One profile, representing 11.8% of the sample, was characterised by multiple indicators of precarity and thus identified as being in *Highly precarious* employment situations. This profile was more likely to be employed in manual labour roles and was the only profile to display poor health-related ability to work, likely reflecting the demands of their current roles and a high financial need to continue. Established literature on HRM policies and practices provides insights into how employers and policymakers may adapt work situations to improve workability across the life course. Building upon past scholarship, the interpretation of current results grounded in a structural analysis of the challenges experienced by the current cohort of older Māori workers indicate that continued efforts to support Māori cultural identity in education and workplaces may meaningfully reduce barriers to positive outcomes for older workers of tomorrow.

References

Allen, J., Alpass, F. M., & Stephens, C. V. (2021). New Zealand Health, Work, and Retirement Longitudinal Study. In D. Gu & M. E. Dupre (Eds.), *Encyclopedia of Gerontology and Population Aging* (pp. 3484–3490). Springer International Publishing. https://doi.org/10.1007/978-3-030-22009-9_977

Allen, J., Alpass, F. M., Towers, A., Stevenson, B., Szabó, Á., Breheny, M., & Stephens, C. (2023). The health, work, and retirement study: representing experiences of later life in Aotearoa New Zealand. *Journal of the Royal Society of New Zealand*, *53*(4), 532–547. https://doi.org/10.1080/03036758.2022.2099911

Atkinson, J., Crampton, P., & Salmond, C. (2021). *NZDep2018 analysis of census 2018 variables*.

Australian Bureau of Statistics. (2022). *ANZSCO - Australian and New Zealand Standard Classification of Occupations [Internet]. Canberra: ABS; 2022 [cited 2023 May 31].* Available from: https://www.abs.gov.au/statistics/classifications/anzsco-australian-and-new-zealand-standard-classification-occupations/latest-release.

Barrington, J. and Beaglehole, T. (1972) Māori Schools in a Changing Society. Wellington: New Zealand Council for Educational Research.

Bartholomew, R. (2020) New Zealand's Forgotten History of Racial Segregation. Auckland: Bartholomew Publishing.

Bazzoli, A., Probst, T. M., & Tomas, J. (2022). A Latent Profile Analysis of Precarity and Its Associated Outcomes: The Haves and the Have-Nots. *International Journal of Environmental Research and Public Health*, *19*(13), 7582. https://www.mdpi.com/1660-4601/19/13/7582

Blustein, D. L., Allan, B. A., Davila, A., Smith, C. M., Gordon, M., Wu, X., Milo, L., & Whitson, N. (2022). Profiles of Decent Work and Precarious Work: Exploring Macro-Level Predictors and Mental Health Outcomes. *Journal of Career Assessment*, *0*(0), 10690727221119472. https://doi.org/10.1177/10690727221119473

Blustein, D. L., Perera, H. N., Diamonti, A. J., Gutowski, E., Meerkins, T., Davila, A., Erby, W., & Konowitz, L. (2020). The uncertain state of work in the U.S.: Profiles of decent work and precarious work. *Journal of Vocational Behavior*, *122*, 103481. https://doi.org/10.1016/j.jvb.2020.103481

Brazzale, P. (2022). *Older Māori and Work: A review of the peer-reviewed literature*. https://officeforseniors.govt.nz/assets/documents/our-work/Older-Maori-and-work-A-review-of-the-peer-reviewed-literature/Older-Maeori-and-Work-A-review-of-the-peer-reviewed-literature-.pdf

Breheny, M., Stephens, C., Henricksen, A., Stevenson, B., Carter, K., & Alpass, F. (2016). Measuring living standards of older people using Sen's Capability Approach: development and validation of the LSCAPE-24 (Living Standards Capabilities for Elders) and LSCAPE-6. *Ageing and Society*, *36*(2), 307–332. https://doi.org/10.1017/S0144686X14001160

Brougham, D. & Haar, J. (2020). Technological disruption and employment: The influence on job insecurity and turnover intentions: A multi-country study. *Technological Forecasting & Social Change*, 161, 120276, 1-10. https://doi.org/10.1016/j.techfore.2020.120276

Calman, R. (n.d.) *Māori education – mātauranga – Missionaries and the early colonial period*. Te Ara – the Encyclopaedia of New Zealand, http://www.TeAra.govt.nz/en/zoomify/34874/education-ordinance-1847

Cho, Y. (2020). The associations between patterns of precarious employment and workers' health. *The Social Science Journal*, 1–14. https://doi.org/https://doi.org/10.1016/j.soscij.2019.09.006

Choi, E. Y., Choi, S.-H., & Lee, H. (2021). The Association between Job Quality Profiles and Work-Life Balance among Female Employees in Korea: A Latent Profile Analysis. *International Journal of Environmental Research and Public Health*, *18*(4), 1672. https://doi.org/10.3390/ijerph18041672

Clark, S., & Muthén, B. (2009). *Relating Latent Class Analysis Results to Variables not Included in the Analysis*.

Cunningham, C., Durie, M., Fergusson, D., Fitzgerald, E., Hong, B., Horwood, J., Jensen, J., Rochford, M., & Stevenson, B. (2002). Ngā Āhuatanga Noho o te Hunga Pakeke Māori Living Standards of Older Māori.

Cunningham, C., Stevenson, B., & Tassell, N. (2005). *Analysis of the characteristics of whānau in Aotearoa. A report prepared for the Ministry of Education.*

Denison, H. J., Eng, A., Barnes, L. A., Cheng, S., Mannetje, A. 't, Haddock, K., Douwes, J., Pearce, N., & Ellison-Loschmann, L. (2018). Inequities in exposure to occupational risk factors between Māori and non-Māori workers in Aotearoa New Zealand. *Journal of Epidemiology and Community Health*, *72*(9), 809. https://doi.org/10.1136/jech-2018-210438

Douglas, J., Haar, J., & Harris, C. (2017). Job insecurity and job burnout: Does union membership buffer the detrimental effects? *New Zealand Journal of Human Resource Management*, 17(2), 23-40.

Haar, J. & Brougham, D. (2022). A teams approach towards job insecurity, perceived organisational support and cooperative norms: A moderated-mediation study of

individual wellbeing. *The International Journal of Human Resource Management*, 33(8), 1670-1695.

Haar, J., & Martin, W. J. (2022). He aronga takirua: Cultural double-shift of Māori scientists. *Human Relations*, *75*(6), 1001–1027. https://doi.org/10.1177/00187267211003955

Henare, M. (1988). *The Royal Commission on Social Policy April Report 1988* https://www.publicgood.org.nz/wp/wp-content/uploads/2018/04/RCSP-All-volumes-NEW-latest.pdf

Hohaia, D. (2016). In search of a decolonised military: Māori cultural learning experiences in the New Zealand Defence Force. *Kōtuitui: New Zealand Journal of Social Sciences Online*, *11*(1), 47–58. https://doi.org/10.1080/1177083X.2015.1050404

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Hunn, J. (1961) *1960 Annual Report of the Department of Māori Affairs*. Wellington: Government Printer.

Huria, T., Cuddy, J., Lacey, C., & Pitama, S. (2014). Working With Racism. *Journal of Transcultural Nursing*, *25*(4), 364–372. https://doi.org/10.1177/1043659614523991

Irwin, K.G. (1989a) '*Bicultural Education in Tomorrow's Schools*', PPTA Journal Term 1

Irwin, K.G. (1989b) 'Multicultural Education: The New Zealand Response.' NZJES Vol 24, No.1, pp 3-17.

Irwin, K.G. (2022) *Decolonising Public Policy: The Galaxy, The Gavel and the Gun*. Wellington: Office of the Retirement Commission, Te Ara Ahunga Ora.

Irwin, K.G., Hetet, L., Maclean, S. and Potae, G. (2013) 'Chapter Three Māori Affairs Policy' in *What works with Maori? What the people said*. Wellington: Families Commission.

Irwin, K.G. with Davies, L., Werata, W., Potae-Rokx, H., Tuuta, C., Potaka, S., McClausand, V., and Bassett, D. (2010) *Whanau: Yesterday, Today, Tomorrow*. Wellington: Families Commission.

Ilmarinen, J. (2006). The Work Ability Index (WAI). *Occupational Medicine*, *57*(2), 160–160. https://doi.org/10.1093/occmed/kqm008

Ilmarinen, J., & Rantanen, J. (1999). Promotion of work ability during ageing. *American Journal of Industrial Medicine*, *36*(SUPPL. 1), 21–23.

https://doi.org/10.1002/(SICI)1097-0274(199909)36:1+<21::AID-AJIM8>3.0.CO;2-S

Jensen, J., Spittal, M., & Krishnan, V. (2005). *ELSI short form: User manual for a direct measure of living standards*.

Julià, M., Vanroelen, C., Bosmans, K., Van Aerden, K., & Benach, J. (2017). Precarious Employment and Quality of Employment in Relation to Health and Well-being in Europe. *International Journal of Health Services*, *47*(3), 389–409. https://doi.org/10.1177/0020731417707491

Kooij, D. T. A. M., Jansen, P. G. W., Dikkers, J. S. E., & de Lange, A. H. (2014). Managing aging workers: A mixed methods study on bundles of HR practices for aging workers. *International Journal of Human Resource Management*, *25*(15), 2192–2212. https://doi.org/10.1080/09585192.2013.872169

Kooij, D. T. A. M., & Van De Voorde, K. (2015). Strategic HRM for older workers. In *Aging Workers and the Employee-Employer Relationship* (pp. 57–72). Springer International Publishing. https://doi.org/10.1007/978-3-319-08007-9_4

Kreshpaj, B., Orellana, C., Burström, B., Davis, L., Hemmingsson, T., Johansson, G., Kjellberg, K., Jonsson, J., Wegman, D. H., & Bodin, T. (2020). What is precarious employment? A systematic review of definitions and operationalizations from quantitative and qualitative studies. *Scandinavian Journal of Work, Environment & Health*, *46*(3), 235–247. https://www.jstor.org/stable/27004193

Kukutai, T., Campbell-Kamariera, K., Mead, A., Mikaere, K., Moses, C., Whitehead, J. & Cormack, D. (2023). *Māori data governance model*. Te Kāhui Raraunga

Ministry of Education. (2020). *Ngā Haeata o Aotearoa: Ka Hikitia 2019 Report*. https://www.educationcounts.govt.nz/publications/maori_education/maori-medium-and-english-medium/5851/nga-haeata-o-aotearoa-2019

Moyle, P. (2016). Māori social workers' experiences of care and protection: A selection of findings. *Aotearoa New Zealand Social Work*, *26*(1), 55–64. https://doi.org/10.11157/anzswj-vol26iss1id55

Naranjo, A., Shoss, M., Gebben, A., DiStaso, M., & Su, S. (2021). When minor insecurities project large shadows: A profile analysis of cognitive and affective job insecurity. *Journal of Occupational Health Psychology*, *26*(5), 421–436. https://doi.org/10.1037/ocp0000294

Peckham, Fujishiro, Hajat, Flaherty, & Seixas. (2019). Evaluating Employment Quality as a Determinant of Health in a Changing Labor Market. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, *5*(4), 258. https://doi.org/10.7758/rsf.2019.5.4.09

Peckham, T., Flaherty, B., Hajat, A., Fujishiro, K., Jacoby, D., & Seixas, N. (2022). What Does Non-standard Employment Look Like in the United States? An Empirical Typology of Employment Quality. *Social Indicators Research*, *163*(2), 555–583. https://doi.org/10.1007/s11205-022-02907-8

Peckham, T., Seixas, N., de Castro, A. B., & Hajat, A. (2022). Do Different Patterns of Employment Quality Contribute to Gender Health Inequities in the U.S.? A Cross-Sectional Mediation Analysis. *International Journal of Environmental Research and Public Health*, *19*(18), 11237. https://doi.org/10.3390/ijerph191811237

Pitt-Catsouphes, M., & Smyer, M. (2012). *The Age and Generations Study, 2007-2008*. https://doi.org/10.3886/ICPSR34837.v1

Royal, T. A. C. (Ed.). (2003). *The Woven Universe: Selected Writings of Rev. Maori Marsden* (T. A. C. Royal, Ed.). Estate of Rev. Maori Marsden.

Schouten, L. S., Bültmann, U., Heymans, M. W., Joling, C. I., Twisk, J. W. R., & Roelen, C. A. M. (2016). Shortened version of the work ability index to identify workers at risk of long-term sickness absence. *The European Journal of Public Health*, *26*(2), 301–305. https://doi.org/10.1093/eurpub/ckv198

Selby, M. (2010) *Keynote Address*. NZQA Symposium honouring Dr Ranginui Walker. 30 June 2010, Te Papa.

Siegrist, J., Starke, D., Chandola, T., Godin, I., Marmot, M., Niedhammer, I., & Peter, R. (2004). The measurement of effort–reward imbalance at work: European comparisons. *Social Science & Medicine*, *58*(8), 1483–1499. https://doi.org/10.1016/S0277-9536(03)00351-4

Stats NZ. (2020a). *Urban accessibility – methodology and classification*. https://www.stats.govt.nz/assets/Uploads/Methods/Urban-accessibility-methodology-and-classification/Download-document/Urban-accessibility-methodology-and-classification.pdf

Stats NZ. (2020b, June 30). *Population, by age and sex, 2018 Census ethnic group summaries*.

StatsNZ. (2020c). *Mana Ōrite Relationship Agreement*. https://www.stats.govt.nz/about-us/what-we-do/mana-orite-relationship-agreement/

StatsNZ. (2022). *Population Estimates – DPE: Estimated Māori Ethnic Group Estimated Resident Population by Age and Sex (1991+) (Annual-Dec). updated 17 May 2022*. https://infoshare.stats.govt.nz/

Stevenson, B. (2004). *Te Hoe Nuku Roa: A measure of Māori cultural identity*. He Puʻkenga Koʻrero : A Journal of Maʻori Studies, 8(1), 37-458.

Te Ara Ahunga Ora, The Retirement Commission (2021) RRIP Policy Paper (03). Wellington: Te Ara Ahunga Ora, The Retirement Commission

Te Kāhui Raraunga Charitable trust. (2023). Māori Data Governance Model. https://www.kahuiraraunga.io/tawhitinuku

Te Kupenga. (2018). Te Kupenga: 2018 (final) – English – supplementary tables. https://www.stats.govt.nz/information-releases/te-kupenga-2018-final-english

Te Whata (n.d.). Te Whata iwi data tool. https://tewhata.io/

Topa, G., Depolo, M., & Alcover, C.-M. (2018). Early Retirement: A Meta-Analysis of Its Antecedent and Subsequent Correlates. *Frontiers in Psychology*, *8*. https://doi.org/10.3389/fpsyg.2017.02157

Van Aerden, K., Gadeyne, S., & Vanroelen, C. (2017). Is any job better than no job at all? Studying the relations between employment types, unemployment and subjective health in Belgium. *Archives of Public Health*, *75*(1), 55. https://doi.org/10.1186/s13690-017-0225-5

Van Aerden, K., Moors, G., Levecque, K., & Vanroelen, C. (2014). Measuring Employment Arrangements in the European Labour Force: A Typological Approach. *Social Indicators Research*, *116*(3), 771–791. https://doi.org/10.1007/s11205-013-0312-0

Van Aerden, K., Moors, G., Levecque, K., & Vanroelen, C. (2015). The relationship between employment quality and work-related well-being in the European Labor Force. *Journal of Vocational Behavior*, *86*, 66–76. https://doi.org/10.1016/j.jvb.2014.11.001

Vermunt, J. K. (2010). Latent Class Modeling with Covariates: Two Improved Three-Step Approaches. *Political Analysis*, *18*(4), 450–469. https://doi.org/10.1093/pan/mpq025

Ware, J., et al. (2002). *How to Score Version 2 of the SF-12® Health Survey (With a Supplement Documenting Version 1)*. Quality Metric Incorporated.

Williams, J. (2010) *Final Report Wai 262. Ko Aotearoa Tēnei*. *(3 Volumes)*. Wellington: Waitangi Tribunal.

Zhan, Y., Wang, M., & Daniel, V. (2019). Lifespan Perspectives on the Work-to-Retirement Transition. In *Work Across the Lifespan* (pp. 581–604). Elsevier. https://doi.org/10.1016/B978-0-12-812756-8.00025-6

Appendix A. Populations and indicators assessed in prior mixture models of employment precarity

***Table S1**. Chart of samples assessed, indicators of employment precarity used, and analysis type/conclusion in research adopting a mixture modelling approach to identifying profiles of employment precarity and job quality.*

Reference	***Participants***	***Indicators***	***Analysis approach; # profiles indicated, % of sample; predictors/outcomes***
Peckham, Flaherty, et al. (2022); Peckham, Seixas, et al. (2022)	Employed adults from 2018-2002 U.S. General Social Survey (*n* = 6389 wage earners, *n* = 979 self-employed)	Eleven indicators of 'Employment quality': • Income: quartiles • employment contract: permanent vs other/contractor • days of mandatory additional work: 3 categories • working hours: 4 categories • regular work hours: 3 categories • opportunity to develop abilities: yes/no • adequate information, equipment and training: yes/no • union membership: yes/no • frequency of employee involvement in decisions • control over schedule (flexibility in days/hours worked) • abusive treatment in past 12 months: yes/no	LCA, 8 profiles of wage earners and 2 profiles of self-employed: • Standard Employment Relationship (SER; 24% total) • Portfolio employment (15% total) • Inflexible Skilled employment (13% total) • Dead-End employment (12% total) • Skilled contractor (5% total) • Job-to-job (8% total) Predictors: age, gender, education, ethnicity, self-rated health, frequent mental distress, workplace injuries.
Blustein et al. (2022)	422 U.S. employees (mean age = 36.1 years, SD = 10.8) recruited via MTurk	Nine indicators of 'Decent and precarious work': • safe working conditions • access to healthcare • adequate compensation • time for rest • shared values with employer • vulnerability • inadequate wages • inadequate rights • inability to exercise rights	LPA, 4 profiles: • Indecent/precarious (11.8%); • Low healthcare-low rights (16.1%); • Highly decent (40.8%), and; • Vulnerability dominant (21.3%) Predictors: education, economic constraints, marginalisation, depression, and anxiety.
Bazzoli et al. (2022)	315 U.S. employees (mean age = 39.9, SD = 10.5)	Six indicators of 'Employment precarity': • self-rated job insecurity • self-rated financial insecurity • prior unemployment experiences • per capita household income • skill-based underemployment • time-based underemployment	LPA, 2 profiles: • Haves (75%), • Have Nots (25%). Predictors: lower life satisfaction, physical health, job satisfaction, affective commitment, higher perceived contract breach, and work-family conflict.

Reference	***Participants***	***Indicators***	***Analysis approach; # profiles indicated, % of sample; predictors/outcomes***
Naranjo et al. (2021)	U.S. employees responding to the U.S. (n = 934; mean age = 43.19, SD = 13.99) and UK (n = 937; mean age = 44.27, SD = 11.96) International Social Survey Programme	Two indicators of 'Cognitive and affective job insecurity': • Perceived job insecurity • worry about job loss	LPA, 3 profiles: • Secure alignment (secure in their role and do not worry about potential job loss: US 56.3%; UK 38.6%) • Affective misalignment (worry significantly about job loss despite perceiving minimal job threats: US 16.0%; UK 25.5%) • Ambivalent alignment (worry to some extent and perceive minimal job threats: US 27.8%; UK 35.9%) Predictors: perceived employability, perceived SES, years of education.
Choi et al. (2021)	15,723 female employees participating in the Korean Working Conditions Survey	Seven indicators of 'Job quality' - *Job Demand-Resources* model: • physical environment (health risks in workplace) • work intensity (demands and pace of job) • working time quality (duration, working time arrangements, and flexibility) • skills and discretion (decision latitude, organisational participation, and training) • social environment (management quality, social support, and adverse social behaviours) • prospects (employment status, career prospects, and job security) • earnings (average monthly income)	LPA, 5 profiles: • High flying (31%) • Smooth (36%) • Footloose (9%) • Strict (18%) • Manual (4%)
Blustein et al. (2020)	492 U.S. employed persons recruited via MTurk (mean age = 34.61, SD = 9.81).	Two indicators of 'Decent and precarious work': • Decent work factor score: safe conditions; access to health care; adequate compensation; time for rest; congruent values with employer • Precarious work factor score: vulnerability, inadequate wages, inadequate rights; inability to exercise rights	LPA, 5 profiles: • Indecent-Precarious (31.7%) • Highly Decent (11.2%) • Low Health Care-Low Rights (17.4%) • Vulnerability-Dominant (9.6%) • Health Care-Stability (30.1%) Predictors: age, income level, and educational level. Outcomes: autonomy, social contribution, survival needs, job satisfaction, and life satisfaction
Cho (2020)	Data from employed persons responding to the 2006–2010–2014 U.S General Social Surveys (n = 5,411)	Eight indicators of 'Precarious employment': • subjective job security • subjective job loss possibility • subjective work decision involvement • involuntary work hours • labour union membership • fringe benefits, • subjective adequacy of income relative to needs • subjective income fairness	LCA, 4 profiles: • Most precarious (16.7%) • Low precarious with middle income (39.5%) • Low precarious with high income (20.1%) • Mixed precarious (23%) Predictors: gender, education, race/ethnicity, self-rated health.

Reference	***Participants***	***Indicators***	***Analysis approach; # profiles indicated, % of sample; predictors/outcomes***
Peckham et al. (2019)	5933 in wage earners (n = 5125, 86.4%) and self-employed (n = 808, 14.6%) responding to the 2002, 2006, 2010, or 2014 U.S. General Social Survey.	Eleven indicators of 'Employment quality': • employment arrangement • income • mandatory extra days of work • working hours • working times regularity • opportunity to develop abilities • have adequate training, info, equipment • union representation • control over schedule • employee involvement • workplace harassment/threats	LCA, 6 profiles for wage earners and 2 profiles for self-employed: • SER-like (22.2% total) • Portfolio (14.9% total) • Inflexible skilled (15.3% total) • Dead-end (12.0% total) • Precarious (11.5% total) • Optimistic precarious (10.5% total) • Skilled contractor (5.3% total) • Job-to-job (8.3% total)
Van Aerden et al. (2017)	3443 respondents (age range 18-64) to the first wave of the Belgian Generations and Gender Survey 2008-2010 who were working for an employer	Nine indicators of 'Employment conditions': • type of employment contract (perm v temp) • average monthly net income (4 cat) • non-wage benefits • flexible working times for personal reasons • exceptional working times (nights, weekends, shift work etc.) • involuntary part-time employment • long working hours • irregular working times • training opportunities	LCA, 4 profiles: • SER-like jobs (38.1%) • Instrumental jobs (32.7%) • Precarious jobs (16.4%) • Portfolio jobs (12.8%)
Van Aerden et al. (2014, 2015, 2017)	19213 persons with an employment contract from EU27 countries participating in the 2005 European Working Conditions Survey	Eleven indicators of 'Employment quality': • type of employment contract (permanent, temporary 1 year+ duration, temporary < 1 year duration, temporary agency) • monthly job income • non-wage benefits • uncompensated exceptional working times • long working hours • schedule unpredictability • involuntary part-time employment • training received in last 12 months • information on OH&S • flexibility in working times • employee influence/input at work	LCA, 5 profiles*: • SER-like jobs (33.6%) • Instrumental jobs (26.6%) • Precarious unsustainable jobs (15.3%) • Precarious intensive jobs (14.0%) • Portfolio jobs (10.5%) Predictors: gender, age, education, occupational class, organisational sector, organisation size, intrinsic quality of work tasks. *profile % varied by country

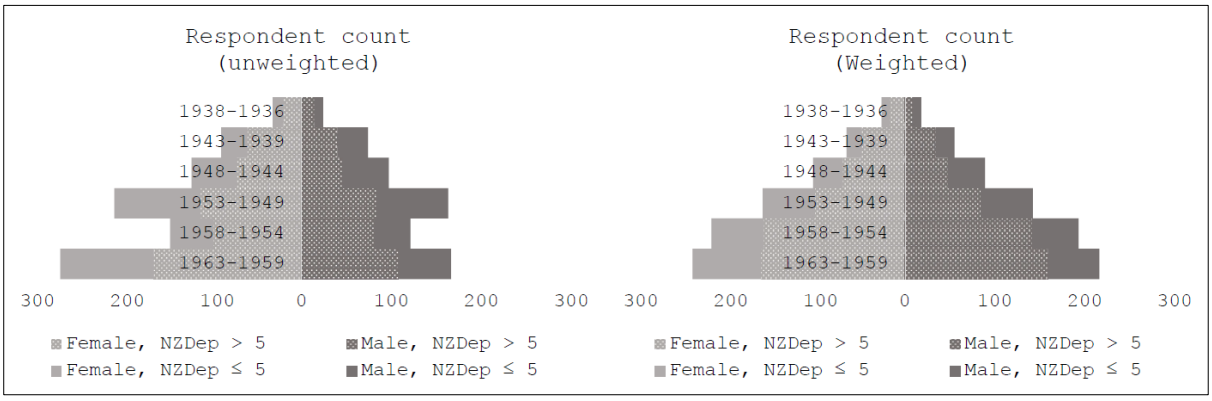
Note: Latent Class Analysis (LCA) is indicated where all indicator variables are categorical or a mix of continuous and categorical; Latent Profile Analysis (LPA) is used where all indicator variables are continuous; SER = Standard Employment Relationship.

Appendix B. Generalisability of findings

Survey weights

Survey weights were used to reduce biases associated with age, sex, ethnicity, and area-level relative socio-economic status associated with survey response and design. Raw and survey-weighted counts of Māori respondents to the 2018 Health, Work, and Retirement survey are presented in **Figure S1**. These population pyramids illustrate participant counts by age, sex, and high/low relative area-level socio-economic deprivation. Figures show how raw counts (left figure) were impacted by survey-weighting procedures (right figure) accounting for the age, sex, ethnicity, and area-level deprivation of respondents relative to the original random samples drawn from the NZ Electoral Roll and scaled to the estimated 2018 Māori resident population by year of birth and sex (StatsNZ, 2022)

Figure S1 *Population pyramid depicting unweighted (n = 1511) and weighted count of Māori respondents to the 2018 Health, Work and Retirement survey by year of birth, gender, and area-level deprivation index decile (NZDep), ages 55-82. Primary analyses are based on a subset of weighted data from respondents who met inclusions criteria (employed at 2018 survey: n = 810).*



Comparisons with key indicators from the General Social Survey

To evaluate the generalisability of report findings, we compared patterns of responses to two indicators of overall health and income adequacy among Māori respondents to the 2018 Health, Work and Retirement survey with those of older Māori respondents to the 2018 General Social Survey (GSS). The GSS is a face-to-face household survey of ~8000 usually resident persons aged 15+ in New Zealand. The GSS is conducted every two years utilising a multi-stage stratified sampling design to recruit a sample representative by region, urban/rural area, ethnicity, and socio-economic status. The GSS is used to provide estimates of social and economic well-being for the population, as well as monitoring of well-being over time. In contrast, the Health, Work, and Retirement (HWR) survey is a targeted postal survey of older adults conducted to

explore research questions relevant to identifying factors influencing well-being. Respondents to the 2018 HWR survey were aged 55-82, representing consenting participants from random samples drawn 2006-2018 from the national electoral roll, over-sampling persons of Māori descent to support adequate representation for purposes of targeted analyses.

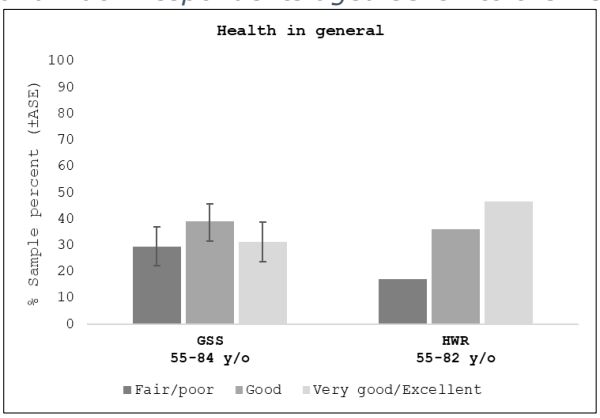
Where the 2018 HWR provides data from a larger sample of older Māori living in the community (*n* = 1511), the GSS is selected for comparison due to the higher rate of participation and representation associated with studies designed to support population-level inferences and its use of questions shared with the HWR. Compared to postal survey methods, face-to-face interview methods employed by the GSS generally result in higher rates of consent to participate. Additionally, the multi-stage stratified sampling methods of the GSS support proportional representation of the sample across multiple geographic and demographic factors. These methods are implemented to support sample representativeness and generalisability of findings. The de-identified postal survey and random sampling methods employed by the HWR are a lower-cost method of research. De-identified postal survey methods support surveying of people who may be hard to reach (e.g., isolated areas, less frequently at home, fewer large blocks of time to participate etc.); however, they present different barriers to participation (e.g., literacy, visual/motor impairments, out of date mailing address etc.). Additionally, cohorts recruited to longitudinal studies may accumulate additional biases associated with retention in the study over time. Care must be taken in comparing estimates from interview and postal survey methods due to the potential for measurement non-invariance across the different data collection modes (driven by factors such as social desirability of responses and reticence due to concerns for privacy etc.) that cannot be assessed in the current research.

Proportions of each sample endorsing each response were examined to support broad inferences around how well the longitudinal postal-survey sample represents the range of experiences of older Māori in the community, emphasizing the relative spread of responses. The below results compare responses to global indicators of health (**Box 1**, **Figure S2**) and income adequacy (**Box 2**, **Figure S3**) from older Māori responding to the 2018 GSS and 2018 HWR survey. Comparisons indicate that respondents in the HWR provided a good spread of responses across both indicators, supporting its ability to represent an appropriate range of experiences in the general community. However, HWR respondents potentially under-represent those experiencing health and income-related hardship and overrepresent those experiencing higher levels of health and income adequacy.

Box 1. *Respondents to the 2018 GSS and 2018 HWR surveys were asked, 'In general, would you say your health is: Poor, Fair, Good, Very good, or Excellent'.*

Figure S2 represents the proportions of Māori respondents who endorsed response options to the self-rated health item by study. Estimates from the HWR are based on survey-weighted data from *n* = 1485 respondents. Both surveys indicate a reasonable spread of respondents endorsing low, medium, and high self-rated health. GSS estimates suggest similar proportions of respondents endorsed *Poor/Fair, Good*, and *Very good/Excellent* health. However, a greater proportion of respondents to the HWR endorsed *Very good/Excellent* health compared to *Good* health, and a lower proportion reported *Fair/Poor* health compared to *Good* health. Similar proportions of respondents endorsed *Good* health across these studies.

Figure S2 *Chart illustrating summary responses to a single-item question on self-rated general health from Māori respondents aged 55-84 to the General Social Survey (GSS) and Māori respondents aged 55-82 to the Health, Work and Retirement (HWR) survey.*

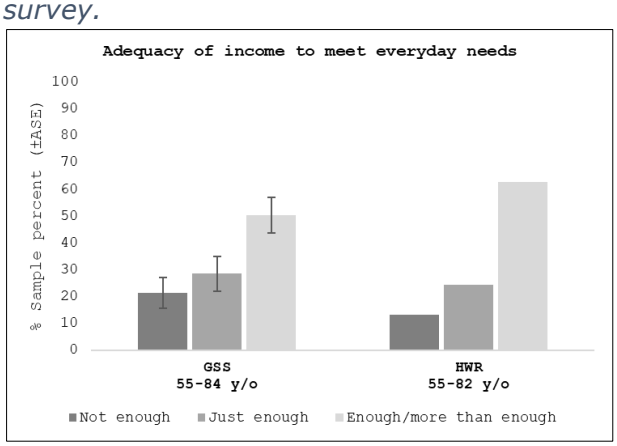


Note. This work is based on/includes customised Stats NZ's data which are licensed by Stats NZ for re-use under the Creative Commons Attribution 4.0 International license; ASE = with 95% confidence, the absolute sampling error of the estimate.

Box 2. *Respondents to the 2018 GSS and HWR surveys were asked, 'How well does your total income meet your everyday needs for such things as accommodation, food, clothing and other necessities? Not enough, Just enough, Enough, or More than enough?'.*

Figure S3 represents the proportions of Māori respondents who endorsed answers by study. Estimates from the HWR are based on survey-weighted data from *n* = 1,483. Both surveys indicate a reasonable spread of respondents endorsing low, medium and high levels of income adequacy. GSS estimates indicate that a greater proportion of respondents endorsed having *Enough/More than enough*, compared to *Just enough* or *Not enough*. A similar pattern was observed for HWR respondents, although a smaller proportion endorsed having *Not enough* income than *Just enough* income. Similar proportions of respondents endorsed having *Just enough* income across these studies.

Figure S3 *Chart illustrating summary responses to a single-item question on self-rated income adequacy from Māori respondents aged 55-84 to the General Social Survey (GSS) and Māori respondents aged 55-82 to the Health, Work and Retirement (HWR) survey.*



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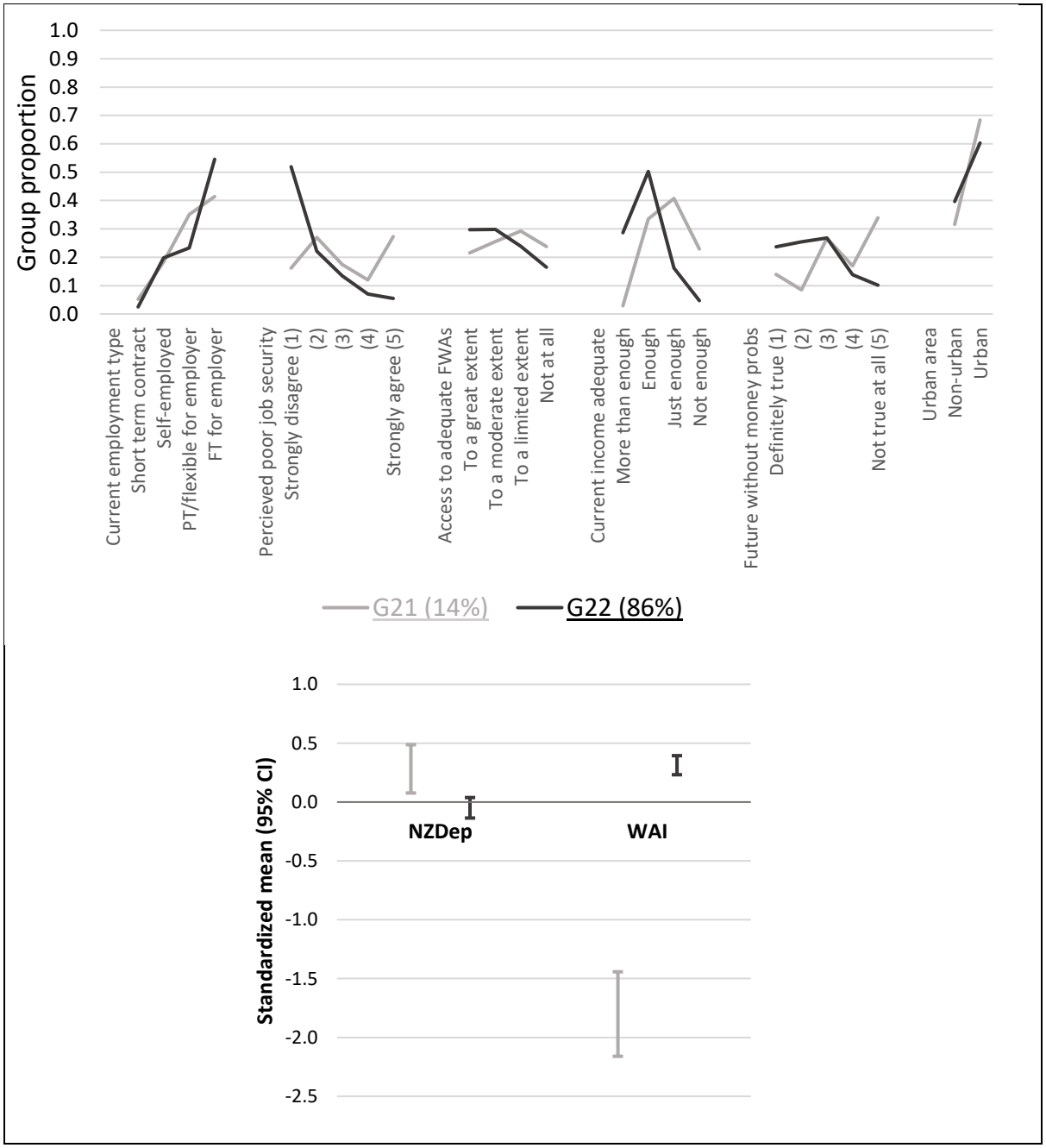
While mindful of potential method effects associated with responses to the GSS and HWR surveys, current results suggest that while the HWR data represent experiences of individuals across a range of health and income levels, HWR data may proportionally under-represent Māori in the most disadvantaged situations and over-represent those most advantaged, particularly in terms of health.

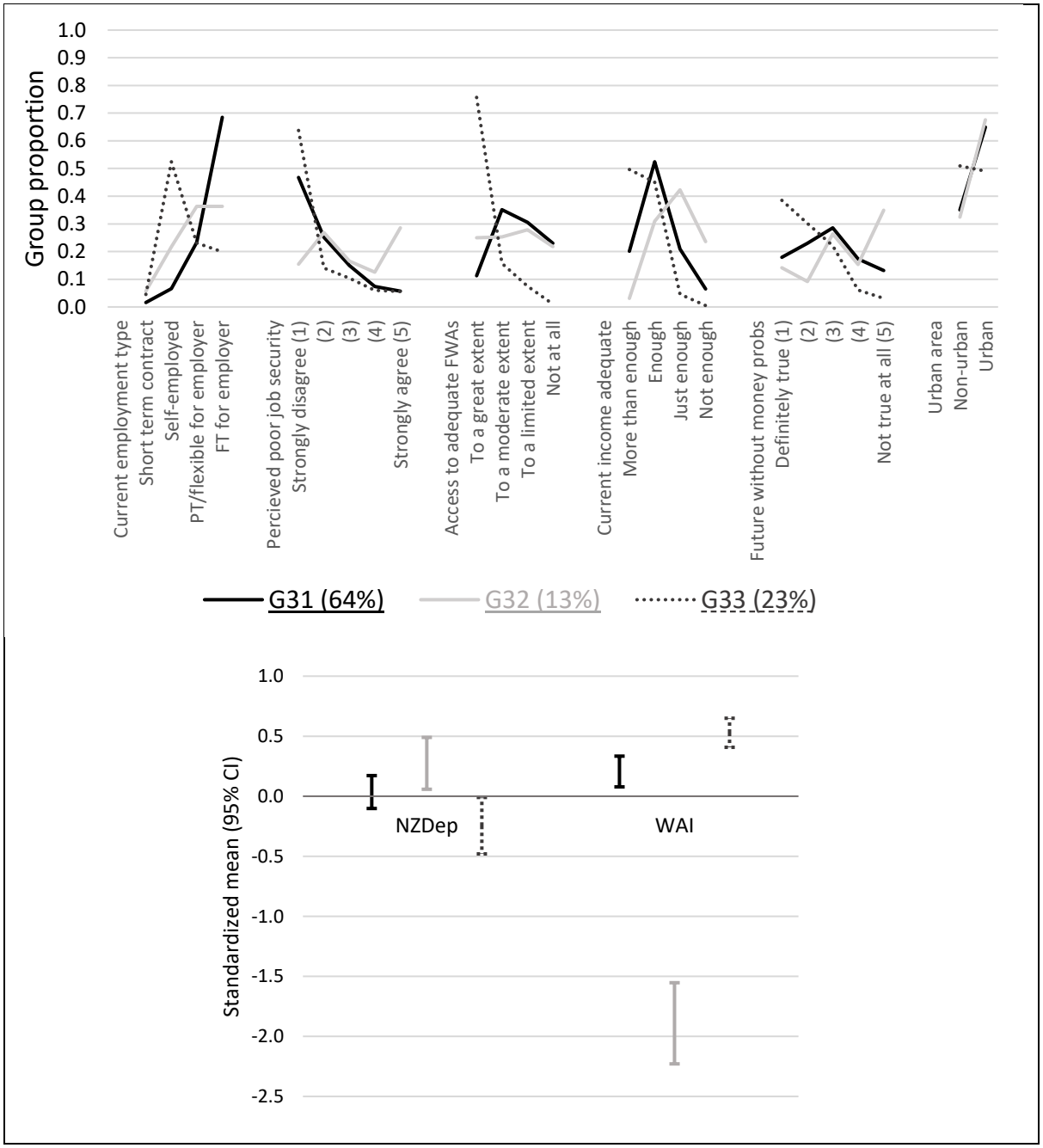
Appendix C. Illustration of employment precarity profiles for 2- and 3-group LCA models

***Figure S4**. Sample proportions (top) and estimated means (lower) for model indicators by G2 group membership (n = 810).*



Note. NZDep = 2018 New Zealand Index of Deprivation; WAI = Work Ability Index.

Figure S5. Sample proportions (top) and estimated means (lower) for model indicators by G3 group membership (n = 810).



Note. NZDep = 2018 New Zealand Index of Deprivation; WAI = Work Ability Index.