Measuring Māori Identity and Health: The Cultural Cohort Approach

A thesis presented in fulfilment of the requirements for the degree of

Doctor of Philosophy

in

Public Health

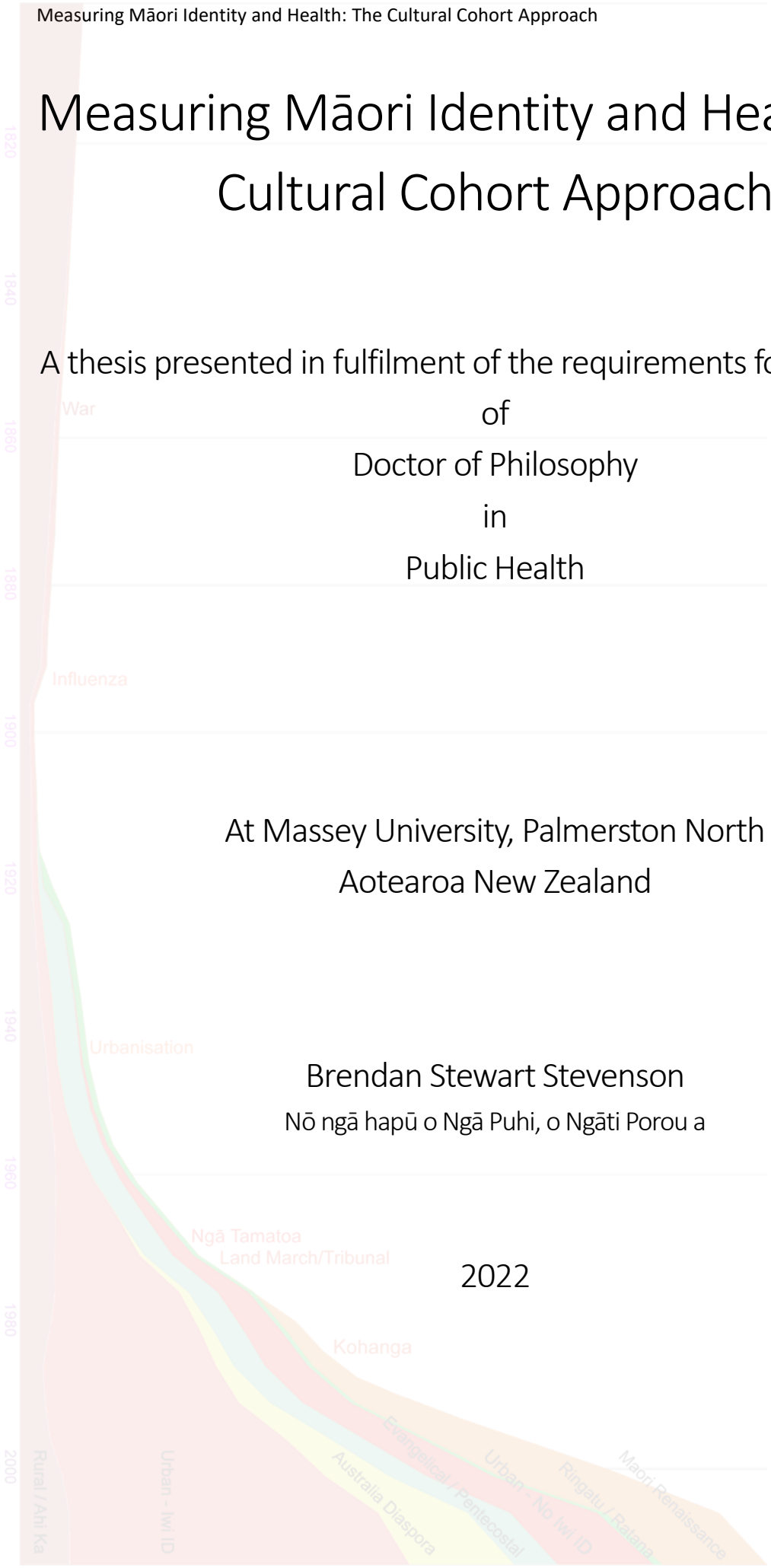
At Massey University, Palmerston North

Aotearoa New Zealand

Brendan Stewart Stevenson

Nō ngā hapū o Ngā Puhi, o Ngāti Porou a

2022



Abstract

Current statistical methods of disaggregating populations by ethnic or cultural identity wrongly assume cultural invariance within an ethnic population over time and place. Calculating risk factors within ethno-cultural populations also wrongly assumes homogeneity of risk, obscuring what may be distinct sub-populations with very different demographics, risk profiles, and health outcomes. The Cultural Cohort Approach (CCA) proposes a novel method for understanding within-ethnic population difference, whereby cultural identity is framed as the enduring membership of multiple related cultural cohorts, rather than the contextual and unstable measure of ethnic group affiliation currently used. It predicts that multiple cultural cohorts exist inside an ethno-cultural population, that these cultural cohorts are resilient and culturally distinct, exist over generations, and can divide at pre-existing social or economic stratifications in response to powerful external forces. The cultural cohort approach unites history, extant identity theories and research to identify and describe these within-ethnic cultural cohorts. The measurement of a Māori cultural cohort joins existing Māori identity research, historical documents, and personal accounts to enumerate distinct Māori cultural cohorts, describe relationships between cultural cohorts, and exclude unrelated cultural cohorts. Across three distinct components of this thesis the Cultural Cohort Approach (CCA) is first described and a worked example of its use in identifying Māori cultural cohorts is given. Second, these hypothesised cultural cohorts were mapped to a cross-sectional data collection wave of Māori participants (n=3287, born between 1941 and 1955) from Massey University's longitudinal Health, Work and Retirement (HWR) study in a test of the CCA's predictive accuracy using latent class analysis. Third, longitudinal HWR study data for Māori participants (n=1252, born between 1941 and 1955) was used in a second worked example to test the stability of the predicted cultural cohorts using latent transition analyses and further refine the CCA. The Māori cultural cohorts identified using the CCA had clear narratives, shared cultural characteristics, and identifiable cultural differences that persisted across time as predicted. The CCA will allow researchers to better represent the diverse lived realities of ethno-cultural populations and support more nuanced analytical insights into how health and well-being is patterned between distinct cultural cohorts.

Acknowledgements

The wait has been long and I nearly faltered many times. But the need to get this 'cultural cohort' idea of mine down has kept me here.

To Jessica Kereama, thank you for your tremendous patience and wisdom. I love you.

To my children, Ihaia, Nina, and Pip. Thank you for being born.

To my parents, Stewart Stevenson and Geneva Hildreth; I got there in the end!

To friends and colleagues who supported, asked annoying questions, and supplied magnificent advice. Most annoying of all were Darryn Joseph, John Waldon, Mary Breheny, and Kirsten Lovelock.

To the Health and Ageing Research Team for a world class study and being good friends: Fiona Alpass, Chris Stephens, Jo Allen, Vicki Beagley, and Hannah Phillips.

Lastly my supervisors (who I also consider friends) in order of appearance: Andy Towers, Ian Laird, Suzanne Phibbs, and Margaret Forster. For their unflagging optimism, advice, and support.

I apologise if I have forgotten anybody, this PhD took an unreasonable amount of time and I've forgotten many who have offered advice, given feedback, and kept me in the fight.

Turou Hawaiki!

Glossary

The following glossary does not provide comprehensive translations of Māori terms which often have multiple meanings, instead they are defined in relation to how they are used in the thesis.

Word	**Description**
Māori	The indigenous peoples of Aotearoa
Aotearoa	Māori name for New Zealand
Iwi	A large Māori population connected by geography and ancestry
Hapū	A sub-group of an iwi connected by an eponymous ancestor or significant event
Marae	The centre of traditional Māori life for a hapū comprising buildings for meeting, sleeping, eating, etc
Whānau	A small group related by ancestry or purpose, extended family
Te Tiriti o Waitangi	The founding document of Aotearoa New Zealand signed in 1840 by representatives of the English crown and iwi
Rangatahi	Māori youth
Rūnanga	The mandated organisation representing an iwi
Kōhanga reo	Māori language immersion pre-school
Kura kaupapa Māori	Māori language immersion school for ages 5 to 13
Whare kura	Māori language immersion school for ages 13 to 18
Whare wānanga	Māori language and science focussed tertiary institution
Kaupapa Māori	Traditional Māori centred activity
Whakapapa	Ancestry
Waiata	Māori language songs and chants
Te reo Māori	Māori language
Te Ao Māori	Literally the Māori world: Traditional Māori language, knowledge, customs, and practices
Taumata/paepae	Those speaking for a hapū or iwi in formal Māori settings
NZ European	New Zealand European
Mātauranga Māori	Māori knowledge
Papakāinga	Ancestral homelands
Kaumātua	Older Māori, often with important roles on marae

Contents

Table of tables

Table of figures

Chapter 1: Introduction and overview of the thesis

In 2015 I attended a seminar at a Whare Wānanga about the Māori health and the natural environment at which several well-regarded senior Māori academics spoke; the korero was enlightening and thought provoking. They presented innovative solutions to existing social issues such as limited access to healthy food, poor health and wellbeing, or growing the numbers of te reo Māori speakers. These solutions revolved around the notion of choice and lifestyle change which presupposed individual, family, and whanau having access to resources necessary to make such a change. Examples were given by speakers of personal sacrifice made when implementing these changes like the years spent developing their lifestyle block and the many marae hui they have attended often around the country, all of which were in the context of having relatively substantial resources like growing up around te reo Māori speakers, being well involved with marae or owning property. There were also powerful speeches around how participation in kōhanga, kura, and wānanga whānau benefits those who are part of such whānau.

However, this laudable aim of solving such important issues through land development or te reo Māori and marae-centred initiatives presupposes access to these economic and cultural resources. This had me wondering about the size of these groups, of those with access to land or Māori cultural resources and those without such access. I thought about whānau like mine who had their parents or grandparents move away from their marae, forging new lives with no or little connection to their marae. And in the last few decades, I see many of my generation and my children's generation reconnecting with their marae. Based on my own experiences of reconnecting with my Māori heritage as an adult and from stories, it looked to me that while they were all clearly Māori, their experience of **being** Māori was quite different. They differed in slang, ability in te reo Māori, music, food, and beliefs. These differences were not randomly distributed; there were distinct patterns of identity that were shared, maintained, and created

by whānau and communities. It is the explanation of these intangible yet persistent cultural differences in sub-groups within our Māori community that I applied this thesis to. The intent is not to discredit or diminish commentators favouring a strong Māori waka as the solution to Māori health and economic disparities, but rather to identify and understand the diversity of Māori realities (Durie, 1995a).

This work is important to me. I have been a researcher for over two decades, a large chunk of that as a research officer working with Māori data, in that there were indicators of Māori descent, ethnicity, or other cultural indicators like language, marae participation, or iwi affiliation. In that time it has been the constant challenge to authentically identify and group Māori for further analysis. While Māori descent is the most honest measure, being based on whakapapa, it also provides little insight into Māori diversity. In contrast, the most common method of disaggregating the Māori population is that of self-identified ethnic affiliation. Using ethnicity to understand differences between ethno-cultural populations is of questionable value, it has an unstable denominator in that people change their ethnic affiliation between different data collections (see Broman & Kukutai, 2021; Carter, Hayward, Blakely, & Shaw, 2009), outcomes vary depending on how multiple ethnic affiliations are combined (see Boven, Exeter, Sporle, & Shackleton, 2020; Callister, Didham, Newell, & Potter, 2007; Statistics New Zealand, 2009c; Yao, Bullen, et al., 2022; Yao, Meissel, et al., 2022), and often has little explanatory power once socio-economic factors are taken into account (see Dulin, Stephens, Alpass, Robert, & Stevenson, 2011; Jensen, Spittal, Crichton, Sathiyandra, & Krishnan, 2002; Statistics New Zealand, 2015; Towers, 2008; Towers et al., 2011; Weimand, Hall-Lord, Sällström, & Hedelin, 2012).

However, ethno-cultural differences do need to be understood, even the blunt analyses of Māori versus non-Māori ethnicity tell us we need to pay attention. Māori health inequities (see V. Cameron et al., 2012; Cormack, Stanley, & Harris, 2018; Disney, Teng, Atkinson, Wilson, & Blakely, 2017; Ministry of Health, 2015; Thom & Grimes, 2022; Tobias, Blakely, Matheson,

Rasanathan, & Atkinson, 2009) do exist and the battle to address the health and wealth gap between Māori and non-Māori-non-Pacific occurs at the constitutional level, in legislation, across government policy, and in schools, hospitals and clinics. The insights needed to prioritise resources, develop more effective policy and public health initiatives, and conduct research that reflects the diverse realities of Māori are driven by good measures, including of ethno-cultural identity.

Given the diversity of beliefs, behaviours and circumstances of Māori, there will be discrete within-Māori populations who show poorer health and wellbeing outcomes relative to other Māori populations and to the general population, just as there will be within-Māori populations who have better outcomes. By identifying and understanding within-ethnic populations, better research, policy development, and health promotion initiatives are possible by understanding who it will impact and how they need to engage with members of these diverse populations.

Rather than attempting to measure individual affiliation, we propose understanding the diverse realities existing within an ethno-cultural population, and by placing the individual within each of these populations, enable authentic representation of those ethno-cultural populations.

Research Objective and Aims

The overall objective of this study is to describe a method for understanding within-ethnicity cultural diversity by integrating pre-existing theory, history, and research to characterise enduring cultural groups within an ethnic population, and to identify how these groups formed or changed over time. This method is developed using published literature involving the indigenous Māori population in Aotearoa New Zealand (Aotearoa NZ) and tested using an existing longitudinal dataset of older Māori.

The specific aims of the research are to:

- Review existing measures of Māori Cultural Identity, map these measures onto theoretical cultural domains, identify domains which have not been adequately captured by existing measures (if any)
- Derive a minimum set of items to form a measure of Māori cultural cohorts using the results of the survey and explore mapping common survey data descriptors (e.g., location, ethnicity, Māori descent, age, gender, language, living standards, and education) to these groups as a proxy for existing studies with limited Māori cultural data
- With reference to the use of Māori identity and the within-ethnicity cultural diversity approach, describe the application of effective tools and procedures in describing and analysing large longitudinal datasets
- Determine if it is possible to identify these Māori cultural cohorts through the use of statistical procedures such as Latent Cluster/Transition Analysis, Multi-Level Modelling (MLM), General Estimating Equations (GEE), or Trajectory Analysis (TA).

Methodology

This is a PhD by Publication. The three publishable journal articles arising from this thesis are (1) Theory development, (2) Theory testing, and (3) Theory refinement. Each article is intended to stand separate from this thesis, although they will necessarily reference preceding article(s).

The research questions of this thesis centre around identifying and systematising the mechanisms that produce, change, and maintain within-ethnic population cultural sub-groups through the observations made by historians of key events, direct observations (collected via interviews or published documentation), and theories proposed by commentators and researchers. The methods used in the construction of each paper varied, with article one drawing on extant literature and consultation with Māori whānau, workmates, and academics, while articles two and three continued to draw from extant literatures but incorporated

statistical analyses from an existing longitudinal dataset. Given the focus of this thesis was to unpack within-ethnicity cultural diversity and deliver a theory or method for the use of researchers and government, a theory-development focussed methodological approach was required.

Philosophical foundations

The underlying philosophical approach of this thesis derives from the Critical Realism tradition developed by Roy Bhaskar (Bhaskar, 1978, 1997). Essentially, Critical Realism proposes that there exists an objective unobservable reality comprising mechanisms (objects, structures, and causal relations), which produce observable events, which in turn are experienced by people (Price & Martin, 2018). The researcher can directly measure experience (by asking people), infer events from experience or direct measurement, and theorise about the underlying mechanisms of reality; this enables researchers to derive an understanding of the social world by identifying the structures that generate observable events (Breheny et al., 2021). The researcher can make valid claims about these mechanisms, refining these claims over time, with the proviso that these claims are "historical, contingent, and changing" (M. Archer et al., 2016, p. 7). These domains are summarised in Table 1 with (Bhaskar, 1997) linking each to the appropriate level of reality; additional descriptors have been added to map the intentions of this thesis (theorised, inferred, observed).

Table 1. Critical Realism domains and levels, adapted from Bhaskar (1997).

	Theorised	**Inferred**	**Observed**
	Domain of Real	**Domain of Actual**	**Domain of Empirical**
Mechanisms	✓		
Events	✓	✓	
Experiences	✓	✓	✓

The applied elements of this thesis are inspired by complex systems theory and directly adopts elements of Liu, Fisher-Onar, and Woodward (2014) Critical Junctures Theory (CJT) to model the cultural development of ethnic populations. To maintain a clear narrative through this

thesis, we will focus on CJT as the founding theory. The primary analytical method used will be based on realist synthesis techniques where our research interest is to identify "hidden causal forces (mechanisms) responsible for the manifestation of empirically measurable outcomes" (Jagosh, 2019, p. 362). Realist synthesis has its foundations in critical realism (Schick-Makaroff, MacDonald, Plummer, Burgess, & Neander, 2016) and emphasises the need for diverse data sources and methodological approaches. CJT is a theory explaining the mechanisms behind any events occurring at the nation-state level and how these are experienced by individuals. we will be adapting components of CJT and adding additional components to describe the mechanisms underlying ethno-cultural populations.

Statistical Methods

Cluster analyses will be used to identify any within-ethnicity cultural subgroups in the dataset. In a cluster analysis, each discrete subgroup are classically thought of as a hidden latent variable that can only be observed indirectly (Greaves, Houkamau, & Sibley, 2015; Lanza, Bray, & Collins, 2013; Ruscio & Ruscio, 2008). To uncover the existence of these subgroups, the appropriate latent variable or construct analysis need to be selected based on the hypothesised nature of the latent variable and the available indicators; Table 2 summarise four most common analytical latent variable analytical techniques.

Table 2. Four Different Latent Variable Models Adapted from (Collins & Lanza, 2010).

	Continuous Latent Variable	**Categorical Latent Variable**
Indicators treated as continuous	Factor Analysis	Latent Profile Analysis
Indicators treated as Categorical	Latent trait analysis or Item Response Theory	Latent Class Analysis

Cluster and grouping analyses have been used before to identify Māori cultural group membership (Greaves et al., 2015). It is not assumed that the indicator variables are in any way directional, with a higher score in any cultural indicator no better or worse than a lower score. Additionally, given that the cultural characteristics of any given cultural subgroup may be quite

different and that the strength and significance of any given indicator variable will vary between Cultural Cohorts, the variables identifying membership must also be allowed to vary between subgroups. Latent class analysis (LCA) fulfils this such that "each individual belongs to one of a set of mutually exclusive and exhaustive latent classes" (Lanza & Collins, 2008, p. 446). Where a latent class is an unobservable sub-population represented by a number of categorical variables and is described by differing combinations of these variables. This is in contrast to variable centred approaches such as factor analysis that identify "a factor structure that accounts for the linear relations among a set of observed variables" and which holds "for all individuals" (Collins & Lanza, 2010, p. 8). Collins and Lanza (2010) state that LCA is a person-centred approach, finding "subtypes of individuals that exhibit similar patterns of individual characteristics". LCA assumes that there is an "unobserved categorical variable that divides a population into mutually exclusive and exhaustive latent classes. Class membership of individuals is unknown but can be inferred from a set of measured items" (Lanza & Rhoades, 2013, p. 3). As part of understanding how stable ethno-cultural identity is over time, a development of LCA called latent transition analysis (LTA) will be used. The equivalent to latent classes is latent status and was proposed by Lanza and Collins (2008) to model discrete latent class membership over time, in terms of both membership probabilities and of transition probabilities (i.e. the probability of moving from one group to another between measurement points).

Further, LTA is an ideal analytical technique as it clusters individuals by their patterns of responding to a set of categorical indicators over time in addition to supplying metrics for the stability of Cultural Cohort membership. LTA has not been used to study cultural identity per se, but it has been used successfully to study health behaviour clustering and transition probabilities (Cleveland, Lanza, Ray, Turrisi, & Mallett, 2012; Lanza & Bray, 2010; Lanza & Rhoades, 2013; Patrick et al., 2009). The data used in this thesis comprises six data collection waves over 10 years (2006-2016) which offers an ideal platform on which to test the stability of the sub-cohorts identified in the LCA on baseline data.

Overview of the thesis

Each article is presented in a long but publication ready form, with an appendix following each article containing supplementary material that could not be part of the publication. There will need to be efficiencies made for submission, but for the purpose of completeness the entire paper is included.

Each article is intended to stand alone and build upon the first and subsequent publications. Taken together they provide a cohesive narrative: publication one details the cultural cohort approach (CCA); the second publication tests the CCA through identifying and characterising Māori cultural cohorts with a statistical analysis of existing cross-sectional data; and the final publication further refining the CCA and testing for stability over time with a statistical analysis of existing longitudinal data. Data for this thesis will reflect the requirements of the three journal articles, with article one drawing from published literature, while articles two and three will further tap into published research and incorporate new statistical analyses from an existing longitudinal dataset.

The following are specific research questions to be answered from the three publications:

1. Do distinct groups exist within the Māori descent population that are distinguishable by Māori-specific cultural markers only

2. What is the minimum set of Māori cultural indicators needed to effectively disaggregate the New Zealand Māori descent population for the purpose of tracking and comparing health status

3. What measures currently exist that usefully distinguish between these groups

4. If not, what additional data needs to be collected to form a comprehensive understanding of Māori Cultural Identity

5. Does membership in differing Māori cultural groupings vary over time and age

6. Is there an identifiable process that describes the development of ethno-cultural populations over time

7. What causes an ethno-cultural population to change

Article one builds the theoretical and methodological foundation which subsequent articles test and refine. Article one addressed two research aims, to review existing measures of Māori Cultural Identity, map these measures onto theoretical cultural domains, identify domains which have not been adequately captured by existing measures, and with reference to the use of Māori identity and the within-ethnicity cultural diversity approach, describe the application of effective tools and procedures in describing and analysing large longitudinal datasets. We begin by clearly articulating the need to understand within-ethnicity cultural difference, before describing a robust approach to identify and describe these within-ethnicity cultural cohorts for the Māori descent population in Aotearoa NZ. The theoretical grounding of this approach is described and the key processes shaping cultural cohorts over time are explained and examples given. The specific research questions answered by Article 1 are:

1. Do distinct groups exist within the Māori descent population that are distinguishable by Māori-specific cultural markers only

6. Is there an identifiable process that describes the development of ethno-cultural populations over time

7. What causes an ethno-cultural population to change

Article 2 goes into more detail about why CCA is needed with particular reference to the statistical applications of ethnicity and within-ethnicity difference in understanding health and wellbeing. Article 2 builds upon Article 1 by adding further richness to the approach described and the Māori cultural cohorts predicted to exist. Article 2 addresses the last three research aims: Derive a minimum set of items to form a measure of Māori cultural cohorts using the results of the survey and explore mapping common survey data descriptors to these groups as a proxy for existing studies with limited Māori cultural data; With reference to the use of Māori identity and the within-ethnicity cultural diversity approach, describe the application of effective tools and procedures in describing and analysing large longitudinal datasets; Determine if it is possible to identify these Māori cultural cohorts through the use of statistical procedures. The existence of these predicted Māori cultural cohorts and therefore the utility of the cultural cohort approach is tested using a comprehensive set of Māori cultural identity indicators from a nationally representative dataset of older Māori collected by the Health and

Ageing Research Team (HART) at Massey University (Towers, Stevenson, Breheny, & Allen, 2015). The specific question answered in Article 2 are:

1. Do distinct groups exist within the Māori descent population that are distinguishable by Māori-specific cultural markers only
2. What is the minimum set of Māori cultural indicators needed to effectively disaggregate the New Zealand Māori descent population for the purpose of tracking and comparing health status
3. What measures currently exist that usefully distinguish between these groups
4. If not, what additional data needs to be collected to form a comprehensive understanding of Māori Cultural Identity.

Article 3 takes the lessons learned from Article 2, testing a key prediction of the Māori cultural cohort approach that cultural cohort membership is stable over time using longitudinal data from the same HART study. In summarising the results of the previous two articles we address the last three research aims to: further explore a minimum set of items used to measure identify Māori cultural cohorts; describe the application of effective tools and procedures in using the CCA to describe and analyse longitudinal datasets; and identify these Māori cultural cohorts through the use of a longitudinal statistical procedure. Article 3 answers the research questions below, but as importantly, takes all that was learned from the preceding articles and from testing for the stability of cultural cohort membership, to present a final answer to the utility of the Māori cultural cohort approach, how best to implement the approach, and how can the approach benefit the health and wellbeing of ethnic populations generally and Māori in particular.

2. What is the minimum set of Māori cultural indicators needed to effectively disaggregate the New Zealand Māori descent population for the purpose of tracking and comparing health status
3. What measures currently exist that usefully distinguish between these groups
4. If not, what additional data needs to be collected to form a comprehensive understanding of Māori Cultural Identity

Chapter 2: Race and Ethnicity

This chapter further outlines the case for a new approach to understanding ethno-cultural identity and unpacking the cultural diversity within a given ethnic population. With the exception of the global level focus of Critical Junctures Theory (Fisher-Onar, Liu, & Woodward, 2014; Liu et al., 2014) and key psychological literature familiar to the author, this chapter unapologetically focuses on articles developing, using, or measuring Māori cultural identity and ethnicity in Aotearoa NZ.

This thesis was born of two decades of working as a research officer in studies that were only about Māori (Cunningham, Stevenson, & Tassell, 2005; Stevenson, 2004; Te Hoe Nuku Roa, 1996), had significant Māori samples (Towers et al., 2015), and on teams working on Māori student data (Trinick & Stevenson, 2009), wellbeing for older Māori (Cunningham, Durie, Stevenson, & Fitzgerald, 2002), and numerous smaller iwi or hapū projects. Consistent across these projects was an understanding that Māori realities are diverse and that the research must avoid the all-too-common ecological fallacy of simply combining all Māori (typically using Māori ethnic affiliation, Māori descent, or identifying as Māori) into a single population. In aggregating data sets, Māori culture is homogenised and any within-ethnicity health differences averaged-out (Valles, 2012). Despite this averaging of Māori outcomes, significant health disparities remain (Cormack & Robson, 2010; Harris, Cormack, & Stanley, 2013a ; Kingi, 2006; Tobias et al., 2009) and these disparities will not be distributed evenly.

While this is not always the case, the conflation of individual ethno-cultural identity and ethnic culture is particularly common where individual ethnic affiliation is aggregated in government reporting, policy development, and public health initiatives as if this amorphous mass represents an entire culture, blunting health initiatives and contributing to the “negative portrayal of Māori” (Simmonds, 2010, p. 34). Culture is shared, generational and resilient, while individual identity is unique, dynamic, and layered

Culture is not race. Biology does not support the notion of race, it is "inherited, although not in a strictly biological fashion. It is passed down according to a system of folk heredity" (J. Marks, 1994, p. 173), reflecting outdated labels for adaptations discrete geographic populations have made to their environment. There are far greater genetic differences between people than between groups of people however defined (by race, ethnicity, or continent), with Gannett (2004) stating that once populations are recognised as "always evolving and changing in their genetic composition, races could no longer be conceived as permanent, static entities" (Gannett, 2004, p. 326). Further the ways in which race is used implies a biological origin for race, whereas "…the statistical, population-based approach conceives of races as kinds of populations, not kinds of people" (Gannett, 2004, p. 327). The importance of ancestry and whakapapa is reflected in the notion that "race is a dynamic, not static, category: races come into and pass out of existence. Races are constituted on the basis of genealogical relations among populations of organisms, and not similarities in the intrinsic properties of organisms" (Gannett, 2004, p. 327). Historically this reflected relative independence from other populations which helped preserve clear lines of ancestry and maintained by social rules dictating how populations interact and cultural significances attached to the environment in particular mountains, rivers, and lakes or seas. Contemporary definitions of race have shifted to a more social constructionist view rather than the genealogical, although "this insight is lost in statistical analysis of race, which most often uses the construction as if it were a fixed characteristic" (James, 2001, p. 236). Despite the differing ways in which race can be assigned to an individual, race continues to be used as though it represents a socially and biologically homogenous population. Where race is part of official data collections Gissis (2008) identified two clusters: those who continued to use race as a descriptor due to being a de-facto historical standard (allowing comparability to other work) amidst on-going political/policy directives. While a second cluster advocated dropping the use of race altogether and has "called upon the relevant scientific communities to find another, more sophisticated, classificatory mechanism

that would capture" these differences (Gissis, 2008, p. 446). The question to be asked then, is ethnicity a better classification system?

Donna Cormack (2010) neatly summarised the theoretical approaches to the description and measurement of ethnicity falling into three broad approaches: primordialist, instrumentalist, and social constructionism. Resembling race-based approaches, the primordialist perspective frames ethnicity as "as a natural, pre-existing reality based on tangible or concrete features, such as kinship and geographic origin" (p. 3), while instrumentalist emphasise the social, political and cultural utility that ethnic group membership brings. Social constructionism posits that ethnicity arises out of social discourse between people for contingent and contextual purposes whereas Cormack points out, common or natural language use of ethnicity "draws on a history of racialised talk and emphasises notions of Otherness.

As a descriptor, ethnicity is often used to signify difference or deviation from the norm, as in the case of 'ethnic food' or 'ethnic festivals'" (Cormack, 2010, p. 2). The norm being majority or mainstream culture (in white or European in English speaking countries) where meaning is most effectively established by "comparisons between binary opposites (James, 2001, p. 237), which in countries with a history of exploration, exploitation, and colonisation by England or other European nations, this inevitably becomes a comparison between indigenous or non-white populations and a majority white population. Thus, there is a need for epidemiological and demographic analyses to incorporate "the effects of colonisation and colonialism" in any ethno-cultural analyses (Axelsson, Kukutai, & Kippen, 2016, p. 2). However, modelling these effects is mired in problems of group membership and how the effects of colonisation will have had differential effects on the indigenous population – some within-ethnic populations will have been affected more than others. The current use of racial or ethnic categories does little to understand how invasion and colonialism has impacted indigenous peoples beyond perpetuating stereotypes and one-size-fits-all policies.

Underlying the categorisation of race and ethnicity is a much larger unobservable ethno-cultural construct comprising peoples, histories, institutions, and the causal relations between these (Bhaskar, 1978, 1997). The measurement of individual ethno-cultural membership is typically via self-reported affiliation, participation, or knowledge of that ethno-cultural construct, external judgements based on pre-conceived or stereotypical characteristics, or constructed post-hoc from multiple indicators. Lifting our theoretical starting point away from contested and value-laden descriptions of race or ethnicity to the broader notion of ethnic culture gives us the theoretical space to critically evaluate what we are measuring and determine if there is a better way to measure ethno-cultural membership.

Ethno-cultural identity

Culture is about people and place (Liu, McCreanor, McIntosh, & Teaiwa, 2005; Moeke-Pickering, 1996; Pere, 1993). Culture codifies practices that bind its people together and enables its members to survive and flourish, it includes shared memories (Liu & Hilton, 2005) sustaining and enabling the transfer of "knowledge, beliefs, values, motives, meanings, and identities from one generation to the next" (Kramer, 2013, p. 124). Culture is an increasing abstraction of concrete behaviours, experiences and memories; linked by emotion (affect) and efficacy. Many of these concrete 'building blocks' will be common to all human experience, some will be shared with a more limited set of people, with still others unique to the individual. Culture is also about shared meanings; these shared meanings are learned, experienced, shared. Without these shared meanings a person would never know what another person intends in any given interaction.

Ethnic cultures are not mutually exclusive – they overlap, merge, diverge, and share cultural elements with the cultural boundaries between ethnic populations that are porous and contextual (Hale, 2004; Mathews, 2000). Individual affiliation or self-ascribed membership in an ethno-cultural population can be described as comprising the "meanings that persons attach to

the multiple roles they typically play in highly differentiated societies" (Stryker & Burke, 2000, p. 284). Theorists describe the probability of matching one of these internally constructed identities to current context as 'Identity Salience', with Stryker and Burke (2000) succinctly summarising Mead's Identity Theory as "commitment shapes identity salience shapes role choice behaviour", where commitment is the cost of losing "meaningful relationships to others, should that identity be forgone" (p. 286). In a process similar to cognitive dissonance, behaviour is the process whereby an individual seeks to bring "situationally perceived self-relevant meanings into agreement with the identity standard" (pp. 287-288), where an identity standard comprises culturally prescribed meanings attached to any given context. This process of matching current contextual self-meanings and "self-definitional meanings held in the identity standard" (p. 288) is defined as self-verification. Stryker and Burke (2000) also claim that the "greater the number of related identities, the greater the difficulty of dealing simultaneously with relationships between them" (p. 292). While this notion seems common sense, it appears to a subtractive theory tied to ideas of limited and competing cognitive resources, as seen in some theories of language development for example (see Poulin-Dubois, Blaye, Coutya, & Bialystok, 2011; Yang & Lust, 2009). Such a notion ignores the synergistic possibilities of multiple identities, which can allow an individual multiple positive adaptive behaviours for any given context.

Multiple ethnic cultures

Ryder, Alden, and Paulhus (2000) summarised two mutually exclusive approaches to modelling ethno-cultural identity where there is a mainstream (dominant) culture and a heritage (indigenous or minority) culture to which an individual belongs; one assumes here that it is the heritage culture individual who is incorporating the mainstream culture. The unidimensional approach has individuals placed on a "continuum of identities ranging from exclusively heritage culture to exclusively mainstream culture" (Ryder et al., 2000, p. 49). Such an approach typically assumes the acculturation of the heritage culture into the mainstream as inevitable

(and beneficial) and loses completely the direction and strength of the relationship between identities. The bicultural model on the other hand allows the two identities (or more) in question to be independent of each other, in practice though, the scales are often interdependent (Berry, 1970; Sommerlad & Berry, 1970). Although as Ryder et al. (2000, p. 51) comment "reported scale intercorrelations vary wildly and frequently contradict theoretical expectations". They go on to say that core cultural constructs "may display an independent, rather than an inverse, relationship", supporting the idea that an individual can independently affiliate with more than one ethno-cultural identity.

Even in the bicultural model, there is often no analysis of the historical processes that have formed the central 'mainstream culture' nor those that bring the indigenous or minority culture into such a position of unequal power. Whilst analyses using these frameworks find benefits can accrue to those who fit the mainstream culture (at the expense of their own native or 'heritage' culture), there are significant pressures on minority cultures to conform and to fit, much of the perceived benefit then may be due to a reduction in the normative pressures on the individual. From this perspective then, those with the strongest mainstream normative forces (corresponding to countries which show the greatest health benefits in conforming to the majority mainstream culture), may be the least tolerant places to live. Berry (1997) does acknowledge that most studies utilising the bicultural model are more strongly multicultural, although some work suggests that the finding still holds in more assimilationist societies (Berry, 1997, p. 25).

It is not uncommon in Aotearoa NZ to lay claim to multiple cultural identities (Callister et al., 2007; Cormack & Robson, 2010; Kukutai, 2007). Although the relatively simple "act of claiming a Māori identity can be difficult for those who believe in a set of criteria and perceive themselves to have failed to meet aspects of a set of criteria for in-group membership" (Te Huia, 2015, p. 18), in conjunction with a constrained set of official ethnic identities to choose from, the cultural diversity of Māori will be further under-estimated. In continuing to understand cultural

difference through various combinations and permutations of Māori descent and ethnic affiliation further progress recognising within-group cultural differences will be hampered - ethno-cultural identity must be understood in the context of a peoples' histories and of historical events changing the trajectories of ethno-cultural populations.

Māori ethnicity

Over the years, many Māori researchers have endeavoured to understand these within-Māori differences and derive a set of mutually exclusive categories to be adopted by the research community, government agencies, and health sector (e.g., Cormack & Robson, 2010; A. E. Durie, 1993; Gloyne, 2018; Greaves et al., 2015 ; Kukutai, 2010; McIntosh, 2005; Ryks, 2019; Stevenson, 2004; Te Hoe Nuku Roa, 1996; J. Williams, 2000). While all of these gave us insights into within-Māori differences, all required relatively detailed information (Statistics New Zealand, 2016a), none were definitive, and no significant changes have been made to the 'default' ethnic affiliation measures used to disaggregate ethno-cultural populations (Ministry of Health, 2017; Statistics New Zealand, 2017) across official data collections. All of these approaches and measures have a common construct they are tapping - ethno-cultural identity, which is a restricted form of social identity "that limits membership in the nation to blood, ancestry, or shared cultural characteristics such as language and religion" (Kurtiş, Yalcinkaya, & Adams, 2017, p. 610). The cultural cohort approach is about membership in a well described and unique within-ethnic cultural population, and functions as a measure of ethno-cultural identity. It is crucial then to describe what constitutes an ethnic culture, bringing the analyst's understanding of what is being measured closer to the respondent's internal conceptualisation of that ethno-cultural category. We are borrowing the idea of a cohort from life course theory, which is a population who have experienced the "same significant event within a given period of time" (Pilcher, 1994, p. 489) and generational cohorts encompassing kinship and relationships between families.

A corollary to this cohort model of culture is the notion that theorists, academics, and social commentators are also bound by those same cultural contexts, meaning that markers of identity as defined by these theorists need to change over time. Many early Māori academics and writers identified that being Māori is a function of being raised in a Māori community (Rangihau, 1977) where Māori tikanga and kawa are learned first-hand, as well as Māori rites of passage (Karetu, 1990). Still resonating in the literature are Ngata's powerful words 'Ki te kore koe e mōhio ki te kōrero Māori ehara koe i te Māori' (Karetu, 1993) privileging Māori language over all other Māori identity markers. More recent discussions of who is Māori include broader self-identification (e.g., Statistics New Zealand, 2011; Te Hoe Nuku Roa, 1999) with researchers such as Borell (2005b) describing multi-generational urban communities in South Auckland who arguably have very different markers of Māori identity, look very different to the Māori communities of their forebears, and yet are unmistakably Māori. Related to this are the more analytical works such as Best Outcomes for Māori: Te Hoe Nuku Roa (Te Hoe Nuku Roa, 1999, 1996) and Houkamau, Sibley, and Greaves (Greaves et al., 2015 ; Houkamau, 2010; Houkamau & Sibley, 2015) which revealed the extraordinary diversity of the Māori population and that non-traditional (often urban) Māori populations are common.

Statistics New Zealand's Te Kupenga survey (Zealand, 2014) found, amongst other things, that just over half "could speak more than a few words or phrases in te reo Māori" (55%) with 11% speaking well or very well. While emphasising the association of te reo Māori with other traditional aspects of Māori culture (pepeha, involvement in Māori culture, & Māori educational options), the significant chunk of Māori population with little or no te reo Māori (Statistics New Zealand, 2014a, p. 8) tended to have an ambiguous place in Māori statistics. A further example of the size of this 'ambiguous Māori' population is shown in the 38% who had never been to their ancestral Marae (Statistics New Zealand, 2014b) and in the 107,391 (16% of Māori descent) people resident in New Zealand of Māori descent who did not claim a Māori ethnicity (Statistics New Zealand, 2013).

In this thesis we propose that there is a pragmatic and robust approach to identifying and describing these within-ethnic population cultural groups. This approach adapts existing theory (CJT) and draws from a wealth of existing research, historical documents, and published commentary.

Māori Cultural Cohorts

The cultural cohorts approach proposes a novel method for understanding within-ethnic population difference. Proposing that multiple cultural cohorts exist inside an ethnic population, that these cultural cohorts are resilient and unique, exist over generations, but can split and change at pre-existing stratifications in response to powerful external forces. These stratifications reflect differences in class, socio-economic status, and in physical, economic, or cultural resources (Bécares, Cormack, & Harris, 2013 ; Sporle, Neil Pearce, & Peter Davis, 2002 ; Tobias, 2017) between groups within a cultural cohort. These stratifications existed pre-European contact (Taonui, 2005) with the subsequent colonisation, conflict, repression of culture and the seizing of land acting on those stratifications to form new Māori cultural cohorts. Those same colonial political structures and legal systems continue to have an impact on contemporary Māori populations (Mikaere, 2005; Mutu, 2019) an impact that is not evenly distributed across Māori communities and sub-populations.

The cultural cohorts approach is a way of uniting history, extant identity theories and research to describe these within-ethnic cultural cohorts. Each cultural cohort has a clear narrative, a common origin story, shared cultural characteristics, and identifiable cultural differences. Individual ethno-cultural identity from the cultural cohort perspective is about membership in these cultural cohorts and over their lifetime a person may be an active member of multiple cultural cohorts. It is this idea of multiple cultural cohort membership that most clearly differentiates the cultural cohort approach from other techniques that attempt to place the individual into mutually exclusive ethnic categories. While it is computationally simpler to force

individual ethnic identity into simple mutually exclusive categories such as prioritised ethnicity (Boven et al., 2020; Didham & Callister, 2012; Yao, Meissel, et al., 2022) to compare populations and generate risk scores (e.g., relative risk, odds-ratio), these groups tend not to map to the lived cultural experiences of people and certainly do not represent the cultural diversity of Māori. Cultural cohorts are drawn from narrative and historical experiences, supported by theory and research, and at the individual level represents a life-course journey through multiple Māori ethno-cultural communities. Rather than understanding identity as a point-in-time contextual measure of ethnic affiliation, participation, attitudes, and beliefs, ethno-cultural identity results from the individual's journey through multiple cultural cohorts.

We believe this approach will enable more authentic representation of the diverse lived realities of ethno-cultural populations, and therefore more effective policy development and health promotion initiatives through understanding how different cohorts within the same ethnic population will be impacted and how best to partner and talk with them.

The cultural cohort approach was adapted from Critical Junctures Theory (Liu et al., 2014), which in turn drew upon complex systems theory to describe a nation state. Critical Junctures Theory (CJT) is a macro-level theory, describing the interaction of processes and elements at the highest levels of society producing and reproducing the modern nation state. The cultural cohort approach can be seen as operationalising the measurement of the multiple ethno-cultural identities comprising a nation state. Like the nation state in Critical Junctures Theory, cultural cohorts can be described through symbologies (such as origin stories) and cultural technologies (like Māori practices, beliefs, knowledges, marae and whare wānanga in Aotearoa NZ). At key moments in the progression of a cultural cohort an event large enough to force a non-linear change or split in the symbologies and technologies of a cultural cohort occurs, termed a critical juncture, at which point one or more new cultural cohorts form. Cultural cohorts are a meso-level phenomena, occurring with the nation state, and interacting with other ethno-cultural populations within the nation state. Cultural cohorts are an emergent property of

the cumulative effect of all individuals who have comprised that cohort over a rich cultural history. Thus, rather than understanding cultural identity as a point-in-time measure of group-identity, beliefs and attitudes, cultural identity is the cumulative effect of enduring membership in a cultural cohort over their lifetime. Every cultural cohort shapes and is shaped by those individuals that have comprised it, reflecting the cultural cohorts from which they were born, and the cumulative intersecting effects of environment, class, and wealth on health and wellbeing.

The measurement of a Māori cultural cohort occurs at the meso-level in adopting theoretical understandings of Māori ethno-cultural identity and at the micro-level in identifying cultural cohorts in unit level data as statistical measures of individuals and households or in the rich narratives coming from individual interviews and group dialogues. In doing this, we draw upon existing work, integrating the results of analyses, measures or theories of Māori cultural identity that have captured distinct cultural cohorts, for example a rural marae-centred cultural cohort or a non-traditional urban Māori community cohort. This open approach to theory encourages the selection of the best-fitting theory and measures for any given cultural cohort. There is also an explicit assumption that cultural cohorts can change, so measures and theory also need to adapt to represent contemporary or emergent cultural cohorts. A pragmatic way to assess historical and contemporary understandings of cultural identity is to examine existing ethno-cultural specific identity measures as these will reflect the cultural characteristics of actual ethnic populations, but that these characteristics may have changed over time and that one measure may be better at identifying some ethno-cultural populations than others.

There currently exist multiple generic ethnic or cultural identity theories (e.g., Phinney & Ong, 2007; Stryker & Burke, 2000; Adriana J. Umana-Taylor, Yazedjian, & Bamaca-Gomez, 2004), non-Māori ethnic identity measures (e.g., Sellers, Rowley, Chavous, Shelton, & Smith, 1997; Suinn, Ahuna, & Khoo, 1992) and Māori-specific cultural identity measures (e.g., Borell, 2005a; Durie, 1999a; Gloyne, 2018; Greaves et al., 2015; Kukutai, 2010; Ryks, Pearson, & Waa, 2016;

Thomas, 1988; J. Williams, 2000). In the following section we summarise some of the more commonly used Māori cultural identity measures in the published literature that were directly applicable to development of the cultural cohort approach.

Key Māori cultural cohort literature

There have been multiple investigations over the last two decades using differing combinations of Māori descent, Māori and non-Māori ethnic affiliation, and iwi affiliation to disaggregate the Māori ethnic population in order to understand how health varies within Māori populations see(see Boven et al., 2020; Didham & Callister, 2012; Kukutai, 2010). More nuanced measurement of Māori cultural identity by researchers goes back over seven decades however (e.g., D. Archer & Archer, 1971; Beaglehole & Ritchie, 1958; Harker, 1971; Thomas, 1988), with the Te Hoe Nuku Roa study (Durie, 1995b, 1999a; Forster, 2008; Te Hoe Nuku Roa, 1996) having an enduring influence from the 1990s onwards, alongside Māori researchers like Tahu Kukutai (Kukutai, 2004 ; 2007 ; 2010 ; 2013 ; Kukutai & Callister, 2009 ; Kukutai & Didham, 2011) and Donna Cormack (Bécares et al., 2013; Cormack, 2010; Cormack & Robson, 2010). From 2010 onwards, the measurement of Māori cultural identity shifted to the use of more advanced statistical techniques as evidenced by the latent cluster profiles of Greaves, Houkamau & Sibley (2015) and the spatial analyses of John Ryks (Ryks, 2019; Ryks et al., 2016). In the following section, Māori identity measures used in our analyses will be briefly summarised.

We apologise for any Māori researchers we have missed in summarising this area of study. There is a wealth of insights captured in theses, unpublished reports, and community projects, which simply could not be reviewed within this thesis and its central articles.

Te Hoe Nuku Roa and the old school

The Best Outcomes for Māori: Te Hoe Nuku Roa (THNR) study (Durie, 1995b, 1999a; Forster, 2008; Te Hoe Nuku Roa, 1996) comprises a corpus of work that has influenced the

measurement of Māori identity (Durie, 1995b; Stevenson, 2004), whānau (Cunningham et al., 2005), and wellbeing (Cunningham et al., 2002 ; Durie, 1999b ; 2004 ; 2006) for around two decades. A theme running through much of this work was the acknowledgement of the "diverse realities" of Māori (Durie, 1995a) and the dangers of lumping all Māori together. A method of measuring the multiple components of cultural identity was developed by Te Hoe Nuku Roa (1996) and formalised by Stevenson (2004). These measures were also adapted by other studies such as the Health, Work and Retirement study (Towers, 2008) and the Ministry of Social Development's Living Standards Research (Cunningham et al., 2002), while also influencing government data collections like Te Kupenga (Statistics New Zealand, 2020b). The core measures used by THNR were self-identification ("Do you identify as Māori"), whakapapa (ancestry), marae participation, whānau associations (extended family), whenua tipu (ancestral land), contact with Māori people, and Māori language. These were combined to form a scale score (Stevenson, 2004) and grouped into three clusters equivalent to the groupings originally proposed by Te Hoe Nuku Roa (1996) of Notional, Positive, and Secure. In this framing of Māori identity, a Secure Māori identity reflected good access to Māori language, Māori land, whānau and te Ao Māori; a Positive Māori cultural identity comprised those with a strong Māori identity but poor access to Māori cultural resources (e.g., language, marae). Finally, a Notional Māori cultural identity comprised individuals of Māori descent who described themselves as Māori but were not involved or connected to te Ao Māori. The measures used in the analyses in this thesis all derive from the work by the THNR team and adopted by the HWR study (Towers, 2008) which supplied the data for the latent group analyses.

In a similar fashion to the categories proposed by Te Hoe Nuku Roa (secure, positive, notional Māori identity), both Joe Williams (2000) and Paraone Gloyne (2018) approach Māori identity from a traditional te Ao Māori perspective. Joe Williams (2000) framing of Māori community identity has: a traditional Māori and bicultural core at the centre; a primarily urban semi-traditional group identifying with iwi, whānau, or recently community; an unconnected group with 'token' connections to their Māori identity and "unhappy with itself, both in terms of its

racial identification and its current situation" (p. 2); and a fourth group having Māori descent but no other identifiably Māori indicators. Gloyne (2018) describes three groups with a traditional Māori identity being at the centre: Ahi kā (keeping the home fires burning) being the most connected to te Ao Māori; Ahi mahana (literally warm fire) connected to te Ao Māori and typically living away from their whenua, returning home on occasion; and Ahi mātao (dying embers) the least connected to Te Ao Māori, whose faces have been forgotten by those on the marae and in their homelands. The Māori cultural measures described were used in our analyses and the broad cultural categories proposed by these theorists informed the identification of multiple Māori cultural identity cohorts within the thesis.

Common to the literature surrounding the measurement of Māori cultural identity is the need to understand urban Māori identities, especially as most Māori now live in cities and large towns (Kukutai, 2013; Ryks et al., 2016; Statistics New Zealand, 2018a).

You Belong to the City: Urban Māori

Urban Māori have a special role to play in understanding of Māori identity, they are unique locations where Māori communities and marae had cities around them and where entire Māori whānau from other iwi relocated en masse. The different rights, obligations and interests of Māori residing in the city has led to a multitude of ways to distinguish between iwi from that place (mana whenua whenua) and those with ancestral links outside of the region (mātāwaka) (Ryks et al., 2016). The diversity of iwi Māori identity was further explored by splitting mātāwaka into taura here (iwi links outside of the region) and taunga hou (Māori descent but reporting no iwi affiliation) (Ryks, 2019; Ryks et al., 2016). This statistical treatment of urban Māori identity, based on administrative indicators such as Māori descent, ethnicity, iwi affiliation has limited utility in health research, in contrast with the rich insights from qualitative understanding of urban Māori identities.

Qualitative research into urban Māori identities show a more complex picture (Keenan, 2014; Liu et al., 2005) where iwi, community, and pacific identities are layered with no sense of disconnection from a Māori identity. Belinda Borell (2005a), in her thesis on Māori identity for rangatahi in South Auckland, was particularly relevant to this thesis in identifying the characteristics of an urban Māori community-centred population. This group referred to conventional indicators of Māori identity such as whakapapa, iwi affiliation, and te reo Māori as being part of their identity in both positive and negative ways. However, other characteristics unique to these urban populations were also present, including gang affiliations, a sense of belonging and connection to their community (southside pride), and a distinctive 'nesian' identity with Māori and Pacific people entwined through inter-marriage, physical appearance, and a shared recent history. As with the population level measures and Māori cultural categories in the previous section, the nuanced understanding of Māori identity within urban centres described here is key to identifying and describing Māori cultural cohorts using the CCA in this thesis.

More advanced statistical techniques can bring a far more nuanced approach to Māori cultural identity to bridge the gap between the scalable but limited administrative measures (like the census), the conventional indicators collected by smaller surveys like Te Kupenga (Statistics New Zealand, 2020b), and the diversity revealed by qualitative research. The latent profile approach taken by Greaves, Houkamau and Sibley (2015) is an example of such an approach and is discussed in the next section.

Better, but bigger: Māori Identity Signatures

Compared to the additive scales and ethnic or iwi group affiliation traditionally used to measure Māori identity (as described in the preceding sections) a more sophisticated approach was taken by Greaves et al. (2015) based on the Multi-Dimensional Model of Māori Identity and Cultural Engagement (MMM-ICE2). The MMM-ICE2 comprises 54-items organised into seven

sub-scales: Group Membership Evaluation; Cultural Efficacy and Active Identity Engagement; Interdependent Self-Concept; Spirituality; Socio-Political Consciousness; Authenticity Beliefs; and Perceived Appearance (Houkamau & Sibley, 2015). A latent Profile Analysis was run using responses to this scale (n=686 Māori participants) which identified six Māori Identity Signatures. Two strongly enculturated (te Ao Māori centred) latent profiles emerged with Traditional Essentialists having a "more restrictive view" (p.547) of the Māori group than Traditional Inclusives. Two groups with relatively neutral scores were identified (High Moderates and Low Moderate) who, while less enculturated than the two Traditional groups; still valued Māori culture and identity. A moderately traditionally Māori-centred profile with high scores on the spirituality sub-scale was also identified as a Spiritually Orientated profile. As with previous theories a notional or unconnected group was identified called the Disassociated Māori latent profile, with low scores across all seven sub-scales of the MMM-ICE2.

Summary

Ethnicity and contemporary measures of Māori cultural identity are not sufficient for the task required of them. To meaningfully disaggregate ethnic populations, there needs to be a direct correspondence between the categories generated by the theory or numerical technique and the lived cultural experiences of the diversity of Māori. The mutually exclusive categories described by 'default' ethnic affiliation measures do not exist (Callister et al., 2007; Callister, Didham, & Potter, 2005 ; Cormack & Robson, 2010; Kukutai, 2007), nor does ethnicity provide public health or targeted policy initiatives with meaningful information (Kukutai, 2004; Valles, 2012 ; Valles, Bhopal, & Aspinall, 2015). Driven by 'default' ethnic affiliation measures (Ministry of Health, 2017; Simmonds, 2010; Statistics New Zealand, 2017), Māori continue to be treated as a homogenous group (Gissis, 2008; James, 2001; Mihaere, 2015).

The Cultural Cohort Approach reframes the macro-level Critical Juncture Theory, to focus on the within-nation state ethno-cultural population. The Māori population, bound by ancestry, is

comprised of multiple overlapping and inclusive cultural cohorts each described by Māori cultural symbologies and technologies, some of which are common to multiple cultural cohorts and others unique only to them. Māori symbologies include ocean spanning migrations and the settlement of Aotearoa NZ, eponymous ancestors, wars and treaties (notably te Tiriti o Waitangi), and the taking of vast tracts of Māori land by the settler government. More recently, the formation of urban community-based cultures following the movement of families to the city and the establishment of urban marae and Māori institutions. These are preserved as collective narratives of origins, ritual, and whakapapa. Māori specific cultural technologies include manaakitanga, whakapapa, family connectedness, and relationality, and maintained by Māori institutions such as marae wānanga, rūnanga, social media, and mandated government agencies (e.g., Te Puni Kōkiri, Māori Television, Te Māngai Pāho, and Te Tumu Paeroa). The Cultural Cohort Approach allows us to understand how these Cultural Cohorts survived, thrived, and adapted to a constantly changing world.

The following three chapters will further develop and test the CCA and in the process add to the literature on the diversity of Māori ethno-cultural identity. The following three chapters are the basis for the three publications forming the centre of this thesis. Before submission there will need to be efficiencies made to keep each article with journal word limits, which will be made on a case-by-case basis. These chapters are summarised below.

Chapter 3: Within Māori Diversity: Health Promotion and Māori Cultural Cohorts will build the case for the CCA, describe its key components, and give a worked example of how to identify Māori cultural cohorts.

Chapter 4: Multiple Māori Cultural Cohorts in an Older Population will further elaborate on the CCA, make a set of predictions about the cultural cohorts nested within Māori aged 55 or older, and test those predictions using data from the Health, Work and Retirement study (Stevenson, Noone, Towers, Stevenson, & Noone, 2008).

Chapter 5: Stability of Māori Cultural Cohorts in an Older Population will further refine the CCA based on the findings of Chapter 4, again make a set of predictions about what cultural cohorts are present in a smaller longitudinal subsample of the data used in Chapter 4 and the stability of cultural cohort membership over across four timepoints (2006, 2008, 2010, 2012). The accumulated learnings from the three papers will be summarised at the end of Chapter 5. A concluding chapter (Chapter 6) will elaborate further on the CCA, identify key learnings and limitations, propose future research to build and further refine the CCA, and suggest potential analyses that the CCA could bring unique insights to.

Chapter 3: Article 1

Title: Within Māori Diversity: Health Promotion and Māori Cultural Cohorts

Brendan Stevenson, Suzanne Phibbs, Andy Towers, Ian Laird, Margaret Forster

Massey University

Abstract

Based on Critical Junctures Theory, the cultural cohorts approach proposes that there are culturally unique cohorts within a given ethnic group. These cultural cohorts are stable over generations, but significant historical events can change or split these cohorts at within-ethnic stratifications (such as class) into related but distinct cultural cohorts. Cultural cohorts have different health and wellbeing outcomes relative to each other and to the general population. The cultural cohort approach unites history, extant identity theories and research to identify these within-ethnic cultural cohorts. This approach will enable more effective policy development, health promotion, and research through a nuanced understanding of within-ethnicity cultural differences. We demonstrate the cultural cohort approach using examples drawn from published literature, giving a description of the formation of contemporary New Zealand Māori cultural cohorts and their defining characteristics.

Keywords: Māori, Ethnicity, Culture, Critical Junctures Theory, Cultural Cohorts, Public Health

Glossary

Word	Description
Māori	The indigenous peoples of Aotearoa
Aotearoa	Māori name for New Zealand
Iwi	A large Māori population connected by geography and ancestry
Marae	The centre of traditional Māori life for a hapū comprising buildings for meeting, sleeping, eating, etc
Whānau	A small group related by ancestry or purpose, extended family
Te Tiriti o Waitangi	The founding document of Aotearoa New Zealand signed in 1840 by representatives of the English crown and iwi
Rūnanga	The mandated organisation representing an iwi
Kōhanga reo	Māori language immersion pre-school
Kura kaupapa Māori	Māori language immersion school for ages 5 to 13
Whare kura	Māori language immersion school for ages 13 to 18
Whakapapa	Ancestry
Waiata	Māori language songs and chants
Te reo Māori	Māori language
Te Ao Māori	Literally the Māori world: Traditional Māori language, knowledge, customs, and practices
NZ European	New Zealand European

Introduction

This article presents a new approach to the understanding and measurement of ethno-cultural identity. It is a response to the inappropriate use of ethnicity to understand ethno-cultural difference, where ethnicity is often used as a predictor of health and wellbeing between ethno-cultural populations and assuming homogeneity of risk within ethnic groups (Valles, 2012).

Instead, we seek to understand the cultural differences within an ethnic population, recognising a natural and resilient clustering of beliefs, behaviours, and environment across a given ethnic population with very different health outcomes relative to each other and to the general population. This approach is informed by history, treating existing theory and research as representing key characteristics of within-ethnic populations with varying degrees of accuracy and reflecting the milieu they were created.

In Aotearoa New Zealand (Aotearoa NZ) multiple commentators have warned of the problems with the use of ethnicity in understanding health and wellbeing differences between populations (see Boven et al., 2020; Callister, 2004a; Callister & Blakely, 2004; Callister et al., 2007; Cormack & Robson, 2010; Didham & Callister, 2012; Kukutai, 2004; Kukutai & Callister, 2009), particularly when the natural complexity of individual ethno-cultural identity is reduced to a single identifier limiting "the government's understanding of group dynamics and identification processes in contemporary multicultural societies" (Hansen, 2020, p. 147). For example, prioritised ethnicity[1] is commonly used in the health and health promotion sector (Auckland Regional Public Health Service, 2019; Clark et al., 2020; Curtis, Wright, & Wall, 2005; Dicker et al., 2019; Duncanson et al., 2019; National Women's Health, 2019), encouraged by Ministry of Health guidelines still maintaining the use of prioritisation "in the revised protocols" (Ministry of Health, 2017, p. 27), despite advice against the use of prioritised ethnicity from Statistics New Zealand (Statistics New Zealand, 2005, 2006a, 2017). Although prioritised ethnicity is no longer the default technique it once was as evidenced by government use of the more inclusive method of total ethnicity[2] in outputting key health statistics (New Zealand Health Survey, 2020; Te Hiringa Hauora, 2020).

Further difficulty in using ethnicity to disaggregate the population is illustrated in the tension between the fluid contextual membership of an ethnic group (Callister, 2004a; Kukutai & Callister, 2009; McIntosh, 2005) and the "unitary and exclusive" group referred to by politicians (Brubaker & Cooper, 2000), policy makers, and researchers. This distinction is given further weight when one considers that ethnic affiliation over time is more stable for dominant group ethnicity who "do not necessarily recognise or identify themselves in ethnic or racial terms" (Broman & Kukutai, 2021, p. 107) than for other minority or indigenous populations who

[1] Where people indicated more than one ethnic group, a single ethnicity is derived based on the following hierarchy: Māori, Pacific peoples, Indian, Asian, MELAA (Middle Eastern, Latin American or African), Other, European.
[2] Statistics are generated for all people in each ethnic group stated, giving total ethnicity counts that may exceed 100%.

reported far more movement between ethnic categories. The collection of data on ethnicity and nationality are legacies of government census (Andreasen, 1998, 2000; Brubaker & Cooper, 2000; Gannett, 2004), reflecting the relatively stable and geographically bound populations of the past. In New Zealand, as more of the population is born overseas (Hawke et al., 2014), alongside growing rates of ethnic inter-marriage (Callister, 2004a; Callister & Blakely, 2004; Callister et al., 2007; Callister et al., 2005; Kukutai & Callister, 2009), populations are becoming increasingly mobile and diverse (M. P. Cameron & Poot, 2019), making the use of simple ethnic labels ever more problematic.

Race and ethnicity in official government data

Historically, definitions of ethno-cultural identity in Aotearoa NZ and in countries with similar colonial histories (Australia, USA, Canada) has shifted between race-based, ancestry, country of origin, blood quantum, and nationality approaches. Corresponding measures of individual ethno-cultural identity have been constructed using multiple indicators of "social and cultural attributes that are presumed to identify race or ethnicity" (Stevens, Ishizawa, & Grbic, 2015, p. 17) like language and country of origin or self-ascribed race or ethnic affiliation. The Australian Bureau of Statistics has a laundry list approach to a "statistical standard for classifying cultural and ethnic groups" (Australian Bureau of Statistics, 2019) which is based on a "shared identity or similarity of a group of people" with characteristics that include a long shared history, cultural tradition, common geographic origin, common language, common literature, common religion, being a minority, and being racially conspicuous (Australian Bureau of Statistics, 2019). All of this complexity is then captured with the self-report ancestry question in the census "What is Person 1's ancestry?" (Australian Bureau of Statistics, 2021) selected from a list of nine predetermined groups (English, Irish, Scottish, Chinese, Italian, German, Aboriginal, Torres Strait Islander, Australian) and two write-in options, of which only the first two responses are coded and stored.

While Aotearoa NZ, Australia and Canada no longer explicitly ask about race, United States censuses use both race and ethnicity (Office of Management and Budget, 1997) in an unusual way. One separate question captures a constrained version of ethnicity with the response options in the U.S. 2020 Census being limited to “No, not of Hispanic, Latino, or Spanish origin” or “Yes, Mexican, Mexican Am., Chicano”, “Yes, Puerto Rican”, “Yes, Cuban”, or “Yes, another Hispanic, Latino, or Spanish origin” (R. Marks & Rios-Vargas, 2021). While a second race question asks self-ascribed race with tick boxes for White, Black or African American, American Indian or Alaska Native, and text box for each asking for origins, with examples including German, Irish, English for White races; African American, Jamaican, Haitian for Black or African Am for Black races; and the name of their enrolled or principal tribe(s) for the indigenous race. There are further tick-boxes which include Chinese, Vietnamese, Native Hawaiian, a single text box for other Asian or Pacific Island races, and a single text box for and other races.

The definition and collection of official ethno-cultural identity data is even more complex in Canada. The official definition from Statistics Canada is that “ethnic or cultural origin refers to the ethnic or cultural origins of the person's ancestors. Ancestors may have Indigenous origins, or origins that refer to different countries, or other origins that may not refer to different countries” (Statistics Canada, 2022), with the census question similar to that used by Aotearoa NZ and Australia, “What were the ethnic or cultural origins of this person's ancestors?”, but with four text-responses (Statistics Canada, 2022) of which six responses were coded and stored for use. This ethnicity question was accompanied by multiple questions capturing language, place of origin, indigenous identity (first Nations, Métis or Inuk), and a ‘visible minority’ group membership question “with response categories that look very much like racial groupings. (Stevens et al., 2015, p. 18). In addition, following a decision by the Federal Government to “exclude First Nations people living on reserve from three major population surveys” (First Nations Information Governance Centre, 2022) in 1996, the assembly of First Nations in Canada began an initiative culminating in the establishment of the First Nations Information Governance Centre (FNIGC). The FNIGC is based on First Nations principles of indigenous

ownership, control, access, and possession - OCAP® and is responsible for the collection, storage, analysis, and dissemination of indigenous data collected from First Nations people living on reserves and in northern communities, in particular the First Nations Regional Health Survey.

What follows is a brief summary of government definitions and use of ethnicity in Aotearoa NZ. For a comprehensive discussion on official definitions and use of ethnicity in Aotearoa NZ (see Cormack, 2010). In common with the Australian Bureau of Statistics, New Zealand defines ethnicity as "the ethnic group or groups that people identify with or feel they belong to. Ethnicity is a measure of cultural affiliation, as opposed to race, ancestry, nationality or citizenship. Ethnicity is self-perceived and people can affiliate with more than one ethnic group. An ethnic group is made up of people who have some or all of the following characteristics: a common proper name; one or more elements of common culture which need not be specified, but may include religion, customs or language; unique community of interests, feelings and actions; a shared sense of common origins or ancestry; and a common geographic origin (Statistics New Zealand, 2011). The 2018 census gathers a range of ethno-cultural data (Statistics New Zealand, 2018b) beginning with ethnicity "Which ethnic group do you belong to?" with response options being New Zealand European, Māori, Samoan, Cook Island Māori, Tongan, Niuean, Chinese, Indian, and Other with a accompanying text box. Māori specific questions are also included, these being an ancestry question, "Are you descended from a Māori (that is, did you have a Māori birthparent, grandparent or great-grandparent, etc)" with response options being yes, no, and don't know. If Māori descent is indicated, an iwi affiliation question is also asked "Do you know the name(s) of your iwi (tribe or tribes) and details of those iwi recorded. All ethnic responses are coded and stored.

Government definitions of what ethno-cultural groups are counted are powerful. At any given point in time the definition of race and ethnicity reflects current government policy on understanding health differences across ethno-cultural populations and provides evidence of

differences for policy making and public health initiatives. While some studies have tested using various combinations of ancestry, multiple ethnic affiliation, and cultural specific indicators (e.g., language, tribal affiliations, heritage activities), allowing a more fine-grained understanding of ethno-cultural differences, Census definitions are inevitably defaulted to for analytical simplicity, to compare between studies, for tests of representivity (i.e. comparing sample characteristics to census population characteristics), and to match government policy priorities. Valles et al. (2015) identified a trend for researchers in the US, UK, and NZ to neglect "mixed populations" and lump these populations "with single race/ethnicity populations in a manner that conceals substantial population heterogeneity. The net result is that people report their complex ethnic/racial identities only to have that complexity ignored, preventing adequate public health surveillance of these populations" (p. 269). Rather than seeking to expand or group ethnic categories to better match cultural populations as they exist in society, there has been a trend towards expanding the descriptor as 'racial/ethnic' (Cormack et al., 2018) and include as many labelling conventions as possible.

Despite the many issues with the measurement of ethnicity, academics still see significant value in the use of ethnicity data (J. S. Jackson, Govia, & Sellers, 2011 ; Lynch & Brown, 2011; Noels & Clément, 2015; Phillipson, 2015), with Jackson et al. (2011) clearly stating the potential that ethnicity, in conjunction with socio-economic status (SES), can have in explaining health disparities. Policy makers still require the necessary tools to understand and reduce inequities between ethnic groups, with the use of "ethnicity as a proxy for disadvantage" inadequate as it includes more advantaged groups alongside disadvantaged (Kukutai, 2004, p. 95). However, as Kukutai (2004) also points out, a non-ethnic needs-based model would exclude "the sorting mechanisms or processes" (Kukutai, 2004, p. 95) that cumulatively advantage some ethnic groups while penalising others.

The problem with Māori ethnicity

The use of Māori ethnicity in research and public health is subject not only to changing ethnic descriptors (e.g., Māori, Māori/Pacific, Māori/other), but also of constraining Māori identity. Mihaere (2015) shows how government, often aided by academia, have 'frozen' the meaning of a Māori cultural identity, stripped of any context to the point that "Māori barely recognise themselves in the definitions of our own cultural heritage" (p. 169), distorting and hiding the "social and structural disadvantages experienced by Māori" (p. 163). This is the case for the administrative de-facto Māori ethnicity label, which is so often linked as a causal or explanatory factor in virtually every health, poverty, or crime report to come out of New Zealand implying that Māori culture has once again failed leading to a "re-assertion of Pākehā cultural dominance" (Mihaere, 2015, p. 166).

The use of ethnicity to disaggregate populations can further perpetuate the notion of ethnic inferiority, where the 'norm' (or reference) is always privileged (NZ European in New Zealand) to which the ethnic others (Māori, Pacific nations, and Asian peoples particularly) are compared. The need to identify and understand within-ethnic difference thus becomes essential in allocating effort and resources, and to give an authentic voice that would be lost in a crude representation of an ethnic culture. Health promotion requires a far more nuanced approach; behaviour, attitude, and knowledge change must use messaging and intervention approaches that resonate with the diverse realities of a given population.

Critical Junctures Theory

Critical Junctures Theory (CJT) is a macro-level theory describing the processes, elements, and interactions comprising the nation state. CJT has roots in complexity or dynamical systems theory, primarily intended to "explore the historical trajectories tracking the evolution of the state as a complex system over time, hypothesizing the existence of certain critical junctures at which the system has the potential to make a transition from one pattern of relations between

the system parameters to another" (Liu et al., 2014, p. 4). There are three main components to CJT: The State (as in the nation or sovereign state), Attractors (a set of possible stable solutions or patterns), and Critical Junctures (the moment at which the State moves from one Attractor to another). The State consists of three 'variable families' or system parameters, with each system parameter operationalised for the "purposes of a particular study" (Liu et al., 2014, p. 7); these being state symbologies, identity spaces, and the technologies of state. Taken together, these parameters fully describe the nation state at a given point in time. An Attractor (the most famous attractor being the 'butterfly effect' described by Lorenz (1963) describes one or more possible states a system may converge to over time as measured by the three variable families describing the state. This concept also describes the historical trajectory of the sovereign state over time as measured by the three state parameters (symbologies, identity spaces, technologies). A Critical Juncture describes "a moment or certain window in time where there is the significant possibility of a decisive transition from one attractor to another" (Liu et al., 2014, p. 6), comprising a rupture (shifting the nation to a new state) or singularity which is a decisive moment in history that shifts the entire system to a new set of potential states and eliminating many previous potentials (e.g., World War II's effect on multiple nation states).

Measuring the state

Symbologies

Symbologies are constructed of narrative, myth and ritual, and ideology establishing at a state level "the sole way of ordering the world and defining world-views" (Schopflin, 1997) as quoted by Liu et al., 2014, p. 7). Symbologies comprise foundational narratives of key figures and events "important in constituting their nation's history" (Liu & Hilton, 2005, p. 539). "Peoples," like ethnic or national groups, either have or will seek to establish traditions for governance that maintain temporal continuity between past, present, and future (Sani et al., 2007). History "confers immortality" to events and people, weaving them into stories with temporal forms

referred to by Malinowski (as cited in Liu & Hilton, 2005) as narratives of origin. According to Liu and Hilton (2005) this representation of history becomes its charter, "an account of its origin and historical mission, which will have been amended and renegotiated over time to reflect changing circumstances" (p. 538). In the case of a cultural cohort, this charter is less unique as parts will often be shared with other cultural cohorts and may be closer to the identity mandate spoken of by Stevenson (2004). For example, to claim a Māori identity one must have Māori ancestry and to claim a South Auckland urban Māori identity, one needs to have been part of that community. Symbologies not only include the dominant or current state system, but also includes other representational systems present in society as "alternatives to the present regime" (Liu et al., 2014, p. 7).

Technologies

Technologies of state are "the institutional and technological apparatuses the state uses to carry out its directive" (Liu et al., 2014, p. 9), and maintaining the nation state symbologies. The most easily recognisable of these are legislation, state expenditure, and government agencies such as the military, police, and education with their associated "mandates, personnel, and resources" (Fisher-Onar et al., 2014, p. 29). While these technologies "appear to be among the most concrete of the system parameters in critical junctures theory" (Fisher-Onar et al., 2014, p. 29) it is the interaction with state symbologies and the groups occupying the identity space that shape the trajectory of the nation state over time.

The Identity Space: Other ways of being

Identity spaces capture the demographic diversity of the nation and encapsulated multiple social and group identities. In CJT, the identity space contains all competing narratives to the dominant state narrative, sometimes as a challenge to the legitimacy of the state and typically represented by opposition groups with alternative technologies and symbologies. An important function of these competing narratives is to describe the out-groups, giving a 'them' – necessary

to make an 'us' meaningful. While this would be an interesting aspect of CJT to unpack and include in the CCA, these would consist of other non-Māori ethnic identities that Māori could lay claim to, which would fall outside and complicate this analysis of within-Māori difference.

Attractors

Attractors (borrowed from complex systems theory), describes one or more possible states a system converge to overtime (the most famous of these being the 'butterfly effect' described by Lorenz in 1963). This concept describes the historical trajectory of the sovereign state over time in CJT as measured by the three state parameters (symbologies, technologies, identity spaces). These attractors correspond to a set of common nation state patterns (for example a monarchy, republic, or democratic nation state) that these parameters tend to converge to regardless of the starting conditions. It is a post-hoc description as the complexity of the state and its interactions with the world precludes predicting the future state with any confidence, beyond identifying possible alternatives present in the identity spaces.

CJT is a grand theory, operating at the level of nations, continents, and global economies reproducing themselves over generations as "a shared culture that is different from that of other peoples" (Hilton & Liu, 2017, p. 298). The nation state in turn is maintained by the narratives people produce "about their history that help them as a collective to endure the vicissitudes of time" (Hilton & Liu, 2017, p. 298), a cultural history shared by the multiple ethno-cultural populations in that nation.

Critical Junctures Theory and the Cultural Cohort Approach

While CJT is a macro-level theory, the CCA sits at the meso-level, describing the elements and histories of particular ethno-cultural populations (Figure 1). To operationalise CCA, we propose adapting the mechanisms of CJT to understand within-Māori differences by narrowing the focus of CJT theory to unpack how a sub-national ethno-cultural population is maintained, splits, and

changes over time. In this reframing of CJT, the ethno-cultural population is a subset of the nation state, critical junctures the moment at which an ethno-cultural population shifts to a distinctly different set of characteristics, and attractors the stable patterns of symbologies, technologies, and identity spaces that correspond with the diversity of lived ethno-cultural populations.

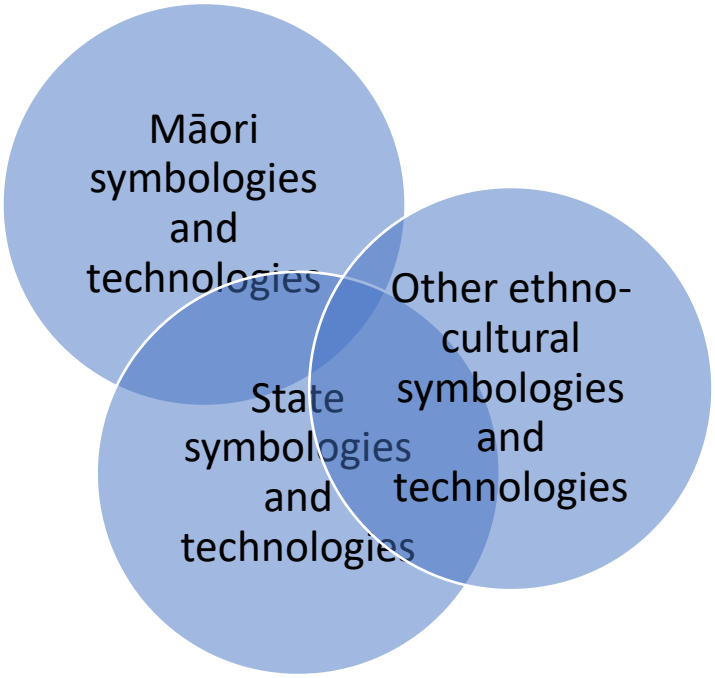


Figure 1. Māori, national, and other ethno-cultural symbologies and technologies.

While our focus in this work is on understanding and describing actualised within-Māori descent ethno-cultural populations rather than attempting to model or describe higher-order complexity, the concept of attractors is still useful in CCA. The argument is made that populations with particular ethno-cultural symbologies and technologies, moderated by the nation state's socio-political environment, will be more likely to stabilise around the same recurring sets of ethno-cultural characteristics, for example a common attractor configuration for Māori may centre around strong connection to marae, learning Māori language, and a culturally significant location. These could be posited as nested within-ethnic population

attractors resembling a 'butterfly attractor' with "more than one possible set of boundaries" (Byrne, 1998, p. 176) or systems with multiple nested more complex structures (see Munoz-Pacheco et al., 2021; Zhou, You, & Tang, 2021) all of which are constrained within a larger higher-order system such as the Māori descent population or higher still within Aotearoa NZ. The stability of these nested attractors will be dependent on the size and age of the population maintaining these unique ethno-cultural characteristics, and the durability of the relevant symbologies and technologies; durability being a function of internal resourcing and cultural capital, external socio-political forces and related ethno-cultural populations supporting or opposing their legitimacy.

CJT focuses on understanding the dominant national identity, of which ethno-cultural identities share some components of. CCA proposes that every ethno-cultural group has its own distinctive symbologies and technologies and that within the Māori descent population there are distinctive cultural cohorts that share characteristics but have their own unique narratives, histories, and technologies. CCA details how to unpack and describe the ethno-cultural identities within the nation state described by CJT, and while our intention is to focus on unique Māori ethno-cultural elements it would also be possible to use the same method to draw out shared national symbologies and technologies.

Splitting heirs: cultural cohorts

Cultures are not uniform, for Māori, there are distinct within-Māori populations who have had very different experiences of the world over multiple generations. These cultural cohorts comprise related individuals, families and whānau (extended family), bound by whakapapa (ancestry) and shared histories. To understand Māori diversity, it is necessary to know the histories and characteristics of a cultural cohort (cultural practices, language, culturally important locations, geographical concentrations, history), and how these have changed in response to significant events such as migration, new technologies, and economic shocks. An

example of the development of a cultural cohort, were the activities and events surrounding the language renaissance beginning in the 1970s (Henry, 2007; Pickering, Walker, Butler, & van Halewyn, 1990; Taonui, 2011), and the creation of new symbologies and technologies (e.g., kōhanga reo) shifting particular Māori populations to a distinct new state.

It must be stressed that these Māori cultural cohorts still exist within the broader Māori population all of which have a legitimate claim to a Māori identity. To claim a Māori identity "requires a mandate for inclusion" (Stevenson, 2004) which can only ever be a Māori ancestor and is a membership that never expires, regardless of whether it is ever claimed aloud.

Symbologies of cultural cohorts

In CJT symbologies are constructed of narrative, myth and ritual, and an ideology establishing the dominant "ordering the world and defining world-views" (Liu et al., 2014, p. 7) with foundational myths (defining events and figures) key to establishing a historical charter (Hilton & Liu, 2017; Liu & Hilton, 2005). An example of a defining event may involve a coup and the topppling of a corrupt government by a great leader whose name becomes synoymous with the creation of the new nation state. The historical charter functions as the states foundational myth; a quasi-legal charter giving an "account of its origin and historical mission" (Liu & Hilton, 2005, p. 538), linking the past with the present, and "defining rights and obligations for a group and legitimizing its social and political arrangements" (p. 538).

For Māori, these are foundational origin stories that include ocean spanning migrations and the settlement of Aotearoa, eponymous ancestors, wars and treaties (notably te Tiriti o Waitangi), and the illegal confiscation of vast tracts of Māori land by the settler government. More recently, the formation of urban community-based cultures following the movement of families to the city and the establishment of urban marae (e.g., Ngā Hau e Whā National Marae in Christchurch, Ngā Whare Waatea Marae in South Auckland, Pipitea Marae in Wellington) and organisations (e.g., Te Whānau o Waipareira in Auckland). The inter-generational nature of an ethnic culture

means “core values, beliefs, traditions, habits, mentalities, and inclinations” (Sani et al., 2007, p. 1120) are trans-generationally transmitted giving permanence to essential cultural traits (Sani et al., 2007) and an identifiable historical trajectory (Fisher-Onar et al., 2014; Liu & Hilton, 2005). These cultural boundaries vary with location (Bécares et al., 2013 ; Borell, 2005a; Smith et al., 2002) and time. Similarly, social activity within a Cultural Cohort defines its own space within which “different metrics and qualities of space and time” (Harvey, 2006, p. 214) shape social interactions. Evidence that sub-populations actively maintain cultural distinctiveness appears in research findings where those who speak te reo Māori (Māori language) are more likely to partner with other Māori (S. Howard & Didham, 2007), that education and employment characteristics influence inter-marriage (Tzeng, 2000), and that perceived distinctiveness of a minority sub-population is related to key cultural attributes (e.g. language) and population size (Livingstone, Spears, Manstead, & Bruder, 2011). In addition to the interactions between people that bind cultures together, cultures have mechanisms and institutions that ensure histories, knowledge, traditions, and language are maintained over time.

Technologies maintaining cultural cohorts

Technologies (Liu et al., 2014) are the means by which symbologies defining the nation state (i.e., narrative, myth and ritual) are maintained including budgetary or economic controls via government agencies (in particular education and state-sponsored curricula) and legislation (including citizenship). Examples being marae and rūnanga, non-governmental organisations, religious organisations, academia (indigenous and western), and groups within government organisations. Te Ao Māori cultural technologies shape thought and action in a similar way to a feedback loop, where cultural group membership will be influenced by, and in-turn practiced differentially through, Māori specific cultural technologies. Examples of these technologies for Māori include manaakitanga, whakapapa, family connectedness, and relationality, with “value based cultural technologies linked with material artifacts” such as marae and land (Kenney & Phibbs, 2015, p. 50).

The final key element of CJT are Critical Junctures. In the CCA, this is viewed as not only significant external events changing the symbologies of a culture, but the existence of 'fracture points' within an ethnic population splitting that population in multiple related cultural cohorts. These fracture points exist at stratifications within populations, along lines of class and unequal resource distribution.

Critical Junctures

In CCA, a critical juncture describes a significant event that changes or splits a cultural cohort, creating one or more cultural cohorts which have very different cultural characteristics from its parent cohort. As in CJT, this could equally be a period or window in time over which this occurred and may comprise a number of events forcing any change. CJT framed a critical juncture as the moment there is a significant possibility of an abrupt shift to a new stable state, with a Singularity describing the event and a Rupture being the non-linear and permanent change in the trajectory of a nation state. "There are many possible critical junctures, only a few of which actualize as rupture—a sticky (or relatively permanent) system change" (Liu et al., 2014, p. 4). In the CCA, as with identity spaces, while it may be possible to look back and identify moments when the cultural cohort nearly changed, these are of little practical use for research and public health initiatives when seeking to understand contemporary health and wellbeing differences within an ethnic population. Hence, a critical juncture is operationalised as a significant and recognisable event that fundamentally changed the cultural characteristics of at least one cultural cohort.

Critical Junctures Theory necessarily defines critical junctures broadly given the enormous number of possible ways it could happen. There is also an assumption that the nation state typically remains intact; that while its symbologies may change, there is still a single definable entity. The CCA builds upon Critical Junctures proposing that not only can entire cultures shift to incorporate new symbologies and technologies, but that cultures can separate at pre-existing

stratifications in response to powerful external events (Liu et al., 2014). Each of these cultural cohorts retains membership of a superordinate ethnic culture and related symbologies.

Stratification: All ethnic populations are stratified by location, inequality, and class (Haller, Eder, & Stolz, 2016 ; Kukutai & Pool, 2014; Siroky & Hechter, 2016; Sporle, Pearce, & Davis, 2002) with people occupying "several social positions simultaneously" (Peter, 1977, p. 28) within an ongoing network of social relations (Granovetter, 1985). People are born into lives already stratified by inequality (e.g., Gender and SES), with that inequality increasing or decreasing over a lifetime in response to changing social conditions (Dannefer, 2003; DiPrete & Eirich, 2006; Lynch & Brown, 2011; Willson, Shuey, & Elder, 2007). Identifying where these stratifications lie can be done using quantitative data (census and survey), qualitative analyses (e.g., interviews with Māori communities), and historical records (e.g., accounts of early Māori communities and the impact of European colonists). Importantly, these stratifications are a group phenomenon, an individual is nested within a family, who are in turn part of a broader network of extended family and friends (Granovetter, 1985). An ethno-cultural population is divided along pre-existing strata with related individuals (family and extended family) more likely to be clustered together sharing beliefs, practices and histories (see Kukutai, 2007; Reid, Varona, Fisher, & Smith, 2016; Stuart & Jose, 2014; A. J. Umana-Taylor, 2006; Wray & Ali, 2014). When an ethno-cultural population does split, these populations can culturally diverge over time, differentiating into culturally distinct cultural cohorts.

Differentiation: Differentiation describes the processes acting on these stratifications within an ethno-cultural population at a Critical Juncture. For example, in a rural setting, families with greater economic resources (e.g., retained their land) would be more likely to remain during an economic depression than those with fewer resources (e.g., lost access to their land) who would be more likely to move in search of employment. As a population divides and shifts in response to external events such as conflict (Esteban, Mayoral, & Ray, 2012), climate-related disasters, economic drivers (e.g. rural to urban drift, recession), technological advancement (e.g. cheap

mass transportation between countries (Mathews, 2000), or internal demographic pressures (e.g. population growth), cultural boundaries form as interaction rates between these newly formed cultural cohorts reduce over time, increasing cultural difference, and the "fixation of some cultural traits in each daughter community" (Foley & Mirazón Lahr, 2011, p. 1085). Given time, a cultural distinct cohort develops to the point where it is clearly identifiable and measurable.

Differentiation and Multiple Cultures

Where cultural populations come into contact, it can be argued that three things happen: (1) Multiculturalism where multiple cultural populations co-exist (relatively) unchanged; (2) Hybridisation (Wetherell & Mohanty, 2010) occurring through intermarriage, the deliberate adoption of another culture, and diffusion of one culture into another (Elder & George, 2016) resulting in a new cultural identity containing elements of both parent cultures; and (3) Acculturation - the colonisation, subjugation, and elimination of one culture, becoming a facsimile of the colonising culture.

In the (simplified) case of two cultures (culture A and culture B) coming into close contact with each other a number of possible outcomes could occur (Table 3): Multiculturalism (A1->A2 and B1->B2) with both cultures retaining their cultural uniqueness over time, co-existing and changing independently of each other in a relatively linear fashion resembling the life course principles of Replacement and Succession (Elder & George, 2016); Hybridisation (A1+B1->C1) with a new cultural forming incorporating aspects of both parent cultural cohorts; and Acculturation (A1+B1->A2) as one culture increasingly takes on the cultural characteristics of another at the expense of its own culturally unique beliefs and practices reducing total cultural diversity; and a fourth option, explored in more detail below, is where one of the cohorts splits into two more new cohorts at a stratification point (A1->A2, $B1_{S1}$->B2 + $B1_{S2}$->B3). This stratification point could be at differences in class, economic resources, or location. In this

paper, we are primarily interested in within culture change, although multiculturalism, hybridisation, and acculturation will inevitably be part of the analysis.

Table 3. Example of Cultural Cohort formation in the interaction of two cultures (A and B).

Cohort		Cultural Cohort	
Parent	Child	Process	Description
A1 ↘ B1 ↗	C1	Hybridisation	Cohort C1 has characteristics of A and B
A1 ↘ B1 ↗	A2	Acculturation	Cohort A2 has members of both A1 and B1 cohorts but only the characteristics of parent cohort A
A1 → ↘ B1 →	A2	Replacement	Cohort A does not change
	C1	Hybridisation	Cohort C1 has some characteristics of parent cohort B and of cohort A
A1 → B1 →	A2	Replacement	Cohort A does not change
	B2	Replacement	Cohort B does not change
A1 → B1 → ↘	A2	Replacement	Cohort A does not change
	B2	Replacement	Cohort B does not change
	B3	Diffusion	Cohort C1 has some characteristics of parent cohort B and new characteristics

Stability

Of equal importance is to understand what keeps each Cultural Cohort fixed and separate from competing cultural identities. Location or physical distance between is cultural cohorts important (see Bécares et al., 2013 ; Borell, 2005b; Reid et al., 2016; Smith et al., 2002), increasing time as "cultural traits in each daughter community" (Foley & Mirazón Lahr, 2011, p. 1085) are fixed or made permanent, and social forces driving within cohort loyalties and between group differences. Examples of these include constructionist approaches (Nagel, 2014), social identity theory (Tajfel & Turner, 1986), in-group favouritism (Hewstone, Rubin, & Willis, 2002), out-group homogeneity effect (Ostrom & Sedikides, 1992), self-attention theory (Mullen, 1983), social comparisons theory (Davis & Wu, 2014), and the politicisation of ethnic and cultural identity (A. Howard & Rensel, 2004; J Linnekin, 1990; J. Linnekin, 1990; Nagel, 2014; Stevenson, 2004; Walker, 1996). Cultural cohorts have high entitativity (there is a perceived

bond between members) as they are "very large groups with long histories and relatively impermeable boundaries" (Hamilton, Sherman, & Castelli, 2002, p. 143) and there are higher levels of interaction between members of a cultural cohort than that of members of other ethno-cultural populations.

Measurement of a cultural cohort is inclusive and contextual

Identifying and measuring the characteristics of a cultural cohort is key to operationalising the CCA, rather than another purely academic exercise. The identification of the cultural cohorts within an ethno-cultural population occurs at the meso-level, including theory and abstracted cultural groups, with analyses at the micro-level on individual and small group data. The CCA is open to how accurate a given measure of culture or Māori identity is, assuming that each measure reflects the understanding of identity at the time and the intended use of the measure (e.g., in health, education). In this view each measure would be better at measuring certain cultural cohorts than others, for example a measure that assumes a marae-based Māori identity would be less effective in measuring urban community-based Māori identities for whom the papakāinga (ancestral home) is less relevant. Measures devised to capture cultural identity reflect the historical context in which they were created, often treating ethnic populations as culturally homogenous relative to age, that differing age cohorts have had very different life experiences. Although each measure of cultural identity or theoretical grouping posits distinct and sometimes incongruent features of what it is to 'be' Māori, they do reflect a valid interpretation of the cultural characteristics of a distinct Māori population or cultural cohort. Identifying and measuring the characteristics of a cultural cohort is key to operationalising or making the CCA useful, rather than another purely academic exercise.

A practical application of the Māori Cultural Cohorts approach is in the prediction and description of distinct Māori cultural cohorts at a point in time using the techniques described above. By drawing on the characteristics of Māori populations described in extant research,

placing those populations in context and mapping transformative events over those descriptions, we can hypothesise the rough size, location, and cultural characteristics of multiple Māori cultural cohorts. With these characteristics described, a study or series of studies could be designed to confirm the existence and cultural characteristics of those hypothesised Māori cultural cohorts. These studies could be qualitative (e.g., gathering inter-generational stories of migration and adaptation) or statistical (e.g., surveying an identified cultural cohort using the correct identifying measures and sample methodology to describe differing health outcomes).

As part of developing the Māori CCA, Brendan Stevenson (the primary researcher for the CCA) shared its basic premise and how it would be used in the public health space with his Māori whānau (wife, cousins, mother, aunties, and sister), academic peers (Massey University academics and independent iwi-based Māori researchers), and work colleagues (Māori staff at Te Hiringa Hauora and Allen + Clarke). This early thinking about the CCA influenced thinking at Te Hiringa Hauora about the need to understand within-ethnicity differences while Brendan Stevenson worked there as a senior researcher. There was consensus that the approach had value, that these Māori cultural cohorts existed (in particular distinct urban pan-iwi, rural marae-based, and contemporary language-based cohorts), with all seeing aspects of their and their parents' experiences in the description of hypothesised cultural cohorts.

Identifying Māori cultural cohorts

Researchers are encouraged to describe a cultural cohort by looking for similarities to groups previously found by researchers, described in historical documents, and postulated in theory. While a cultural cohort cannot be directly measured, its existence can be inferred through multiple observable indicators, and mapped to the hypothesised cultural cohort characteristics.

The analysis begins by mapping key historical events relevant to Māori. Official sources (Ministry for Culture & Heritage, 2017a; e.g., Ministry for Culture & Heritage, 2017b; Zealand,

2006), published literature (e.g., Barcham, 1986; Durie, 2001; Houkamau, 2010; Kukutai, 2010, 2013; Māori Perspective Advisory Committee, 1986; Mihaere, 2015; O'Malley, 1997; Pihama, 2014; Ryks et al., 2016 ; Walker, 1996), and written or oral histories, can be used to hypothesise the existence of Māori Cultural Cohorts. From this review, important historical events related to their formation (critical junctures), key stratifications (within-group differences in economic or cultural resources), and the period in which critical juncture occurred are analysed and possible cultural cohorts revealed. This could be seen as gathering the historical narratives of existing Māori cultural cohorts, grouping origin stories and their accompanying symbologies and technologies.

The CCA explicitly draws on a broad range of published sources when identifying cultural cohorts. For this paper we drew on work by Borell (2005b) to describe multi-generational urban Māori communities in South Auckland; Best Outcomes for Māori: Te Hoe Nuku Roa (Te Hoe Nuku Roa, 1999, 1996), Greaves, Houkamau and Sibley (Greaves et al., 2015 ; Houkamau & Sibley, 2015), Kukutai (2013) and Ryks et al. (2016) in describing the diversity of contemporary Māori populations and non-traditional (often urban) Māori populations. Especially relevant was research by Carla Houkamau (2010) who showed how Māori identities across three generations had been formed by very different cultural conditions as New Zealand society was remade throughout the 20th century and Māori reasserted themselves in a cultural 'renaissance' beginning in the 1970s. The oldest cohort described were the most enculturated having had exposure to "competent Māori role models" in their formative years (p. 192), while a middle group "struggled considerably" as they had been "raised in urban environments and faced negative concepts associated with being Māori". The youngest group in contrast "were raised in multicultural environments and were able to operate effectively within both Māori and Pākehā society" (p. 192). This work beautifully outlines how the period they were born into and location strongly influence ethno-cultural identity, presumably also affecting consequent generations. Examples of the sources used to identify Māori cultural cohorts include published interviews and observations (e.g., Beaglehole & Ritchie, 1958; Borell, 2005b; O'Carroll, 2013; Te

Huia, 2015), statistical measures of identity (e.g., Durie, 1999a; Houkamau, 2010; Kukutai, 2010; J. Williams, 2000), demographically identified populations (e.g., Kukutai, 2013; Ryks et al., 2016; Statistics New Zealand, 2017), and derived groups found through latent variable analyses (e.g., Greaves et al., 2015).

The ideal order the elements of the CCA are done in would be (1) Origins, (2) Abstractions, and (3) Analyses. Origins encompasses a review and analysis of recorded histories and narratives, where the analyst looks for common or shared origin stories, paying special attention to key events and the ethno-cultural context preceding any significant change for potential new cultural cohorts and stratifications - how these new cultural cohorts differ from their parent cultural cohort. This is fairly high-level analysis and may overlap with the macro-level nation state analysis of CJT. Abstractions occur completely at the meso-level, compiling and summarising discrete Māori populations proposed by theorists and cultural commentators, or groups derived from statistical analyses and qualitative techniques. Finally, if the right kinds of data are available, analysis of primary data, guided by and testing for the cultural cohorts identified in the preceding steps.

Origins

Māori society has cultural elements unique to Māori only, elements shared with other ethno-cultural groups, and elements common to all peoples. Within the Māori population, the 'diverse realities' of Māori (Durie, 1994) were formed over time reflecting natural adaptations to the environment, punctuated by significant historical events shifting the trajectory of entire populations. These significant historical events changed the economic and cultural development of some Māori populations, leaving others relatively unchanged. For example, the rural to urban movement following World War II mostly affected those families seeking work (Barcham, 1986; Māori Perspective Advisory Committee, 1986; O'Malley, 1997), while the activism and consequent reo Māori renaissance of the 1970s (Henry, 2007; Pickering et al., 1990; Taonui,

2011) was primarily an urban movement (Hill, 2004). Partly explaining who and why some Māori populations were affected more than others is that Māori were historically stratified by class and resources (Taonui, 2005) and while these factors changed with time, they continue to differentially affect Māori populations (Sporle et al., 2002). Understanding these stratifications and identifying distinct within-Māori populations or cohorts provides nuanced analytical insight into how health and wellbeing is patterned within the Māori population. The complexity of Māori cultural populations arising from local context (e.g., location, socio-economic status, structural inequalities), class and resource stratifications, and external forces has many similarities to a Critical Junctures Theory (Liu et al., 2014) which focuses upon understanding what maintains a nation state over time and the events that precede identifiable transitions to new and distinctly different states.

Abstractions

In Table 4 we give an example of cross-referenced Māori populations with similar characteristics described by Māori researchers or data, with a tentative naming strategy (Whānau Whakapono, Te Ahi Kā, Taura Here, Manu Kōrero, Taunga Hou, Ahi Mātao) utilising existing labels for these populations where they already exist. The identification of these groups also incorporates a review of historical documents and narratives describing the changing nature of different Māori communities over time, which is triangulated with the groups identified by Māori researchers and theorists, giving us more certainty that these are real and enduring Māori cultural cohorts with distinct ethno-cultural characteristics.

Table 4. Example of mapping existing Māori Identity Theory groupings and Hypothesised Māori Cultural Cohorts.

Cultural cohorts	**Whānau Whakapono[3]**	**Te Ahi Kā**	**Taura Here**	**Manu Kōrero[4]**	**Taunga Hou**	**Ahi Mātao**
Description	Te Ao Māori centred Christian faith	Remained in their iwi homelands and actively involved in marae	Living outside of their iwi home, but still remain connected to their ancestral home	Part of the revitalisation of the Māori language as students, teachers, helpers, and parents	Local urban identities centred on the 'hood' (often shared with Pacific peoples)	Largely disengaged from Māori culture, although they may go to marae for important occasions (tangi)
Durie (1999)	Culturally Māori		Bicultural			Marginalised
Williams (2000)	Traditional Core		Primarily Urban		Unconnected	Kiwi/New Zealander
Gloyne (2018)	Te Ahi Kā		Ahi mahana		Ahi mahana	Ahi mātao
Borell (2005)					Māori Environment, Neighbourhood ID, Pasifika Connection, Gang IDs	
Ryks, Pearson & Waa (2016)		Mana Whenua	Taura Here		Taunga Hou	
Cunningham, Stevenson & Tassell (2005)	Secure		Positive		Compromised	Notional
Statistics NZ	Ringatū/ Rātana			Māori Medium Education		
	Specified an iwi[5] (74%)					

In the relatively simple case shown in Table 4, we propose that six Māori Cultural Cohorts are currently well represented in the literature. Other less well studied cultural cohorts, for example gang whānau, hybrid cultural identities, and Māori diaspora populations in Australia would be strong candidates for consideration in the future. These six cultural cohorts are described in more detail below.

Ahi Kā are rural Māori communities and families who have stayed close to their marae (ancestral home) and homelands over multiple generations, although the rural cultural cohort has been simplified as the population size is drawn from census estimates of Māori living outside of the main urban areas – future iterations would analyse existing data in more detail to better understand within population diversity. Contemporary urban Ahi Kā adapted to new ways of existing as towns and cities were built around and on their traditional lands. Ringatū

[3] Māori Christian faith-based community.
[4] Borrowed from Ngā Manu Kōrero which is a secondary school national Māori language speech competition.
[5] Of the Māori descent population 1996 Census (Kukutai, 2010)

and Rātana (Whānau Whakapono) are religions founded by Māori in the late 18th and early 19th century and numbering just over 16,000 in 1926, rising to around 67,000 by 2006.

Taura Here and Taunga Hou are categories adapted from (Ryks et al., 2016) from an analysis of Māori living in major urban areas (Auckland, Hamilton, Wellington, and Christchurch), where Taura Here represents Māori who have iwi (shared eponymous ancestor) outside of that urban area, while Taunga Hou reported no iwi links at all. The peripheral Taunga Hou group reflects a Māori descent population having little or no involvement with Māori culture (Kukutai, 2010) and indistinguishable from their New Zealand European neighbours (J. Williams, 2000). The recent Renaissance cohort (Manu Kōrero) are primarily urban and part of the explosive growth in Māori immersion kōhanga (pre-schools), kura (schools), and Wānanga (tertiary education providers) in the latter half of the 20th century. They are hypothesised to be sub-groups of the Mana Whenua, Ahi Kā, and Taura Here cohorts.

These sub-groups can be summarised as four primary Māori cultural cohorts:

1. Traditional Marae centred identity
    1.1. Te Ahi Kā. A stable population passing Māori language, cultural knowledge, and guardianship of their traditional homelands across generations. This group is connected by geographic place (particularly marae), although there may be cultural differences between rural Māori populations and urban Māori populations for whom cities grew on and around their homelands.
    1.2. Taura Here. A large Māori population who moved away from their traditional homelands from the 1950s but maintained links to those same homelands and many cultural markers (e.g., language and ancestry). This group may maintain traditional institutions in their new homes (e.g., pan-iwi urban marae).
2. Urban Community

2.1. Taunga Hou. A population with little involvement in marae-centred activities and no connection with traditional homelands, but still positive about their Māori identity and ancestry. This group is hypothesised to have formed new urban-based Māori identities incorporating Pasifika and occasional gang cultural markers.

2.2. Manu Kōrero. A mostly urban population once (relatively) disconnected from traditional Māori culture reconnecting by supporting te reo Māori at kohanga reo, kura kaupapa Māori, or whare kura (e.g., their children attend or they teach/work at these institutions) or learning te reo Māori at wānanga (e.g. tertiary institutions or marae-based courses). This group could also include those who are involved with a 'local' urban marae (e.g., Hoani Waititi, Pipitea, Ngā Hau e Whā, Ārai te Uru), but who still have little to with an iwi identity.

3. Māori Christian Based

3.1. Whānau Whakapono. Followers of Māori Christian religions (mostly Ringatū and Rātana) taught almost entirely in te reo Māori and passing traditional practices and knowledge over many generations. This group has had a relatively stable census count sitting between 30,000 and 40,000 individuals for the last four decades with over 50,000 individuals at the 2018 census (Statistics New Zealand, 2019).

4. Mainstream

4.1. Ahi Mātao. A peripheral or 'notional' Māori population who are largely uninvolved in traditional or contemporary Māori cultural activities and with no strong ties to their ancestral homelands.

Analyses

The CCA is intended to be a practical method to unpack Māori diverse realities (Durie, 1995a) and to predict the characteristics of these discrete within-Māori cultural cohorts. While we do not test our predicted cultural cohorts with unit level data in this paper, it is expected that the CCA can provide a more robust theory driven method to identify measures of individual ethno-

cultural identity, test predicted membership against those found in the analysis of the data, and if accurate, utilise aggregated membership of these cultural cohorts for research and health promotion that better reflects diverse Māori lived experiences and ethno-cultural communities. Examples of the kinds of data that could be used include the rich narratives arising from textual, interviews and group work or surveys collecting a set of cultural indicators sufficient to capture the different characteristics of the predicted cultural cohorts. These cultural indicators would include ethnicity, language fluency, iwi affiliation, educational history, beliefs (e.g., religious affiliation), culturally specific knowledge (e.g., ancestry, customary practices), and basic demographics. Participants could be grouped using a range of clustering techniques, including deterministic rule-based methods (Stevenson, 2004), factor analyses (Greaves et al., 2015), or latent class analyses (Lanza et al., 2013; Lanza, Collins, Lemmon, & Schafer, 2007).

Summary

The post-hoc identification of Māori cultural cohorts from extant documents is an integral part of the CCA. While this process has value in consolidating historical and contemporary understanding of Māori cultural identities and the diverse realities in which they are embedded, we must continually test and update our understanding of cultural identity as cultures themselves adapt and change. The CCA flips ethno-cultural identity from one of mutually exclusive categories to one of multiple cultural cohort membership in current and historical ethno-cultural communities. Cultural cohorts are comprised of related individuals travelling through time together, symbologies and technologies evolving and changing. Cultural cohorts map directly to the lived experiences of Māori over their lifetime. Thus, when we begin an analysis of contemporary data, we are looking for groups of people who have now moved and adapted to a changing world together. Unless, of course, a critical juncture occurs sufficiently powerful to force an abrupt non-linear change in one or more cultural cohorts.

As the cultural cohorts are identified, differences within Māori populations due to the differential experiences of discrete populations over time can be teased out. This avoids the current situation, which has people reporting complex ethnic identities, "only to have that complexity ignored, preventing adequate public health surveillance of these populations" (Valles et al., 2015, p. 269). The CCA can potentially help explain health disparities within the Māori population, by mapping cohort-specific health and wellbeing trajectories over time (e.g., suicide, diabetes, smoking rates) and contributing to more effective health promotion initiatives through more accurate messaging and prioritising of funding.

Following the CCA to understand the historical context and cultural characteristics of the study population ensures the researcher understands whose voice is included in the research and most importantly, who is excluded and/or silenced. The CCA approach identifies the heterogeneity due to sub-group cultural differences within an ethnic population (see Valles, 2012; Valles et al., 2015) and answers the call by Mills and Gitlin (2000) to "grasp history and biography and the relations between the two within society" (p. 5). The CCA offers a comprehensive method to identify cultural sub-populations, providing a robust framework to integrate findings from multiple and diverse study methodologies and interpret both cross-sectional findings and longitudinal analyses in a broader socio-historical context.

Additionally, as cultural cohorts in younger Māori descent and other ethno-cultural populations are identified using the CCA, we can lift these findings up to the nation state level and apply the CJT lens. This deeper understanding of Aotearoa NZ's shared national identity and ethno-cultural diversity would inform broader research, policy development, and health and wellbeing initiatives.

In modelling historical cultural stratifications, the cultural cohort approach (CCA) describes the flows of cultural identity over time as discrete cultural populations change, split, merge, and disappear in response to social, economic, structural, and environmental forces. The CCA makes

assumptions explicit when selecting and describing the population, compelling the researcher to understand the cultural heritage and historical forces shaping that population. The cultural cohort framework is well suited to longitudinal data analysis techniques, including latent class/transition analysis, trajectory analysis, and longitudinal cluster/factor analyses. Crucially, in identifying the multiple cultural cohorts within an ethnic population, populations who are not well understood or are overlooked in research are highlighted; making explicit who is excluded from research and policy. In addition, the characteristics of each cultural cohort generated through this process serves to unpack and understand within ethnic population heterogeneity. Moreover, the ability to predict how these Cultural Cohorts may change in the future given hypothetical external influences (e.g., climate change, depression, or war) will enhance the design of health policy, resource allocation, and health promotion interventions at the national, ethnic, and community level. Done well, the CCA will provide a narrative to accompany each cultural cohort which would resonate with the members of that cultural cohort.

References

Andreasen, R. O. (1998). A new perspective on the race debate. *The British Journal for the Philosophy of Science, 49*(2), 199-225.

Andreasen, R. O. (2000). Race: Biological reality or social construct? *Philosophy of Science, 67*(S3), S653-S666.

Auckland Regional Public Health Service. (2019). *Surveillance Report 2018*. Retrieved from Auckland: https://www.arphs.health.nz/assets/Uploads/Resources/Health-professionals/Surveillance/ARPHS-Annual-Surveillance-Report-2018.pdf

Australian Bureau of Statistics. (2019). *Australian Standard Classification of Cultural and Ethnic Groups (ASCCEG)*. Retrieved from https://www.abs.gov.au/statistics/classifications/australian-standard-classification-cultural-and-ethnic-groups-ascceg/latest-release

Australian Bureau of Statistics. (2021). *Ancestry 1st response (ANC1P)*. Retrieved from Australia: https://www.abs.gov.au/census/guide-census-data/census-dictionary/2021/variables-topic/cultural-diversity/ancestry-1st-response-anc1p

Barcham, P. (1986). Racism in Aotearoa: A socialist perspective. In S. Maharey & M. O'Brien (Eds.), *Alternatives: Socialist essays for the 1980's* (pp. 55-75). Palmerston North: Department of Sociology, Massey University.

Beaglehole, E., & Ritchie, J. E. (1958). The Rakau Maori Studies. *The Journal of the Polynesian Society, 67*(2), 132-154. Retrieved from http://www.jstor.org/stable/20703659

Bécares, L., Cormack, D., & Harris, R. (2013). Ethnic density and area deprivation: Neighbourhood effects on Māori health and racial discrimination in Aotearoa/New Zealand. *Social Science & Medicine, 88*(0), 76-82. doi:http://dx.doi.org/10.1016/j.socscimed.2013.04.007

Borell, B. (2005a). *Living in the City Ain't So Bad: Cultural Diversity of South Auckland Rangatahi.* (Unpublished Masters of Philosophy in Psychology). Massey University,

Borell, B. (2005b). Living in the city ain't so bad: Cultural identity for young Maori in South Auckland. In J. Liu, T. McCreanor, T. McIntosh, & T. Teaiwa (Eds.), *New Zealand identities: Departures and destinations* (pp. 191-206). Wellington: Victoria University Press.

Boven, N., Exeter, D., Sporle, A., & Shackleton, N. (2020). The implications of different ethnicity categorisation methods for understanding outcomes and developing policy in New Zealand. *Kotuitui: New Zealand Journal of Social Sciences Online, 15*(1), 123-139. doi:10.1080/1177083X.2019.1657912

Broman, P., & Kukutai, T. H. (2021). Fixed not fluid: European identification in the Aotearoa New Zealand census. *Journal of Population Research, 38*(2), 103-138. Retrieved from https://EconPapers.repec.org/RePEc:spr:joprea:v:38:y:2021:i:2:d:10.1007_s12546-021-09262-4

Brubaker, R., & Cooper, F. (2000). Beyond "identity". *Theory and Society, 29*(1), 1-47. doi:10.1023/A:1007068714468

Byrne, D. (1998). *Complexity theory and the social sciences : an introduction*. London: London : Routledge.

Callister, P. (2004). Ethnicity measures, intermarriage and social policy. *Social Policy Journal of New Zealand, 23*, 109-140.

Callister, P., & Blakely, T. (2004). Ethnic Classification, Intermarriage, and Mortality: Some methodological issues in relation to ethnic comparisons in Aotearoa. *Unpublished Working Paper*.

Callister, P., Didham, R., Newell, J., & Potter, D. (2007). ``Family Ethnicity'': Knitting a Jumper Using Two Woolly Concepts. *Social Policy Journal of New Zealand, 32*, 32.

Callister, P., Didham, R., & Potter, D. (2005). *Ethnic intermarriage in New Zealand*. Retrieved from Wellington:

Cameron, M. P., & Poot, J. (2019). Towards Superdiverse Aotearoa: Dimensions of Past and Future Ethnic Diversity in New Zealand and its Regions. *New Zealand Population Review*(45), 18-45.

Clark, S. T., Zhu, M., Gamble, G. D., Naot, D., Paine, S.-J., Dalbeth, N., . . . Musson, D. S. (2020). Epidemiology of tendon and ligament injuries in Aotearoa/New Zealand between 2010 and 2016. *Injury Epidemiology, 7*(1), 5. doi:10.1186/s40621-020-0231-x

Cormack, D. (2010). *The practice and politics of counting: ethnicity data in official statistics in Aotearoa/New Zealand*. Retrieved from Wellington: http://www.otago.ac.nz/wellington/departments/publichealth/research/erupomare/publications/

Cormack, D., & Robson, C. (2010). *Classification and output of multiple ethnicities: issues for monitoring Māori health*. Retrieved from Wellington:

Cormack, D., Stanley, J., & Harris, R. (2018). Multiple forms of discrimination and relationships with health and wellbeing: Findings from national cross-sectional surveys in Aotearoa/New Zealand. *International Journal for Equity in Health, 17*(1). doi:10.1186/s12939-018-0735-y

Curtis, E., Wright, C., & Wall, M. (2005). The epidemiology of breast cancer in Maori women in Aotearoa New Zealand: implications for screening and treatment. *N Z Med J, 118*(1209), U1297.

Dannefer, D. (2003). Cumulative advantage/disadvantage and the life course: Cross-fertilizing age and social science theory. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 58*(6), S327-S337.

Davis, L. d. u. e., & Wu, S. s. h. e. (2014). Social Comparisons and Life Satisfaction Across Racial and Ethnic Groups: The Effects of Status, Information and Solidarity. *Social Indicators Research, 117*(3), 849-869. doi:10.1007/s11205-013-0367-y

Dicker, B., Todd, V. F., Tunnage, B., Swain, A., Conaglen, K., Smith, T., . . . Howie, G. (2019). Ethnic disparities in the incidence and outcome from out-of-hospital cardiac arrest: A New Zealand observational study. *Resuscitation, 145*, 56-62. doi:https://doi.org/10.1016/j.resuscitation.2019.09.026

Didham, R., & Callister, P. (2012). The effect of ethnic prioritisation on ethnic health analysis: a research note. *N Z Med J, 125*(1359), 58-66.

DiPrete, T. A., & Eirich, G. M. (2006). Cumulative Advantage as a Mechanism for Inequality: A Review of Theoretical and Empirical Developments. *Annual Review of Sociology, 32*(1), 271-297. doi:doi:10.1146/annurev.soc.32.061604.123127

Duncanson, M., Oben, G., Adams, J., Richardson, G., Wicken, A., & Pierson, M. (2019). *Health and wellbeing of under-15 year olds in the Midland region 2018*. Retrieved from Dunedin: https://www.otago.ac.nz/nzcyes

Durie, M. H. (1994). *Whanau, family and the promotion of health*. Palmerston North: Massey University, Deptartment of Maori Studies.

Durie, M. H. (1995). *Nga Matatini Maori: Diverse Maori realities*. Paper presented at the Wānanga Pūrongo Kōreroreo, Tūrangawaewae Marae, Ngāruawahia.

Durie, M. H. (1999). *Whaiora - Maori Health Development Second Edition*. Auckland: Oxford University Press.

Durie, M. H. (2001). *Maori Ora: The Dynamics of Maori Health*. Auckland: Oxford University Press.

Elder, G. H., & George, L. K. (2016). Age, Cohorts, and the Life Course. In M. J. Shanahan, J. T. Mortimer, & M. Kirkpatrick Johnson (Eds.), *Handbook of the Life Course: Volume II* (pp. 59-85). Cham: Springer International Publishing.

Esteban, J., Mayoral, L., & Ray, D. (2012). Ethnicity and Conflict: Theory and Facts. *Science, 336*(6083), 858-865. doi:10.1126/science.1222240

First Nations Information Governance Centre. (2022). Our History. Retrieved from https://fnigc.ca/about-fnigc/our-history/

Fisher-Onar, N., Liu, J. H., & Woodward, M. (2014). Critical junctures? Complexity and the post-colonial nation-state. *International Journal of Intercultural Relations, 43*, 22-34. doi:https://doi.org/10.1016/j.ijintrel.2014.08.009

Foley, R. A., & Mirazón Lahr, M. (2011). The evolution of the diversity of cultures. *Philosophical Transactions of the Royal Society B: Biological Sciences, 366*(1567), 1080-1089. doi:10.1098/rstb.2010.0370

Gannett, L. (2004). The Biological Reification of Race. *The British Journal for the Philosophy of Science, 55*(2), 323-345. doi:10.1093/bjps/55.2.323

Granovetter, M. (1985). Economic Action and Social Structure: The Problem of Embeddedness Economic Action and Social Structure: The Problem of Embeddedness'. *Source: American Journal of Sociology, 91*, 481-510.

Greaves, L., Houkamau, C. A., & Sibley, C. G. (2015). Māori identity signatures: A latent profile analysis of the types of Māori identity. *Cultural Diversity and Ethnic Minority Psychology, 21*(4), 541-549. doi:10.1037/cdp0000033

Haller, M., Eder, A., & Stolz, E. (2016). Ethnic Stratification and Patterns of Income Inequality Around the World: A Cross-National Comparison of 123 Countries, Based on a New Index of Historic Ethnic Exploitation. *Social Indicators Research, 128*(3), 1047-1084. doi:10.1007/s11205-015-1069-4

Hamilton, D., Sherman, S., & Castelli, L. (2002). A Group by Any Other Name-The Role of Entitativity in Group Perception. *European Review of Social Psychology, 12*, 139-166. doi:10.1080/14792772143000049

Hansen, S. L. (2020). *Messy Multiculturalism.* (Doctor of Philosophy PhD). Victoria University of Wellington, Wellington.

Harvey, D. (2006). The Sociological and Geographical Imaginations. *International Journal of Politics, Culture, and Society, 18*(3), 211. doi:10.1007/s10767-006-9009-6

Hawke, G., Bedford, R., Kukutai, T. H., McKinnon, M., Olssen, E., & Spoonley, P. (2014). *Our Futures: Te Pae Tawhiti*. Retrieved from

Henry, E. (2007). Kaupapa Maori entrepreneurship. In *International handbook of research on indigenous entrepreneurship*: Edward Elgar Publishing.

Hewstone, M., Rubin, M., & Willis, H. (2002). Intergroup bias. *Annual Review of Psychology, 53*(1), 575-604.

Hill, R. S. (2004). *State authority, indigenous autonomy: Crown-Maori relations in New Zealand/Aotearoa 1950-2000*. Wellington: Victoria University Press.

Hilton, D. J., & Liu, J. H. (2017). History as the narrative of a people: From function to structure and content. In (Vol. 10, pp. 297-309).

Houkamau, C. A. (2010). Identity construction and reconstruction: the role of socio-historical contexts in shaping Māori women's identity. *Social Identities, 16*(2), 179-196. doi:10.1080/13504631003688872

Houkamau, C. A., & Sibley, C. G. (2015). The Revised Multidimensional Model of Māori Identity and Cultural Engagement (MMM-ICE2). *Social Indicators Research, 122*(1), 279-296. Retrieved from http://www.jstor.org/stable/24721417

Howard, A., & Rensel, J. (2004). Rotuman Identity in the Electronic Age. In T. van Meijl & J. Miedema (Eds.), *Shifting Images of Identity in the Pacific* (pp. 219-236). Leiden: KITLV Press.

Howard, S., & Didham, R. (2007). *Ethnic intermarriage and ethnic transference amongst the Maori population: implications for the measurement and definition of ethnicity*: Statistics New Zealand.

Jackson, J. S., Govia, I. O., & Sellers, S. L. (2011). Chapter 7 - Racial and Ethnic Influences Over the Life Course. In *Handbook of Aging and the Social Sciences (Seventh Edition)* (pp. 91-103). San Diego: Academic Press.

Kenney, C. M., & Phibbs, S. (2015). A Māori love story: Community-led disaster management in response to the Ōtautahi (Christchurch) earthquakes as a framework for action. *International Journal of Disaster Risk Reduction, 14*, 46-55.

Kukutai, T. H. (2004). The problem of defining an ethnic group for public policy: Who is Maori and why does it matter? *Social Policy Journal of New Zealand*(23).

Kukutai, T. H. (2007). White mothers, brown children: Ethnic identification of Maori-European children in New Zealand. *Journal of Marriage and Family, 69*(5), 1150-1161. doi:http://dx.doi.org/10.1111/j.1741-3737.2007.00438.x

Kukutai, T. H. (2010). *The thin brown line: Re-indigenizing inequality in Aotearoa New Zealand.* (Doctor of Philosophy). Stanford University,

Kukutai, T. H. (2013). The structure of urban Māori identites. In C. Andersen & E. J. Peters (Eds.), *Indigenous in the City : Contemporary Identities and Cultural Innovation* (pp. 311-333). Vancouver: UBC Press.

Kukutai, T. H., & Callister, P. (2009). A "main" ethnic group? Ethnic self-prioritisation among New Zealand Youth. *Social Policy Journal of New Zealand, 36*, 16-31.

Kukutai, T. H., & Pool, I. (2014). From common colonization to internal segmentation: Rethinking indigenous demography in New Zealand. In A. Romaniuk & F. Trovato (Eds.), *Aboriginal populations: Social, demographic, and epidemiological perspectives* (pp. 441-468). Edmonton, Canada: The University of Alberta Press.

Lanza, S. T., Bray, B. C., & Collins, L. M. (2013). An introduction to latent class and latent transition analysis. In J. A. Schinka, W. F. Velicer, & I. B. Weiner (Eds.), *Handbook of psychology* (2 ed., Vol. 2, pp. 691-716). Hoboken, NJ: Wiley.

Lanza, S. T., Collins, L. M., Lemmon, D. R., & Schafer, J. L. (2007). PROC LCA: A SAS Procedure for Latent Class Analysis. *Structural equation modeling : a multidisciplinary journal, 14*(4), 671-694. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2785099/

Linnekin, J. (1990). The politics of culture in the Pacific. In J. Linnekin & L. Poyer (Eds.), *Cultural identity and ethnicity in the Pacific* (pp. 149-173). Honolulu: University Press of.

The politics of culture in the Pacific 149-173 (University Press of 1990).

Liu, J. H., Fisher-Onar, N., & Woodward, M. W. (2014). Symbologies, technologies, and identities: Critical junctures theory and the multi-layered nation-state. *International Journal of Intercultural Relations, 43*, 2-12. doi:10.1016/j.ijintrel.2014.08.012

Liu, J. H., & Hilton, D. J. (2005). How the past weighs on the present: Social representations of history and their role in identity politics. *British Journal of Social Psychology, 44*, 537-556.

Livingstone, A. G., Spears, R., Manstead, A. S. R., & Bruder, M. (2011). The more, the merrier? Numerical strength versus subgroup distinctiveness in minority groups. *Journal of Experimental Social Psychology, 47*, 786-793. doi:10.1016/j.jesp.2011.03.012

Lorenz, E. N. (1963). Deterministic Nonperiodic Flow. *Journal of Atmospheric Sciences, 20*(2), 130-141. doi:10.1175/1520-0469(1963)020<0130:Dnf>2.0.Co;2

Lynch, S. M., & Brown, J. S. (2011). Chapter 8 - Stratification and Inequality Over the Life Course. In *Handbook of Aging and the Social Sciences (Seventh Edition)* (pp. 105-117). San Diego: Academic Press.

Malinowski, B. (1926). *Myth in primitive psychology* (Vol. 6): K. Paul, Trench, Trubner & Company, Limited.

Māori Perspective Advisory Committee. (1986). *Puao-Te-Ata-Tu (daybreak)*. Wellington: Department of Social Welfare.

Marks, R., & Rios-Vargas, M. (2021). Improvements to the 2020 Census Race and Hispanic Origin Question Designs, Data Processing, and Coding Procedures. *Newsroom.* Retrieved from https://www.census.gov/newsroom/blogs/random-samplings/2021/08/improvements-to-2020-census-race-hispanic-origin-question-designs.html

Mathews, G. (2000). *Global culture/individual identity: searching for home in the cultural supermarket*. London: Routledge.

McIntosh, T. (2005). Maori identities: Fixed, Fluid, Forced. In J. H. Liu, T. McCreanor, T. McIntosh, & T. Teaiwa (Eds.), *New Zealand identities: Departures and destinations* (pp. 38-51). Wellington: Victoria University Press.

Mihaere, R. (2015). *A kaupapa Māori analysis of the use of Māori cultural identity in the prison system.* (Doctor of Philosophy). Victoria University, Wellington.

Mills, C. W., & Gitlin, T. (2000). *Sociological Imagination*: Oxford University Press, USA.

Ministry for Culture & Heritage. (2017a). New Zealand History. Retrieved from https://nzhistory.govt.nz/

Ministry for Culture & Heritage. (2017b). Te Ara: The Encyclopedia of New Zealand. Retrieved from http://www.teara.govt.nz/en/history

Ministry of Health. (2017). *HISO 10001:2017 Ethnicity Data Protocols*. Retrieved from Wellington: https://www.health.govt.nz/system/files/documents/publications/hiso-10001-2017-ethnicity-data-protocols-v2.pdf

Mullen, B. (1983). Operationalizing the effect of the group on the individual: A self-attention perspective. *Journal of Experimental Social Psychology, 19*(4), 295-322. doi:Doi: 10.1016/0022-1031(83)90025-2

Munoz-Pacheco, J. M., Volos, C., Serrano, F. E., Jafari, S., Kengne, J., & Rajagopal, K. (2021). Stabilization and Synchronization of a Complex Hidden Attractor Chaotic System by Backstepping Technique. *Entropy (Basel), 23*(7). doi:10.3390/e23070921

Nagel, J. (2014). Constructing Ethnicity: Creating and Recreating Ethnic Identity and Culture*. *Social Problems, 41*(1), 152-176. doi:10.2307/3096847

National Women's Health. (2019). *National Women's Health Annual Clinical Report 2018*. Retrieved from Auckland: https://nationalwomenshealth.adhb.govt.nz/assets/Womens-health/Documents/ACR/NWH-Annual-Clinical-Report-2018-final.pdf

New Zealand Health Survey. (2020). Annual data explorer. Retrieved from https://minhealthnz.shinyapps.io/nz-health-survey-2018-19-annual-data-explorer/

Noels, K. A., & Clément, R. (2015). Situational variations in ethnic identity across immigration generations: Implications for acculturative change and cross-cultural adaptation. *International Journal of Psychology, 50*(6), 451-462. doi:10.1002/ijop.12205

O'Carroll. (2013). Maori identity construction in SNS. *International Journal of Critical Indigenous Studies, 6*(2), 2-16.

O'Malley, V. (1997). *Agents of Autonomy*. Wellington: Huia Publishers.

Office of Management and Budget. (1997, October 30, 1997). Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity. *Federal Register, 62(210),* 8. Retrieved from https://www.govinfo.gov/content/pkg/FR-1997-10-30/pdf/97-28653.pdf

Ostrom, T. M., & Sedikides, C. (1992). Out-group homogeneity effects in natural and minimal groups. *Psychological Bulletin, 112*(3), 536.

Peter, M. B. (1977). A Macrosociological Theory of Social Structure. *The American Journal of Sociology, 83*(1), 26-54. Retrieved from http://www.jstor.org/stable/2777762

Phillipson, C. (2015). Placing ethnicity at the centre of studies of later life: theoretical perspectives and empirical challenges. *Ageing & Society, 35*(05), 917-934. doi:doi:10.1017/S0144686X14001032

Pickering, J. W., Walker, E. P., Butler, P. H., & van Halewyn, C. N. (1990). Copper vapour laser treatment of port-wine stains and other vascular malformations. *British Journal of Plastic Surgery, 43*(3), 273-282.

Pihama, L. (2014). Positioning historical trauma theory within Aotearoa New Zealand. *AlterNative (Ngā Pae o te Māramatanga)*. Retrieved from http://ezproxy.massey.ac.nz/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edsinz&AN=edsinz.809714&site=eds-live&scope=site

Reid, J., Varona, G., Fisher, M., & Smith, C. (2016). Understanding Maori 'lived' culture to determine cultural connectedness and wellbeing. *Journal of Population Research*, 1-19. doi:10.1007/s12546-016-9165-0

Ryks, J., Pearson, A. L., & Waa, A. (2016). Mapping urban Māori: A population-based study of Māori heterogeneity. *New Zealand Geographer*, n/a-n/a. doi:10.1111/nzg.12113

Sani, F., Bowe, M., Herrera, M., Manna, C., Cossa, T., Miao, X., & Zhou, Y. (2007). Perceived collective continuity: seeing groups as entities that move through time. *European Journal of Social Psychology, 37*(6), 1118-1134. Retrieved from http://10.0.3.234/ejsp.430

http://ezproxy.massey.ac.nz/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=pbh&AN=27391767&site=eds-live&scope=site

Schopflin, G. (1997). *The functions of myth and a taxonomy of myths* (Vol. 19). London: University of London Press.

Siroky, D., & Hechter, M. (2016). Ethnicity, class, and civil war: the role of hierarchy, segmentation, and cross-cutting cleavages. *Civil Wars, 18*(1), 91-107. doi:10.1080/13698249.2016.1145178

Smith, L. T., Smith, G. H., Boler, M., Kempton, M., Ormond, A., Chueh, H.-C., & Waetford, R. (2002). "Do You Guys Hate Aucklanders Too?" Youth: Voicing Difference from the Rural Heartland.

Sporle, A., Pearce, N., & Davis, P. (2002). The Interaction between Socioeconomic Position and Ethnicity in Health Inequality-The Case of Mortality Patterns over Two Decades in New Zealand.

Sporle, A., Pearce, N., & Davis, P. (2002). The Interaction between Socioeconomic Position and Ethnicity in Health Inequality-The Case of Mortality Patterns over Two Decades in New Zealand.

Statistics Canada. (2022). Ethnic or cultural origin. *Dictionary, Census of Population, 2021.* Retrieved from https://www12.statcan.gc.ca/census-recensement/2021/ref/dict/az/definition-eng.cfm?ID=pop030

Statistics New Zealand. (2005). *Understanding and Working with Ethnicity Data*. Retrieved from http://archive.stats.govt.nz/~/media/Statistics/surveys-and-methods/methods/class-stnd/ethnicity/Understanding%20and%20Working%20with%20Ethnicity%20Data.pdf

Statistics New Zealand. (2006). *The Impact of Prioritisation on the Interpretation of Ethnicity Data*. Retrieved from http://www.stats.govt.nz/browse_for_stats/population/estimates_and_projections/frequently-asked-questions-population-statistics/~/media/Statistics/browse-categories/population/estimates-projections/faq-pop-stats/impact-prioritisation-interpretation-ethnicity.pdf

Statistics New Zealand. (2011). Ethnicity. Retrieved from http://stats.govt.nz/surveys_and_methods/methods/classifications-and-standards/classification-related-stats-standards/ethnicity.aspx

Statistics New Zealand. (2017). Ethnic group. Retrieved from http://datainfoplus.stats.govt.nz/Item/nz.govt.stats/6448e16b-ca6a-41e6-a6f5-4cbc1f0b7fed

Statistics New Zealand. (2018). New Zealand Census of Population and Dwellings. Individual form Tuesday 6 March 2018. *Stats NZ Store House.* Retrieved from https://statsnz.contentdm.oclc.org/digital/collection/p20045coll2/id/713/rec/5

Statistics New Zealand. (2019). 2018 Census population and dwelling counts. Retrieved from https://www.stats.govt.nz/information-releases/2018-census-population-and-dwelling-counts

Stevens, G., Ishizawa, H., & Grbic, D. (2015). Measuring race and ethnicity in the censuses of Australia, Canada, and the United States: Parallels and paradoxes. *Canadian studies in population, 42*, 13-34. doi:10.25336/P6PW39

Stevenson, B. S. (2004). Te Hoe Nuku Roa: A measure of Maori cultural identity. *He Pukenga Korero, 8*(1), 10.

Stuart, J., & Jose, P. E. (2014). The protective influence of family connectedness, ethnic identity, and ethnic engagement for New Zealand Māori adolescents. *Developmental Psychology, 50*(6), 1817.

Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behaviour. In S. Worchel & W. Austin (Eds.), *Psychology of intergroup relations* (pp. 7-24). Chicago: Nelson-Hall.

Taonui, R. (2005). Tribal organisation - Social rank. In M. T. M. f. C. a. Heritage (Ed.), *Te Ara - the Encyclopedia of New Zealand* (pp. 5). Wellington: Manatū Taonga Ministry for Culture and Heritage.

Taonui, R. (2011). Ngā tuakiri hōu – new Māori identities - Māori renaissance. Retrieved from http://www.TeAra.govt.nz/en/nga-tuakiri-hou-new-maori-identities/page-3

Te Hiringa Hauora. (2020). Kupe data explorer. Retrieved from https://kupe.hpa.org.nz

Te Hoe Nuku Roa. (1999). *Te Hoe Nuku Roa source document: Baseline history*. Retrieved from Palmerston North:

Te Hoe Nuku Roa (Ed.) (1996). *Maori profiles: An integrated approach to policy and planning*. Palmerston North: Massey University.

Te Huia, A. (2015). Perspectives towards Māori identity by Māori heritage language learners. *New Zealand Journal of Psychology, 44*(3).

Tzeng, J. M. (2000). Ethnically heterogamous marriages: The case of Asian Canadians. *Journal of Comparative Family Studies, 31*(3), 321-337.

Umana-Taylor, A. J. (2006). Ethnic Identity Formation During Adolescence: The Critical Role of Families. *Journal of Family Issues, 27*(3), 390-414. doi:10.1177/0192513x05282960

Valles, S. A. (2012). Heterogeneity of risk within racial groups, a challenge for public health programs. *Preventive Medicine, 55*(5), 405-408. doi:http://dx.doi.org/10.1016/j.ypmed.2012.08.022

Valles, S. A., Bhopal, R., & Aspinall, P. (2015). Census categories for mixed race and mixed ethnicity: impacts on data collection and analysis in the US, UK and NZ. *Public Health, 3*(129), 266-270.

Walker, R. (1996). *Nga pepa a Ranginui: The Walker papers*. Auckland: Penguin Books.

Wetherell, M., & Mohanty, C. T. (2010). *The SAGE handbook of identities. [electronic resource]*: Los Angeles, [Calif.] ; London : SAGE, 2010.

Williams, J. (2000). *The nature of the Māori community*. Paper presented at the PSSM Conference, Wellington, New Zealand. https://web.archive.org/web/20100527001503/http://pssm.ssc.govt.nz/2000/papers/jwilliam.asp

Willson, A., Shuey, K., & Elder, J. G. (2007). Cumulative Advantage Processes as Mechanisms of Inequality in Life Course Health. *American Journal of Sociology, 112*(6), 1886-1924. doi:10.1086/512712

Wray, S., & Ali, N. (2014). Understanding generation through the lens of ethnic and cultural diversity. *Families, Relationships and Societies, 3*(3), 469-473. doi:10.1332/204674314X14110460471866

Zealand, S. N. (2006). Maori population estimates tables.

Zhou, L., You, Z., & Tang, Y. (2021). A new chaotic system with nested coexisting multiple attractors and riddled basins. *Chaos, Solitons & Fractals, 148*, 111057. doi:https://doi.org/10.1016/j.chaos.2021.111057

Chapter 4: Article 2

Rationale for Article 1

Article 1 began by describing the problematic use of ethnicity to understand health and wellbeing differences between ethno-cultural populations and proposing a novel solution based on identifying and characterising cultural cohorts within an ethnic population. Extant literature was reviewed to establish the need for a cultural cohorts approach, identify the conceptual and theoretical foundations for the existence of such cohorts, and gave an example of this approach to identify possible cultural cohorts within the Māori population of Aotearoa New Zealand. Article 2 now provides a quantitative test of the proposed cultural cohorts approach within an existing dataset of older Māori in Aotearoa New Zealand.

Title: Multiple Māori Cultural Cohorts in an Older Population

Abstract

This work tests the applicability of the Cultural Cohorts Approach; a technique to understand within-ethnicity difference based on the Critical Junctures Theory. The cultural cohorts approach extends our understanding of ethnic identity, proposing that ethnic populations can and do split across time due to external forces (e.g., urbanisation or economic recession) acting on pre-existing stratifications such as class forming distinct within-ethnic cultural cohorts. Individuals can be members of multiple cultural cohorts over their lifetime and remain members well beyond their time resident in that cultural cohort. Identifying these cultural cohorts is achieved by looking at existing identity theory, research, demographics, and historical accounts. The analysis began by first predicting the number and characteristics of the cultural cohorts for Māori born between 1941-1955 based on existing literature. Secondly a series of Latent Class Analyses were run using data from the Health, Work and Retirement (HWR) sample (n=3287) comprising a set of Māori specific cultural indicators for the same age range. The four primary cultural cohorts found in our analysis agreed with previous articles on Māori identity that there exist two distinct Māori cultural populations, with the primary difference being between a majority traditional Māori identity and a smaller mainstream identity. As predicted, there were also cultural differences within the traditional Māori identity populations; mostly between those actively involved in the te Ao Māori or Māori language community and those who reported a Māori or identity but were less active in te Ao Māori.

Keywords

Cultural Cohort; Critical Juncture Theory; Māori; Ethnicity; Culture; Public Health; Latent Cluster Analysis

Glossary

Word	Description
Māori	The indigenous peoples of Aotearoa
Aotearoa	Māori name for New Zealand
Iwi	A large Māori population connected by geography and ancestry
Hapū	A sub-group of an iwi connected by an eponymous ancestor or significant event
Marae	The centre of traditional Māori life for a hapū comprising buildings for meeting, sleeping, eating, etc
Whānau	A small group related by ancestry or purpose, extended family
Kōhanga reo	Māori language immersion pre-school
Kura kaupapa Māori	Māori language immersion school for ages 5 to 13
Whare wānanga	Māori language and science focussed tertiary institution
Whakapapa	Ancestry
Te reo Māori	Māori language
Te Ao Māori	Literally the Māori world: Traditional Māori language, knowledge, customs, and practices
NZ European	New Zealand European
Papakāinga	Ancestral home lands

Introduction

This research is intended to address the systemic misapplication of ethnicity in research, policy development, and health promotion. It builds upon a substantial corpus of research on ethnicity and cultural identity, adapting broader theories of collectivity and nationhood, and brings the novel Cultural Cohorts Approach (CCA) proposed by STEVENSON ET AL (XXXXa) to improve health outcomes for Māori through a precise understanding of Māori communities. Current methods of disaggregating populations by ethnic or cultural identity wrongly assume cultural invariance within an ethnic population and over time and place, while the calculation of risk factors within ethno-cultural populations also wrongly assume homogeneity (Valles, 2012), obscuring what may be distinct sub-populations with very different risk profiles, demographic and health outcomes. Ethnicity is often used to explain social, health and economic differences between populations in research and policy (J. S. Jackson et al., 2011; Lynch & Brown, 2011; Noels & Clément, 2015; Phillipson, 2015) and in the case of criminal offending, Māori ethnicity is presented as an explanation, contributing "to the creation of negative stereotypes about Maori behaviour in general" (M. Jackson, 1988, p. 19).

The use of Māori descent and ethnicity within official statistics is commonly used to compare the health outcomes between Māori and other ethnic populations. While there exists large health and income disparities for Māori, these differences largely disappear once income, wealth and living standards are taken into account. Cross-sectional analyses consistently find trivial or no differences in health due to ethnicity once SES and economic living standards are taken into account, for example using the Health, Work, and Retirement studies (Towers, 2008) a linear regression of Age, Gender, Education on the Physical Health sub-scale of the SF12 (Ware, Kosinski, Turner-Bowker, & Gandek, 2002) explained 5.5% of the variance in Physical health. The addition of Māori descent and Māori ethnicity added an additional 0.6% variance explained. When the same analysis is done with an economic living standards measure (Jensen et al., 2002) included at the first step, 13.4% of variance is explained, with Māori descent and

ethnicity explaining a trivial 0.1% of variance. The same analysis with hazardous alcohol consumption as the dependent variable (Towers et al., 2011) has Māori descent and ethnicity explaining no additional variance and similarly with smoking as the dependent variable had Māori descent and ethnicity explaining a very small .4% of variance (Nagelkerke R^2). Analyses by Stevenson (2001) found no significant relationship between cultural identity and health, although weak interaction effects were found where cultural identity moderated/mediated the relationship between health behaviours (smoking and involvement with sport) and other demographics (age, home ownership, and household crowding). Looking at the explanatory power of two key measures of individual involvement in te Ao Māori, Kukutai et al (2017) reported that Te Reo Māori proficiency explained only 0.21% of life satisfaction and importance of culture 0.32% after taking into account such factors as demographics, income & wealth, employment, housing, health, and general connectedness.

This lack of explanatory power for such a common variable as Māori ethnicity once SES is taken into account may at first glance be a strong argument for discontinuing its use, however the use of ethnicity in this way, is based on the assumption that there are greater differences between ethnic populations than within (Bosque-Prous et al., 2015; Kukutai, 2004; Valles, 2012) or that there is a common 'genetic' component that uniquely identifies the population (Gannett, 2004; Gissis, 2008; J. Marks, 1994); especially that the practices, behaviours and histories of an ethnic population are homogenous enough to be useful in policy formulation, intervention design, equity-based resourcing, or public health initiatives (Gissis, 2008; James, 2001; Mihaere, 2015).

This article proposes that identifying within-ethnic cultural populations is important in understanding health outcomes for policy development and health promotion. We propose unpacking this within ethno-cultural difference heterogeneity using the Cultural Cohorts Approach developed by (STEVENSON ET AL XXXXa), which states that multiple distinctive cultural cohorts exist within the Māori descent population. These cultural cohorts are formed over time as external forces (e.g., an economic recession) acted on pre-existing stratifications

within an ethno-cultural population. Stratifications reflect differences in economic and cultural capital at which significant external events, or Critical Junctures, occur that are powerful enough to shift populations to a new 'reality'. An example would be an economic recession forcing families in rural communities, who do not have the economic or cultural resources to stay (due to the illegal confiscation of their land for example), being forced to the city in search of employment. Over time this new urban cultural cohort incorporates new cultural elements, eventually forming a related but distinctly different cultural cohort from those that remained in their homelands.

Building on critical junctures theory (Liu et al., 2014), the Cultural Cohort approach (STEVENSON ET AL XXXXa) utilises published research, census, extant datasets, demographics, and historical accounts, to identify and describe within-ethnic cultural populations. In this article we apply the Cultural Cohort approach to a longitudinal study of older New Zealanders (Towers, Stevenson, Breheny, & Allen, 2016) which had over-sampled a large Māori descent cohort born in 1941-1956 and includes Māori-specific cultural indicators. This work is focussed on demonstratingg the statistical applications of the CCA to the Māori population, rather than the broader applications of the approach to qualitative work or other ethno-cultural theorising.

Ethnic and Cultural Identity

An ethnic group is a social construct often conflated with race and blood quantum categorisations (Cormack, 2010), ethnic origins and social groupings (Department of Statistics, 1988) with common origins in history and a collective identity. Ethno-cultural identity is a stated membership of an ethnic group, but is conceptually 'slippery', also encompassing history, traditional practices (e.g., art, food, religion, dance, music), and contextual "shared meanings" (Hall, 1997). Most Māori cultural identity measures capture a narrow set of cultural markers of hypothesised Māori cultural realities within a broader cultural arena comprising a rich mixture of Māori, English, European, Pasifika, and Asian identities. High migration rates, population

growth, and mixed ethnic marriages (Callister, 2004a, 2004b; Callister et al., 2007; Callister et al., 2005; Kukutai & Callister, 2009) has led to ever more complex and fluid identities (Greaves et al., 2015; Mendoza, 1989; Phinney & Ong, 2007; Stevenson, 2004; Suinn et al., 1992). Defining an ethnic identity becomes more difficult as cultural beliefs and practices for an ethno-cultural group change over time (a cohort effect), as does the extent to which an individual engages with those practices and beliefs over their lifetime as an age effect (Mathews, 2000). Evidencing the inherently 'woolly' nature of ethnic identity (Callister et al., 2007), are studies that have measured the relationship between Māori ethnicity and health. Studies have found a trivial amount of variance explained by Māori ethnicity once economic factors were accounted for in analyses of mental or physical health (Dulin et al., 2011), alcohol consumption (Towers et al., 2011; Weimand et al., 2012), smoking, involvement with sport (Stevenson, 2001), and life satisfaction (Statistics New Zealand, 2015).

Pragmatically, there is still research value in placing an individual in one or more ethnic populations (J. S. Jackson et al., 2011; Lynch & Brown, 2011; Noels & Clément, 2015; Phillipson, 2015) alongside the "contextual and intersecting factors of race, culture, ethnicity, gender, immigration, and social and economic statuses, which intersect over the life course and influence material, psychological, health, and social well-being" (J. S. Jackson et al., 2011, p. 101). However, a more nuanced understanding of ethnicity (Valles, 2012) is required. The newly proposed CCA does just this (STEVENSON ET AL XXXXa), providing a practical way for health researchers to understand the interplay between health and ethno-cultural identity.

Māori Cultural Cohorts

The CCA proposes using existing research and measures of ethno-cultural identity to identify discrete within-Māori cultural identities characterised by cohort (e.g., generational differences), location (e.g., urban/rural), cultural capital (e.g., inter-generational whanau-based Māori language resources), and Māori-specific cultural indicators (e.g., te reo Māori ability, marae

involvement, knowledge of whakapapa, Māori ethnicity and identity). The Cultural Cohort approach adapts Critical Junctures Theory (Liu et al., 2014) which focuses on the modern nation state to within-ethnicity differences, where the binding principles are those of cultural practices, beliefs, and whakapapa.

Critical Junctures Theory

Critical Junctures Theory (CJT) outlines the parameters needed to fully describe the characteristics of the nation state, the forces or events acting upon that state, and how the entire system experiences discontinuous change in response to sufficiently large forces (Liu et al., 2014). CJT has roots in complexity or dynamical systems theory, allowing interactions to occur between individuals, institutions, collectives, and the state in a non-linear system. A key tenet of the theory is that complex systems are stable over time and resistant to change, requiring a 'kick' to shift the entire system to a new and stable state. CJT applies this idea to the nation state, as they typically have long periods of stability, punctuated by abrupt change as they transition to a new nation state configuration. Modelling the system parameters described by symbologies, technologies, and identity spaces, CJT is primarily intended to "explore the historical trajectories tracking the evolution of the state as a complex system over time, hypothesizing the existence of certain critical junctures at which the system has the potential to make a transition from one pattern of relations between the system parameters to another" (Liu et al., 2014, p. 4).

Three key concepts used in CJT are particularly relevant to CCA: Describing the State at any point in time are (1) state symbologies, (2) the technologies of state, and (3) critical junctures. State symbologies may be variously described as narrative, myth and ritual, or ideology. Multiple measures or indicators are needed to describe the state fully and which will vary tremendously in their nature (e.g., narratives, survey measures, historical accounts). Technologies of state include state institutions, alongside legislative and budgetary powers to

"indoctrinate citizens and reproduce itself" (Liu et al., 2014, p. 5). Finally, critical junctures "describe a moment or certain window in time where there is the significant possibility of a decisive transition from one attractor to another" (Liu et al., 2014, p. 6).

CJT is a broad theoretical framework intended to understand the "transformation of states" (Liu et al., 2014, p. 11) rather than the individual ethnic populations sitting within the nation state. CCA sits at the meso-level between the grand macro-level approach of CJT and the micro-level analyses of individual ethno-cultural identity applies CJT.

Māori Cultural Cohorts

The key concepts of CJT work well at an indigenous cultural level. As with the nation state, there are foundational or creation narratives for Māori and a fundamental sense of belonging (e.g., the arrival of an eponymous ancestor from Hawaiki). Myth, ritual, and identity clearly define the boundaries of a culture, while the equivalent 'state' technologies may be reframed as the Māori institutions of place, iwi, hapū, Marae, Māori-centred education (e.g., Kōhanga, Kura, Wānanga), and Māori media (TV, radio, social media), and similarly critical junctures are events or moments where the entire culture shifts to a 'new normal'.

CCA models how historical stratifications (e.g., class or access to cultural capital) within the Māori population of Aotearoa New Zealand (Aotearoa NZ), in combination with differences in location and economic resources, are sources from which discrete ethno-cultural populations (cultural cohorts) change, split, and merge when external events force change upon a population. This approach provides a method to integrate ethno-cultural research findings from multiple qualitative and quantitative study methodologies, measures of Māori cultural identity, design cross-sectional and longitudinal statistical analyses, and interpret analytical results in a broader socio-historical context. CCA extends CJT to include the concepts of stratification and differentiation, with stratification describing possible fracture points inside ethno-cultural populations where there are large and enduring differences between groups in

resources and status and often by location. Differentiation describes how cohorts develop at these stratifications due to significant external events and over time develop differing cultural characteristics. In reciprocal manner, the characteristics, interconnections, and formation of cultural cohorts can be lifted into CJT analyses as part of understanding and characterising the nation state. As suggested by Stevenson et al (XXXXa), identifying, characterising and confirming the existence of cultural cohorts in an ethno-cultural population is done firstly by reviewing ethnic histories and narratives (origins) looking for shared origin stories and the key events that played a part in the formation of , paying special attention to key events and the ethno-cultural context preceding any significant change for potential new cultural cohorts potential cultural cohorts. Secondly, identifying and summarising discrete within ethnic populations described by theorists, cultural commentators and groups derived from statistical analyses and qualitative techniques (abstractions). A final analysis stage is proposed using primary data collected for the purpose of identifying cultural cohorts or with the necessary measures available to confirm and further characterise the hypothesised cultural cohorts.

A Statistical Application of the Cultural Cohort Approach using the Health, Work & Retirement Study

Published research and historical documents provide the first steps in identifying and characterising Māori cultural cohorts, followed by collating abstracted or meso-level representations of Māori cultural cohorts proposed by other researchers and cultural experts. Identification and confirmation of these cultural cohorts in an existing dataset being both an end of itself (as a demonstration of the practical application of the CCA approach) and as a means to relate a range of outcomes to identified Māori cultural cohorts such as health, wealth, and wellbeing. A dataset with many of the characteristics needed for such an analysis is the Health, Work, and Retirement (HWR) longitudinal study conducted by Massey University's Health and Ageing Research Team (Towers et al., 2016) comprising a large national sample of older Māori born between 1941 and 1955 and a suite of cultural indicators. The first step in the CCA

approach is clearly placing the sample in time and space (a cohort), understanding the events that have affected that population over multiple generations (Critical Junctures), and paying particular attention to how these populations have adapted to significant changes in their lives.

Origins: Critical Junctures and markers of Māori Cohorts from 1941-1955

The historical events of the 1941-1955 age cohort are summarised below, and Māori cultural cohorts identified based on the differential experiences of the members of this group.

The 1941-1956 cohort were born to parents more likely to be native speakers of te reo and to have been born and raised in their homelands. After the Second World War many of them relocated to urban centres and were forced to find work within a system intolerant of cultural difference and reflective of the increasingly industrialised nations of Europe and North America (Durie, Allan, & Cunningham, 1997). Compounding decades of assimilationist policies (Walker, 1996), the urbanisation of Māori saw "the inter-generational transmission of te reo Māori" (Ka'ai-Mahuta, 2011) reduce and the dramatic loss of te reo Māori for many families in the following generations.

The lack of a strong land base (by 1939 Māori had retained around 1% of South Island lands and 9% of the North Island of Aotearoa NZ; Ministry for Culture and Heritage, 2021} and the depression of the 1930s saw significant Māori migration to urban areas. Although many "elders, chiefs and cultural experts remained in their tribal homelands to provide continuity of leadership" (Hill, 2016, p. 146), some remote Māori communities resisted the trend towards Anglicization well into the 1970s (Benton, 1991). The urban Māori population rapidly increased from 26% of the total Māori population in 1946 to three-quarters (76%) living in the city by 1976 (Pool, 1991). Significant concentrations formed in Wellington and Auckland, in particular South Auckland (Statistics New Zealand, 2016b). This movement into urban areas made it more difficult for Māori migrants from rural areas to maintain connections with tribal homelands and their disconnection was intensified by the continuing loss of cultural capital –

particularly language and land (Durie, 1998). This loss was not uniform, some iwi had cities built on and around their homes (e.g., Ngāti Whātua), while others relocated their families maintaining strong connections to their traditional homes and urban marae forming around centring many Māori whānau cultural lives (George, 2010; Pickering et al., 1990). Others developed into contemporary Māori populations with few traditional Māori cultural characteristics, but still distinctively Māori (Barcham, 1986; Borell, 2005b), or a peripheral Māori descent population more resembling mainstream Aotearoa NZ culture (Kukutai, 2010; J. Williams, 2000). A crucial driver of the heterogeneous change occurring across Māori populations were historical stratifications present in Māori society (Sporle et al., 2002; Taonui, 2005) which saw some families retaining significant Māori cultural resources, networks, and prestige (e.g., chiefly or royal ancestors). This group may be recognisable in contemporary times as having higher average levels of Māori language fluency and land ownership, with some being influential members of iwi, hapū, or Māori organisations.

It was during the 1970s, with the cohort now aged between 30 and 44, that Māori efforts for redress and recognition entered the public consciousness in an urban movement "focussed on 'Māoriness' rather than on tribal identity" (Hill, 2004, p. 150). A strengthening language movement was signalled with the first kōhanga reo (Māori language immersion pre-school) in 1982 and the first kura kaupapa Māori (Māori language immersion school) operating in Auckland by 1985. Kōhanga reo numbers grew swiftly to 14,000 children by 1993, before dropping to 9,000 enrolled in kōhanga reo in 2014 (Calman, 2012). Catering to Māori adult learners, Wānanga (Māori tribal based tertiary education) first began in 1981 led by Te Wānanga o Raukawa, followed by Te Wānanga o Aotearoa in 1984, and Te Whare Wānanga o Awanuiārangi in 1992. All three were initially based out of smaller rural towns, providing a mix of distance and campus education to adult learners. The success of this renaissance movement has been, in part, due to members of the 1941-1956 cohort, many of whom would have been part of this movement as parents, supporters, teachers, and leaders. As (Benton, 1991) noted, the number of fluent Māori speakers was "almost certainly greater in the 1970s than they were

in the 1890s" (p. 24), but were only a fraction of the total Māori population, increasingly concentrated in older Māori (the parents and grand-parents of this cohort), and mostly present in religious services or formal marae occasions.

Mapping cultural cohort formation

Table 5 below show the stratifications and CCA processes over time that have formed the Cultural Cohorts hypothesised by STEVENSON ET AL (XXXXa). The table is, at first glance, complex, however it is intended to show the multiple routes by which the same hypothesised cultural cohorts are created and sustained. The framing of the Māori population as being either rural or urban prior to 1940 is a simplification to aid in interpretability. Four decades are represented, from the 1940s to the 1980s, with each decade describing key strata, critical junctures, and the resulting cultural cohort.

Table 5. Māori Cultural Cohort differentiation for the 1941-1955 birth cohort.

<table>
<tr><th colspan="10">Time period</th></tr>
<tr><th>1940s-</th><th colspan="3">1950s-</th><th colspan="3">1970s-</th><th colspan="3">1980s-</th></tr>
<tr><th></th><th>Strata</th><th>Critical Juncture</th><th>Cultural Cohort</th><th>Stratification</th><th>Critical Juncture</th><th>Cultural Cohort</th><th>Stratification</th><th>Critical Juncture</th><th>Cultural Cohort</th></tr>
<tr><td rowspan="6">Rural - Te Ahi Kā</td><td></td><td></td><td>Te Ahi Kā</td><td></td><td></td><td>Te Ahi Kā</td><td></td><td></td><td>Te Ahi Kā</td></tr>
<tr><td rowspan="4">Low Economic Capital</td><td rowspan="4">Urbanisation</td><td rowspan="4">Taura Here</td><td>High Cultural Capital</td><td></td><td>Taura Here</td><td>kohanga and kura</td><td>Renaissance</td><td>Manu Kōrero</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Taura Here</td></tr>
<tr><td>Low Cultural Capital or inter-ethnic marriage</td><td>Disconnected</td><td>Ahi Mātao</td><td></td><td></td><td>Ahi Mātao</td></tr>
<tr><td>Low Cultural Capital</td><td></td><td>Taunga Hou</td><td></td><td></td><td>Taunga Hou</td></tr>
<tr><td rowspan="4">Urban - Te Ahi Kā</td><td rowspan="4"></td><td rowspan="4">Urbanisation</td><td rowspan="4">Te Ahi Kā</td><td>Low Cultural Capital</td><td></td><td>Taunga Hou</td><td>Local kohanga and kura</td><td>Renaissance</td><td>Manu Kōrero</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Taunga Hou</td></tr>
<tr><td>Low Cultural Capital or inter-ethnic marriage</td><td>Disconnected</td><td>Ahi Mātao</td><td></td><td></td><td>Ahi Mātao</td></tr>
<tr><td>High Cultural Capital</td><td></td><td>Te Ahi Kā</td><td></td><td></td><td>Te Ahi Kā</td></tr>
</table>

Abstractions: Māori Cultural Cohorts

Based on the Māori cultural cohorts hypothesised by STEVENSON ET AL (XXXXa) and the historical summary above, Table 4 shows the proposed Māori Cultural Cohorts (Te Ahi Kā, Taura Here, Taunga Hou, Manu Kōrero, and Ahi Mātao), along with analogous cultural cohorts from other theorists, and a rough estimate of possible cultural cohort size. Estimating cultural cohort numbers for the 1941-1956 birth cohort is difficult as few published studies that describe these cultural cohorts also disaggregate by age. STEVENSON ET AL (XXXXa) summarised cultural cohort figures for the general Māori population using estimates from the studies that have published (e.g., Cunningham et al., 2005; Greaves et al., 2015; Kukutai, 2010; Ryks et al., 2016; Statistics New Zealand, 2006b, 2014a), and which have been updated to match the age cohorts in this analysis where possible (1941-1955). The Manu Kōrero Cultural Cohort predicted by STEVENSON ET AL (XXXXa) is a subset of the other Māori Cultural Cohorts (notably Te Ahi Kā, Taura Here, and Taunga Hou).

Table 6. Mapping Hypothesised Māori Cultural Cohorts to existing Māori Identity Theory groups.

	Traditional Marae centred identity		Urban Community		Mainstream
Characteristics	Remained in their iwi homelands and actively involved in marae	Living outside of their iwi home, but still remain connected to their ancestral home	Part of the revitalisation of the Māori language as students, teachers, helpers, and parents	Local urban identities centred on the 'hood' (often shared with Pacific peoples)	Largely disengaged from Māori culture, although they may go to marae for important occasions (tangi)
Hypothesised Cultural cohorts	Te Ahi Kā (Gloyne, 2018)	Taura Here (Ryks, Pearson, & Waa, 2016)	Manu Kōrero[6]	Taunga Hou (Ryks et al., 2016)	Ahi Mātao (Gloyne, 2018)
Williams (2000)	Traditional Core	Primarily Urban	Primarily Urban	Primarily Urban, Unconnected	Unconnected
(Gloyne, 2018)	Te Ahi Kā	Ahi mahana			Ahi Mātao
Borell (2005)				Māori ID, Neighbourhood ID, Pasifika Connection, Gang ID	
Ryks, Pearson & Waa (2016)[7]	Mana Whenua	Taura Here	Mana Whenua/ Taura Here	Taunga Hou	
Kukutai (2010)	Core				Periphery
Cunningham, Stevenson & Tassell (2005)	Secure	Positive	Secure	Compromised	Compromised or Notional
NZ Census			Any Māori Medium Education		
	Know iwi (82%)				

[6] Borrowed from Ngā Manu Kōrero which is a secondary school national Māori language speech competition.
[7] Maori 15 years and older within 2013 Census main urban areas from (Ryks et al., 2016).

Analysis: 1941-1955 Māori Cultural Cohort Markers

Table 7 matches the hypothesised Māori Cultural Cohorts summarised in Table 4 to possible cultural markers. The researchers believe it would not be possible to identify the hypothesised Manu Kōrero cultural cohort as we do not have the variables to clearly identify participation in the technologies and institutions associated with the Māori language renaissance. The CCA approach proposes that cultural marker salience will vary between cultural cohorts; where a cultural marker would not discriminate that cultural cohort from other cohorts (i.e., the response distribution within that cultural cohort is the same as for the entire population) a blank space has been left. For example, those in Ahi Mātao Cultural Cohort may know their whakapapa (Māori ancestry) at rates no different than those in other Māori Cultural Cohorts, but language and involvement with Marae for those in the Ahi Mātao Cultural Cohort are predicted to be lower

Table 7. Key cultural markers mapped to hypothesised Māori Cultural Cohorts.

Identity type	**Traditional Marae centred**		**Mainstream**		**Urban**
Cultural Cohorts	**Te Ahi Kā – Urban**	**Te Ahi Kā –Rural**	**Taura Here**	**Ahi Mātao**	**Taunga Hou**
Historical Antecedents	Remain actively involved in marae	Remain actively involved in marae	Moved away from homelands, maintained links to home marae	From low Cultural Capital whānau and/or inter-ethnic marriage	Moved away from homelands, lost links to home marae. Possibly involved in urban marae
Identity	Māori Ethnicity	Māori Ethnicity	Other Ethnicity	Māori + Other Ethnicity	Māori + Other Ethnicity
Ancestry	Iwi Link + Know Māori ancestry	Iwi Link + Know Māori ancestry	Iwi Link + Know Māori ancestry	Iwi Link + Know Māori ancestry	Iwi Link + Know Māori ancestry
Māori Language	Fair or better	Fair or better	None or Poor	None or Poor	None or Poor
Traditional Institutions	High Home Marae Involvement	Moderate Home Marae Involvement	None to low Marae Involvement	None to low Marae Involvement	Moderate Urban Marae Involvement
Place	Papakāinga: Urban, moderate to high Māori density	Papakāinga: Rural, moderate to high Māori density	Urban	Average Māori density	Urban, high Māori density, moderate or higher Pasifika density
Social Networks	Extensive Māori Networks	Extensive Māori networks	Localised Māori networks	Socialise with few Māori	Localised Māori and/or Pacific networks

Table 7 summarises the hypothesised Māori Cultural Cohorts and the cultural markers most salient to each cohort. These will be used to guide the identification of Cultural Cohorts from the cultural markers collected by the HWR study. While there will be ambiguity as to the exact number of cultural cohorts and the hypothesised characteristics of these groups (dependent on the literature available), the CCA approach provides the first steps to understanding within-ethnic group cultural populations, and the means to confirm or adjust the characterisation of Māori Cultural Cohorts.

Method

Participants

The dataset used in this analysis will be drawn from the Health, Work, and Retirement Study (HWR) (Towers et al., 2016). The HWR is a nationally representative longitudinal study of health ageing in New Zealanders which has surveyed its participants at two yearly intervals (Towers et al., 2016) with the last survey wave conducted in 2020. The initial cross-sectional survey in 2006 was randomly drawn from the New Zealand electoral roll for community dwelling New Zealanders between 55 and 70 years of age and included a Māori over-sample to ensure equal explanatory power (Robson, 2002) and to compensate for the higher attrition rates of older participants (Moreno-John et al., 2004). For all participants (Māori and non-Māori), a final sample of 6662 was achieved (53% response rate) with 3127 of these participants agreeing to be part of the longitudinal study (Towers, 2008).

The analysis in this paper concentrates on Māori descent participants (

Table 8) born between 1941 and 1955 (n=3287) in the 2006 cross-sectional study. The cohort will be grouped into 5-year age groups, i.e., born between 1941-1945, 1946-1950, and 1951-1955.

Table 8. Participants of Māori descent in 2006.

	Cohort	% of sample
Born	1951-1955	41.8%
	1946-1950	31.3%
	1941-1945	26.9%
Gender	Male	44.4%
	Female	55.6%

The HWR study collected data from a broad range of domains, including health and wellbeing, socio-economic standards, living standards, household characteristics, and Māori culture. Since the identification of Māori Cultural Cohorts requires a large and diverse set of cultural markers, the HWR study is well placed to provide.

HWR Data Preparation

The dataset used was from the Health, Work and Retirement studies 2006 survey round. The Health, Work and Retirement (HWR) study begun in 2006 (Towers, 2008) examining the wellbeing, and physical and mental health of its members and relating this to cultural, work, retirement, socioeconomic, and demographic factors. The study involved a national random postal survey and has collected ten waves of data to date in 2006, 2008, 2010, 2012, 2013, 2014, 2016, 2018, 2020, and 2021. The study also supplemented the postal data with a cohort of in-depth face-to-face interviews in 2010 and 2012. The HWR sample was randomly drawn from the New Zealand Electoral Roll in 2006 and incorporated a Māori descent over-sample to ensure equal explanatory power for Māori and non-Māori in the cross-sectional sample and into the future as past experience shows higher attrition rates for Māori. Around 3100 non-Māori participants were recruited from the general population and just over 3500 were of Māori descent. To compensate for both the oversampling of Māori and for any response biases due to age, gender, or ethnicity a weight is calculated for all respondents that rebalances the sample to more accurately reflect the population from which the sample was drawn.

The sample comprised 3287 individuals of Māori descent aged between 55 and 69 years, 56% were female. Nine variables were used from the HWR dataset, grouped as identity, ancestry, Māori language, traditional institutions, place, and social networks.

Measures

Beyond the cohort characteristics of age, period, and place, a set of cultural characteristics is equally important to differentiate between Māori cohorts and can be broadly grouped by knowledge (e.g., language, ancestry), affiliation (identity and ethnicity), cultural practices (participation in culturally unique activities), and belief systems (e.g., religion). These characteristics were drawn from Māori cultural identity measures developed over the last thirty years, notably: Māori knowledge (Ling & Thomas, 1986); affiliation, attitudes, and beliefs (Greaves et al., 2015); affiliation, knowledge, and practice (Stevenson, 2004; Te Hoe Nuku Roa, 1996); ancestry, tribe, and ethnicity (Kukutai, 2010); affiliation, history, and practice (Borell, 2005a); affiliation and practice (Greaves et al., 2015).

The two ethnic affiliation questions were derived from the questionnaire ethnic groups question. Māori ethnic group was simply coded as 1 if they had ticked the Māori ethnicity box and 0 otherwise, while the non-Māori ethnic group variable was coded as a 1 if any ethnic group excluding Māori had been ticked and 0 otherwise (Table 9).

Table 9. Ethnic affiliation.

Which ethnic groups do you belong to?		
Māori Ethnic Group (n=3287)	Yes	No
	83%	17%
Non-Māori ethnic group (n=3287)	Yes	No
	22%	78%

Ancestry

Ancestry was a question developed for the Best outcomes for Māori: Te Hoe Nuku Roa study (Stevenson, 2004; Te Hoe Nuku Roa, 1999) and subsequently used by the HWR survey. The question was collapsed from four categories to three for the LCA analyses as shown in Table 10.

Table 10. Māori ancestry.

How many generations of your Māori ancestry can you name? (n=3173)

	1 or 2 generations	3 generations	4+ generations	Total
1 generation	6%	0%	0%	6%
2 generations	22%	0%	0%	22%
3 generations	0%	26%	0%	26%
More than 3 generations	0%	0%	46%	46%
Total	27%	26%	46%	100%

Māori Language

Māori language ability was also based on the Best outcomes for Māori: Te Hoe Nuku Roa study (Stevenson, 2004; Te Hoe Nuku Roa, 1999) and adopted by the HWR survey. The original six categories was reducedd to three categories as shown in Table 11.

Table 11. Māori language ability.

How would you you're your overall ability with Māori language? (n=3224)

	None or Poor	Fair or Good	Very Good or Excellent	Total
Excellent	0%	0%	8%	8%
Very good	0%	0%	7%	7%
Good	0%	13%	0%	13%
Fair	0%	20%	0%	20%
Poor	42%	0%	0%	42%
Not applicable	10%	0%	0%	10%
Total	52%	33%	15%	100%

Traditional Institutions

Marae involvement was also based on the Best outcomes for Māori: Te Hoe Nuku Roa study (Stevenson, 2004; Te Hoe Nuku Roa, 1999) and reduced from five categories to three as shown in Table 12.

Table 12. Marae involvement.

Have you ever been to a marae; and if yes – how often over the past 12 months? (n=3217)

	Not at all	Once or more	More than once a month	Total
Not at all	22%	0%	0%	22%
Once	0%	15%	0%	15%
A few times	0%	24%	0%	24%
Several times	0%	29%	0%	29%
More than once a month	0%	0%	11%	11%
Total	22%	67%	11%	100%

Place

The main urban, other urban, and rural variable was created by linking the meshblock identifier for each individual with meshblock information from the 2006 census (Statistics New Zealand, 2009b) and reducing the six categories down to three categories as shown in Table 13.

Table 13. Urban/rural.

Statistics NZ Meshblock data (n=3284)	Main Urban Area	Other Urban Area	Rural Area	Total
Main Urban Area	57%	0%	0%	57%
Minor Urban Area	0%	14%	0%	14%
Other (Inland Water, Inlet, and Oceanic)	0%	0%	0.1%	0%
Other Rural	0%	0%	17%	17%
Rural Centre	0%	0%	4%	4%
Secondary Urban Area	0%	7.2%	0%	7%
Total	57%	21%	22%	100%

Social Networks

The Māori and Pacific meshblock density variable was created by linking the meshblock identifier for each individual with meshblock information from the 2006 census (Statistics New Zealand, 2009b) then dividing the total count for all residents in that meshblock who indicated Māori ethnicity and dividing by the total number of residents. This was repeated for all residents indicating a Pacific ethnicity (and dividing by the total number of residents). Table 13 shows how the continuous variable created was grouped for the LCA.

Table 14. Māori and Pacific meshblock density.

Statistics NZ Meshblock data (number of meshblocks=3284)	Mean	0%	0-9%	10-49%	50%+
Māori Ethnic Density	26%	16%	22%	47%	14%
Pacific Ethnic Density	6.4%	51%	34%	12%	3%

An additional Māori-centred social networks variable was used based a Best outcomes for Māori: Te Hoe Nuku Roa study (Stevenson, 2004; Te Hoe Nuku Roa, 1999) measure and used by the HWR survey. The contact with Māori measure was reduced to a binary variable from the original three categories as shown in Table 15.

Table 15. Contact with Māori.

This question considers your contacts with people. In general, would you say your contacts are with…(n=3090)

	Some or fewer/Few Māori/No Māori	Mainly Māori	Total
Mainly Māori	19%	0%	19%
Some Māori	0%	52%	52%
Few Māori	0%	29%	29%
Total	19%	81%	100%

Analysis

A latent cluster analysis (LCA) was used to identify the cultural cohorts in the HWR data whereby each discrete cultural cohort would be modelled as a latent variable. A latent variable is classically thought of as a hidden variable that can only be observed indirectly by inference and the use of indicator variables (Greaves et al., 2015; Lanza et al., 2013; Ruscio & Ruscio, 2008). Latent class analysis (LCA) is a technique used to indirectly measure an unobserved variable through the analysis of two or more observed variables (Collins & Lanza, 2010). LCA is robust to any departures from normality and to missing data enabling the researchers to keep all observation in the analysis. (Lanza et al., 2013) emphasise that LCA is a person-centred approach, grouping like individuals together, maximising group difference while minimising within-group differences. Where a latent class is an unobservable sub-population represented by a number of categorical variables and is described by differing combinations of these variables. This is in contrast to variable centred approaches such as factor analysis that identify "a factor structure that accounts for the linear relations among a set of observed variables" and which holds "for all individuals" (Collins & Lanza, 2010, p. 8).

For this analysis, all indicator variables are assumed to be categorical, so a higher score in any cultural indicator, is no better or worse than a lower score. As both the latent variable (Cultural Cohort) and the indicator variables are categorical, a latent class analysis is most appropriate (Collins & Lanza, 2010). An important aspect of the CCA, is that the cultural characteristics of each Cultural Cohort may be quite different and that the strength and significance of any given indicator variable will vary between Cultural Cohorts, meaning that the variables identifying

membership for any given cultural cohort must also be allowed to vary. LCA fulfils this requirement by allowing variable salience to vary by latent group (i.e., each latent group will have different variable distributions) while ensuring that "each individual belongs to one of a set of mutually exclusive and exhaustive latent classes" (Lanza & Collins, 2008, p. 446).

Figure 2 shows how three cohorts are expressed as observed indicator variables and associated error terms over time. Each oval represents an observed latent variable (a Cultural Cohort in this study), the X's represent indicator variables that directly measure an aspect of that latent variable, and the e's are error terms (i.e., measurement error). The Time axis is an indication that the latent variables in this analysis are hypothesised to have an age or cohort specific element to their specification. Indicator variables may be shared by cohorts but are not assumed to do so.

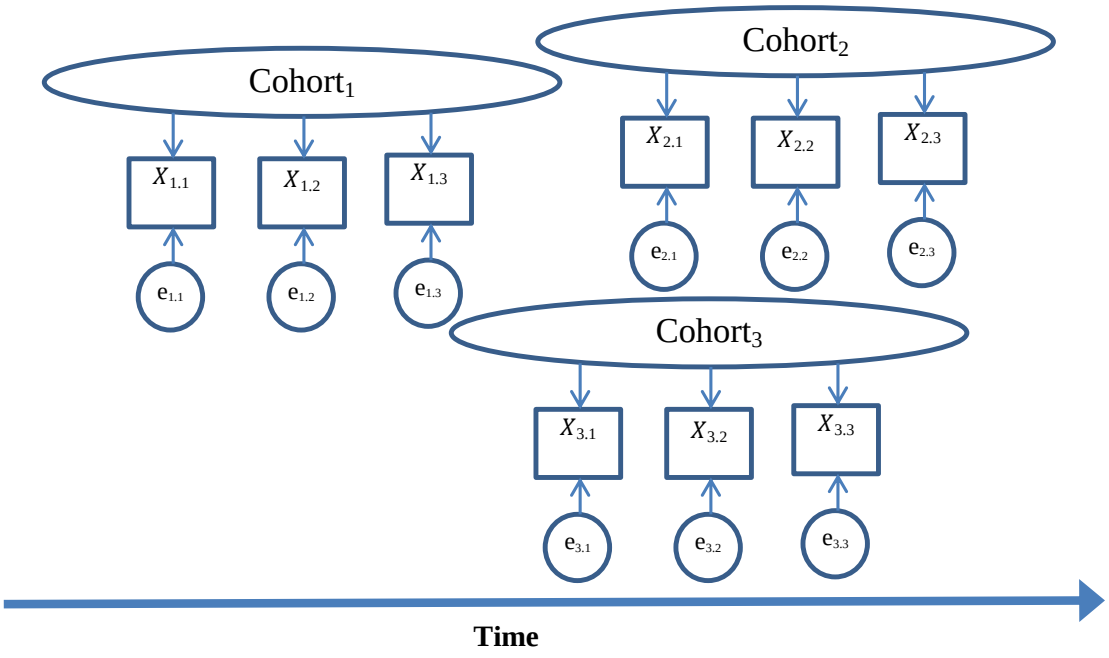


Figure 2. Three Cohorts as Latent Variables with Indicator Variables (X) and Error Terms (e) over time.

Importantly, LCA is a person-centred approach, grouping like individuals together. For this analysis, all indicator variables are assumed to be categorical (Collins & Lanza, 2010) with the strength and significance of any given indicator variable varying between Cultural Cohorts. An

important assumption underlying latent class analyses is that the hypothesised Māori cultural cohorts exist in the real world, consequently while the groups extracted will be sample specific, they may not "correspond to the categories posited by one's theory" (Schwartz et al., 2014, p. 69), so it is important that the results are "mapped onto existing theory, replicated with a new sample, or both" (Schwartz et al., 2014, p. 69).

The analyses were conducted using the statistical packages: SPSS (IBM Corp, 2016) for data preparation, tabulation, and descriptive analyses; poLCA (Linzer & Lewis, 2011) in RStudio Version 1.1 (RStudio Team, 2020) for Latent Class Analysis; and Microsoft Excel as an intermediate step to organise output from these statistical packages. The code and results of the LCA are included in Appendix A.

Latent Class Model

To minimise the chance of the analysis finding a local rather than the global maxima (the optimal identified latent data structure), the model was run 100 times using the nrep=100 option. The convergence tolerance was the default $1x10^{-10}$ (where the iterative change in the log-likelihood is smaller than this value, the maximum log-likelihood is found). Cases with missing values were retained in the model. In addition to the model parameters, the posterior probabilities (the probability that a participant belongs to a latent class) and the predicted class (the latent class that each participant is most likely to belong to) were exported to a Microsoft Excel spreadsheet.

An LCA analysis maximises between-group difference and minimises within-group difference, where the cultural factors within each latent group, while having similar response patterns, are assumed to be unrelated to other latent groups (Oberski, 2016) or display local independence. Importantly, the groups identified by the LCA are driven by not only the cultural markers available but will be influenced by response patterns peculiar to the sample and questions (e.g.., overlap into unrelated latent constructs). Therefore, while a relative likelihood approach (e.g.

lowest AIC or BIC) is typically recommended when choosing the optimal number of latent groups, other values may be chosen "based on substantive concerns or ease of interpretation" (Oberski, 2016, p. 8).

Results

Table 16 summarises the results of running the LCA multiple times with differing solutions (from two to nine latent classes) to determine what number of latent classes best fit the data and the cohorts predicted by the cultural cohort approach. The formula $\exp((AIC_{min} - AIC_i)/2)$ was used to distinguish between the models by calculating the relative likelihood that each model will minimise the information loss when compared to the model with the lowest AIC score. A smaller number means a lower probability of minimising information loss. While the nine-group solution had the lowest AIC score, it had a poor model agreement figure of 5% (the proportion of models that agreed with the final solution) nor did it match the CCA predictions; there is evidence that AIC is less effective than BIC in finding an optimal solution when there is more than one correct model or a 'true' model and at least one other over-sized model (Ding, Tarokh, & Yang, 2018) which is likely the case for our data.

The six-group solution on the other hand had a high 68% model agreement figure (i.e., over two-thirds of the models agreed on the same solution), better matched the hypothesised Māori cultural cohorts, and had the lowest BIC score (i.e., the solution best fit the data).

Table 16. LCA Model Selection (n=3287).

Latent Classes	Model Agreement[a]	AIC	BIC	relative likelihood of model i	
				AIC	BIC
2	100%	54136.97	54374.78	<.001	<.001
3	96%	53552.53	53912.29	<.001	<.001
4	86%	53226.42	53708.15	<.001	<.001
5	25%	53074.32	53677.99	<.001	0.0003
6	68%	52935.97	53661.6	<.001	1
7	47%	52845.02	53692.6	<.001	<.001
8	14%	52802.98	53772.52	<.001	<.001
9	5%	52775.37	53866.86	1	<.001

[a]Proportion of the 100 models that found the same solution.

The results of the six-group LCA solution were characterised and mapped to the hypothesised Māori Cultural Cohorts. The LCA clearly separated the analyses into four large marae-centred latent groups (74%) and two mainstream or non-traditional latent groups (26%).

Table 17 shows the four traditional marae-centred latent groups and two non-traditional groups. Two were concentrated in main urban areas, one in other urban areas, and the last distributed across rural Aotearoa NZ. Two cohorts had little connection to te Ao Māori, showing very similar cultural characteristics (poor reo Māori, little connection with marae or ancestry, were more likely to report a non-Māori ethnicity, and less likely to report a Māori ethnicity), differing only in the location (main urban and high Māori density, and other urban/rural).

The four marae centred Cohorts were: 6.1 'In the neighbourhood', who resided in distinctive Māori/ Pasifika main urban centre communities, with participants reporting having both a Māori and a non-Māori ethnic identity and had the highest levels of te reo Māori; 6.4 'In the suburbs' located participants in main urban centre neighbourhoods with few other Māori (or Pasifika), and reporting a Māori ethnicity only; 6.6 'Back home' were in towns with higher Māori density, and reporting a Māori ethnic identity with some also having other ethnic links; 6.3 'Back home: rural' were away from towns and cities.

The two cohorts with a significantly lower connection to te Ao Māori (Unconnected) were: 6.2 'Unconnected provincial' with participants in towns and country living near few other Māori and identifying strongly with non-Māori ethnicities; 6.5 'Unconnected main urban' with participants in main urban centres in neighbourhoods alongside many Māori and identifying strongly with non-Māori ethnicities.

Table 17. Traditional Marae Centred Identity LCA and CCA cohorts.

Descriptive Information of LCA Identified Cohort	CCA description of Identified cohort
6.1 (25%) All main urban (100%), moderate Māori ethnic density (mean=25%), high Pasifika ethnic density (mean=18%), majority stated a Māori ethnicity (92%), majority stated a non-Māori ethnicity (92%), high marae involvement (88% once or more), mostly fair or good reo (82%), very few had contact with mainly Māori (8%), good knowledge of ancestry (85% 3+ generations)	**In the neighbourhood**[8] Reside in distinctive urban Māori/ Pasifika communities. Participants reported having both a Māori and another ethnic identity and connected to te Ao Māori. This group also had the highest levels of te reo Māori.
6.4 (21%) All main urban (100%), low Māori ethnic density (mean=10%), very low Pasifika ethnic density (mean=0.2%), almost all stated a Māori ethnicity (98%), few stated a non-Māori ethnicity (4%), high marae involvement (93% once or more), less than half fair or good reo (44%), a quarter had contact with mainly Māori (28%), good knowledge of ancestry (80% 3+ generations)	**In the suburbs**[9] Live in neighbourhoods with few other Māori (or Pasifika), reported a Māori ethnicity only, and connected to te Ao Māori.
LCA 6.6 (13%) All other urban (98%), high Māori ethnic density (mean=40%), low Pasifika ethnic density (mean=4%), almost all stated a Māori ethnicity (98%), few stated a non-Māori ethnicity (22%), high marae involvement (96% once or more), less than half fair or good reo (44%), a quarter had contact with mainly Māori (26%), good knowledge of ancestry (81% 3+ generations)	**Back home**[10]**: in town** In towns with lots of other Māori, reported a Māori ethnic identity with some reporting other ethnic links. Connected to te Ao Māori.
6.3 (15%) All rural (99%), moderate Māori ethnic density (mean=17%), low Pasifika ethnic density (mean=8%), almost all stated a Māori ethnicity (97%), a quarter stated a non-Māori ethnicity (26%), high marae involvement (95% once or more), half fair or good reo (51%), a third contact with mainly Māori (30%), good knowledge of ancestry (80% 3+ generations)	**Back home**[10]**: in the country** Away from towns and cities. Reported a Māori ethnic identity with some also having other ethnic links. Connected to te Ao Māori.
6.5 (12%) All main urban (100%), high Māori ethnic density (mean=55%), low Pasifika ethnic density (mean=4%), two-thirds stated a Māori ethnicity (63%), majority stated a non-Māori ethnicity (90%), very little marae involvement (53% not at all), no or poor reo (97%), very little contact with mainly Māori (1%), lower knowledge of ancestry (67% 3+ generations)	**Unconnected urban** Lived in neighbourhoods alongside many Māori. Identified strongly with other ethnicities. Little connection to te Ao Māori.
6.2 (14%) Outside of main urban (97%), low Māori ethnic density (mean=7%), very low Pasifika density (76% with no Pacifica), two-thirds stated a Māori ethnicity (67%), majority stated a non-Māori ethnicity (94%), very little marae involvement (50% not at all), no or poor reo (92%), almost no contact with mainly Māori (3%), lower knowledge of ancestry (69% 3+ generations)	**Unconnected provincial** Lived in towns and in the country near few other Māori. Identified strongly with other ethnicities. Little connection to te Ao Māori.

[8] Named for the song 'In the neighbourhood' by Sisters Underground (1994) evoking life in South Auckland.
[9] The choice of the phrasing 'In the suburbs' comes from the primary author's (Brendan Stevenson) current residence in the suburbs of Palmerston North with few identifiably Māori families on the same street.
[10] The choice of the phrasing 'Back home' comes from the primary author's (Brendan Stevenson) personal experience as Māori. When whānau and friends speak of going 'back home' they mean back to their iwi homelands or to where they grew up.

Discussion

In what was a micro or individual-level analysis of ethno-cultural identity, this article had two primary aims: (1) to test the CCA in identifying and characterising cultural cohorts predicted by the adaption of Critical Junctures Theory (Liu et al., 2014) to ethno-cultural populations; and (2) to contribute to our understanding of within Māori difference, sizing and characterising the diverse realities of Māori incorporating existing theories and measures of Māori identity. The CCA worked despite some limitations in the available measures for the 2006 HWR sample. Very broadly, as predicted, two groups were identified: four large traditional marae-centred cultural cohorts and two smaller mainstream or culturally disconnected cohorts. 74% of the sample were identified as being a member of a marae-centred cultural cohort and 26% a mainstream cohort.

In developing the predicted cultural cohorts, the idea of a neighbourhood-based hybrid Māori/Pacific peoples' population with little connection to their iwi identity or marae was proposed (Taunga Hou). While a cohort (In the neighbourhood) was identified living in areas with high Māori and Pacific people density and reporting both Māori ethnicity and non-Māori ethnic affiliations, they also reported active links to their marae and high levels of te reo Māori. This cultural cohort is closest to the neighbour-based identity described by (Borell, 2005a; Teaiwa & Mallon, 2005) but were not disconnected from a more traditional marae based identity.

The second marae-centred main urban cohort mapped neatly to the predicted Taura Here cultural cohort, 'in the suburbs', members of this cohort tended to live in neighbourhoods with few other Māori (or Pasifika) with average levels of te reo Māori, had moderate Marae involvement, fair or better te reo Māori, and knew their Māori ancestry well. However, a key characteristic of the Taura Here cultural cohort was that they lived outside of their tribal homelands – as we lacked that information, we chose not to use this label.

The two remaining marae centred cultural cohorts differed primarily in location: one group primarily lived in provincial urban areas (Back home: in town) and the other in rural areas (Back home: in the country). Members of these cohorts lived in areas with higher Māori density, low Pacific density, and moderate self-rated te reo Māori ability. As with the Taura Here cultural cohort, without iwi affiliation we could not assign the Ahi Kā label.

There were two cohorts with a significantly lower connection to te Ao Māori (Unconnected) identified by the LCA, were a main urban and an other urban/rural cultural cohort. We have mapped these to the Unconnected group spoken of by Williams (2000). Both of which are similar to the peripheral Māori identity group identified by (2010), the marginalised group by (1999a), and the Ahi Mātao group hypothesised by Gloyne (2018). The Unconnected group resided in towns and country living near few other Māori whānau (low density areas) and identified strongly with non-Māori ethnicities. The Unconnected group in main urban centres were more likely to live in neighbourhoods with a higher Māori density and identified more with non-Māori ethnicities than a Māori ethnicity. Both Unconnected groups (main urban and urban/rural) reported little involvement with their marae and poor self-rated te reo Māori. There was an unexpectedly large number of participants in this group which may be due to age selection effects (i.e., Māori more connected to traditional Māori identities may drop out of the sample at higher rates than others) or it may reflect how the LCA variables have been reduced down, or this could be closer to the truth than other studies have found – within the Māori descent population, over 40% are not members of a traditional te Ao Māori cultural cohort.

Four main cultural cohorts were identified by the LCA: Back home, In the neighbourhood, In the suburbs, and Unconnected. Table 18 summarises the proposed names and key indicators for the six cultural cohorts.

Table 18. Identified Māori cultural cohorts by strongest indicators.

Connection to Te Ao Māori	Place	Ethnic affiliation	Cultural Cohort	LCA
Marae connection	Provincial centres	Māori	Back home: in town	6.6
Marae connection; Socialise with Māori	Rural; High Maori density; Low Pacific density	Māori	Back home: in the country	6.3
Lower Marae connection; majority fair/good reo Māori	Main urban	Māori; Other	Back home: in the country	6.1
Marae connection; Socialise with Māori	Main urban; Low Māori density; Moderate Pacific density	Māori	In the suburbs	6.4
No Marae connection; Poor reo Māori	Main urban	Other	Unconnected main urban	6.5
No Marae visits; Poor reo Māori	Not main urban; Very low Pacific density	Other	Unconnected provincial	6.2

Based on the predictions of STEVENSON (XXXXa) and the findings of the LCA, the cultural cohorts can be broadly described as having these features:

1. Traditional Marae-centred cultural cohort (all members visited marae at least once in last 12 months)
    1.1. In the suburbs (21%). A large Māori population with roots in urban Māori communities and concentrated in the big cities, but actively maintaining links to marae. This group may also maintain traditional institutions in their new homes (e.g., pan-iwi urban marae) and reported varying levels of reo Māori.
    1.2. Back home (35%). A stable population passing Māori language, cultural knowledge, and guardianship of their traditional homelands across generations. Varying levels of reo Māori. 14% were in Provincial centres (i.e., towns and small cities) and 12% in rural areas.
    1.3. In the neighbourhood (8%). This group is hypothesised to have formed new urban-based Māori identities incorporating Pasifika. Less active with marae, but majority had fair or good reo Māori.
2. Unconnected to te Ao Māori
    2.1. Unconnected (44%). A large peripheral or 'notional' Māori population disconnected from marae and generally poor reo Māori. They were also less likely to live in areas with high Māori or Pacific densities. A quarter (25%) were in main urban areas and 19% were outside of the main urban centres.

Conclusion

In what is a validation of the CCA, the predicted Ahi Mātao cultural cohorts were identified as Unconnected by the LCA, with multiple marae-centred cohorts clearly identified. In contrast, while the LCA did not identify a non-traditional Māori-centred cohort (Taunga Hou) as predicted, this was not a failure of the cultural cohorts' approach. There may be insufficient members of this cohort in the sample, the necessary variables to differentiate them from others may be missing, or this cohort does not exist. Supporting the latter conclusion, Kukutai (2013) reported no clear evidence for a "culturally dislocated" (330) urban population or any urban-rural/urban-tribal divide in census data or as Keenan (2014) put it "layered Māori identities thrived" (p. 251) in these urban environments – their iwi identity was never lost. An additional complication with the data was that the location variable in conjunction with Māori and Pacific density was intended to function as a proxy for geographic local community, a more direct measure of this community effect would be preferable and investigated in subsequent work.

Previously, understanding within-Māori difference was conducted by either developing measures based on theorists' experience and understanding of Māori identity and culture, clustering techniques, or qualitative community and peer-group studies. The CCA is an advance on these approaches as it explicitly drew upon the findings of previous studies, while incorporating a broader view of culture as an emergent property of communities with shared origin mythologies, beliefs, practices, and language across multiple generations. Added to this is a distinctive Critical Junctures-based process describing the formation of within-Māori cultural cohorts as a natural consequence of community adaptations to significant (life changing) events. While predicting cultural cohorts is initially driven by existing theory and literature, the process of validating those predictions will inevitably lead to supporting some findings and critiquing other work.

The CCA clarifies what the researcher needs to know to differentiate between discrete within-ethnic populations. This drives the study design (e.g., community based qualitative and/or survey) and the measures required (e.g., language, location, ethnicity, identity, marae involvement, distance to papakāinga) to clearly differentiate between predicted cultural cohorts. The analytical techniques used will be dependent on the type of data collected and the purpose of the analysis. For example, understanding what health messaging would be most effective for different populations (interviews/focus groups) or how health attitudes and behaviours differ between within-ethnic populations (survey). An advantage in keeping the identification of cultural cohorts constrained to cultural indicators only, is that analyses of economic and health related differences between cultural cohorts are possible, avoiding problems of collinearity that arise when socio-economic indicators are also used to disaggregate populations.

Limitations

The two main limitations to the current analysis were data related. (1) There were key measures lacking in this sample, notably religion, te Ao Māori centred learning (e.g., Māori immersion schooling, traditional arts), iwi affiliation, and involvement or distance to home marae. Also missing were measures to control for more proximal events that can influence how respondents answered the survey questions (e.g., treaty settlement processes) or changes in cultural cohorts defined by location as communities shift, through process like gentrification of traditionally Māori and Pacific communities pushing those communities to outlying suburbs; although given time, this could prove to be a Critical Juncture where new cultural cohorts are formed. (2) The data is drawn from individuals, so historical and contemporary whānau cultural identity was not directly measurable. (3) The measures included in the analysis are relatively unstable and more useful in understanding individual identity at a point-in-time rather than potential membership in an ethno-cultural population. More stable or fixed measures are

necessary such as education and childhood ethno-cultural environment would be better suited for the cultural cohort approach.

References

Barcham, P. (1986). Racism in Aotearoa: A socialist perspective. In S. Maharey & M. O'Brien (Eds.), *Alternatives: Socialist essays for the 1980's* (pp. 55-75). Palmerston North: Department of Sociology, Massey University.

Benton, R. A. (1991). 'Tomorrow's Schools' and the Revitalization of Maori: Stimulus or Tranquilizer? In *Bilingual Education: Focusschrift in Honor of Joshua A. Fishman on the Occasion of His 65th Birthday, I* (pp. 135-147). Amsterdam: Benjamins.

Borell, B. (2005a). *Living in the City Ain't So Bad: Cultural Diversity of South Auckland Rangatahi.* (Unpublished Masters of Philosophy in Psychology). Massey University,

Borell, B. (2005b). Living in the city ain't so bad: Cultural identity for young Maori in South Auckland. In J. Liu, T. McCreanor, T. McIntosh, & T. Teaiwa (Eds.), *New Zealand identities: Departures and destinations* (pp. 191-206). Wellington: Victoria University Press.

Bosque-Prous, M., Espelt, A., Borrell, C., Bartroli, M., Guitart, A. M., Villalbí, J. R., & Brugal, M. T. (2015). Gender differences in hazardous drinking among middle-aged in Europe: the role of social context and women's empowerment. *European Journal of Public Health, 25*(4), 698-705. doi:10.1093/eurpub/cku234

Callister, P. (2004a). Ethnicity measures, intermarriage and social policy. *Social Policy Journal of New Zealand, 23*, 109-140.

Callister, P. (2004b). Seeking an ethnic identity: Is 'New Zealander'a valid ethnic category? *New Zealand Population Review, 30*(1).

Callister, P., Didham, R., Newell, J., & Potter, D. (2007). ``Family Ethnicity'': Knitting a Jumper Using Two Woolly Concepts. *Social Policy Journal of New Zealand, 32*, 32.

Callister, P., Didham, R., & Potter, D. (2005). *Ethnic intermarriage in New Zealand*. Retrieved from Wellington:

Calman, R. (2012). Māori education – mātauranga - Kaupapa Māori education. Retrieved from http://www.teara.govt.nz/en/maori-education-matauranga/page-5

Collins, L. M., & Lanza, S. T. (2010). General Introduction. In *Latent Class and Latent Transition Analysis* (pp. 1-22): John Wiley & Sons, Inc.

Cormack, D. (2010). *The practice and politics of counting: ethnicity data in official statistics in Aotearoa/New Zealand*. Retrieved from Wellington: http://www.otago.ac.nz/wellington/departments/publichealth/research/erupomare/publications/

Cunningham, C., Stevenson, B. S., & Tassell, N. (2005). *Analysis of the Characteristics of Whanau in Aotearoa: A report for the Ministry of Education*, Wellington.

Department of Statistics. (1988). *Report of the Review Committee on Ethnic Statistics*. Retrieved from Wellington: http://www.stats.govt.nz/

Ding, J., Tarokh, V., & Yang, Y. (2018). Model Selection Techniques: An Overview. *IEEE Signal Processing Magazine, 35*(6), 16-34. doi:10.1109/MSP.2018.2867638

Dulin, P. L., Stephens, C. V., Alpass, F., Robert, H., & Stevenson, B. S. (2011). The impact of socio-contextual, physical and lifestyle variables on measures of physical and psychological wellbeing among Māori and non-Māori: the New Zealand Health, Work and Retirement Study. *Ageing & Society, 31*(08), 1406-1424. doi:doi:10.1017/S0144686X10001479

Durie, M. H. (1998). *Whaiora: Maōri health development*: Oxford University Press.

Durie, M. H. (1999). *Whaiora - Maori Health Development Second Edition*. Auckland: Oxford University Press.

Durie, M. H., Allan, G. R., & Cunningham, C. (1997). Oranga Kaumatua The Health and Wellbeing of Older Maori. *Massey University: New Zealand: School of Maori Studies*.

Gannett, L. (2004). The Biological Reification of Race. *The British Journal for the Philosophy of Science, 55*(2), 323-345. doi:10.1093/bjps/55.2.323

George, L. (2010). *Tradition, invention, and innovation : multiple reflections of an urban marae : a thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Social Anthropology at Massey University, Auckland, New Zealand.* (Doctor of Philosphy (Ph.D.) Doctoral). Massey University, Retrieved from http://hdl.handle.net/10179/1251

Gissis, S. B. (2008). When is 'race' a race? 1946–2003. *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences, 39*(4), 437-450. doi:http://dx.doi.org/10.1016/j.shpsc.2008.09.006

Gloyne, P. (2018). Te Ahi Kā. *Te Mōkihi*(61). Retrieved from https://hail.to/rakaihautu/publication/3ELpJte/article/N3Rp7G2

Greaves, L., Houkamau, C. A., & Sibley, C. G. (2015). Māori identity signatures: A latent profile analysis of the types of Māori identity. *Cultural Diversity and Ethnic Minority Psychology, 21*(4), 541-549. doi:10.1037/cdp0000033

Hall, S. (1997). *Representation: Cultural representations and signifying practices.*: Sage Publications, Inc Open University Press.

Hill, R. S. (2004). *State authority, indigenous autonomy: Crown-Maori relations in New Zealand/Aotearoa 1950-2000*. Wellington: Victoria University Press.

Hill, R. S. (2016). New Zealand Maori: The Quest for Indigenous Autonomy. *Ethnopolitics, 15*(1), 144-165. doi:10.1080/17449057.2015.1101844

IBM Corp. (2016). IBM SPSS Statistics for Windows (Version 24). Armonk, NY: IBM Corp.

Jackson, J. S., Govia, I. O., & Sellers, S. L. (2011). Chapter 7 - Racial and Ethnic Influences Over the Life Course. In *Handbook of Aging and the Social Sciences (Seventh Edition)* (pp. 91-103). San Diego: Academic Press.

Jackson, M. (1988). *The Maori and the criminal justice system : a new perspective = he whaipaanga hou. Part 2 / Moana Jackson*. Wellington, N.Z: Policy and Research Division, Dept. of Justice.

James, A. (2001). Making sense of race and racial classification. *Race and Society, 4*(2), 235-247. doi:http://dx.doi.org/10.1016/S1090-9524(03)00012-3

Jensen, J., Spittal, M., Crichton, S., Sathiyandra, S., & Krishnan, V. (2002). *The Direct Measurement of Living Standards: The New Zealand ELSI Scale. Nga Whakaaturanga Ahuatanga Noho*. Retrieved from Wellington:

Ka'ai-Mahuta, R. (2011). The impact of colonisation on te reo Māori: A critical review of the State education system. *Te Kaharoa, 4*(1). Retrieved from https://doi.org/10.24135/tekaharoa.v4i1.117

Keenan, E. (2014). *Māori urban migrations and identities,'Ko Ngā Iwi Nuku Whenua': A study of urbanisation in the Wellington region during the twentieth century.* (Doctor of Philosophy). Victoria University of Wellington, Wellington.

Kukutai, T. H. (2004). The problem of defining an ethnic group for public policy: Who is Maori and why does it matter? *Social Policy Journal of New Zealand*(23).

Kukutai, T. H. (2010). *The thin brown line: Re-indigenizing inequality in Aotearoa New Zealand.* (Doctor of Philosophy). Stanford University,

Kukutai, T. H. (2013). The structure of urban Māori identites. In C. Andersen & E. J. Peters (Eds.), *Indigenous in the City : Contemporary Identities and Cultural Innovation* (pp. 311-333). Vancouver: UBC Press.

Kukutai, T. H., & Callister, P. (2009). A "main" ethnic group? Ethnic self-prioritisation among New Zealand Youth. *Social Policy Journal of New Zealand, 36*, 16-31.

Kukutai, T. H., Sporle, A., & Roskruge, M. (2017). *Subjective whānau wellbeing in Te Kupenga - Full Report (pdf)*. Retrieved from Wellington: https://thehub.swa.govt.nz/assets/Uploads/Subjective-whanau-wellbeing-report.pdf

Lanza, S. T., Bray, B. C., & Collins, L. M. (2013). An introduction to latent class and latent transition analysis. In J. A. Schinka, W. F. Velicer, & I. B. Weiner (Eds.), *Handbook of psychology* (2 ed., Vol. 2, pp. 691-716). Hoboken, NJ: Wiley.

Lanza, S. T., & Collins, L. M. (2008). A new SAS procedure for latent transition analysis: transitions in dating and sexual risk behavior. *Developmental Psychology, 44*(2), 446-456. doi:10.1037/0012-1649.44.2.446

Ling, P. A., & Thomas, D. R. (1986). Imitation of television aggression among Maori and European boys and girls. *New Zealand Journal of Psychology, 15*(2), 47-53.

Linzer, D. A., & Lewis, J. B. (2011). poLCA: An R Package for Polytomous Variable Latent Class Analysis. *Journal of statistical software, 42*, 1-29.

Liu, J. H., Fisher-Onar, N., & Woodward, M. W. (2014). Symbologies, technologies, and identities: Critical junctures theory and the multi-layered nation-state. *International Journal of Intercultural Relations, 43*, 2-12. doi:10.1016/j.ijintrel.2014.08.012

Lynch, S. M., & Brown, J. S. (2011). Chapter 8 - Stratification and Inequality Over the Life Course. In *Handbook of Aging and the Social Sciences (Seventh Edition)* (pp. 105-117). San Diego: Academic Press.

Marks, J. (1994). Black, White, other: Racial categories are cultural constructs masquerading as biology. *Natural History, 1*, 32-35.

Mathews, G. (2000). *Global culture/individual identity: searching for home in the cultural supermarket*. London: Routledge.

Mendoza, R. H. (1989). An Empirical Scale to Measure Type and Degree of Acculturation in Mexican American Adolescents and Adults. *Journal of Cross-Cultural Psychology, 20*(4), 372-385. doi:10.1177/0022022189204003

Mihaere, R. (2015). *A kaupapa Māori analysis of the use of Māori cultural identity in the prison system.* (Doctor of Philosophy). Victoria University, Wellington.

Moreno-John, G., Gachie, A., Fleming, C. M., NÁpoles-Springer, A., Mutran, E., Manson, S. M., & PÉrez-Stable, E. J. (2004). Ethnic Minority Older Adults Participating in Clinical Research Developing Trust. *Journal of Aging and Health, 16*. doi:10.1177/0898264304268151

Noels, K. A., & Clément, R. (2015). Situational variations in ethnic identity across immigration generations: Implications for acculturative change and cross-cultural adaptation. *International Journal of Psychology, 50*(6), 451-462. doi:10.1002/ijop.12205

Oberski, D. (2016). Mixture Models: Latent Profile and Latent Class Analysis. In (pp. 275-287).

Phillipson, C. (2015). Placing ethnicity at the centre of studies of later life: theoretical perspectives and empirical challenges. *Ageing & Society, 35*(05), 917-934. doi:doi:10.1017/S0144686X14001032

Phinney, J. S., & Ong, A. D. (2007). Conceptualization and measurement of ethnic identity: Current status and future directions. *Journal Of Counseling Psychology, 54*(3), 271-281. doi:10.1037/0022-0167.54.3.271

Pickering, J. W., Walker, E. P., Butler, P. H., & van Halewyn, C. N. (1990). Copper vapour laser treatment of port-wine stains and other vascular malformations. *British Journal of Plastic Surgery, 43*(3), 273-282.

Pool, I. (1991). *Te iwi Maori : a New Zealand population, past, present & projected*: Auckland, N.Z. : Auckland University Press, 1991.

Robson, B. (2002). *Mana Whakamarama—Equal explanatory power: Maori and non-Maori sample size in national health surveys.* Retrieved from Wellington:

RStudio Team. (2020). RStudio: Integrated Development for R. Boston, MA: RStudio, PBC. Retrieved from http://www.rstudio.com/

Ruscio, J., & Ruscio, A. M. (2008). Categories and Dimensions: Advancing Psychological Science Through the Study of Latent Structure. *Current Directions in Psychological Science, 17*(3), 203-207. doi:10.1111/j.1467-8721.2008.00575.x

Ryks, J., Pearson, A. L., & Waa, A. (2016). Mapping urban Māori: A population-based study of Māori heterogeneity. *New Zealand Geographer*, n/a-n/a. doi:10.1111/nzg.12113

Schwartz, S. J., Syed, M., Yip, T., Knight, G. P., Umaña-Taylor, A. J., Rivas-Drake, D., & Lee, R. M. (2014). Methodological issues in ethnic and racial identity research with ethnic minority populations: theoretical precision, measurement issues, and research designs. *Child Dev, 85*(1), 58-76. doi:10.1111/cdev.12201

Sporle, A., Pearce, N., & Davis, P. (2002). The Interaction between Socioeconomic Position and Ethnicity in Health Inequality-The Case of Mortality Patterns over Two Decades in New Zealand.

Statistics New Zealand. (2006). Maori population estimates tables.

Statistics New Zealand. (2009). 2006mbdatasetallnz.zip. Retrieved from https://www3.stats.govt.nz/meshblock/2006/excel/Backup/

Statistics New Zealand. (2014). *2013 Census QuickStats about culture and identity*. Retrieved from www.stats.govt.nz

Statistics New Zealand. (2015). *Ngā tohu o te ora: The determinants of life satisfaction for Māori 2013*, Wellington.

Statistics New Zealand. (2016). Historical population estimates tables. Retrieved from http://www.stats.govt.nz/browse_for_stats/population/estimates_and_projections/historical-population-tables.aspx

Stevenson, B. S. (2001). *Maori cultural identity and health.* (Masters). Massey University, Palmerston North.

Stevenson, B. S. (2004). Te Hoe Nuku Roa: A measure of Maori cultural identity. *He Pukenga Korero, 8*(1), 10.

Suinn, R. M., Ahuna, C., & Khoo, G. (1992). The Suinn-Lew Asian Self-Identity Acculturation Scale: Concurrent and Factorial Validation. *Educational and Psychological Measurement, 52*(4), 1041-1046. doi:10.1177/0013164492052004028

Taonui, R. (2005). Tribal organisation - Social rank. In M. T. M. f. C. a. Heritage (Ed.), *Te Ara - the Encyclopedia of New Zealand* (pp. 5). Wellington: Manatū Taonga Ministry for Culture and Heritage.

Te Hoe Nuku Roa. (1999). *Te Hoe Nuku Roa source document: Baseline history*. Retrieved from Palmerston North:

Te Hoe Nuku Roa (Ed.) (1996). *Maori profiles: An integrated approach to policy and planning*. Palmerston North: Massey University.

Teaiwa, T., & Mallon, S. (2005). Ambivalent kinships? Pacific people in New Zealand. In J. Liu, T. McCreanor, T. McIntosh, & T. Teaiwa (Eds.), *New Zealand identities: Departures and destinations* (pp. 207-229). Wellington: Victoria University Press.

Towers, A. (2008). Health, Work and Retirement Survey: Summary report for the 2006 data wave: Methodology. Retrieved from http://hwr.massey.ac.nz/resources/methodology_towers.pdf

Towers, A., Stephens, C. V., Dulin, P., Kostick, M., Noone, J., & Alpass, F. (2011). Estimating older hazardous and binge drinking prevalence using AUDIT-C and AUDIT-3 thresholds specific to older adults. *Drug and Alcohol Dependence, 117*(2-3), 211-218. doi:10.1016/j.drugalcdep.2011.02.008

Towers, A., Stevenson, B. S., Breheny, M., & Allen, J. (2016). Health, Work, and Retirement Longitudinal Study. In N. A. Pachana (Ed.), *Encyclopedia of Geropsychology* (pp. 1-9). Singapore: Springer Singapore.

Valles, S. A. (2012). Heterogeneity of risk within racial groups, a challenge for public health programs. *Preventive Medicine, 55*(5), 405-408. doi:http://dx.doi.org/10.1016/j.ypmed.2012.08.022

Walker, R. (1996). *Nga pepa a Ranginui: The Walker papers*. Auckland: Penguin Books.

Ware, J., Kosinski, M., Turner-Bowker, D., & Gandek, B. (2002). *How to Score Version 2 of the SF-12 Health Survey*. Retrieved from Lincoln, RI:

Weimand, B. M., Hall-Lord, M. L., Sällström, C., & Hedelin, B. (2012). Life-sharing experiences of relatives of persons with severe mental illness – a phenomenographic study. *Scandinavian Journal of Caring Sciences, 27*, 99-107. doi:10.1111/j.1471-6712.2012.01007.x

Williams, J. (2000). *The nature of the Māori community*. Paper presented at the PSSM Conference, Wellington, New Zealand. https://web.archive.org/web/20100527001503/http://pssm.ssc.govt.nz/2000/papers/jwilliam.asp

Appendix A

Following is an example of the R software syntax for the LCA for the 6-group solution used to assess the existence of hypothesised Māori cultural cohorts in this article. Predicted class membership and the associated probabilities were saved in an excel sheet.

R LCA Syntax

```
attach (LCA_Analyses_for_R)
library("poLCA", lib.loc="~/R/win-library/3.4")
library("xlsx", lib.loc="~/R/win-library/3.4")

f <- cbind(BirthCohortPhD, Māori.2006, nonMāori06, MaraeVisitsShort06, Reo06, Ancestry06, Contact06, MāoriEthnicityDensityCat06, PacificEthnicityDensityCat06, LocationShort06)~1

lc6 <- poLCA(f, LCA_Analyses_for_R, nclass=6, maxiter=3000, na.rm=FALSE, nrep=100, graphs=TRUE)

write.xlsx(lc6$posterior, file = "…/LCA Posterior.xlsx", sheetName="6Groups", append = TRUE)
write.xlsx(lc6$predclass, file = "…/LCA Predicted.xlsx", sheetName="6Groups", append = TRUE)
```

The output from the LCA analysis gives the probability of membership for every latent class for each participant in the sample. The highest probability for each participant for a given latent class was used in the analyses.

Table 19. Proportion in each category for 6 Group LCA Best Class.

		6 Group LCA Best Class						
	Latent Class	**1**	**2**	**3**	**4**	**5**	**6**	**Total**
	% of Sample	**8%**	**19%**	**12%**	**21%**	**25%**	**14%**	**100%**
Birth Cohort	1951-1955	38%	41%	33%	35%	47%	44%	40%
	1946-1950	36%	30%	39%	37%	29%	24%	32%
	1941-1945	26%	29%	28%	28%	24%	31%	28%
Urban/ Rural	Main Urban Area	100%	3%	1%	100%	100%	2%	56%
	Other Urban Area	0%	46%	0%	0%	0%	98%	22%
	Rural Area	0%	51%	99%	0%	0%	0%	22%
Māori Ethnicity Density	0%	16%	23%	20%	8%	18%	11%	16%
	0-9%	30%	23%	16%	18%	34%	10%	22%
	10-49%	49%	43%	34%	60%	43%	52%	47%
	50%+	5%	11%	30%	13%	5%	27%	14%
	Mean	24.5	6.5	16.8	10.0	54.6	40.1	23.5
Pacific Ethnicity Density	0%	41%	76%	67%	28%	47%	52%	51%
	0-9%	39%	19%	27%	43%	40%	36%	34%
	10-49%	17%	5%	6%	22%	11%	12%	12%
	50%+	2%	0%	0%	8%	3%	0%	3%
	Mean	18.1	0.0	8.4	0.2	4.3	4.0	6.7
Māori	Māori ethnicity	92%	67%	97%	98%	63%	98%	83%
	No Māori ethnicity	8%	33%	3%	2%	37%	2%	17%
Other Ethnicity	Other Ethnicity	92%	94%	26%	4%	90%	22%	22%
	No Other Ethnicity	8%	6%	74%	96%	10%	78%	78%
Visit Marae	Not at all	12%	50%	5%	7%	53%	4%	4%
	Once or more	79%	50%	75%	80%	47%	75%	75%
	Once a month+	9%	0%	20%	13%	0%	21%	21%
Te Reo Māori	None or Poor	12%	92%	25%	28%	97%	29%	29%
	Fair or Good	82%	8%	51%	44%	3%	44%	44%
	Very Good+	7%	0%	23%	29%	0%	27%	27%
Contact with Māori	Mainly Māori	8%	3%	30%	28%	1%	26%	16%
	Some or few Māori	92%	97%	70%	72%	99%	74%	84%
Know Ancestry	1 or 2 generations	15%	31%	20%	20%	33%	19%	25%
	3 generations	29%	28%	15%	26%	23%	24%	24%
	4+ generations	56%	41%	64%	55%	44%	57%	51%

Table 20. Difference between group and total proportion for 6 Group LCA Best Class.

			Difference between cultural cohort and total %					
	Category	Total	1	2	3	4	5	6
Birth Cohort	1951-1955	40%	-2%	1%	-7%	-5%	7%	4%
	1946-1950	32%	4%	-2%	7%	5%	-3%	-8%
	1941-1945	28%	-2%	1%	0%	0%	-4%	3%
Urban/ Rural	Main Urban	56%	44%	-53%	-55%	44%	44%	-54%
	Other Urban	22%	-22%	24%	-22%	-22%	-22%	76%
	Rural	22%	-22%	29%	77%	-22%	-22%	-22%
Visit Marae	Not at all	4%	8%	46%	1%	3%	49%	0%
	Once or more	75%	4%	-25%	0%	5%	-28%	0%
	Once a month+	21%	-12%	-21%	-1%	-8%	-21%	0%
Te Reo Māori	None or Poor	29%	-17%	63%	-4%	-1%	68%	0%
	Fair or Good	44%	38%	-36%	7%	0%	-41%	0%
	Very Good+	27%	-20%	-27%	-4%	2%	-27%	0%
Know Ancestry	1/2 generations	25%	-10%	6%	-5%	-5%	8%	-6%
	3 generations	24%	5%	4%	-9%	2%	-1%	0%
	4+ generations	51%	5%	-10%	13%	4%	-7%	6%
Māori Ethnicity Density	0%	16%	0%	7%	4%	-8%	2%	-5%
	0-9%	22%	8%	1%	-6%	-4%	12%	-12%
	10-49%	47%	2%	-4%	-13%	13%	-4%	5%
	50%+	14%	-9%	-3%	16%	-1%	-9%	13%
Pacific Ethnicity Density	0%	51%	-10%	25%	16%	-23%	-4%	1%
	0-9%	34%	5%	-15%	-7%	9%	6%	2%
	10-49%	12%	5%	-7%	-6%	10%	-1%	0%
	50%+	3%	-1%	-3%	-3%	5%	0%	-3%
Māori ethnicity	Māori	83%	9%	-16%	14%	15%	-20%	0%
	No Māori	17%	-9%	16%	-14%	-15%	20%	0%
Other ethnicity	Other	22%	70%	72%	4%	-18%	68%	0%
	No Other	78%	-70%	-72%	-4%	18%	-68%	0%
Contact	Mainly Māori	16%	-8%	-13%	14%	12%	-15%	10%
	Few or some Māori	84%	8%	13%	-14%	-12%	15%	-10%

Chapter 5: Article 3

Rationale for this article

Article 1 described the need for a different approach to understanding ethno-cultural differences, proposing the CCA as a solution and worked through the example of the indigenous Māori of Aotearoa New Zealand. Article 2 further explained the need for the CCA and tested the approach using a Māori descent dataset from the Health, Work and Retirement (HWR) study (Towers, 2008) to identify hypothesised Māori cultural cohorts. Article 3 takes what was learned from Article 2, incorporating these results in a refinement of the CCA, and tests the claim made by the CCA that cultural cohorts are stable over time using a longitudinal dataset from the same HWR study (Towers, 2008). The learnings across all three articles are to be summarised giving an improved final version of the CCA, avenues for future analysis and refining.

Title: Stability of Māori Cultural Cohorts in an Older Population

Abstract

This paper builds on previous work on the development and use of the cultural cohort approach (CCA). The CCA is an alternative way of understanding and measuring ethno-cultural identity based on the Critical Junctures Theory and proposes that there are multiple unique cultural cohorts within an ethno-cultural population. The CCA posits that new discrete cultural cohorts can form at pre-existing stratifications such as class as a result of large external forces such as war or recession. Individual ethno-cultural identity is formed as a result of membership of these cultural cohorts over a person's lifetime. In this paper we further refined the CCA and tested the stability over time of cultural cohort membership identified by STEVENSON ET AL (XXXXb) using Health, Work and Retirement longitudinal data (participants were surveyed in 2006, 2008, 2010, 2012) for a Māori descent cohort born between 1941 and 1955 (n=1252) using latent transition analyses (LTA). We found that the CCA was valuable when interpreting the output from the LTA and evidence for the stability of super-ordinate cultural cohorts (called Connected and inclusive, Connected and competent, Unconnected). Several refinements were noted: First, the need to distinguish between point-in-time fluid ethno-cultural identity and enduring membership of cultural cohorts. Second, that individuals are members of multiple related cultural cohorts often connected to life stage. This paper further supports the utility of the CCA in mapping within-Māori cultural cohorts to the diverse Māori populations documented in historical records and published literature. providing a nuanced understanding of ethno-cultural differences to deliver better research, policy, and public health initiatives by identifying and characterising within-ethnic cultural cohorts.

Glossary

Word	Description
Māori	The indigenous peoples of Aotearoa
Aotearoa	Māori name for New Zealand
Hapū	A sub-group of an iwi connected by an eponymous ancestor or significant event
Marae	The centre of traditional Māori life for a hapū comprising buildings for meeting, sleeping, eating, etc
Whānau	A small group related by ancestry or purpose, extended family
Whare wānanga	Māori language and science focussed tertiary institution
Kaupapa Māori	Traditional Māori centred activity
Whakapapa	Ancestry
Te reo Māori	Māori language
Te Ao Māori	Literally the Māori world: Traditional Māori language, knowledge, customs, and practices
Taumata/paepae	Those speaking for a hapū or iwi in formal Māori settings
NZ European	New Zealand European
Mātauranga Māori	Māori knowledge
Papakāinga	Ancestral home lands
Kaumātua	Older Māori, often with important roles on marae

Introduction

In Aotearoa New Zealand (Aotearoa NZ) ethnic identity is framed as a self-defined measure of cultural affiliation (Statistics New Zealand, 2017) comprising self-categorisation, feelings about group membership, attachment, participation in and knowledge of shared culture (Houkamau et al., 2021). However, research illustrates that the concept of ethnicity as utilised in this manner is often conflated with race and national identity (Cormack, 2010; J. Linnekin, 1990; Walker, 1996), physiological attributes (Gannett, 2004), geographic origin (Gissis, 2008; Gannett, 2004), and ancestry (Gannett, 2004; Gissis, 2008). This is further complicated by a history of racism, bad science, and politics (Cormack & Robson, 2010; Gissis, 2008; James, 2001; Kukutai & Callister, 2009; Smedley & Smedley, 2005). Two primary issues arise when using ethnicity to segment a population for research or public health purposes: (1) the contextual deliberative choice made when an ethnicity is recorded (e.g., in a survey or administrative dataset) results in an unstable population denominator as it changes between measurement instances, and (2) the assumption that greater differences in culture, health, and socio-economic exist between ethnic populations than within an ethnic population (see STEVENSON ET AL XXXXa). For example, Māori reporting a Māori only ethnic affiliation had "considerably worse smoking outcomes" (Boven et al., 2020, p. 132), higher breast cancer incidence (Curtis et al., 2005), and mortality rates (Callister & Blakely, 2004; Curtis et al., 2005) when compared to prioritised, total, mixed Māori ethnicity, and non-Māori-non-Pacific ethnic populations. While post-hoc theorising about the best way of combining multiple ethnic affiliations gives no additional useful information to inform public health initiatives or policy, the usual approach of ignoring these differences and lumping all Māori together is no better.

The use of mutually exclusive ethnic categories bears little resemblance to diverse lived realities of Māori (Durie, 1995a) and while ethnicity is the most commonly collected ethnic identity measure, there have been many measures of cultural identity developed over the years including measures of participation in cultural activities or institutions, knowledge and

language ability, and affiliation (e.g., Bennett, 2001; Hirini et al., 1999; Kukutai, 2004; Rangihau, 1977; Ritchie, 1963; Stevenson, 2004; Te Hoe Nuku Roa, 1999; Thomas, 1988; Valentine, 2009; John Williams, 1960). Insights into the diversity of Māori communities have come from Borrell (2005) in her work with multi-generational urban Māori communities in South Auckland, how Māori identities differ across three generations due to very different cultural conditions (Houkamau, 2010), the distribution of Māori within and outside their tribal homelands (Ryks, 2019). All measures of ethno-cultural identity reflect milieu they were created in, especially the dominant identity theories of the time, and the markers of culture relevant to the ethnic population active and alive. There remains however the idea that individual ethno-cultural identity ethno-cultural identity is a singular fixed category that reflects the context of the measurement (e.g., a government mandated census or a in-person survey conducted by a Māori researcher) and of the questions themselves which may not provide the categories or responses that they can see themselves in.

Shifting from a focus on self-identified ethnic affiliation to ethno-cultural membership offers a potential resolution. It decouples individual ethnic affiliation from contextual choice and fixed government definitions. An ethnic culture is a resilient group phenomenon, an emergent property of the shared histories, beliefs, language, and practices of distinct ethnic populations to which an individual belongs. People are often part of multiple cultures simultaneously and over their lifetime have been members of through different ethno-cultural cohorts, even though only one may be salient at any given point in time (STEVENSON ET AL XXXXa, XXXXb).

The cultural cohort approach developed by Stevenson et al (XXXXa) proposes that multiple cultural cohorts exist within an ethno-cultural population. To explain this multiplicity of cultural cohorts we have adapted Critical Junctures Theory (CJT) (Liu et al., 2014). CJT is an over-arching theory that proposes that it is possible to construct a variable set fully describing a nation state, identify the mechanisms whereby a nation state maintains and controls a national identity over time, and how a nation state can abruptly shift to a new 'historical trajectory', for example a

coup d'état shifting a nation's political system from a monarchy to a democracy. The CCA framework, drops down to the meso-level or ethno-cultural identities within the nation state. We propose that it is possible to fully describe a cultural cohort, that there exist mechanisms maintaining that cultural cohort over time, and that external events can force enduring change upon these cultural cohorts. The key tenets of the CCA are that (1) multiple ethno-cultural population exist within any given ethnic group, (2) that ethno-cultural populations are resilient, unique, and are identifiable over multiple generations, and (3) cohorts can fundamentally change and divide in response to powerful external forces. At the within-person or micro-level, this paper further extends the initial analyses of the CCA (STEVENSON ET AL XXXXb) by identifying and testing the stability over time for individuals of Māori ethno-cultural membership using longitudinal data from the New Zealand government-funded Health, Work and Retirement (HWR) Longitudinal Study. The identification and confirmation of cultural cohorts is done in the following order: (1) Origins, (2) Abstractions, and (3) Analyses. Step one is to review recorded histories and narratives for the ethno-cultural population, looking for common or shared origin stories, and paying attention to key events (STEVENSON ET AL, XXXXa). Step two, abstractions, looks to summarise within-ethnic cultural populations described theorists, cultural experts, and any groups derived from statistical and qualitative analyses. In the final step, where possible, an analysis of primary data informed by and testing for the hypothesised cultural cohorts is carried out.

The argument for the existence of multiple cultural cohorts across time

There is an assumption common to the researcher, policy and health promotion that those reporting a Māori ethnic affiliation are the same people measured across multiple separate data collections (e.g., those reporting a Māori ethnicity in the 2018 census are the same people reporting a Māori ethnicity in a 2018 health survey) and that they are more similar to each other than those who did not report a Māori ethnicity. These assumptions do not hold up well with closer scrutiny as "ethnic groups and ethnicity are not fixed, bounded entities; they are

open, flexible, and subject to change" (Broman & Kukutai, 2021; Carter et al., 2009; Rademakers & van Hoorn, 2020; Smedley & Smedley, 2005, p. 17), influenced by environment and context (Carter et al., 2009; Simmonds, 2010), shaped by the value placed on an ethnic group by friends and family (Houkamau et al., 2021; Te Huia, 2015), and change over time (Platt, Simpson, & Akinwale, 2005; Rademakers & van Hoorn, 2020; Rademakers & van Hoorn, 2021a). Additionally, at different moments in their lives an iwi, contemporary, traditional, or Pākehā identity (Te Huia, 2015) may have more salience. The CCA (STEVENSON ET AL XXXXa, XXXXb) is more interested in which of the cultural cohorts an individual is a member of, rather than which ethno-cultural identity they are currently identifying with. The CCA puts together a number of indicators relevant to identifying the cultural cohort an individual belongs to instead of relying on self-identification as the determinant of the meaning of ethnicity. Successive iterations of the CCA alongside data with the necessary marker will identify a minimum set of markers to place an individual into pre-determined clusters of cultural cohorts. Using cultural cohort membership in any analyses or population estimates will go a substantial towards stabilising the population denominator and allow more accurate comparisons between data collections.

Testing the CCA predictions on a longitudinal sample

Previous work in this series on CCA (STEVENSON ET AL, XXXXa; STEVENSON ET AL, XXXXb) focussed on characterising ethno-cultural identity at a point-in-time, based on extant history, research, and theory. A key prediction of CCA was that cultural cohorts are stable over time and across generations, which is largely at odds with the literature stating that change is common for ethnic affiliation (Carter et al., 2009; Platt et al., 2005; Rademakers & van Hoorn, 2020; Rademakers & van Hoorn, 2021a), racial identity (Rademakers & van Hoorn, 2021b), and iwi Māori identity (Kukutai & Rarere, 2015).

The most commonly researched component of ethno-cultural identity is that of ethnicity. (Carter et al., 2009), using data from the longitudinal Survey of Family, Income, and

Employment (SoFIE), found significant differences in the probability of people reporting different ethnicities over time with the strongest predictor of change being the first ethnicity measured, with "anyone self-identifying as 'Other' (i.e., any ethnicity other than NZ European, Māori, Pacific or Asian) the most likely to change ethnicity between waves (54.7%), followed by Māori (36.5%)" (Carter et al., 2009, p. 37).

A key aspect of the CCA approach is that cultural cohort membership can be reliably identified over time, so a development of LCA called latent transition analysis (LTA) will be used to test the long-term stability of cultural cohort membership. LTA models discrete latent class membership over time (Lanza & Collins, 2008), in terms of both membership probabilities and of transition probabilities (i.e., the probability of moving from one group to another between measurement points). The advantage to using LTA in investigating the stability of the cohort membership over time is that low transition probabilities would indicate members of a cohort are unlikely to move between categories over time – hence stable. Latent transition analyses will extract groups that are a function of the data, so it is important that the analyst maps the result to theory and to their predictions (Busseri, Sadava, Molnar, & DeCourville, 2009; Schwartz et al., 2014).

Origins

Stevenson et al (XXXXa, XXXXb) proposed that we need to treat each of these populations as a within-ethnicity cultural cohort, all of whom have Māori ancestry, but are culturally distinct – differing in Māori-specific knowledge and skills (e.g., Māori language ability, ancestry, mātauranga Māori, Māori histories), location (e.g., living close to their ancestral marae, a distinctive community), origin stories (e.g., how their ancestors forged new homes in the city or how they never left their papakāinga), customs (e.g., taking shoes off at the door, hospitality), and beliefs (e.g., spirituality, interdependent wellbeing). The CCA uses information about the individual to place them as belonging to a cultural cohort, irrespective of context. While the

individual may affiliate to differing ethnicities over time, there is no change to the ethno-cultural context which they grew up in, with the potential for shifts to related cultural cohorts possible (e.g., learning te reo Māori or moving back to ancestral homelands).

Abstractions

In a test of the CCA (STEVENSON XXXXb) found two main Cultural Cohorts (Table 18) - four traditional marae-centred cultural cohorts and two cultural cohorts unconnected to traditional Māori indicators (e.g., marae, language). The four marae centred cohorts (all members visited marae at least once in last 12 months) comprised two cohorts outside of the main urban areas called 'Back home' a main urban community-based cohort ('In the neighbourhood') in areas with large communities of Māori and Pacific peoples', and a main urban cohort residing in areas with few other Māori. The two unconnected cohorts had little connection to marae, generally poor reo Māori and were much less likely to live in areas with high Māori or Pacific densities.

Table 21. Identified Māori cultural cohorts by strongest indicators.

Connection to Te Ao Māori	**Place**	**Ethnic affiliation**	**Cultural Cohort**	**%**
Marae connection	Other urban	Māori	Back home: in town	13%
Marae connection; Socialise with Māori	Rural; High Māori density; Low Pacific density	Māori	Back home: in the country	15%
Marae connection; majority fair/good reo Maori	Main urban, moderate Māori density, high Pacific peoples density	Māori; Other	In the neighbourhood	25%
Marae connection; Socialise with Māori	Main urban; Low Māori density; Moderate Pacific density	Māori	In the suburbs	21%
No Marae connection; Poor reo Māori	Main urban	Other	Unconnected main urban	12%
No Marae visits; Poor reo Māori	Not main urban; Very low Pacific density	Other	Unconnected provincial	14%

Adapting an example of a cultural cohort taxonomy from STEVENSON ET AL (XXXXb) in applying the cultural cohort approach to an older Māori descent population, we can make predictions about which cohorts we can expect to see based on the measures available and in line with the hypothesis. Naming these Cultural Cohorts also drew from STEVENSON ET AL (XXXXb) summary of several contemporary Māori theorists with Te Ahi Kā (Gloyne, 2018) describing Māori who have remained connected and active on their marae, Taura Here (Ryks et al., 2016) describing those who have moved away from their traditional iwi homelands but retain a secure Māori identity, and Ahi Mātao (Gloyne, 2018) describing Māori who have largely

disengaged from Māori culture. In the table below (Table 22) two new cultural cohorts have been proposed - Manu Kōrero and Manu Kiritata. Borrowing the term describing an accomplished Māori speaker, we used here to describe those who have been part of the Māori language movement beginning in the 1970s. Extending the manu (bird) metaphor, Manu Kiritata (literally neighbourhood bird) was proposed to describe a Māori population who had moved to the cities in search of better job opportunities and forming neighbourhood-based Māori cultural identities (with some blending of local Pacific cultures).

Common variables used to test the stability of cultural cohort membership over time are Māori ethnicity affiliation, other (non-Māori) ethnic affiliation, main urban/other urban/rural location, Māori language ability, and any marae involvement. Historical antecedent information, pan-iwi marae involvement, and Māori language/mātauranga education were not available for this analysis. Knowledge of ancestry was not considered a useful discriminating variable based on STEVENSON ET AL (XXXXb) analysis, while Māori/Pacific community information (in the form of an ethnic density variable calculated from 2006 census information) does not change for sample waves in the analysis after 2006 (although it may be possible to look at changes between census in future analyses). Reflecting the key concepts of CCA, we have grouped the variables into symbologies, technologies, and added (contextual) identity.

Table 22. Key cultural markers mapped to hypothesised Māori Cultural Cohorts.

		Marae-centred					Unconnected
CCA domain	**Cultural Cohort**	**Te Ahi Kā: Urban**	**Te Ahi Kā: Rural**	**Taura Here**	**Manu Kōrero**	**Manu Kiritata**	**Ahi Mātao**
	Origin stories	Actively involved with home marae	Actively involved with home marae	Moved away from homelands, maintained links to home marae	Moved away from homelands, maintained links to home marae. Whānau involved in Māori renaissance.	Moved away from homelands, new home in main urban neighbourhoods,	Moved away from homelands, live a largely NZ European lifestyle
Identity	In ancestral homelands	Yes	Yes	No	-	No	-
Symbology	Urban/Rural	Urban	Rural	-	Urban	Urban	
Identity	Māori community	Yes	Yes	No		Yes	
Identity	Pacific community			No		Yes	
Symbology	Social Networks	Socialise with mostly Māori	Socialise with mostly Māori	-	Socialise with mostly Māori	Socialise with Māori and Pacific	Socialise with few Māori and Pacific
Technology [11]	Māori Language	Fair or better	Fair or better	-	Good or better		None or Poor
Technology	Education				Māori language education and/or Māori Wānanga		
Symbology	Know Māori ancestry	Yes	Yes	Yes	Yes	Yes	
Technology	Marae involvement	Moderate or better	Moderate or better	Low or better	Low or better		None to low
Technology	Pan-iwi marae involvement			Low or better	Moderate or better	Moderate or better	None to low
Identity	Māori Ethnicity	Yes	Yes	Yes	Yes	Yes	
Identity	Other Ethnicity				No	Yes	Yes

[11] We propose that te reo Māori is primarily a technology as it regulates what is authentically Māori for many cultural cohorts.

This paper is an extension of our previous test of the CCA model (see STEVENSON ET AL XXXXb). Specifically, this is an application of the CCA to an HWR longitudinal dataset to identify multiple discrete sub-cohorts of Māori older adults and test their temporal stability. Based on predictions from the initial CAA model (STEVENSON ET AL XXXa) and the conclusions made in the initial CCA testing (STEVENSON ET AL XXXXb), we expect to see multiple Māori cultural cohorts in particular the Ahi Mātao cohort, and two Ahi Kā cultural cohorts (though there may be insufficient information to confidently distinguish between the Taura Here cultural cohorts Taura Here, Manu Kōrero, and Manu Kiritata). We will assess whether membership in identified Māori cultural cohorts will show significant stability across time, with minor identifiable transitions between related cohorts.

Given we are only cultural cohort membership across eight years and this is an older cohort, who may be experiencing quite different life changes when compared to the general population such as retirement and taking on additional roles on the marae (Waldon, 2003).

Method

Sample

The same HWR dataset used by STEVENSON ET AL (XXXXb) was used for the LTA. The LTA procedure is robust to missing data (Collins & Lanza, 2010; Lanza & Collins, 2008) so all data from the Māori descent participants in the HWR longitudinal sample was used. In 2006 the sample were aged between 55 and 69, with 40% were born between 1951 and 1955, 32% between 1946 and 1950, and 28% between 1941 and 1945. From Table 23, the sample size (n= 1252) at each sample wave reduced to 1207 in 2008, 872 in 2010, and 802 in 2012. Of those agreeing to be part of the longitudinal sample around 55% were female. Given the age of the cohort, the proportion of retirement age is key as it often precipitates significant lifestyle changes (Szabó, Allen, Stephens, & Alpass, 2018), including changing cultural expectations for older Māori and kaumātua (Edwards, 2010).

Table 23. Sample size, retention rate, age, and gender over time.

Year	Sample	Retention	Mean age	% 65+	% Female
2006	1252	100%	61	26%	56%
2008	1207	96%	63	39%	55%
2010	872	70%	65	53%	54%
2012	802	64%	67	68%	55%

In using the Health, Work, and Retirement Team (HART), the modelling of discrete Māori populations will be assisted by the age of the cohort, as ethnic identity is relatively more stable or crystallised in later life (Erikson, 1994; Stark & Traxler, 1974).

Measures

The analysis employed a reduced set of the variables used by STEVENSON ET AL (XXXXb) to lessen the computational complexity of the LTA, given that the complete set of Latent Statuses is Māori Ethnicity x Non-Māori Ethnicity x Marae Involvement x Language x Main Urban = 2 x 2 x 3 x 3 x 3 = 108. Longitudinally and assuming no relationship between previous responses (i.e., each wave is independent), the complete set of potential latent statuses over time is thus 108 x 108 x 108 x 108 = 136,048,896. Multiple trials were conducted with larger variable sets, beginning with the same nine variables as used by STEVENSON ET AL (XXXXb) for a Latent Cluster Analysis, which had a complete set Latent Statuses of $(2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 4 \times 4 \times 2)^4 = 1.15553 \times 10^{16}$ and despite having a relatively powerful Windows nased PC, never achieved convergence. The selection of a minimum set of indicators was based both on what measures most usefully distinguished between the six latent classes identified and computational overheads. Initially the variable set included Māori and Pacific population density[12] in addition to the final variable set (Māori or other ethnicity, location, Māori language, marae involvement) from Table 24. Including both or either of the population density variables exceeded computational limits with analyses taking several days to run and still not achieving

[12] Created by linking the meshblock identifier for each individual with meshblock information from the 2006 NZ census. Density was calculated by dividing the total count for Māori ethnicity divided by the total number of residents. The same process was used for Pacific ethnicity.

convergence. The decision was made to use the minimum set of variables as there was still valuable insights to be had and for the purposes of this article, we were primarily interested in testing the stability of cultural cohorts' over-time rather than identifying a definitive set of Māori cultural cohorts for this age group.

Table 24. Variables used in LTA by sample wave.

Variable	CCA domain	Category	2006	2008	2010	2012
Ethnicity	Identity	Māori Ethnicity	83%	80%	83%	81%
		Other Ethnicity	55%	53%	63%	64%
Location	Symbology	Main Urban Area	56%	58%	70%	72%
		Other urban	22%	22%	16%	15%
		Rural	22%	20%	15%	13%
Māori Language	Technology	None or Poor	54%	55%	58%	59%
		Fair or Good	32%	31%	32%	30%
		Very Good or Excellent	14%	14%	11%	11%
Marae Involvement	Technology	Not at all	25%	24%	19%	22%
		Once or more	65%	66%	68%	66%
		More than once a month	9.2%	10%	13%	12%

The five measures used in the LTA analysis were the same as used in the LCA analysis by STEVENSON (XXXXb) and are described below.

Ethnicity

The two ethnic affiliation questions were derived from the HWR questionnaire ethnic groups question and based on the 2006 NZ Census question (Statistics New Zealand, 2009a). The Māori ethnic group was coded as 1 if they had ticked the Māori ethnicity box and 0 otherwise. The non-Māori ethnic group variable was coded as a 1 if any ethnic group excluding Māori had been ticked and 0 otherwise.

Māori Language

The self-rated Māori language ability question was based on the Best outcomes for Māori: Te Hoe Nuku Roa study (Stevenson, 2004b; Te Hoe Nuku Roa, 1999b) and used by the HWR survey. As with STEVENSON (XXXXb), the Māori language ability indicator was reduced from six categories to three categories: Not applicable and poor; Fair or good; Very good or excellent.

Traditional Institutions

As with the Māori language ability question, marae involvement was also taken from the Best outcomes for Māori: Te Hoe Nuku Roa study (Stevenson, 2004b; Te Hoe Nuku Roa, 1999b) and used by the HWR survey. Marae involvement was reduced from five categories to three: Not at all; Once, a few times, or several times; More than once a month.

Place

The main urban (30,000+), other urban (1,000 to 29,000), and rural (<1,000) variable was created from 2006 census meshblock information (Statistics New Zealand, 2009).

For the dataset used in this analysis, the same individuals are being measured using the same measures at each of the four time-points, so we have imposed measurement invariance across all groups in the LTA "to increase parsimony and, importantly, ensure that the latent classes have the same meaning" (Lanza & Bray, 2010, p. 9) allowing meaningful comparisons between latent classes.

Analyses

A Latent Transition Analysis, PROC LTA (The Methodology Center, 2015), was run using SAS (SAS Institute Inc, 2012). The latent class approach identifies categorical and mutually exclusive latent groups representing "underlying (unobserved) subgroups in a population" (Lanza & Collins, 2008, p. 446). LTA is a longitudinal extension to Latent Class Analysis allowing "latent class membership to change over time" (Lanza & Collins, 2008, p. 447), giving estimates of initial latent class membership, transition probabilities (e.g., the probability that an individual in a particular latent class at time one will change membership to any other latent classes at time two), and item response probabilities for each latent class. As with a Latent Class Analysis, all variables are treated as categorical. Appendix A includes details of the code used and the transition probabilities.

Results

To choose which model provided the optimal solution for the data, the Akaike information criterion (AIC) and Bayesian information criterion (BIC), alongside the characteristics of the predicted cultural cohorts were used (Oberski, 2016). The formula $\exp((AIC_{min} - AIC_i)/2)$ was used to determine which model best fit the data by calculating the relative likelihood for each model compared to the model with the lowest AIC score. This was also done for the BIC. The LTA modelling (Table 25) revealed a seven-group solution was agreed on by both the AIC and BIC coefficients (see STEVENSON XXXXb).

Table 25. LTA Model Selection (n=1252).

			relative likelihood of model i	
Latent Classes	**AIC**	**BIC**	**AIC**	**BIC**
2	12096.86	12461.27	<.001	<.001
3	11296.71	11892.08	<.001	<.001
4	10038.96	10896.09	<.001	<.001
5	8881.25	10030.93	<.001	<.001
6	7843.24	9316.27	<.001	<.001
7	7356.48	9183.65	1	1
8	7393.34	9605.44	<.001	<.001
9	7459.99	10087.83	<.001	<.001

Latent Groups Identified

The latent groups identified by the Latent Transition Analysis at time 1 were mapped to the hypothesised cultural cohorts and organised by marae-centred (64%) and unconnected cultural Cohorts (36%).

Table 26 shows that there was little to differentiate between the marae-centred cohorts apart from place (main urban, other urban, or rural) and whether they reported a non-Māori ethnicity. However, latent group 7.6 stood out as almost a third (30%) rated their te reo Māori

as very good or excellent. As was found by STEVENSON ET AL (XXXXb), there was no way to clearly distinguish Ahi Kā or Manu Kōrero cultural cohorts. Cultural cohorts well involved with marae were collectively grouped as connected. Half (XX%) of the participants were connected and competent, distinguished by high marae involvement and te reo Māori ability, and a sole Māori ethnicity. A much smaller connected and inclusive cultural cohort (11%), split between main urban and provincial locations, was also identified. A third broad cultural cohort somewhat resembling the hypothesised Manu Kiritata but lacking key indicators (e.g., Māori medium education) was termed connected, inclusive and competent. These last three cohorts differed from the connected and exclusive cultural cohort in that they were more likely to report a non-Māori ethnic affiliation as well as a Māori ethnicity.

As with the marae-centred latent groups, there was nothing to distinguish the two non-traditional latent groups apart from place. Both unconnected cultural cohorts (24%) had no involvement with marae, had poor reo Māori and were more likely to report a non-Māori ethnic affiliation.

Table 26. Traditional Marae Focussed Identity LTA and CCA cohorts.

Descriptive Information of LTA Identified Cohort	CCA description of Identified cohort
LTA 7.4 (27%) All main urban (100%), majority stated a Māori ethnicity (98%), almost no other ethnicity (4%), high marae involvement (92% once or more), over two-thirds fair or better (70%) and 28% very good or excellent reo.	**Connected and competent – urban** Residing in the city, strongly connected to marae and high levels of te reo Māori. Reported a Māori ethnicity only.
LTA 7.3 (3.8%) All main urban (99.8%), majority stated a Māori ethnicity (99%) and an other ethnicity (91%), high marae involvement (100% once or more), most fair or better (86%) and 12% very good or excellent reo	**Connected, inclusive and competent – urban** Residing in the city, strongly connected to marae and high levels of te reo Māori. Participants reported having both a Māori and another ethnic identity.
LTA 7.6 (24%) All other urban and rural (95%), majority stated a Māori ethnicity (98%), few stated an other ethnicity (5.5%), high marae involvement (96% once or more), three-quarters fair or better (75%) and 30% very good or excellent reo	**Connected and competent - provincial** Living in the provinces, strongly connected to marae and high levels of te reo Māori. Majority reported a Māori ethnic identity only.
LTA 7.7 (4.3%) All main urban (100%), most stated a Māori ethnicity (70%), majority stated an other ethnicity (92%), moderate marae involvement (70% once or more), over three-quarters fair or better reo (77%)	**Connected and inclusive - urban** Residing in the city and connected to marae. Participants reported having both a Māori and another ethnic identity.
LTA 7.1 (6.9%) All other urban and rural (94%), majority Māori ethnic identification (86%), majority stated an other ethnicity (89%), high marae involvement (91% once or more), almost two-thirds fair or better reo (63%)	**Connected and inclusive – provincial** In towns and connected to marae. Participants reported having both a Māori and another ethnic identity.
LTA 7.5 (21%) All main urban (100%), two-thirds stated a Māori ethnicity (66%), majority stated an other ethnicity (91%), little marae involvement (47% not at all), all stated no or poor reo (100%)	**Unconnected - main urban** In the city, unconnected to marae, and poor reo Maori. Participants typically reported having a non-Maori ethnic identity.
LTA 7.2 (13%) All other urban and rural (96%), two-thirds stated a Māori ethnicity (67%), majority stated an other ethnicity (89%), very little marae involvement (47% not at all), no or poor reo (97%)	**Unconnected - provincial** In the provinces, unconnected to marae, and poor reo Maori. Participants typically reported having a non-Maori ethnic identity.

Cultural Cohort Stability

A simple test of ethnic stability over time was also carried using the HWR dataset (Table 27). There were clear differences in ethnic mobility over time, with the group stating a Māori ethnicity only affiliation in 2006 being the most stable ethnic identity. Māori participants who did not report a Māori ethnicity in 2006 were the most likely to change their response in subsequent survey waves. While those reporting both a Māori ethnicity and any other ethnicity (including Pacific, NZ European, and Asian) in 2006 were slightly less likely to report a Māori

ethnicity over subsequent years compared to those stating a Māori ethnicity only. While at first there appears to be a similar pattern to that found in the LTA with the three broad latent groups, with the unconnected group appearing equivalent to the no Māori ethnicity affiliation in 2006, the unconnected group was much more stable (Figure 3), while the two connected latent groups were equivalently stable compared to the two Māori ethnic affiliation groups, there remains a fundamental problem with the use of ethnicity to understand the stability of ethno-cultural identity – they do not map to Māori lived experiences of any known ethno-cultural problem and in fact highlight the unstable denominator generated by a point-in-time ethnic affiliation measure. While we lack many of the necessary indicators to definitively map the latent groups to the hypothesised cultural cohorts, the latent groups already exhibit greater stability over time and demonstrate some of the ethno-cultural characteristics predicted by the CCA for this age group; marae involvement remains a fundamental discriminating identifier with language and location also important, while ethnicity serves a more ambiguous function.

Table 27. Māori ethnicity identification for all Māori descent participants over time with complete HWR data across six sample waves (n=653).

	Percentage reporting a Māori ethnicity[a]					
Ethnicity in 2006	**2006**	**2008**	**2010**	**2012**	**2014**	**2016**
No Māori ethnicity (n=133)	0%	30%	42%	39%	43%	36%
Māori and other ethnicity (n=287)	100%	83%	91%	87%	85%	85%
Māori ethnicity alone (n=233)	100%	97%	96%	96%	92%	97%

Figure 3 below shows how the LTA groups clustered and the probability of movement between latent groups over time. For ease of interpretation, these probabilities have been converted to the number of people in 2006 (n=1252), flowing through to each successive wave, so while the total number stays the same for each year, the number in each latent group changes. For example, of the 150 individuals in 2006 in the provincial Connected and Inclusive cohort, 69 remained, 63 shifted to a main urban Connected and Inclusive cohort, and 17 moved to the main urban Connected and Competent cohort in 2008. The actual transition probabilities are included in the appendices (Table 29). For these smaller cultural cohorts, in particular the provincial groups, the transition probabilities will become less accurate as the numbers reduce.

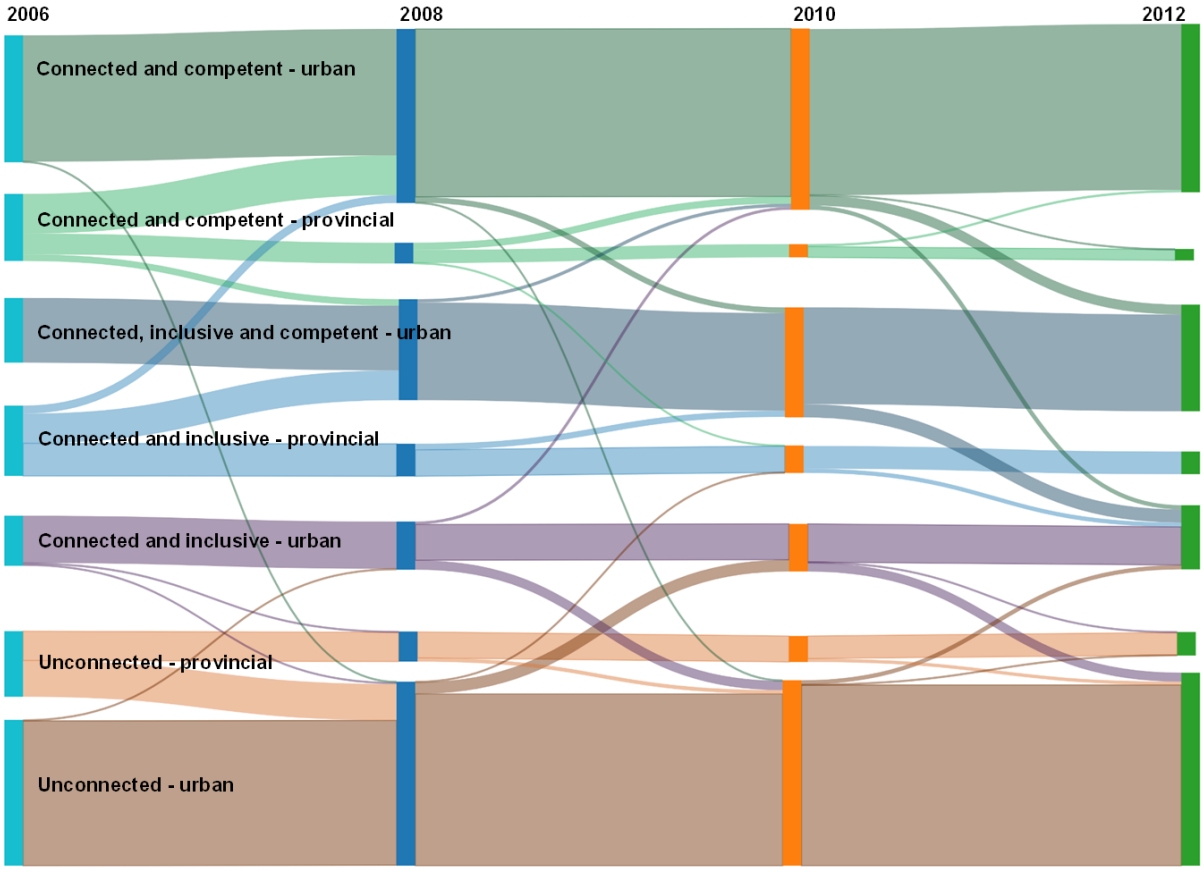


Figure 3. Sankey diagram showing changing latent group membership over time (assuming no change in sample size year-on-year).

It is important to note that the transition probabilities are estimated for the latent group (which were identified through via the distribution of all five of the variables in the LTA), so the calculated size of a cohort after 2006 does not represent any single variable distribution in that cohort. For example, in 2008 the percentage of the sample in main urban areas was 58%, but Figure 3 implies a much greater shift from provincial areas to main urban areas (around 86%) but was actually a shift to a latent group that includes main urban membership as a characteristic in 2006, amongst many other characteristics. Another problem in using the urban-rural location variable is that location may only be salient for some cultural cohorts but not others. For example, whether they are returning home (tribal homelands or where they grew up) or if they are simply moving to a new job elsewhere – one is a shift in cultural cohort membership and the other is not. Carefully designed measures for this purpose are needed.

Despite the difficulty in precisely differentiating between the marae-centred cultural cohorts what we can take from the analysis is the stability of the three primary cultural groups identified by the LTA: Connected and Inclusive, Connected and Competent, and Unconnected, and how individuals move between these three primary cultural cohorts. The small (3.8%) Connected, inclusive, and competent group was merged with the Connected and Inclusive cultural grouping as shifts in membership for this group were primarily with the two Connected and Inclusive latent groups. To assist readability, these three collapsed groups will be referred to as Inclusive, Competent, and Unconnected reflecting their main distinguishing characteristic.

Looking only at how membership changed over time (Table 28) for these three main cultural cohorts, the membership of each cultural cohort over the four sampling waves remained relatively stable at around a third of the total. At time two 96% of the two merged Connected groups (Inclusive or Competent), and 99% of respondents in the Unconnected cultural groups remained within the same broad groupings between 2006 and 2008. There was some movement at the boundary between the Inclusive and Competent groups as they effectively swapped 4% of their predicted membership. There was slightly more movement between the broad latent groups from 2008 to 2010 with 90% of the Inclusive, 96% of the Competent groups, and 95% of the Unconnected groups remaining the same. About 3% of the Inclusive and Competent latent groups swapped membership, with movement also occurring between the Inclusive and Unconnected groups (4% from Inclusive to Unconnected and 7% the opposite way). From 2020 to 2012 90% of the Inclusive, 100% of the Competent groups, and 96% of the Unconnected groups remained in the same group from 2010. Membership shifts were more irregular by 2012 with 7.5% of the Inclusive cultural cohort coming from the Competent and 2.3% from the Unconnected groups. The Unconnected group also comprised 4.3% of the 2010 Inclusive group.

Table 28. Changes in cohort membership over time (n=1252). Shaded cells indicate no change in latent group membership.

	2006			
2008	Inclusive	Competent	Unconnected	Total

Inclusive	96%	3.6%	0.5%	386 (100%)
Competent	4.2%	96%	-	414 (100%)
Unconnected	1.2%	0.2%	99%	453 (100%)
Total	393	411	448	1252

2010	2008 Inclusive	Competent	Unconnected	Total
Inclusive	90%	3.4%	6.5%	392 (100%)
Competent	3.2%	97%	-	412 (100%)
Unconnected	4.4%	0.3%	95%	448 (100%)

2012	2010 Inclusive	Competent	Unconnected	Total
Inclusive	90%	7.5%	2.3%	412 (100%)
Competent	-	100%	-	381 (100%)
Unconnected	4.3%	-	96%	459 (100%)

Discussion

The CCA was used by STEVENSON ET AL (XXXXa, XXXXb) to identify discrete within-Māori ethno-cultural populations, based on Critical Junctures Theory (Liu et al., 2014), which were then further tested in this article against a key claim of stability over time. CCA predicts that multiple cultural cohorts exist inside an ethnic population, that these cultural cohorts are resilient and unique, exist over multiple generations, changing and dividing in response to powerful external forces.

While we could clearly identify three distinct latent groups, it become clear that the measures available were not sufficient to identify the hypothesised cultural cohorts to the detail needed, and the small sample size for some of the latent groups was quite small, particularly the provincial latent goups so we are less confident about those transitions. While we were confident in the naming of the Unconnected cultural cohort, mapping the marae-centred latent groups to the hypothesised cultural cohorts was less clear. The two marae-centred cohorts differed primarily in that those in the Inclusive group cultural cohort were more likely to report a non-Māori ethnic affiliation than those in the Competent cultural cohort.

The measures used in this analysis are similar to many other measures of Māori culture and identity (e.g., Cunningham et al., 2005; Kukutai, 2010; Statistics New Zealand, 2004)), which tend to be estimates of current behaviours, beliefs, and attitudes. These are inherently unstable, changing with context and with time; intended as a point-in-time measure of affiliation or self-ascribed group identity. More useful in the identification of cultural cohorts are skills or knowledge-based measures, such as Māori language ability or knowledge of ancestry, as these reflect time an individual has spent living within a particular cultural cohort, although these are confounded with age. More stable and better reflecting the Cultural Cohort Approach in identifying cultural cohorts would be measures of time spent in distinct Māori communities, Māori medium education, or supporting Māori institutions such as marae, iwi authorities, Māori creative arts, and Māori traditional practices.

As expected, two primary cultural cohort groupings - unconnected and marae-centred cultural cohorts, were identified. Although the cultural cohorts predicted in previous analyses (STEVENSON XXXXa, XXXXb) were not clearly discernible with the measures used. However, the additional information given by the latent transition analysis, showed how the identified Māori cultural cohorts showed good stability across time, with some shifting in membership between similar cultural cohorts over time.

Refinements to the Cultural Cohort Approach

This article draws together the previous articles by STEVENSON ET AL (XXXXa, XXXXb), adding a test of the cultural cohort approach on longitudinal data. From the initial outline of the CCA approach by STEVENSON ET AL (XXXXa) the authors have developed their thinking and refined the approach, presenting the learnings here. While a key part of the cultural cohort approach proved particularly useful, which was the collation of existing documents to predict and describe discrete cultural cohorts, the analytical framing of cultural cohort membership did change. These being multiple cohort membership, natural groupings of cultural cohorts, current

versus historical membership, and the impact membership of a cultural cohort has had on an individual.

An individual is a member of related and nested multiple cultural cohorts, with membership at a given point in time dependent on contextual factors such as life stage (e.g., childhood in an urban Māori community, mainstream or Kura Kaupapa Māori schooling, returning to the marae to support). Individuals will move between related cohorts over their life-course (such as growing and working in an urban Māori community, studying te reo Māori, and moving back to their marae in retirement). This could be managed by distinguishing between historical cultural cohort membership and current cultural cohort membership.

As the authors have progressed through the analyses here and in STEVENSON ET AL (XXXXb) it became clear that the variable set needed to identify Māori cultural cohorts needs to encompass residence in distinctive Māori communities (symbologies) and experiences with Māori institutions (Māori technologies such as te reo Māori education). It would thus be theoretically possible to construct the measures needed to identify for each cultural cohort, with some measures common to multiple cultural cohorts and other measures specific to that cultural cohort only, with the understanding that these may change in the future and new cultural cohorts' form. Currently, there are very few ways to derive a population denominator for cultural cohort based analyses such as health outcome and behaviour prevalence rates. Ideally, new measures developed that capture cultural cohort membership, with the denominators more complex as individuals may have multiple memberships – but this would also reflect the reality and richness of ethno-cultural identity.

It also became evident that a defining feature of the cultural cohort approach was the notion of 'perpetual membership', where once an individual has been identified as living or growing-up within a cultural cohort, they are members of that cultural cohort forever. However, this is subject to two provisos: (1) that an individual has had sufficient residence time in that cultural

cohort to embed the behaviours and beliefs of that cultural cohort, and (2) that there is a degree of cultural maintenance with the individual 'reconnecting' with the cultural cohort, however sporadic.

Limitations

For both the analyses in this article and by STEVENSON ET AL (XXXXb), a confounding factor was the age of the sample, 55 to 74 years old in 2006, with an increasing proportion of respondents in the LTA sample retiring over time; from 26% in 2006 to 39%, 53%, and 68% in 2008, 2010, and 2012 respectively (Stevenson, 2021). While ethno-cultural identity is relatively stable, large lifestyle changes often occur as they near retirement. Among these are changes in housing and location (e.g., downsizing, moving to the city, moving away from the city), more leisure time alongside guaranteed but often reduced income, and for those connected to their marae expectations of their roles on their marae may change (Durie, 1999a; Waldon, 2003). This may indicate the existence of post-retirement cultural cohorts nested within existing cohorts reflecting the different experiences and circumstances as they retire. Not surprisingly unpacking these more subtle differences would require a different set of variables to those available in the 2006 to 2012 HWR dataset.

The LTA used in this analysis generates mutually exclusive group membership for each individual so while it was possible to identify super-ordinate cultural cohorts such as the Connected or Unconnected cultural cohorts it was not possible to identify whether an individual is currently or has been a member of multiple other Cultural Cohorts in the past. Where it is possible to identify membership in more than one cultural cohort, for example similar membership probabilities in more than latent group, there remains a volatility problem where the measures typically reflect a point-in-time estimate of cultural affiliation or participation, rather than membership in any cultural cohorts over their lifetime.

A final limitation of the data is that it was not possible to test for intergenerational membership of Cultural Cohorts, for example children having membership of the same cultural cohort as their parents, in addition to membership other Cultural Cohorts they have lived within throughout their life.

Future directions

To date, the CCA has only been tested with existing survey data that had incorporated a suite of Māori cultural measures from two decades earlier (Stevenson, 2004; Te Hoe Nuku Roa, 1996). Four follow-up studies are recommended to further validate the CCA and add to our understanding of existing cultural cohorts: (1) A large qualitative study focussed on stories of the diverse communities Māori have lived within (looking back over multiple generations), specifically looking for key cultural markers of those communities and their origin stories; this could be done by seeking interviews from individuals in the cultural cohorts identified by STEVENSON ET AL (XXXXb) from the HWR study; (2) A study looking to understand the key cultural markers and origin stories of hard-to-engage cohorts such as gang whānau (Roguski & McBride-Henry, 2020); (3) Further data analysis using HWR early-life recall data collection (Allen, 2018) or other large survey datasets such as the Statistics New Zealand Te Kupenga (Statistics New Zealand, 2020b); (4) Delve into the overlap with Pākehā identities (Bell, 2009; Panelli et al., 2008) seeking to understand how Māori and Pākehā origin stories differ and converge, and cultural markers distinctive to the cultural cohorts that emerge.

Summary

The primary purpose of this article was to build upon the work of STEVENSON ET AL (XXXXa, XXXXb) in the development of a new approach to understanding ethno-cultural identity and of assigning membership to separate within-ethnic cultural populations. For this article we investigated the stability of membership of the identified latent groups mapped to the predicted cultural cohorts. As we progressed with the longitudinal LTA, it became increasingly clear that

there is a need to distinguish between point-in-time contextual identity measures (e.g., ethnic affiliations, involvement with Māori institutions like marae) and historical events shaping individual cultural trajectories (e.g., Māori language education, growing up in certain Māori communities, marae roles) to clearly identify cultural cohort membership.

In a development of the cultural cohorts approach we have emphasised that all individuals have been members of at least one cultural cohort, that cultural cohorts are nested (i.e., a Manu Kiritata cultural cohort is nested within a broader marae-centred cohort), and membership requires some quantum of residence time (e.g., spending their childhood on their marae, reo Māori immersion course) sufficient to have a lasting influence on behaviour and beliefs.

People belong to cultural cohorts, independently of whether they currently affiliate to that cultural cohort, with a cultural cohort emerging from the normative actions and shared beliefs of related individuals over time. The Cultural Cohort Approach will ensure the diversity within ethno-cultural populations are better understood as each cultural cohort embodies not only a rich cultural history but the cumulative effects of health, wealth and discrimination (Cormack et al., 2018; Harris, Cormack, & Stanley, 2013b).

While collecting the necessary information to assess cultural cohort membership will not currently be possible in many scenarios (e.g., hospital administration data), the CCA can drive the development of measures that better reflect the diversity of ethno-cultural populations (rather than attempting to discern those communities post-hoc) to be incorporated in other data collections.

References

Allen, J. (2018). *Work and Retirement (HWR) study Life Course History Telephone Interview project. Technical report for the Health, Work and Retirement Study*. Retrieved from Palmerston North: https://www.massey.ac.nz/massey/fms/Colleges/College%20of%20Humanities%20and%20S

ocial%20Sciences/Psychology/HART/publications/reports/Technical_Report_LCHI_2017_V1.pdf?0CDCE0914E3A6FCAE4C4EA542A7B1A30

Bell, A. (2009). Dilemmas of Settler Belonging: Roots, Routes and Redemption in New Zealand National Identity Claims. *The Sociological Review, 57*(1), 145-162. doi:10.1111/j.1467-954X.2008.01808.x

Bennett, J. (2001). Maori as Honorary Members of the White Tribe.

Boven, N., Exeter, D., Sporle, A., & Shackleton, N. (2020). The implications of different ethnicity categorisation methods for understanding outcomes and developing policy in New Zealand. *Kotuitui: New Zealand Journal of Social Sciences Online, 15*(1), 123-139. doi:10.1080/1177083X.2019.1657912

Broman, P., & Kukutai, T. H. (2021). Fixed not fluid: European identification in the Aotearoa New Zealand census. *Journal of Population Research, 38*(2), 103-138. Retrieved from https://EconPapers.repec.org/RePEc:spr:joprea:v:38:y:2021:i:2:d:10.1007_s12546-021-09262-4

Busseri, M., Sadava, S., Molnar, D., & DeCourville, N. (2009). A Person-Centered Approach to Subjective Well-Being. *Journal of Happiness Studies, 10*, 161-181. doi:10.1007/s10902-007-9072-3

Callister, P., & Blakely, T. (2004). Ethnic Classification, Intermarriage, and Mortality: Some methodological issues in relation to ethnic comparisons in Aotearoa. *Unpublished Working Paper*.

Carter, K. N., Hayward, M., Blakely, T., & Shaw, C. (2009). How much and for whom does self-identified ethnicity change over time in New Zealand? Results from a longitudinal study. *Social Policy Journal of New Zealand, 36*, 32-45.

Collins, L. M., & Lanza, S. T. (2010). General Introduction. In *Latent Class and Latent Transition Analysis* (pp. 1-22): John Wiley & Sons, Inc.

Cormack, D. (2010). *The practice and politics of counting: ethnicity data in official statistics in Aotearoa/New Zealand*. Retrieved from Wellington: http://www.otago.ac.nz/wellington/departments/publichealth/research/erupomare/publications/

Cormack, D., & Robson, C. (2010). *Classification and output of multiple ethnicities: issues for monitoring Māori health*. Retrieved from Wellington:

Cormack, D., Stanley, J., & Harris, R. (2018). Multiple forms of discrimination and relationships with health and wellbeing: Findings from national cross-sectional surveys in Aotearoa/New Zealand. *International Journal for Equity in Health, 17*(1). doi:10.1186/s12939-018-0735-y

Cunningham, C., Stevenson, B. S., & Tassell, N. (2005). *Analysis of the Characteristics of Whanau in Aotearoa: A report for the Ministry of Education*, Wellington.

Curtis, E., Wright, C., & Wall, M. (2005). The epidemiology of breast cancer in Maori women in Aotearoa New Zealand: implications for screening and treatment. *N Z Med J, 118*(1209), U1297.

Durie, M. H. (1995). *Nga Matatini Maori: Diverse Maori realities*. Paper presented at the Wānanga Pūrongo Kōreroreo, Tūrangawaewae Marae, Ngāruawahia.

Durie, M. H. (1999). *Whaiora - Maori Health Development Second Edition*. Auckland: Oxford University Press.

Edwards, W. J. W. (2010). *Taupaenui : Maori positive ageing.* (Doctor of Philosophy in Public Health). Massey University, Palmerston North.

Erikson, E. H. (1994). *Identity and the life cycle*: WW Norton & Company.

Gannett, L. (2004). The Biological Reification of Race. *The British Journal for the Philosophy of Science, 55*(2), 323-345. doi:10.1093/bjps/55.2.323

Gissis, S. B. (2008). When is 'race' a race? 1946–2003. *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences, 39*(4), 437-450. doi:http://dx.doi.org/10.1016/j.shpsc.2008.09.006

Gloyne, P. (2018). Te Ahi Kā. *Te Mōkihi*(61). Retrieved from https://hail.to/rakaihautu/publication/3ELpJte/article/N3Rp7G2

Harris, R., Cormack, D., & Stanley, J. (2013). The relationship between socially-assigned ethnicity, health and experience of racial discrimination for Māori: analysis of the 2006/07 New Zealand Health Survey. *BMC Public Health, 13*(1), 844. doi:10.1186/1471-2458-13-844

Hirini, P. R., Flett, R. A., Kazantzis, N., Long, N. R., Millar, M. A., & MacDonald, C. (1999). Health care needs for older Māori: A study of Kaumātua and kuia. *Social Policy Journal of New Zealand, 13*, 136-153.

Houkamau, C. A. (2010). Identity construction and reconstruction: the role of socio-historical contexts in shaping Māori women's identity. *Social Identities, 16*(2), 179-196. doi:10.1080/13504631003688872

Houkamau, C. A., Milojev, P., Greaves, L., Dell, K., Sibley, C. G., & Phinney, J. (2021). Indigenous ethnic identity, in-group warmth, and psychological wellbeing: A longitudinal study of Māori. *Current Psychology*, 1-17.

James, A. (2001). Making sense of race and racial classification. *Race and Society, 4*(2), 235-247. doi:http://dx.doi.org/10.1016/S1090-9524(03)00012-3

Kukutai, T. H. (2004). The problem of defining an ethnic group for public policy: Who is Maori and why does it matter? *Social Policy Journal of New Zealand*(23).

Kukutai, T. H. (2010). *The thin brown line: Re-indigenizing inequality in Aotearoa New Zealand.* (Doctor of Philosophy). Stanford University,

Kukutai, T. H., & Callister, P. (2009). A "main" ethnic group? Ethnic self-prioritisation among New Zealand Youth. *Social Policy Journal of New Zealand, 36*, 16-31.

Kukutai, T. H., & Rarere, M. (2015). *Te Ao Hurihuri: Iwi identification in the census*. Retrieved from Te Rūnanga Tātari Tatauranga: https://www.waikato.ac.nz/__data/assets/pdf_file/0008/269216/NIDEA-Brief-No5-IwiIdentification.pdf

Lanza, S. T., & Bray, B. C. (2010). Transitions in drug use among high-risk women: An application of Latent Class and Latent Transition Analysis. *Advances and applications in statistical sciences, 3*(2), 203-235. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3171700/

Lanza, S. T., & Collins, L. M. (2008). A new SAS procedure for latent transition analysis: transitions in dating and sexual risk behavior. *Developmental Psychology, 44*(2), 446-456. doi:10.1037/0012-1649.44.2.446

Linnekin, J. (1990). The politics of culture in the Pacific. In J. Linnekin & L. Poyer (Eds.), *Cultural identity and ethnicity in the Pacific* (pp. 149-173). Honolulu: University Press of.

Liu, J. H., Fisher-Onar, N., & Woodward, M. W. (2014). Symbologies, technologies, and identities: Critical junctures theory and the multi-layered nation-state. *International Journal of Intercultural Relations, 43*, 2-12. doi:10.1016/j.ijintrel.2014.08.012

Oberski, D. (2016). Mixture Models: Latent Profile and Latent Class Analysis. In (pp. 275-287).

Panelli, R., Allen, D., Ellison, B., Kelly, A., John, A., & Tipa, G. (2008). Beyond Bluff oysters? Place identity and ethnicity in a peripheral coastal setting. *Journal of Rural Studies, 24*(1), 41-55. Retrieved from https://doi.org/10.1016/J.JRURSTUD.2007.05.008

Platt, L., Simpson, L., & Akinwale, B. (2005). Stability and change in ethnic groups in England and Wales. *POPULATION TRENDS-LONDON-, 121*, 35.

Rademakers, R., & van Hoorn, A. (2020). Choosing Your Ethnicity: A Longitudinal Analysis of Ethnic Identity Choice and Intra-Individual Ethnicity Change. *Available at SSRN 3557883*.

Rademakers, R., & van Hoorn, A. (2021a). Ethnic switching: Longitudinal evidence on prevalence, correlates, and implications for measuring ethnic segregation. *Journal of Development Economics*, 102694.

Rademakers, R., & van Hoorn, A. (2021b). Physical Appearance and Ancestry as Predictors of Racial Passing: A Research Note on Racial (Non-) Fluidity in the US. *Available at SSRN 3964577*.

Rangihau, J. (1977). Being Maori. In M. King (Ed.), *Te Ao Hurihuri: The World Moves On: Aspects of Maoritanga*. Wellington: Hicks Smith.

Ritchie, J. E. (1963). *The making of a Maori*. Auckland: A. H. & A. W. Reed.

Roguski, M., & McBride-Henry, K. (2020). The failure of health promotion for marginalised populations. *Australian and New Zealand Journal of Public Health, 44*(6), 446-448. doi:https://doi.org/10.1111/1753-6405.13048

Ryks, J. (2019). *Māori heterogeneity in regional Aotearoa New Zealand: An exploratory study*. Retrieved from Hamilton: https://www.waikato.ac.nz/__data/assets/pdf_file/0010/664129/CaDDANZ-Brief-_7-Online.pdf

Ryks, J., Pearson, A. L., & Waa, A. (2016). Mapping urban Māori: A population-based study of Māori heterogeneity. *New Zealand Geographer*, n/a-n/a. doi:10.1111/nzg.12113

SAS Institute Inc. (2012). SAS for Windows (Version 9.4). Cary, NC, USA.

Schwartz, S. J., Syed, M., Yip, T., Knight, G. P., Umaña-Taylor, A. J., Rivas-Drake, D., & Lee, R. M. (2014). Methodological issues in ethnic and racial identity research with ethnic minority populations: theoretical precision, measurement issues, and research designs. *Child Dev, 85*(1), 58-76. doi:10.1111/cdev.12201

Simmonds, S. (2010). *The implications of using different methods to measure ethnicity in a cohort study.* (Masters). University of Otago,, Wellington.

Smedley, A., & Smedley, B. D. (2005). Race as biology is fiction, racism as a social problem is real: Anthropological and historical perspectives on the social construction of race. *Am Psychol, 60*(1), 16-26. doi:10.1037/0003-066X.60.1.16

Stark, P. A., & Traxler, A. J. (1974). Empirical Validation of Erikson's Theory of Identity Crises in Late Adolescence. *The Journal of Psychology, 86*(1), 25-33. doi:10.1080/00223980.1974.9923880

Statistics New Zealand. (2004). *Report of the Review of the Measurement of Ethnicity June 2004*. Retrieved from http://www.stats.govt.nz/

Statistics New Zealand. (2009). 2006 Census questionnaires. Retrieved from https://cdm20045.contentdm.oclc.org/digital/collection/p20045coll2/id/1215/rec/1

Statistics New Zealand. (2017). Ethnic group. Retrieved from http://datainfoplus.stats.govt.nz/Item/nz.govt.stats/6448e16b-ca6a-41e6-a6f5-4cbc1f0b7fed

Statistics New Zealand. (2020). Te Kupenga: 2018 (final) – English. Retrieved from https://www.stats.govt.nz/information-releases/te-kupenga-2018-final-english

Stevenson, B. S. (2004). Te Hoe Nuku Roa: A measure of Maori cultural identity. *He Pukenga Korero, 8*(1), 10.

Stevenson, B. S. (2021). *Health, Work and Retirement Study, unpublished tables*. Retrieved from Palmerston North:

Szabó, Á., Allen, J., Stephens, C., & Alpass, F. (2018). Is retirement associated with physical health benefits? A longitudinal investigation with older New Zealanders. *Age and Ageing, 48*(2), 267-272. doi:10.1093/ageing/afy176

Te Hoe Nuku Roa. (1999). *Te Hoe Nuku Roa source document: Baseline history*. Retrieved from Palmerston North:

Te Hoe Nuku Roa (Ed.) (1996). *Maori profiles: An integrated approach to policy and planning*. Palmerston North: Massey University.

Te Huia, A. (2015). Perspectives towards Māori identity by Māori heritage language learners. *New Zealand Journal of Psychology, 44*(3).

The Methodology Center. (2015). PROC LCA & PROC LTA (Version 1.3.2). University Park: The Methodology Center, Penn State. Retrieved from http://methodology.psu.edu

Thomas, D. R. (1988). Development of a test of Maori knowledge. *New Zealand Journal of Psychology, 17*(2), 59-67.

Towers, A. (2008). Health, Work and Retirement Survey: Summary report for the 2006 data wave: Methodology. Retrieved from http://hwr.massey.ac.nz/resources/methodology_towers.pdf

Valentine, H. (2009). *Kia Ngāwari ki te Awatea: The relationship between Wairua and Māori well-being: A psychological perspective.* (Doctor of Clinical Psychology). Massey University, Palmerston North, New Zealand.

Waldon, J. (2003). Oranga Kaumātua: perceptions of health in older Māori people. *Pacific Health Dialogue, 10*(2), 79-86.

Walker, R. (1996). *Nga pepa a Ranginui: The Walker papers*. Auckland: Penguin Books.

Williams, J. (1960) Maori achievement motivation. In*: Vol. 5. Monographs on Maori Social Life and Personality* (pp. 113). Wellington: Victoria University.

Article 3: Appendix A

Following is an example of the SAS software syntax for the LTA for the 7-group solution used to assess the existence of hypothesised Māori cultural cohorts in this article. Predicted class membership and the associated probabilities were saved as a text file and imported into an excel sheet for analysis.

```
PROC LTA
DATA=LTA.CI_HWR  OUTPOST=LTA.CI_HWR_LTA7;
TITLE1 'Latent Transition Analysis on HWR Maori Descent 2006 to 2012 data ';
TITLE2 'Seven Groups from Ethnicity, Marae Participation, Language, Main Urban';
TITLE3 'Measurement Invariance over time';
NSTATUS 7;
NTIMES 4;
ITEMS Maori_2006 nonMaori06 MaraeVisitsShort06 Reo06 MainUrban06       Maori_2008
nonMaori08 MaraeVisitsShort08 Reo08 MainUrban08  Maori_2010 nonMaori10
MaraeVisitsShort10 Reo10 MainUrban10  Maori_2012 nonMaori12 MaraeVisitsShort12 Reo12
MainUrban12;
CATEGORIES 2 2 3 3 2;
SEED 409621;
ID CID;
MEASUREMENT times;
RUN;
```

```
Latent Transition Analysis on HWR Māori Descent 2006 to 2012 data 1
'Seven Groups from Ethnicity, Marae Participation, Language, Main Urban'
'Measurement Invariance over time'

Data Summary, Model Information, and Fit Statistics (EM Algorithm)

Number of subjects in dataset: 3287
Number of subjects in analysis: 3287
Number of measurement items per time: 5
Response categories per item: 2 2 3 3 3
Number of occasions (times): 4
Number of groups in the data: 1
Number of latent statuses: 7
```

Rho starting values were randomly generated (seed = 409621).

Parameter restrictions: Rho (measurement) parameters were constrained to be equal across time.

The model converged in 1458 iterations.

Maximum number of iterations: 100000

Convergence method: maximum absolute deviation (MAD)

Convergence criterion: 0.000001000

==========

Fit statistics:

==========

Log-likelihood: -20171.62

Latent Status	Time 1	1	2	5	3	4	7	6
	Proportion	6.9%	13%	21%	3.8%	27%	4.3%	24%
Māori	**Māori**	0.8616	0.6706	0.656	0.9938	0.9774	0.7043	0.9745
	Non-Māori	0.1384	0.3294	0.344	0.0062	0.0226	0.2957	0.0255
Non-Maori	**Other**	0.8918	0.8914	0.9108	0.9051	0.0429	0.9218	0.0549
	Non-other	0.1082	0.1086	0.0892	0.0949	0.9571	0.0782	0.9451
Marae Visits	**Not at all**	0.0888	0.4708	0.4714	0	0.076	0.3027	0.0399
	Once or more	0.785	0.5292	0.5277	0.7923	0.7715	0.6973	0.7171
	More than once a month	0.1262	0	0.0009	0.2077	0.1525	0	0.2429
Reo	**None or Poor**	0.3744	0.9686	1	0.14	0.3029	0.233	0.2476
	Fair or Good	0.6098	0.03	0	0.7452	0.4198	0.7298	0.4565
	Very Good or Excellent	0.0158	0.0014	0	0.1147	0.2772	0.0372	0.2959
Location	**Main Urban Area**	0.0565	0.0391	0.9995	0.9984	1	1	0.0512
	Other Urban Area	0.4314	0.5146	0.0005	0.0016	0	0	0.4833
	Rural Area	0.5121	0.4462	0	0	0	0	0.4655

Table 29. Seven Group LTA Transition Probabilities.

		Time 2						
		Rural LTA	**Other Urban LTA**	**Main Urban LTA**	**Main Urban LTA**	**Rural LTA**	**Other Urban LTA**	**Main Urban LTA**
Time 1	**Rural LTA 7.3**	1						
	Other Urban LTA 7.6	0.0966	0.3124	0.591				
	Main Urban LTA 7.4			0.9961				0.0039
	Main Urban LTA 7.7				0.9471	0.0144		0.0385
	Rural LTA 7.2					0.4476		0.5524
	Other Urban LTA 7.1	0.4221		0.1159			0.4621	
	Main Urban LTA 7.5				0.0058			0.9942
		Time 3						
Time 2	**Rural LTA 7.3**	0.9667		0.0333				
	Other Urban LTA 7.6		0.6311	0.3422			0.0267	
	Main Urban LTA 7.4	0.033	0.0005	0.9632				0.0033
	Main Urban LTA 7.7			0.0574	0.7483			0.1944
	Rural LTA 7.2					0.8675		0.1325
	Other Urban LTA 7.1	0.191					0.809	
	Main Urban LTA 7.5				0.064		0.0014	0.9346
		Time 4						
Time 3	**Rural LTA 7.3**	0.881			0.119			
	Other Urban LTA 7.6		0.8266	0.1642		0.0092		
	Main Urban LTA 7.4	0.0557	0.0019	0.9182	0.0242			
	Main Urban LTA 7.7				0.803	0.0066		0.1904
	Rural LTA 7.2					0.8721		0.1279
	Other Urban LTA 7.1				0.1631		0.8369	
	Main Urban LTA 7.5				0.0239	0.0028		0.9733

Chapter 6: Thesis Summary

This thesis took a journey from theory development in the first publication, testing the cultural cohort approach (CCA) using a Latent Cluster Analysis in the second publication, and the third publication further refining the CCA and testing for stability over time using a Latent Transition Analysis. Each article applied the CCA in the suggest order of (1) Origins, (2) Abstractions, and (3) Analyses. Approaching the activities necessary to operationalise the CCA in this order worked well, flowing naturally between understanding the historical context, events, and origin stories, to a review of extant literature and meso-level abstractions of within-ethnic populations from researchers and cultural experts, culminating in confirmation and further characterising these cultural cohorts with an analysis of primary source data. For this thesis pre-existing survey data was used, but textual, interviews or focus group drawn from a broad spectrum of the Māori population for the purpose of unpacking Māori experiences of different Māori cultural communities over their lifetime would be particularly insightful and could be used to develop measures to better capture those experiences.

In this thesis the cultural cohort approach was tested on the Māori descent population in Aotearoa NZ, drawing on published historical documents, cultural identity theories and research, then confirmed using Māori identity and engagement data from Massey University's Health, Work and Retirement Study. One study used a latent class analysis on a large cross-sectional sample (n=3287) of Māori born between 1941 and 1955 to map the latent classes to cultural cohorts predicted by the cultural cohort approach. A second study using longitudinal data from a subset of the same sample (n=1252) tested the stability of predicted cultural cohorts over-time using a latent transition analysis.

As we validated, tested, and refined the cultural cohort approach, we also gained insights into the measurement of cultural identity and the identification of Māori cultural cohorts that were identified as result of applying the cultural cohort approach stand as a robust description of

actual Māori cultural cohorts as described by the extant literature. Three major outputs resulted from this thesis: (1) The cultural cohort approach; (2) A more natural method of understanding and developing measures of cultural identity; and (3) The identification of a discrete set of within-Māori cultural cohorts and an accompanying formation narrative.

The use of CCA in operationalising components of a CJT nation state level analysis was also supported. The same techniques used in identifying the characteristics of a cultural cohort are also applicable in identifying shared national identities, with the more ethno-cultural focussed analyses of the CCA populating the identity spaces of CJT. This could be done by understanding a cultural cohort as the trajectory of specific ethno-cultural symbologies and technologies around an attractor, which are nested within higher-order ethno-cultural identity like the Māori descent population, and in turn are nested within the Aotearoa NZ nation-state.

The Cultural Cohort Approach

The use of ethnicity in comparing a Māori ethnic population to non-Māori populations problematically assumes homogeneity of health-related risk within the Māori ethnic group, that these populations are comparable across different data collections (e.g., surveys, administrative datasets, and censuses), and it is roughly the same population over time (e.g., it is the same people reporting a Māori ethnicity across consecutive censuses). There is also the problem that most contemporary measures of Māori ethno-cultural identity comprise mutually exclusive and conceptually indistinct categories. The CCA begins with the assumption that individuals are members of multiple cultural cohorts and each cultural cohort directly maps to the lived cultural experiences of Māori. Each cultural cohort is based on existing historical narratives and experiences and supported by theory and research. An individual's ethno-cultural identity is a rich tapestry representing their journey through multiple Māori ethno-cultural communities.

Based on the nation state or macro-level Critical Junctures Theory (CJT), the Cultural Cohort Approach (CCA) operationalises the identification and characterisation of the ethno-cultural

identity space, by unpacking within-Māori ethnic-population diversity in Aotearoa NZ. This was accomplished using existing meso-level theory, commentary, narrative, and research in Māori ethno-cultural identity to identify discrete Māori cultural cohorts and then giving two micro-level analytical examples using existing survey data.

Research questions

The following research questions were asked at the beginning of this thesis and will be answered individually. However, given the clear theory development stage that were followed in the writing of the three publications (theory development, theory testing, theory refinement), it was not always possible to directly gather evidence or answer these questions.

(1) do distinct groups exist within the Māori descent population that are distinguishable by Māori-specific cultural markers only

The CCA clearly identified two primary Māori cultural cohorts (marae-centred and non-traditional) and predicted further cultural cohorts that were partially identified by the analyses in publications one and two (Taura Here, Ahi Kā, Manu Kōrero, and Manu Kiritata). By extension, given the same information for a different ethnic population (from published research and historical documentation) it would be possible to identify distinct cultural cohort within any ethnic population.

(2) What is the minimum set of Māori cultural indicators needed to effectively disaggregate the New Zealand Māori descent population for the purpose of tracking and comparing health status,

(3) What measures currently exist that usefully distinguish between these groups, and

(4) If not, what additional data needs to be collected to form a more comprehensive understanding of Māori Cultural Identity

There may no minimum set of Māori cultural identity measures, because as highlighted by the CCA, cultural cohort indicators are different for each cohort and change over time as people and cultures adapt to environmental, social, political, and technological change. However, a cultural cohort, correctly identified, will naturally reflect the cumulative effects of class, economic and cultural resources impacting the health and wellbeing of that individual. For the purpose of tracking and comparing health status, no additional measures are needed beyond those necessary to identify the cultural cohort membership. At a bare minimum, an indicator of marae involvement was the single strongest identifier, with measures of residence in particular communities (e.g., religious, urban Māori and/or Pacific concentrations, Māori language speaking), and culturally specific education (e.g., kura, wānanga). Many of these indicators currently exist, marae involvement, education, and religion, but retrospective measures of community are needed, that would need to be carefully designed and regularly updated. As the symbologies and technologies for a cultural cohort are identified, the measures required would be naturally identified. For example, cultural cohort specific origin stories and technologies maintaining cultural practices and beliefs (e.g., marae or religious organisations).

(5) Does membership in differing Māori cultural groupings vary over time and age

Publication three, the LTA analysis, did show that individuals moved between related cultural cohorts and for an older cohort this may have been due to retirement changing lifestyle choices (e.g., moving into urban centres or back to the marae) or “associated with important individual

behavioural adjustments, particularly the learning of a new language" (Rademakers & van Hoorn, 2020, p. 28). These age-related shifts would need further analysis to understand individual trajectories within and between related cohorts.

(6) Is there an identifiable process that describes the development of ethno-cultural populations over time

While ethnicity has become more fluid over time as geographical boundaries fall and cultural groups increasingly mingle, the politics of indigenous peoples in colonised countries have "been accompanied by a hardening of social categories and a dramatic strengthening of Māori and Hawaiian identities" (A. Howard & Rensel, 2004, p. 219). Larger socio-political forces within and between nation states, such as colonisation, urbanisation, globalisation and cultural revitalisation alongside adaptation by Māori populations to local context (Borell, 2005b) are examples of the forces acting on cultural cohorts.

(8) What causes an ethno-cultural population to change

Change is cultural cohort specific. By following an individual cultural cohorts journey as historical documents and stories are examined we can identify the forces and events that change the cultural cohort over time or events (critical junctures) that fundamentally change the cultural cohort, possibly dividing a cultural cohort into two or more cohorts. Nothing beyond what was available in the literature was used to identify these critical junctures. It would instructive to gather additional data prior-to, during and after the critical juncture acts on the cultural cohort(s).

Research Aims

The research aims of this thesis were also met, the CCA was fully described using published research and practical examples of its use given. Two example analyses were performed following the CCA for individuals of Māori descent: the LCA in publication two and LTA in

publication three, both using measures drawn from the HWR longitudinal study. The steps to doing these analyses were detailed in each publication.

The cultural cohort approach was tested on the Māori descent population in Aotearoa NZ, drawing on published historical documents, cultural identity theories and research, then tested using Māori identity and engagement data from Massey University's Health, Work and Retirement Study. One study used a latent class analysis on a large cross-sectional sample (n=3287) of Māori born between 1941 and 1955 to map the latent classes to cultural cohorts predicted by the cultural cohort approach. A second study used longitudinal data tested the stability of membership in predicted cultural cohorts over-time using a latent transition analysis. In common with previous research, the cultural cohort approach identified two primary cohorts: a majority traditional marae-centred cohort and a smaller cohort unconnected to marae or te reo Māori. As predicted by the cultural cohort approach, there were distinct cultural differences within the traditional Māori cohort – a strong sole-Māori group well connected to marae in provincial and rural settings, a similar cohort in main urban areas, and an urban cohort with strong ties to their local community. While a relatively simple taxonomy was found for the narrowly defined age cohort in the HWR analyses, a broader all of Māori cultural identity theory and classification system would be more complex and would need periodic updating as generations of Māori change in unforeseen ways.

The process of identifying the cultural cohorts in the testing and refinement publications, led to a number of improvements to the CCA, these and the operationalisation of the CCA are detailed below.

Operationalising the Cultural Cohort Approach

As we progressed through the analyses and discussion over the three articles, the application and utility of the CCA became ever clearer. Where we arrived in operationalising the CCA is

summarised in the following sections, but we emphasise that the CCA needs evolve in the same manner that cultural cohorts do and adapt to changing techniques and theory.

There are three key steps in operationalising the CCA: (1) Origins, (2) Abstractions, and (3) Analyses. At the macro-level, we need to be cognisant of how multiple ethno-cultural populations comprise the nation state with each ethno-cultural population interacting with other populations, the nation state, and the international environment (necessitating a more CJT based analysis). At the meso-level, where CCA primarily focuses, we begin with an analysis of origins - recorded histories and narratives, looking for shared origin stories, and paying attention to key events, pre-existing stratifications and the ethno-cultural context preceding the formation of potential new cultural cohorts. Next we review and summarise abstracted understandings of ethno-cultural populations as theory, opinion, and analysis, looking for commonalities and overlaps indicating more reliable evidence for a pre-existing cultural cohort. The narratives and characteristics defining cultural cohort origins are mapped to the abstracted cultural cohorts postulated by cultural experts and researchers. This process is done with the understanding that these abstractions reflect the milieu and can change over time. Thirdly, at the micro-level, we are describing individual membership of one or more cultural cohorts over their lifetime using data collected for the purpose or existing datasets with the necessary cultural indicators.

Key to the CCA is identifying moments in history (critical junctures) which significantly changed the trajectory of an ethnic population (part or all of an ethnic group) and moments which had a greater impact on one sub-group of that ethnic population, and how do these groups differ (stratification). In researching the history of an ethnic population, we generate a narrative about the defining characteristics, movements and important events over multiple generations. Published stories, personal accounts, historical documents all provide a rich source of information to build this narrative, in the process identifying important symbologies and technologies creating and maintaining a cultural cohort.

Building on these narratives, the researcher delves into the academic literature gathering cultural identity theories and research, then mapping the results of these to the narratives generated earlier. At this point one would begin naming and characterising the cultural cohorts as the researcher gains increasing confidence in identifying each cohort. Additional research and analysis could also be done at this point to fill in gaps in the research or data using questions based on the symbologies, technologies, and critical junctures (i.e., origin stories) of that cohort. These may take the form of qualitative research into poorly understood populations and communities, or quantitative research using surveys or existent datasets.

Key characteristics of a cultural cohort are that:

1. Membership of a cultural cohort does not expire, the effects of being part of a cultural cohort have an effect on the cultural trajectory of an individual
2. A critical period or 'residence time' in a particular community is required for the characteristics of a cultural cohort to be embedded in behaviour and beliefs and that there is continuing maintenance of a cultural cohort, however sporadic
3. An individual may have membership of multiple cultural cohorts, with membership at a given point in time dependent on contextual factors such as life stage (e.g., childhood in a given Māori community, mainstream or Kura Kaupapa schooling, returning to the marae) and measurement context (i.e., who is asking and for what purpose). However, some cultural cohorts are mutually exclusive - if you are a member of one cohort, you cannot be a member of another kind (e.g., marae-centred and Ahi Mātao)
4. There is a nesting to Cultural Cohorts: Whakapapa is central - Connection to marae, hapū and iwi, with cohorts of Māori actively involved in their marae or renaissance cohorts (e.g., second language learners)
5. Many cultural cohorts may be centred around geographic clusters such as a south Auckland neighbourhood cohort (Borell, 2005a). However, geo-located data (e.g., urban/rural and Māori population density based on meshblock) is only useful for

current cultural cohort membership and even then, only in conjunction with other information (e.g., marae involvement, reo Māori, Kaupapa Māori education)

6. Individual membership in a cultural cohort has two forms
    a. historical cultural cohort membership (e.g., growing up in a small town near their marae, shifting to strongly Māori/Pacific suburbs in South Auckland for work) and
    b. current cultural cohort membership (e.g., now retired 'back home' and regularly active on their marae)

Analyses can occur at multiple levels, depending on the data available and the purpose of the analysis. With analyses at the individual or small group level (e.g., survey or interview), understanding which cultural cohorts they have been members of over their lifetime, the life stage (e.g., childhood, adult, retired), and the length of time (e.g., grew up by their marae, three years studying at a whare wānanga) would be relevant (Figure 4). At a higher level of abstraction or meso-level we are identifying and characterising cultural cohorts and, how they have formed and changed over time. At the nation state level, we are informed by Critical Junctures Theory as we examine interactions between multiple ethno-cultural populations and the global environment, for example how power relations between indigenous and settler ethno-cultural identities has shaped national cultural identities.

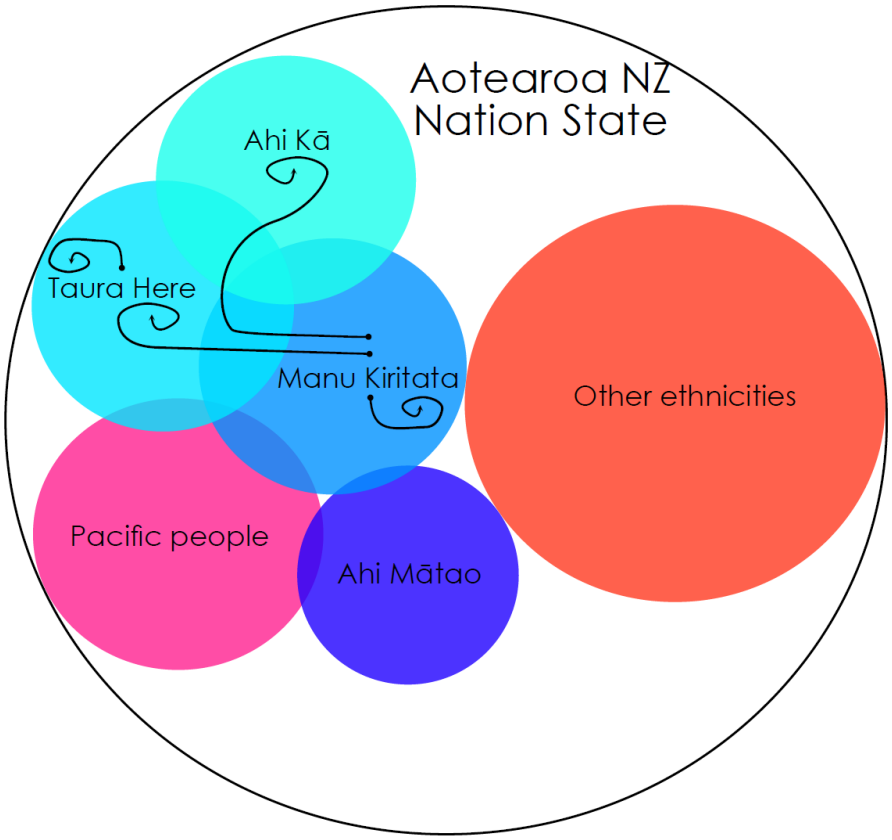


Figure 4. Individual trajectories across multiple cultural cohorts (Māori descent in blue). Lines represent individual trajectories.

It is this nuanced understanding of the cultural diversity within an ethnic population that will benefit researchers in understanding how differences in health or wellbeing have accumulated over time by detailing the unique narrative of each cultural cohort, ensuring better policy, and more effective public health.

Importantly, those factors found to be most useful in distinguishing cultural groupings within age cohorts, will vary over time. Populations were less mobile in the early 1900s with socio-economic conditions and Māori cultural capital varying between different geographic regions, for example some Māori communities maintaining strong traditional practices and Māori language fluency compared to other communities. For these older cohorts then, geographic and age - in conjunction with other possible identifiers such as iwi, descent, or ethnicity - may provide the necessary information to logically form Māori Cultural Cohorts. Into the latter

1900s, the variable best suited for distinguishing between these later cohorts would begin to change as Māori populations became increasingly urbanised. Further differentiation between cohorts who were actively affected by the Māori renaissance, may require a slightly different set of indicators, with the youngest and possibly most mobile cohorts needing yet another set of indicators. While not explored in this thesis, we also speculate that the long-term stability of a cultural cohort is dependent on a number of things: a larger population and a deep and rich history of a cultural cohort is better, alongsie the durability of the relevant symbologies and technologies; where durability is a function of socio-political forces (e.g., do state technologies actively resource and support their unique symbologies and technologies) and how related ethno-cultural populations support or oppose their legitimacy.

For example, when designing a public health campaign, knowing the characteristics of a particular cultural cohort will ensure collaborations are with stakeholders who are connected members of that cultural cohort, providing more tailored messaging or interventions based on key cultural cohort characteristics like: (a) engagement with Māori institutions (e.g., marae, wānanga), (b) urban or rural communities, (c) religion, and (d) age or life-stage. This may mean separating a public health initiative for Māori into very different activities for urban Māori communities, rural marae-centred communities, renaissance groups (those following kauapapa Māori education pathways), and groups not all involved in Māori institutions. This would help in clarifying a boundary problem common to research on Māori, for example where self-assessments of health and wellbeing are blurred between self and whānau (Durie, 1985; Durie et al., 1996; Durie et al., 1997). There is no doubt that a significant proportion of Māori do assess wellbeing as inclusive of whanau (e.g., Borell, 2005b; Edwards, 2010; Kingi, 2002; Rauna, 2010; Rousselle, Palmers, & Noel, 2004; Tupara, 2009; Wenn, 2007), but others may be more likely to assess wellbeing in terms of the self only. These differences may lie in the nature of the cultural cohorts they have been part, perhaps reflecting the greater inter-dependence of the traditional connected cultural cohorts compared to the independence that may be inherent in some unconnected mainstream cultural cohorts.

Within Māori diversity – the CCA Way

In common with previous research, the cultural cohort approach identified two primary cohorts in the older Māori population (55 years of age or older): a majority traditional marae-centred cohort and a smaller cohort unconnected to marae or te reo Māori. As predicted by the cultural cohort approach, there were distinct cultural differences within the traditional Māori cohort – a strong sole-Māori group well connected to marae in provincial and rural settings, a similar cohort in main urban areas, and an urban cohort with strong ties to their local community. Based primarily on the findings of article 2, these can be summarised below:

1. Traditional Marae centred identity (74%)
    1.1. Te Ahi Kā. A stable population passing Māori language, cultural knowledge, and guardianship of their traditional homelands across generations. This group is connected by geographic place (particularly marae), although there may be cultural differences between rural Māori populations and urban Māori populations for whom cities grew on and around their homelands.

    This group is often separated into *mana whenua* (those residing in their traditional homelands) and *taura here* or *mātāwaka* (those residing in other iwi lands). These distinctions are important for organisations like rūnanga or iwi social service providers (representing their iwi) but are less useful for understanding health outcomes at a population level, given the complexity of iwi identities (Kukutai & Rarere, 2015; Statistics New Zealand, 2021). The cultural cohort approach in this thesis identified two sub-groups to the Ahi Kā population in addition to any urban/rural split.

    1.1.1. Manu Kōrero. A mostly urban population part of revitalisation of te reo and mātauranga Māori (mostly through participation in kohanga reo, kura kaupapa Māori, whare kura, or wānanga)

1.1.2. Whānau Whakapono. Followers of Māori Christian religions (mostly Ringatū and Rātana) taught almost entirely in te reo Māori and passing traditional practices and knowledge over many generations (Benton, 1991)

1.2. Manu Kiritata. This group have formed strong urban neighbourhood/community-based identities in addition to their connection to their iwi Māori identity. These groups are often part of non-iwi affiliated traditional institutions in their communities (e.g., pan-iwi urban marae)

2. Mainstream (26%)

2.1. Ahi Mātao. A peripheral or 'notional' Māori population who are largely uninvolved in traditional or contemporary Māori cultural activities and with no strong ties to their ancestral homelands. As with any other ethno-cultural population, there will be distinct cultural sub-groups distinguished by more non-Māori cultural characteristics, but we do not unpack this population in this thesis.

Measuring Cultural Identity – the Cultural Cohort Way

As we progressed through this thesis and the three core articles, it became ever more obvious that the prevalent way of measuring identity is wrong. Most current cultural identity measures capture point-in-time affiliation with an ethnic identity, participation in cultural activities, involvement with cultural institutions, or culturally specific attitudes and beliefs. This will give an unstable context-dependent measure of identity at that measurement instance. The cultural cohort approach instead flips the notion of cultural identity to one of durable ethno-cultural group memberships. An individual belongs to a cultural cohort in perpetuity (although circumstances could change this), with extended exposure within that cultural cohort shaping and fixing culturally specific beliefs and behaviours.

The cultural cohort approach describes the underlying structures and mechanisms that have created and maintained an ethno-cultural population. We do this by collating the published

experiences and events affecting an ethno-cultural population, then by mapping extant theories and research about those ethno-cultural populations, we can discern the underlying cohort and generate a narrative describing origins, adaptations, important events, and key cultural indicators for each cultural cohort. This narrative being far more compelling and relatable than current cultural identity measures and can be validated simply by asking "do you see yourself in this story? Do you see your parents and grandparents?"

The cultural cohort approach is far more concerned about the historical antecedents of a cultural cohort and the key temporal technologies and symbologies making that group distinct from any other – temporal in the sense that these technologies and symbologies can change over time whilst maintaining ethno-cultural continuity. By devising and testing a parsimonious set of indicators that best capture these technologies and symbologies, an individual can be placed within one or more of these cultural cohorts and access an already rich narrative, which can be further enhanced with additional measures and data.

Both qualitative and quantitative techniques will benefit from using the cultural cohort approach. The CCA brings a deeper understanding about the diversity within an ethno-cultural population shaping the differing engagements and partnerships required (i.e., representation from each cultural cohort), measurement design so instruments are sensitive to each cultural cohort (e.g., survey, interview, monitoring), tailored intervention or campaign design, and in a more nuanced analysis of ethno-cultural identity. By working through the cultural cohort approach of we ensure that the diverse cultural cohorts inside an ethnic population is authentically represented, and who is included or excluded made explicit.

Conclusion

The use of ethnicity to disaggregate health and wellbeing outcomes with national populations is problematic; there is no definable link between ethnic affiliation and behaviour, giving no

explanatory power when used to understand these differences, at best serving as a weak proxy for the cumulative disadvantage of discrimination and inequality averaged over the entire ethnic population. Progress has been made with post-hoc analyses of official ethnic and iwi affiliation indicators, but these are reaching a limit in how much information can be wrung from various combinations of these indicators and still lack a direct connection to identifiable lived group experiences. Similarly, the development of identity and ethno-cultural measures continue to be driven by unstable point-in-time indicators, limiting comparisons between official data collections or surveys.

The cultural cohort approach (CCA) proposed in this thesis is a novel technique to understand within-ethnic population difference. Rather than developing yet another set of cultural identity measures, it explicitly incorporates the decades of research and historical documents that already exist and that contain all the information necessary to understand group difference within ethnic populations, including how these groups formed and how health and wellbeing is patterned within them. The description of a Māori cultural cohort draws upon existing work, where an existing measure or theory of Māori cultural identity captures a set of related cultural cohorts more accurately, for example marae-centred cultural cohorts, than other cultural cohorts for example non-traditional urban Māori communities. This open approach to theory encourages the selection of best-fitting theory and measures for any given cultural cohort. There is also an explicit assumption that cultural cohorts can change, so measures and theory also need to adapt to represent contemporary cultural cohorts. Where additional information is needed to better understand the cultural characteristics of a given cultural cohort and the measures needed to place an individual within that cultural cohort, the information unearthed by the CCA in understanding the journey over time of a cultural cohort and its members will give a distinct advantage in their development. Uniquely the CCA models individual ethno-cultural identity as their journey through and membership of the cultural cohorts identified in the origins and abstractions steps of the CCA.

The grounding principle in CCA is that cultural cohorts are resilient and unique, have existed over multiple generations, but change and divide at within-ethnic stratifications (e.g., class or location) in response to powerful external forces. By following the CCA, each cultural cohort will have a narrative and origin story, their cultural characteristics clearly described, and how each cultural cohort is related to other cultural cohorts. While it was not something that could be explored in this thesis, the idea that some origin stories will be far more durable and accessible intergenerationally (e.g., Te Ahi Kā) than others (e.g., Ahi Mātao) also arose. This imbalance in intergenerational narratives is potentially a useful source of information both to characterise a cultural cohort and as an individual indicator of membership in a given cultural cohort.

This approach will enable better research by authentically representing the diverse lived realities of ethno-cultural populations. The CCA will support more effective policy development and health promotion initiatives by understanding who it will impact, in what way, and how they need to engage. Additionally, the CCA provides a method to understand and model the increasing ethnic diversity in Aotearoa NZ, as concurrent membership in other non-Māori ethno-cultural cohorts would be common, despite not being explored in this thesis.

Limitations and suggestions for further research

An important limitation in this were the data used in the analyses. It was believed when this thesis began that using the Māori identity measures drawn from the HWR study (Towers, 2008) would be sufficient to unambiguously identify the predicted Māori cultural cohorts. However, the evolution of the CCA over the course of writing this thesis, clarified what measures would be best suited to identify a cultural cohort, several of which were missing from the dataset available at the time. Key measures that would need to be included were religion (particularly Māori-Christian based), te Ao Māori education (e.g., kura Kaupapa Māori, wānanga, te reo Māori

course), and growing-up or residing for long periods of time in identified Māori communities (e.g., rural marae-centred, urban high Māori and/or Pacific density neighbourhoods, low Māori density residential/suburbs). Some of these measures already exist (religion) and some need to be developed. A second limitation is that while the CCA can be applied to any ethnic population, the supporting material (e.g., historical documents, identity research) may not be as comprehensive as for Māori. This may mean predicting some cultural cohorts will be less accurate and the description of their key characteristics less complete. A third limitation is the difficulty of testing for intergenerational membership of Cultural Cohorts, where children have membership of many of the same cultural cohorts as their parents, in addition to membership of Cultural Cohorts specific to their cultural milieu.

Four avenues for further research immediately present themselves: (1) Build upon cultural cohorts described in this thesis, adding further detail to the historical narratives, technologies and symbologies for each cultural cohort; (2) conduct in-depth qualitative research with the cultural cohorts predicted by the CCA to further test the theory, enhance the narratives and characteristics of each cohort, and identify any cohorts missing from the literature; (3) investigate alternative datasets to test the predictions of the CCA, for example using the Statistics New Zealand hosted Integrated Data Infrastructure (IDI) comprising linked census, survey, and government administrative datasets (Statistics New Zealand, 2020a) or incorporating early-life history and religious data from differing waves of the HWR study (Allen, 2018) - an advantage with the CCA is that measures do not need to be taken at the same time; and (4) generate socio-economic and health profiles for each of the cultural cohorts.

Additional projects using the CCA would be to describe the cultural markers and origin stories of hard-to-reach cultural cohorts such as gang whānau (Roguski & McBride-Henry, 2020) or unpack the Ahi Mātao cultural cohort as part of investigating how cultural hybridisation occurs within between Māori and Pākehā cultural cohorts (Bell, 2009; Panelli et al., 2008; Wetherell & Mohanty, 2010). There are other analytical techniques that could be applied (e.g., Factor

Analysis, Factor Mixture Model) and further work can be using Latent Cluster Analysis (LCA) with other data sets and measures or utilising the LCA output in other ways (e.g., incorporate the membership probabilities for other latent clusters for each participant giving a more complex multi-cultural cohort picture).

The possibilities of the cultural cohort approach for both within-culture and as a component of a CJT national level analysis are enormous, and as we approach a future filled with life-changing and global events, some of which are occurring now – climate change, nationalism, weaponised dis-information, pandemics, and war. Any of these have the potential to separate people, communities, and cultures into new distinct forms.

Kia ora

References

Allen, J. (2018). *Work and Retirement (HWR) study Life Course History Telephone Interview project. Technical report for the Health, Work and Retirement Study*. Retrieved from Palmerston North: https://www.massey.ac.nz/massey/fms/Colleges/College%20of%20Humanities%20and%20Social%20Sciences/Psychology/HART/publications/reports/Technical_Report_LCHI_2017_V1.pdf?0CDCE0914E3A6FCAE4C4EA542A7B1A30

Andreasen, R. O. (1998). A new perspective on the race debate. *The British Journal for the Philosophy of Science, 49*(2), 199-225.

Andreasen, R. O. (2000). Race: Biological reality or social construct? *Philosophy of Science, 67*(S3), S653-S666.

Archer, D., & Archer, M. (1971). Maoris in cities. *Race, Vol. 13*(2), 179-185. Retrieved from http://search.epnet.com/login.aspx?direct=true&db=psyh&an=1974-00810-001

Archer, M., Decoteau, C., Gorski, P., Little, D., Porpora, D., Rutzou, T., . . . Vandenberghe, F. (2016). What is critical realism. *Perspectives, 38(2),* 6. Retrieved from http://www.asatheory.org/uploads/4/3/3/7/43371669/perspectives_38_2__fall_2016_final.pdf

Auckland Regional Public Health Service. (2019). *Surveillance Report 2018*. Retrieved from Auckland: https://www.arphs.health.nz/assets/Uploads/Resources/Health-professionals/Surveillance/ARPHS-Annual-Surveillance-Report-2018.pdf

Australian Bureau of Statistics. (2019). *Australian Standard Classification of Cultural and Ethnic Groups (ASCCEG)*. Retrieved from https://www.abs.gov.au/statistics/classifications/australian-standard-classification-cultural-and-ethnic-groups-ascceg/latest-release

Australian Bureau of Statistics. (2021). *Ancestry 1st response (ANC1P)*. Retrieved from Australia: https://www.abs.gov.au/census/guide-census-data/census-dictionary/2021/variables-topic/cultural-diversity/ancestry-1st-response-anc1p

Axelsson, P., Kukutai, T. H., & Kippen, R. (2016). The field of Indigenous health and the role of colonisation and history. *Journal of Population Research*, 1-7. doi:10.1007/s12546-016-9163-2

Barcham, P. (1986). Racism in Aotearoa: A socialist perspective. In S. Maharey & M. O'Brien (Eds.), *Alternatives: Socialist essays for the 1980's* (pp. 55-75). Palmerston North: Department of Sociology, Massey University.

Beaglehole, E., & Ritchie, J. E. (1958). The Rakau Maori Studies. *The Journal of the Polynesian Society, 67*(2), 132-154. Retrieved from http://www.jstor.org/stable/20703659

Bécares, L., Cormack, D., & Harris, R. (2013). Ethnic density and area deprivation: Neighbourhood effects on Māori health and racial discrimination in Aotearoa/New Zealand. *Social Science & Medicine, 88*(0), 76-82. doi:http://dx.doi.org/10.1016/j.socscimed.2013.04.007

Bell, A. (2009). Dilemmas of Settler Belonging: Roots, Routes and Redemption in New Zealand National Identity Claims. *The Sociological Review, 57*(1), 145-162. doi:10.1111/j.1467-954X.2008.01808.x

Bennett, J. (2001). Maori as Honorary Members of the White Tribe.

Benton, R. A. (1991). 'Tomorrow's Schools' and the Revitalization of Maori: Stimulus or Tranquilizer? In *Bilingual Education: Focusschrift in Honor of Joshua A. Fishman on the Occasion of His 65th Birthday, I* (pp. 135-147). Amsterdam: Benjamins.

Berry, J. W. (1970). Marginality, Stress and Ethnic Identification in an Acculturated Aboriginal Community. *Journal of Cross-Cultural Psychology, 1*(3), 239-252. doi:10.1177/135910457000100303

Berry, J. W. (1997). Immigration, Acculturation, and Adaptation. *Applied Psychology, 46*(1), 5-34. doi:https://doi.org/10.1111/j.1464-0597.1997.tb01087.x

Bhaskar, R. (1978). *The Possibility of Naturalism: A philosophical critique of the contemporary human sciences*: Routledge.

Bhaskar, R. (1997). *A Realist Theory of Science*: Verso.

Borell, B. (2005a). *Living in the City Ain't So Bad: Cultural Diversity of South Auckland Rangatahi.* (Unpublished Masters of Philosophy in Psychology). Massey University,

Borell, B. (2005b). Living in the city ain't so bad: Cultural identity for young Maori in South Auckland. In J. Liu, T. McCreanor, T. McIntosh, & T. Teaiwa (Eds.), *New Zealand identities: Departures and destinations* (pp. 191-206). Wellington: Victoria University Press.

Bosque-Prous, M., Espelt, A., Borrell, C., Bartroli, M., Guitart, A. M., Villalbí, J. R., & Brugal, M. T. (2015). Gender differences in hazardous drinking among middle-aged in Europe: the role of social context and women's empowerment. *European Journal of Public Health, 25*(4), 698-705. doi:10.1093/eurpub/cku234

Boven, N., Exeter, D., Sporle, A., & Shackleton, N. (2020). The implications of different ethnicity categorisation methods for understanding outcomes and developing policy in New Zealand. *Kotuitui: New Zealand Journal of Social Sciences Online, 15*(1), 123-139. doi:10.1080/1177083X.2019.1657912

Breheny, M., Stevenson, B. S., Bécares, L., Abelson, J., Rafferty, J., & Cormack, D. (2021). Tabulating experiences of racism and racial discrimination across the life course. *Stigma and Health, 6*(1), 43-52. doi:10.1037/sah0000279

Broman, P., & Kukutai, T. H. (2021). Fixed not fluid: European identification in the Aotearoa New Zealand census. *Journal of Population Research, 38*(2), 103-138. Retrieved from https://EconPapers.repec.org/RePEc:spr:joprea:v:38:y:2021:i:2:d:10.1007_s12546-021-09262-4

Brubaker, R., & Cooper, F. (2000). Beyond “identity”. *Theory and Society, 29*(1), 1-47. doi:10.1023/A:1007068714468

Busseri, M., Sadava, S., Molnar, D., & DeCourville, N. (2009). A Person-Centered Approach to Subjective Well-Being. *Journal of Happiness Studies, 10*, 161-181. doi:10.1007/s10902-007-9072-3

Byrne, D. (1998). *Complexity theory and the social sciences : an introduction*. London: London : Routledge.

Callister, P. (2004a). Ethnicity measures, intermarriage and social policy. *Social Policy Journal of New Zealand, 23*, 109-140.

Callister, P. (2004b). Seeking an ethnic identity: Is ‘New Zealander’a valid ethnic category? *New Zealand Population Review, 30*(1).

Callister, P., & Blakely, T. (2004). Ethnic Classification, Intermarriage, and Mortality: Some methodological issues in relation to ethnic comparisons in Aotearoa. *Unpublished Working Paper*.

Callister, P., Didham, R., Newell, J., & Potter, D. (2007). ``Family Ethnicity'': Knitting a Jumper Using Two Woolly Concepts. *Social Policy Journal of New Zealand, 32*, 32.

Callister, P., Didham, R., & Potter, D. (2005). *Ethnic intermarriage in New Zealand*. Retrieved from Wellington:

Calman, R. (2012). Māori education – mātauranga - Kaupapa Māori education. Retrieved from http://www.teara.govt.nz/en/maori-education-matauranga/page-5

Cameron, M. P., & Poot, J. (2019). Towards Superdiverse Aotearoa: Dimensions of Past and Future Ethnic Diversity in New Zealand and its Regions. *New Zealand Population Review*(45), 18-45.

Cameron, V., Faatoese, A., Gillies, M., Robertson, P., Huria, T., & Doughty, R. (2012). A cohort study comparing cardiovascular risk factor in rural Māori, urban Māori and non-Māori communities in New Zealand. *BMJ Open, 2*. doi:10.1136/bmjopen-2011-000799

Carter, K. N., Hayward, M., Blakely, T., & Shaw, C. (2009). How much and for whom does self-identified ethnicity change over time in New Zealand? Results from a longitudinal study. *Social Policy Journal of New Zealand, 36*, 32-45.

Clark, S. T., Zhu, M., Gamble, G. D., Naot, D., Paine, S.-J., Dalbeth, N., . . . Musson, D. S. (2020). Epidemiology of tendon and ligament injuries in Aotearoa/New Zealand between 2010 and 2016. *Injury Epidemiology, 7*(1), 5. doi:10.1186/s40621-020-0231-x

Cleveland, M. J., Lanza, S. T., Ray, A. E., Turrisi, R., & Mallett, K. A. (2012). Transitions in First-Year College Student Drinking Behaviors: Does Pre-College Drinking Moderate the Effects of Parent- and Peer-Based Intervention Components? *Psychology of addictive behaviors : journal of the Society of Psychologists in Addictive Behaviors, 26*(3), 440-450. doi:10.1037/a0026130

Collins, L. M., & Lanza, S. T. (2010). General Introduction. In *Latent Class and Latent Transition Analysis* (pp. 1-22): John Wiley & Sons, Inc.

Cormack, D. (2010). *The practice and politics of counting: ethnicity data in official statistics in Aotearoa/New Zealand*. Retrieved from Wellington: http://www.otago.ac.nz/wellington/departments/publichealth/research/erupomare/publications/

Cormack, D., & Robson, C. (2010). *Classification and output of multiple ethnicities: issues for monitoring Māori health*. Retrieved from Wellington:

Cormack, D., Stanley, J., & Harris, R. (2018). Multiple forms of discrimination and relationships with health and wellbeing: Findings from national cross-sectional surveys in Aotearoa/New Zealand. *International Journal for Equity in Health, 17*(1). doi:10.1186/s12939-018-0735-y

Cunningham, C., Durie, M. H., Stevenson, B. S., & Fitzgerald, E. D. (2002). Maori Perspectives on the Measurement of Living Standards. In (pp. 2-36). Wellington, NZ: Ministry of Social Development.

Cunningham, C., Stevenson, B. S., & Tassell, N. (2005). *Analysis of the Characteristics of Whanau in Aotearoa: A report for the Ministry of Education*, Wellington.

Curtis, E., Wright, C., & Wall, M. (2005). The epidemiology of breast cancer in Maori women in Aotearoa New Zealand: implications for screening and treatment. *N Z Med J, 118*(1209), U1297.

Dannefer, D. (2003). Cumulative advantage/disadvantage and the life course: Cross-fertilizing age and social science theory. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 58*(6), S327-S337.

Davis, L. d. u. e., & Wu, S. s. h. e. (2014). Social Comparisons and Life Satisfaction Across Racial and Ethnic Groups: The Effects of Status, Information and Solidarity. *Social Indicators Research, 117*(3), 849-869. doi:10.1007/s11205-013-0367-y

Department of Statistics. (1988). *Report of the Review Committee on Ethnic Statistics*. Retrieved from Wellington: http://www.stats.govt.nz/

Dicker, B., Todd, V. F., Tunnage, B., Swain, A., Conaglen, K., Smith, T., . . . Howie, G. (2019). Ethnic disparities in the incidence and outcome from out-of-hospital cardiac arrest: A New Zealand observational study. *Resuscitation, 145*, 56-62. doi:https://doi.org/10.1016/j.resuscitation.2019.09.026

Didham, R., & Callister, P. (2012). The effect of ethnic prioritisation on ethnic health analysis: a research note. *N Z Med J, 125*(1359), 58-66.

Ding, J., Tarokh, V., & Yang, Y. (2018). Model Selection Techniques: An Overview. *IEEE Signal Processing Magazine, 35*(6), 16-34. doi:10.1109/MSP.2018.2867638

DiPrete, T. A., & Eirich, G. M. (2006). Cumulative Advantage as a Mechanism for Inequality: A Review of Theoretical and Empirical Developments. *Annual Review of Sociology, 32*(1), 271-297. doi:doi:10.1146/annurev.soc.32.061604.123127

Disney, G., Teng, A., Atkinson, J., Wilson, N., & Blakely, T. (2017). Changing ethnic inequalities in mortality in New Zealand over 30years: Linked cohort studies with 68.9 million person-years of follow-up. *Population Health Metrics, 15*. doi:10.1186/s12963-017-0132-6

Dulin, P. L., Stephens, C. V., Alpass, F., Robert, H., & Stevenson, B. S. (2011). The impact of socio-contextual, physical and lifestyle variables on measures of physical and psychological wellbeing among Māori and non-Māori: the New Zealand Health, Work and Retirement Study. *Ageing & Society, 31*(08), 1406-1424. doi:doi:10.1017/S0144686X10001479

Duncanson, M., Oben, G., Adams, J., Richardson, G., Wicken, A., & Pierson, M. (2019). *Health and wellbeing of under-15 year olds in the Midland region 2018*. Retrieved from Dunedin: https://www.otago.ac.nz/nzcyes

Durie, A. E. (1993). *Report on the evaluation of the "Tihei Mauri Ora" teacher development contract*, Palmerston North.

Durie, M. H. (1985). A Maori perspective of health. *Soc Sci Med, 20*(5), 483-486. doi:10.1016/0277-9536(85)90363-6

Durie, M. H. (1994). *Whanau, family and the promotion of health*. Palmerston North: Massey University, Deptartment of Maori Studies.

Durie, M. H. (1995a). *Nga Matatini Maori: Diverse Maori realities*. Paper presented at the Wānanga Pūrongo Kōreroreo, Tūrangawaewae Marae, Ngāruawahia.

Durie, M. H. (1995b). Te Hoe Nuku Roa: A Maori identity measure. *The Journal of the Polynesian Society, 104*(4), 10. Retrieved from https://www.jstor.org/stable/20706636

Durie, M. H. (1998). *Whaiora: Maōri health development*: Oxford University Press.

Durie, M. H. (1999a). *Whaiora - Maori Health Development Second Edition*. Auckland: Oxford University Press.

Durie, M. H. (1999b). Whaiora - Maori Health Development Second Edition.

Durie, M. H. (2001). *Maori Ora: The Dynamics of Maori Health*. Auckland: Oxford University Press.

Durie, M. H. (2004). An Indigenous model of health promotion. *Health Promotion Journal of Australia, 15*, 181-185. doi:10.1071/HE04181

Durie, M. H. (2006). *Measures of Maori Wellbeing*. Retrieved from Wellington: http://www.treasury.govt.nz/publications/media-speeches/guestlectures/durie-aug06

Durie, M. H., Allan, G., Cunningham, C., Edwards, W. J. W., Gillies, A., Kingi, T. K., . . . Waldon, J. (1996). *Oranga Kaumätua - a report prepared for the Ministry of Health and Te Puni Kökiri*. Retrieved from Palmerston North:

Durie, M. H., Allan, G. R., & Cunningham, C. (1997). Oranga Kaumatua The Health and Wellbeing of Older Maori. *Massey University: New Zealand: School of Maori Studies*.

Edwards, W. J. W. (2010). *Taupaenui : Maori positive ageing.* (Doctor of Philosophy in Public Health). Massey University, Palmerston North.

Elder, G. H., & George, L. K. (2016). Age, Cohorts, and the Life Course. In M. J. Shanahan, J. T. Mortimer, & M. Kirkpatrick Johnson (Eds.), *Handbook of the Life Course: Volume II* (pp. 59-85). Cham: Springer International Publishing.

Erikson, E. H. (1994). *Identity and the life cycle*: WW Norton & Company.

Esteban, J., Mayoral, L., & Ray, D. (2012). Ethnicity and Conflict: Theory and Facts. *Science, 336*(6083), 858-865. doi:10.1126/science.1222240

First Nations Information Governance Centre. (2022). Our History. Retrieved from https://fnigc.ca/about-fnigc/our-history/

Fisher-Onar, N., Liu, J. H., & Woodward, M. (2014). Critical junctures? Complexity and the post-colonial nation-state. *International Journal of Intercultural Relations, 43*, 22-34. doi:https://doi.org/10.1016/j.ijintrel.2014.08.009

Foley, R. A., & Mirazón Lahr, M. (2011). The evolution of the diversity of cultures. *Philosophical Transactions of the Royal Society B: Biological Sciences, 366*(1567), 1080-1089. doi:10.1098/rstb.2010.0370

Forster, M. (2008). Te Hoe Nuku Roa: A journey towards Maori centered research. *Ethnobotany Research and Applications, 1*, 047-054.

Gannett, L. (2004). The Biological Reification of Race. *The British Journal for the Philosophy of Science, 55*(2), 323-345. doi:10.1093/bjps/55.2.323

George, L. (2010). *Tradition, invention, and innovation : multiple reflections of an urban marae : a thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Social Anthropology at Massey University, Auckland, New Zealand.* (Doctor of Philosphy (Ph.D.) Doctoral). Massey University, Retrieved from http://hdl.handle.net/10179/1251

Gissis, S. B. (2008). When is 'race' a race? 1946–2003. *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences, 39*(4), 437-450. doi:http://dx.doi.org/10.1016/j.shpsc.2008.09.006

Gloyne, P. (2018). Te Ahi Kā. *Te Mōkihi*(61). Retrieved from https://hail.to/rakaihautu/publication/3ELpJte/article/N3Rp7G2

Granovetter, M. (1985). Economic Action and Social Structure: The Problem of Embeddedness Economic Action and Social Structure: The Problem of Embeddedness'. *Source: American Journal of Sociology, 91*, 481-510.

Greaves, L., Houkamau, C. A., & Sibley, C. G. (2015). Māori identity signatures: A latent profile analysis of the types of Māori identity. *Cultural Diversity and Ethnic Minority Psychology, 21*(4), 541-549. doi:10.1037/cdp0000033

Hale, H. E. (2004). Explaining Ethnicity. *Comparative Political Studies, 37*(4), 458-485. doi:10.1177/0010414003262906

Hall, S. (1997). *Representation: Cultural representations and signifying practices.*: Sage Publications, Inc Open University Press.

Haller, M., Eder, A., & Stolz, E. (2016). Ethnic Stratification and Patterns of Income Inequality Around the World: A Cross-National Comparison of 123 Countries, Based on a New Index of Historic Ethnic Exploitation. *Social Indicators Research, 128*(3), 1047-1084. doi:10.1007/s11205-015-1069-4

Hamilton, D., Sherman, S., & Castelli, L. (2002). A Group by Any Other Name-The Role of Entitativity in Group Perception. *European Review of Social Psychology, 12*, 139-166. doi:10.1080/14792772143000049

Hansen, S. L. (2020). *Messy Multiculturalism.* (Doctor of Philosophy PhD). Victoria University of Wellington, Wellington.

Harker, R. K. (1971). Maori Education and Research.

Harris, R., Cormack, D., & Stanley, J. (2013a). The relationship between socially-assigned ethnicity, health and experience of racial discrimination for Maori: analysis of the 2006/07 New Zealand Health Survey. *BMC Public Health, 13*(1), 844. Retrieved from http://www.biomedcentral.com/1471-2458/13/844

Harris, R., Cormack, D., & Stanley, J. (2013b). The relationship between socially-assigned ethnicity, health and experience of racial discrimination for Māori: analysis of the 2006/07 New Zealand Health Survey. *BMC Public Health, 13*(1), 844. doi:10.1186/1471-2458-13-844

Harvey, D. (2006). The Sociological and Geographical Imaginations. *International Journal of Politics, Culture, and Society, 18*(3), 211. doi:10.1007/s10767-006-9009-6

Hawke, G., Bedford, R., Kukutai, T. H., McKinnon, M., Olssen, E., & Spoonley, P. (2014). *Our Futures: Te Pae Tawhiti*. Retrieved from

Henry, E. (2007). Kaupapa Maori entrepreneurship. In *International handbook of research on indigenous entrepreneurship*: Edward Elgar Publishing.

Hewstone, M., Rubin, M., & Willis, H. (2002). Intergroup bias. *Annual Review of Psychology, 53*(1), 575-604.

Hill, R. S. (2004). *State authority, indigenous autonomy: Crown-Maori relations in New Zealand/Aotearoa 1950-2000*. Wellington: Victoria University Press.

Hill, R. S. (2016). New Zealand Maori: The Quest for Indigenous Autonomy. *Ethnopolitics, 15*(1), 144-165. doi:10.1080/17449057.2015.1101844

Hilton, D. J., & Liu, J. H. (2017). History as the narrative of a people: From function to structure and content. In (Vol. 10, pp. 297-309).

Hirini, P. R., Flett, R. A., Kazantzis, N., Long, N. R., Millar, M. A., & MacDonald, C. (1999). Health care needs for older Māori: A study of Kaumātua and kuia. *Social Policy Journal of New Zealand, 13*, 136-153.

Houkamau, C. A. (2010). Identity construction and reconstruction: the role of socio-historical contexts in shaping Māori women's identity. *Social Identities, 16*(2), 179-196. doi:10.1080/13504631003688872

Houkamau, C. A., Milojev, P., Greaves, L., Dell, K., Sibley, C. G., & Phinney, J. (2021). Indigenous ethnic identity, in-group warmth, and psychological wellbeing: A longitudinal study of Māori. *Current Psychology*, 1-17.

Houkamau, C. A., & Sibley, C. G. (2015). The Revised Multidimensional Model of Māori Identity and Cultural Engagement (MMM-ICE2). *Social Indicators Research, 122*(1), 279-296. Retrieved from http://www.jstor.org/stable/24721417

Howard, A., & Rensel, J. (2004). Rotuman Identity in the Electronic Age. In T. van Meijl & J. Miedema (Eds.), *Shifting Images of Identity in the Pacific* (pp. 219-236). Leiden: KITLV Press.

Howard, S., & Didham, R. (2007). *Ethnic intermarriage and ethnic transference amongst the Maori population: implications for the measurement and definition of ethnicity*: Statistics New Zealand.

IBM Corp. (2016). IBM SPSS Statistics for Windows (Version 24). Armonk, NY: IBM Corp.

Jackson, J. S., Govia, I. O., & Sellers, S. L. (2011). Chapter 7 - Racial and Ethnic Influences Over the Life Course. In *Handbook of Aging and the Social Sciences (Seventh Edition)* (pp. 91-103). San Diego: Academic Press.

Jackson, M. (1988). *The Maori and the criminal justice system : a new perspective = he whaipaanga hou. Part 2 / Moana Jackson*. Wellington, N.Z: Policy and Research Division, Dept. of Justice.

Jagosh, J. (2019). Realist Synthesis for Public Health: Building an Ontologically Deep Understanding of How Programs Work, For Whom, and In Which Contexts. *Annual Review of Public Health, 40*(1), 361-372. doi:10.1146/annurev-publhealth-031816-044451

James, A. (2001). Making sense of race and racial classification. *Race and Society, 4*(2), 235-247. doi:http://dx.doi.org/10.1016/S1090-9524(03)00012-3

Jensen, J., Spittal, M., Crichton, S., Sathiyandra, S., & Krishnan, V. (2002). *The Direct Measurement of Living Standards: The New Zealand ELSI Scale. Nga Whakaaturanga Ahuatanga Noho*. Retrieved from Wellington:

Ka'ai-Mahuta, R. (2011). The impact of colonisation on te reo Māori: A critical review of the State education system. *Te Kaharoa, 4*(1). Retrieved from https://doi.org/10.24135/tekaharoa.v4i1.117

Karetu, T. S. (1990). The Clue to Identity. *New Zealand Geographic*(5), 112-117. Retrieved from https://www.nzgeo.com/stories/the-clue-to-identity/

Karetu, T. S. (1993). Toku reo, toku mana. In W. Ihimaera (Ed.), *te ao marama 2*. Auckland: Reed Books.

Keenan, E. (2014). *Māori urban migrations and identities,'Ko Ngā Iwi Nuku Whenua': A study of urbanisation in the Wellington region during the twentieth century.* (Doctor of Philosophy). Victoria University of Wellington, Wellington.

Kenney, C. M., & Phibbs, S. (2015). A Māori love story: Community-led disaster management in response to the Ōtautahi (Christchurch) earthquakes as a framework for action. *International Journal of Disaster Risk Reduction, 14*, 46-55.

Kingi, T. K. (2002). *Hua oranga: best health outcomes for Māori.* (Doctor of Philosophy in Māori Studies). Massey University, Wellington, New Zealand.

Kingi, T. K. (2006). *Culture, health and Māori development.* Paper presented at the A paper presented at the Te Mata o te Tau Lecture Series, Palmerston North, Te Mata o te Tau Academy for Māori Research and Scholarship, Massey University, Palmerston North.

Kramer, E. M. (2013). Dimensional accrual and dissociation: An introduction. In J. Grace & E. M. Kramer (Eds.), *Communication, comparative cultures, and civilizations* (Vol. 3). New York: Hampton.

Kukutai, T. H. (2004). The problem of defining an ethnic group for public policy: Who is Maori and why does it matter? *Social Policy Journal of New Zealand*(23).

Kukutai, T. H. (2007). White mothers, brown children: Ethnic identification of Maori-European children in New Zealand. *Journal of Marriage and Family, 69*(5), 1150-1161. doi:http://dx.doi.org/10.1111/j.1741-3737.2007.00438.x

Kukutai, T. H. (2010). *The thin brown line: Re-indigenizing inequality in Aotearoa New Zealand.* (Doctor of Philosophy). Stanford University,

Kukutai, T. H. (2013). The structure of urban Māori identites. In C. Andersen & E. J. Peters (Eds.), *Indigenous in the City : Contemporary Identities and Cultural Innovation* (pp. 311-333). Vancouver: UBC Press.

Kukutai, T. H., & Callister, P. (2009). A "main" ethnic group? Ethnic self-prioritisation among New Zealand Youth. *Social Policy Journal of New Zealand, 36*, 16-31.

Kukutai, T. H., & Didham, R. (2011). Re-making the majority? Ethnic New Zealanders in the 2006 census. *Ethnic and Racial Studies, 35*(8), 1427-1446. doi:10.1080/01419870.2011.607508

Kukutai, T. H., & Pool, I. (2014). From common colonization to internal segmentation: Rethinking indigenous demography in New Zealand. In A. Romaniuk & F. Trovato (Eds.), *Aboriginal populations: Social, demographic, and epidemiological perspectives* (pp. 441-468). Edmonton, Canada: The University of Alberta Press.

Kukutai, T. H., & Rarere, M. (2015). *Te Ao Hurihuri: Iwi identification in the census*. Retrieved from Te Rūnanga Tātari Tatauranga: https://www.waikato.ac.nz/__data/assets/pdf_file/0008/269216/NIDEA-Brief-No5-IwiIdentification.pdf

Kukutai, T. H., Sporle, A., & Roskruge, M. (2017). *Subjective whānau wellbeing in Te Kupenga - Full Report (pdf)*. Retrieved from Wellington: https://thehub.swa.govt.nz/assets/Uploads/Subjective-whanau-wellbeing-report.pdf

Kurtiş, T., Yalcinkaya, N. S., & Adams, G. E. (2017). Silence in official representations of history: Implications for national identity and intergroup relations. *Journal of Social and Political Psychology, 5*(2), 21.

Lanza, S. T., & Bray, B. C. (2010). Transitions in drug use among high-risk women: An application of Latent Class and Latent Transition Analysis. *Advances and applications in statistical sciences, 3*(2), 203-235. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3171700/

Lanza, S. T., Bray, B. C., & Collins, L. M. (2013). An introduction to latent class and latent transition analysis. In J. A. Schinka, W. F. Velicer, & I. B. Weiner (Eds.), *Handbook of psychology* (2 ed., Vol. 2, pp. 691-716). Hoboken, NJ: Wiley.

Lanza, S. T., & Collins, L. M. (2008). A new SAS procedure for latent transition analysis: transitions in dating and sexual risk behavior. *Developmental Psychology, 44*(2), 446-456. doi:10.1037/0012-1649.44.2.446

Lanza, S. T., Collins, L. M., Lemmon, D. R., & Schafer, J. L. (2007). PROC LCA: A SAS Procedure for Latent Class Analysis. *Structural equation modeling : a multidisciplinary journal, 14*(4), 671-694. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2785099/

Lanza, S. T., & Rhoades, B. L. (2013). Latent Class Analysis: An Alternative Perspective on Subgroup Analysis in Prevention and Treatment. *Prevention science : the official journal of the Society for Prevention Research, 14*(2), 157-168. doi:10.1007/s11121-011-0201-1

Ling, P. A., & Thomas, D. R. (1986). Imitation of television aggression among Maori and European boys and girls. *New Zealand Journal of Psychology, 15*(2), 47-53.

The politics of culture in the Pacific 149-173 (University Press of 1990).

Linnekin, J. (1990). The politics of culture in the Pacific. In J. Linnekin & L. Poyer (Eds.), *Cultural identity and ethnicity in the Pacific* (pp. 149-173). Honolulu: University Press of.

Linzer, D. A., & Lewis, J. B. (2011). poLCA: An R Package for Polytomous Variable Latent Class Analysis. *Journal of statistical software, 42*, 1-29.

Liu, J. H., Fisher-Onar, N., & Woodward, M. W. (2014). Symbologies, technologies, and identities: Critical junctures theory and the multi-layered nation-state. *International Journal of Intercultural Relations, 43*, 2-12. doi:10.1016/j.ijintrel.2014.08.012

Liu, J. H., & Hilton, D. J. (2005). How the past weighs on the present: Social representations of history and their role in identity politics. *British Journal of Social Psychology, 44*, 537-556.

Liu, J. H., McCreanor, T., McIntosh, T., & Teaiwa, T. (Eds.). (2005). *New Zealand identities: Departures and destinations*. Wellington: Victoria University Press.

Livingstone, A. G., Spears, R., Manstead, A. S. R., & Bruder, M. (2011). The more, the merrier? Numerical strength versus subgroup distinctiveness in minority groups. *Journal of Experimental Social Psychology, 47*, 786-793. doi:10.1016/j.jesp.2011.03.012

Lorenz, E. N. (1963). Deterministic Nonperiodic Flow. *Journal of Atmospheric Sciences, 20*(2), 130-141. doi:10.1175/1520-0469(1963)020<0130:Dnf>2.0.Co;2

Lynch, S. M., & Brown, J. S. (2011). Chapter 8 - Stratification and Inequality Over the Life Course. In *Handbook of Aging and the Social Sciences (Seventh Edition)* (pp. 105-117). San Diego: Academic Press.

Malinowski, B. (1926). *Myth in primitive psychology* (Vol. 6): K. Paul, Trench, Trubner & Company, Limited.

Māori Perspective Advisory Committee. (1986). *Puao-Te-Ata-Tu (daybreak)*. Wellington: Department of Social Welfare.

Marks, J. (1994). Black, White, other: Racial categories are cultural constructs masquerading as biology. *Natural History, 1*, 32-35.

Marks, R., & Rios-Vargas, M. (2021). Improvements to the 2020 Census Race and Hispanic Origin Question Designs, Data Processing, and Coding Procedures. *Newsroom.* Retrieved from https://www.census.gov/newsroom/blogs/random-samplings/2021/08/improvements-to-2020-census-race-hispanic-origin-question-designs.html

Mathews, G. (2000). *Global culture/individual identity: searching for home in the cultural supermarket*. London: Routledge.

McIntosh, T. (2005). Maori identities: Fixed, Fluid, Forced. In J. H. Liu, T. McCreanor, T. McIntosh, & T. Teaiwa (Eds.), *New Zealand identities: Departures and destinations* (pp. 38-51). Wellington: Victoria University Press.

Mendoza, R. H. (1989). An Empirical Scale to Measure Type and Degree of Acculturation in Mexican American Adolescents and Adults. *Journal of Cross-Cultural Psychology, 20*(4), 372-385. doi:10.1177/0022022189204003

Mihaere, R. (2015). *A kaupapa Māori analysis of the use of Māori cultural identity in the prison system.* (Doctor of Philosophy). Victoria University, Wellington.

Mikaere, A. (2005). Cultural invasion continued: The ongoing colonisation of Tikanga Maori. *Yearbook of New Zealand Jurisprudence, 8*(2), 134-172. Retrieved from https://search.informit.org/doi/10.3316/informit.490129918180703

Mills, C. W., & Gitlin, T. (2000). *Sociological Imagination*: Oxford University Press, USA.

Ministry for Culture & Heritage. (2017a). New Zealand History. Retrieved from https://nzhistory.govt.nz/

Ministry for Culture & Heritage. (2017b). Te Ara: The Encyclopedia of New Zealand. Retrieved from http://www.teara.govt.nz/en/history

Ministry of Health. (2015). *Tatau Kahukura: Maori Health Chart Book 2015* (3rd ed.). Wellington: Ministry of Health.

Ministry of Health. (2017). *HISO 10001:2017 Ethnicity Data Protocols*. Retrieved from Wellington: https://www.health.govt.nz/system/files/documents/publications/hiso-10001-2017-ethnicity-data-protocols-v2.pdf

Moeke-Pickering, T. (1996). *Maori identity within whanau: A review of literature*. Retrieved from Hamilton, New Zealand:

Moreno-John, G., Gachie, A., Fleming, C. M., NÁpoles-Springer, A., Mutran, E., Manson, S. M., & PÉrez-Stable, E. J. (2004). Ethnic Minority Older Adults Participating in Clinical Research Developing Trust. *Journal of Aging and Health, 16*. doi:10.1177/0898264304268151

Mullen, B. (1983). Operationalizing the effect of the group on the individual: A self-attention perspective. *Journal of Experimental Social Psychology, 19*(4), 295-322. doi:Doi: 10.1016/0022-1031(83)90025-2

Munoz-Pacheco, J. M., Volos, C., Serrano, F. E., Jafari, S., Kengne, J., & Rajagopal, K. (2021). Stabilization and Synchronization of a Complex Hidden Attractor Chaotic System by Backstepping Technique. *Entropy (Basel), 23*(7). doi:10.3390/e23070921

Mutu, M. (2019). 'To honour the treaty, we must first settle colonisation' (Moana Jackson 2015): the long road from colonial devastation to balance, peace and harmony. *Journal of the Royal Society of New Zealand, 49*(sup1), 4-18. doi:10.1080/03036758.2019.1669670

Nagel, J. (2014). Constructing Ethnicity: Creating and Recreating Ethnic Identity and Culture*. *Social Problems, 41*(1), 152-176. doi:10.2307/3096847

National Women's Health. (2019). *National Women's Health Annual Clinical Report 2018*. Retrieved from Auckland: https://nationalwomenshealth.adhb.govt.nz/assets/Womens-health/Documents/ACR/NWH-Annual-Clinical-Report-2018-final.pdf

New Zealand Health Survey. (2020). Annual data explorer. Retrieved from https://minhealthnz.shinyapps.io/nz-health-survey-2018-19-annual-data-explorer/

Noels, K. A., & Clément, R. (2015). Situational variations in ethnic identity across immigration generations: Implications for acculturative change and cross-cultural adaptation. *International Journal of Psychology, 50*(6), 451-462. doi:10.1002/ijop.12205

O'Carroll. (2013). Maori identity construction in SNS. *International Journal of Critical Indigenous Studies, 6*(2), 2-16.

O'Malley, V. (1997). *Agents of Autonomy*. Wellington: Huia Publishers.

Oberski, D. (2016). Mixture Models: Latent Profile and Latent Class Analysis. In (pp. 275-287).

Office of Management and Budget. (1997, October 30, 1997). Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity. *Federal Register, 62(210),* 8. Retrieved from https://www.govinfo.gov/content/pkg/FR-1997-10-30/pdf/97-28653.pdf

Ostrom, T. M., & Sedikides, C. (1992). Out-group homogeneity effects in natural and minimal groups. *Psychological Bulletin, 112*(3), 536.

Panelli, R., Allen, D., Ellison, B., Kelly, A., John, A., & Tipa, G. (2008). Beyond Bluff oysters? Place identity and ethnicity in a peripheral coastal setting. *Journal of Rural Studies, 24*(1), 41-55. Retrieved from https://doi.org/10.1016/J.JRURSTUD.2007.05.008

Patrick, M. E., Collins, L. M., Smith, E., Caldwell, L., Flisher, A., & Wegner, L. (2009). A prospective longitudinal model of substance use onset among South African adolescents. *Substance Use & Misuse, 44*(5), 647-662.

Pere, M. R. (1993). Taku taha Maori: My Maoriness. In W. Ihimaera (Ed.), *Te Ao Maori. Regaining Aotearoa: Maori writers speak out* (pp. 275-277). Auckland: Reed Publishing.

Peter, M. B. (1977). A Macrosociological Theory of Social Structure. *The American Journal of Sociology, 83*(1), 26-54. Retrieved from http://www.jstor.org/stable/2777762

Phillipson, C. (2015). Placing ethnicity at the centre of studies of later life: theoretical perspectives and empirical challenges. *Ageing & Society, 35*(05), 917-934. doi:doi:10.1017/S0144686X14001032

Phinney, J. S., & Ong, A. D. (2007). Conceptualization and measurement of ethnic identity: Current status and future directions. *Journal Of Counseling Psychology, 54*(3), 271-281. doi:10.1037/0022-0167.54.3.271

Pickering, J. W., Walker, E. P., Butler, P. H., & van Halewyn, C. N. (1990). Copper vapour laser treatment of port-wine stains and other vascular malformations. *British Journal of Plastic Surgery, 43*(3), 273-282.

Pihama, L. (2014). Positioning historical trauma theory within Aotearoa New Zealand. *AlterNative (Ngā Pae o te Māramatanga)*. Retrieved from http://ezproxy.massey.ac.nz/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edsinz&AN=edsinz.809714&site=eds-live&scope=site

Pilcher, J. (1994). Mannheim's Sociology of Generations: An Undervalued Legacy. *The British Journal of Sociology, 45*(3), 481-495. doi:10.2307/591659

Platt, L., Simpson, L., & Akinwale, B. (2005). Stability and change in ethnic groups in England and Wales. *POPULATION TRENDS-LONDON-, 121*, 35.

Pool, I. (1991). *Te iwi Maori : a New Zealand population, past, present & projected*: Auckland, N.Z. : Auckland University Press, 1991.

Poulin-Dubois, D., Blaye, A., Coutya, J., & Bialystok, E. (2011). The effects of bilingualism on toddlers' executive functioning. *Journal of Experimental Child Psychology, 108*(3), 567-579. doi:10.1016/j.jecp.2010.10.009

Price, L., & Martin, L. (2018). Introduction to the special issue: applied critical realism in the social sciences. *Journal of Critical Realism, 17*(2), 89-96. doi:10.1080/14767430.2018.1468148

Rademakers, R., & van Hoorn, A. (2020). Choosing Your Ethnicity: A Longitudinal Analysis of Ethnic Identity Choice and Intra-Individual Ethnicity Change. *Available at SSRN 3557883*.

Rademakers, R., & van Hoorn, A. (2021a). Ethnic switching: Longitudinal evidence on prevalence, correlates, and implications for measuring ethnic segregation. *Journal of Development Economics*, 102694.

Rademakers, R., & van Hoorn, A. (2021b). Physical Appearance and Ancestry as Predictors of Racial Passing: A Research Note on Racial (Non-) Fluidity in the US. *Available at SSRN 3964577*.

Rangihau, J. (1977). Being Maori. In M. King (Ed.), *Te Ao Hurihuri: The World Moves On: Aspects of Maoritanga*. Wellington: Hicks Smith.

Rauna, R. (2010). *Tūranga Ā Mua, Tūranga Ā Muri Research into Leadership For Governing Tribal Assets.* (Thesis for the fulfilment of a Master of Business Administration). University of Waikato, Hamilton.

Reid, J., Varona, G., Fisher, M., & Smith, C. (2016). Understanding Maori 'lived' culture to determine cultural connectedness and wellbeing. *Journal of Population Research*, 1-19. doi:10.1007/s12546-016-9165-0

Ritchie, J. E. (1963). *The making of a Maori*. Auckland: A. H. & A. W. Reed.

Robson, B. (2002). *Mana Whakamarama—Equal explanatory power: Maori and non-Maori sample size in national health surveys.* Retrieved from Wellington:

Roguski, M., & McBride-Henry, K. (2020). The failure of health promotion for marginalised populations. *Australian and New Zealand Journal of Public Health, 44*(6), 446-448. doi:https://doi.org/10.1111/1753-6405.13048

Rousselle, L., Palmers, E., & Noel, M. P. (2004). Magnitude comparison in preschoolers: What counts? Influence of perceptual variables. *Journal of Experimental Child Psychology, 87*(1), 57-84. Retrieved from <Go to ISI>://000188062300003

RStudio Team. (2020). RStudio: Integrated Development for R. Boston, MA: RStudio, PBC. Retrieved from http://www.rstudio.com/

Ruscio, J., & Ruscio, A. M. (2008). Categories and Dimensions: Advancing Psychological Science Through the Study of Latent Structure. *Current Directions in Psychological Science, 17*(3), 203-207. doi:10.1111/j.1467-8721.2008.00575.x

Ryder, A. G., Alden, L. E., & Paulhus, D. L. (2000). Is acculturation unidimensional or bidimensional? A head-to-head comparison in the prediction of personality, self-identity, and adjustment. *J Pers Soc Psychol, 79*(1), 49-65.

Ryks, J. (2019). *Māori heterogeneity in regional Aotearoa New Zealand: An exploratory study*. Retrieved from Hamilton: https://www.waikato.ac.nz/__data/assets/pdf_file/0010/664129/CaDDANZ-Brief-_7-Online.pdf

Ryks, J., Pearson, A. L., & Waa, A. (2016). Mapping urban Māori: A population-based study of Māori heterogeneity. *New Zealand Geographer*, n/a-n/a. doi:10.1111/nzg.12113

Sani, F., Bowe, M., Herrera, M., Manna, C., Cossa, T., Miao, X., & Zhou, Y. (2007). Perceived collective continuity: seeing groups as entities that move through time. *European Journal of Social Psychology, 37*(6), 1118-1134. Retrieved from http://10.0.3.234/ejsp.430

http://ezproxy.massey.ac.nz/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=pbh&AN=27391767&site=eds-live&scope=site

SAS Institute Inc. (2012). SAS for Windows (Version 9.4). Cary, NC, USA.

Schick-Makaroff, K., MacDonald, M., Plummer, M., Burgess, J., & Neander, W. (2016). What Synthesis Methodology Should I Use? A Review and Analysis of Approaches to Research Synthesis. *AIMS public health, 3*(1), 172-215. doi:10.3934/publichealth.2016.1.172

Schopflin, G. (1997). *The functions of myth and a taxonomy of myths* (Vol. 19). London: University of London Press.

Schwartz, S. J., Syed, M., Yip, T., Knight, G. P., Umaña-Taylor, A. J., Rivas-Drake, D., & Lee, R. M. (2014). Methodological issues in ethnic and racial identity research with ethnic minority populations: theoretical precision, measurement issues, and research designs. *Child Dev, 85*(1), 58-76. doi:10.1111/cdev.12201

Sellers, R. M., Rowley, S. A. J., Chavous, T. M., Shelton, J. N., & Smith, M. A. (1997). Multidimensional Inventory of Black Identity: A preliminary investigation of reliability and constuct validity. *Journal of Personality and Social Psychology, 73*(4), 805-815. doi:10.1037/0022-3514.73.4.805

Simmonds, S. (2010). *The implications of using different methods to measure ethnicity in a cohort study.* (Masters). University of Otago,, Wellington.

Siroky, D., & Hechter, M. (2016). Ethnicity, class, and civil war: the role of hierarchy, segmentation, and cross-cutting cleavages. *Civil Wars, 18*(1), 91-107. doi:10.1080/13698249.2016.1145178

Smedley, A., & Smedley, B. D. (2005). Race as biology is fiction, racism as a social problem is real: Anthropological and historical perspectives on the social construction of race. *Am Psychol, 60*(1), 16-26. doi:10.1037/0003-066X.60.1.16

Smith, L. T., Smith, G. H., Boler, M., Kempton, M., Ormond, A., Chueh, H.-C., & Waetford, R. (2002). "Do You Guys Hate Aucklanders Too?" Youth: Voicing Difference from the Rural Heartland.

Sommerlad, E. A., & Berry, J. W. (1970). The role of ethnic identification in distinguishing between attitudes towards assimilation and integration of a minority racial group. *Human Relations, 23*(1), 23-29. doi:10.1177/001872677002300103

Sporle, A., Pearce, N., & Davis, P. (2002). The Interaction between Socioeconomic Position and Ethnicity in Health Inequality-The Case of Mortality Patterns over Two Decades in New Zealand.

Sporle, A., Pearce, N., & Davis, P. (2002). The Interaction between Socioeconomic Position and Ethnicity in Health Inequality-The Case of Mortality Patterns over Two Decades in New Zealand.

Stark, P. A., & Traxler, A. J. (1974). Empirical Validation of Erikson's Theory of Identity Crises in Late Adolescence. *The Journal of Psychology, 86*(1), 25-33. doi:10.1080/00223980.1974.9923880

Statistics Canada. (2022). Ethnic or cultural origin. *Dictionary, Census of Population, 2021.* Retrieved from https://www12.statcan.gc.ca/census-recensement/2021/ref/dict/az/definition-eng.cfm?ID=pop030

Statistics New Zealand. (2001). Household Economic Survey (Year ended 30 June 2001). Retrieved from http://www.stats.govt.nz/

Statistics New Zealand. (2004). *Report of the Review of the Measurement of Ethnicity June 2004*. Retrieved from http://www.stats.govt.nz/

Statistics New Zealand. (2005). *Understanding and Working with Ethnicity Data*. Retrieved from http://archive.stats.govt.nz/~/media/Statistics/surveys-and-methods/methods/class-stnd/ethnicity/Understanding%20and%20Working%20with%20Ethnicity%20Data.pdf

Statistics New Zealand. (2006a). *The Impact of Prioritisation on the Interpretation of Ethnicity Data*. Retrieved from http://www.stats.govt.nz/browse_for_stats/population/estimates_and_projections/frequently-asked-questions-population-statistics/~/media/Statistics/browse-categories/population/estimates-projections/faq-pop-stats/impact-prioritisation-interpretation-ethnicity.pdf

Statistics New Zealand. (2006b). Maori population estimates tables.

Statistics New Zealand. (2009a). 2006 Census questionnaires. Retrieved from https://cdm20045.contentdm.oclc.org/digital/collection/p20045coll2/id/1215/rec/1

Statistics New Zealand. (2009b). 2006mbdatasetallnz.zip. Retrieved from https://www3.stats.govt.nz/meshblock/2006/excel/Backup/

Statistics New Zealand. (2009c). *The Impact of Prioritisation on the Interpretation of Ethnicity Data*. Retrieved from Wellington: http://www.stats.govt.nz/~/media/Statistics/browse-categories/population/census-counts/review-measurement-ethnicity/impact-of-prioritisation-on-the-interpretation-ethnicity.pdf

Statistics New Zealand. (2011). Ethnicity. Retrieved from http://stats.govt.nz/surveys_and_methods/methods/classifications-and-standards/classification-related-stats-standards/ethnicity.aspx

Statistics New Zealand. (2013). *2013 Census QuickStats about Māori*. Retrieved from Wellington:

Statistics New Zealand. (2014a). *2013 Census QuickStats about culture and identity*. Retrieved from www.stats.govt.nz

Statistics New Zealand. (2014b). *Taku marae e: Connecting to ancestral marae 2013*. Retrieved from Wellington: www.stats.govt.nz

Statistics New Zealand. (2015). *Ngā tohu o te ora: The determinants of life satisfaction for Māori 2013*, Wellington.

Statistics New Zealand. (2016a). Ethnicity. Retrieved from http://www.stats.govt.nz/methods/classifications-and-standards/classification-related-stats-standards/ethnicity/definition.aspx#

Statistics New Zealand. (2016b). Historical population estimates tables. Retrieved from http://www.stats.govt.nz/browse_for_stats/population/estimates_and_projections/historical-population-tables.aspx

Statistics New Zealand. (2017). Ethnic group. Retrieved from http://datainfoplus.stats.govt.nz/Item/nz.govt.stats/6448e16b-ca6a-41e6-a6f5-4cbc1f0b7fed

Statistics New Zealand. (2018a). Maori descent indicator and ethnic group (grouped total responses) by age group and sex, for the census usually resident population count, 2006, 2013, and 2018 Censuses (RC, TA, SA2, DHB, urban rural indicator). Retrieved from https://nzdotstat.stats.govt.nz/wbos/Index.aspx?_ga=2.164155967.1497068261.1647941974-1025517499.1600400667#

Statistics New Zealand. (2018b). New Zealand Census of Population and Dwellings. Individual form Tuesday 6 March 2018. *Stats NZ Store House.* Retrieved from https://statsnz.contentdm.oclc.org/digital/collection/p20045coll2/id/713/rec/5

Statistics New Zealand. (2019). 2018 Census population and dwelling counts. Retrieved from https://www.stats.govt.nz/information-releases/2018-census-population-and-dwelling-counts

Statistics New Zealand. (2020a). Integrated Data Infrastructure. Retrieved from https://www.stats.govt.nz/integrated-data/integrated-data-infrastructure/

Statistics New Zealand. (2020b). Te Kupenga: 2018 (final) – English. Retrieved from https://www.stats.govt.nz/information-releases/te-kupenga-2018-final-english

Statistics New Zealand. (2021). Iwi affiliation (estimated counts): 2018. *Information releases.* Retrieved from https://www.stats.govt.nz/information-releases/iwi-affiliation-estimated-counts-2018

Stevens, G., Ishizawa, H., & Grbic, D. (2015). Measuring race and ethnicity in the censuses of Australia, Canada, and the United States: Parallels and paradoxes. *Canadian studies in population, 42*, 13-34. doi:10.25336/P6PW39

Stevenson, B. S. (2001). *Maori cultural identity and health.* (Masters). Massey University, Palmerston North.

Stevenson, B. S. (2004). Te Hoe Nuku Roa: A measure of Maori cultural identity. *He Pukenga Korero, 8*(1), 10.

Stevenson, B. S. (2021). *Health, Work and Retirement Study, unpublished tables*. Retrieved from Palmerston North:

Stevenson, B. S., Noone, J., Towers, A., Stevenson, B. S., & Noone, J. (2008). Health, Work and Retirement Survey: Summary report for the 2006 data wave: Maori Cultural Identity. In. Palmerston North: Massey University.

Stryker, S., & Burke, P. J. (2000). The Past, Present, and Future of an Identity Theory. *Social Psychology Quarterly, 63*(4), 284-297. Retrieved from http://www.jstor.org.ezproxy.massey.ac.nz/stable/2695840

Stuart, J., & Jose, P. E. (2014). The protective influence of family connectedness, ethnic identity, and ethnic engagement for New Zealand Māori adolescents. *Developmental Psychology, 50*(6), 1817.

Suinn, R. M., Ahuna, C., & Khoo, G. (1992). The Suinn-Lew Asian Self-Identity Acculturation Scale: Concurrent and Factorial Validation. *Educational and Psychological Measurement, 52*(4), 1041-1046. doi:10.1177/0013164492052004028

Szabó, Á., Allen, J., Stephens, C., & Alpass, F. (2018). Is retirement associated with physical health benefits? A longitudinal investigation with older New Zealanders. *Age and Ageing, 48*(2), 267-272. doi:10.1093/ageing/afy176

Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behaviour. In S. Worchel & W. Austin (Eds.), *Psychology of intergroup relations* (pp. 7-24). Chicago: Nelson-Hall.

Taonui, R. (2005). Tribal organisation - Social rank. In M. T. M. f. C. a. Heritage (Ed.), *Te Ara - the Encyclopedia of New Zealand* (pp. 5). Wellington: Manatū Taonga Ministry for Culture and Heritage.

Taonui, R. (2011). Ngā tuakiri hōu – new Māori identities - Māori renaissance. Retrieved from http://www.TeAra.govt.nz/en/nga-tuakiri-hou-new-maori-identities/page-3

Te Hiringa Hauora. (2020). Kupe data explorer. Retrieved from https://kupe.hpa.org.nz

Te Hoe Nuku Roa. (1999). *Te Hoe Nuku Roa source document: Baseline history*. Retrieved from Palmerston North:

Te Hoe Nuku Roa (Ed.) (1996). *Maori profiles: An integrated approach to policy and planning*. Palmerston North: Massey University.

Te Huia, A. (2015). Perspectives towards Māori identity by Māori heritage language learners. *New Zealand Journal of Psychology, 44*(3).

Teaiwa, T., & Mallon, S. (2005). Ambivalent kinships? Pacific people in New Zealand. In J. Liu, T. McCreanor, T. McIntosh, & T. Teaiwa (Eds.), *New Zealand identities: Departures and destinations* (pp. 207-229). Wellington: Victoria University Press.

The Methodology Center. (2015). PROC LCA & PROC LTA (Version 1.3.2). University Park: The Methodology Center, Penn State. Retrieved from http://methodology.psu.edu

Thom, R. R. M., & Grimes, A. (2022). Land loss and the intergenerational transmission of wellbeing: The experience of iwi in Aotearoa New Zealand. *Social Science & Medicine, 296*, 114804. doi:https://doi.org/10.1016/j.socscimed.2022.114804

Thomas, D. R. (1988). Development of a test of Maori knowledge. *New Zealand Journal of Psychology, 17*(2), 59-67.

Tobias, M. (2017). Social rank: a risk factor whose time has come? *The Lancet*. doi:10.1016/S0140-6736(17)30191-5

Tobias, M., Blakely, T., Matheson, D., Rasanathan, K., & Atkinson, J. (2009). Changing trends in indigenous inequalities in mortality: lessons from New Zealand. *International Journal of Epidemiology, 38*(6), 1711-1722. doi:10.1093/ije/dyp156

Towers, A. (2008). Health, Work and Retirement Survey: Summary report for the 2006 data wave: Methodology. Retrieved from http://hwr.massey.ac.nz/resources/methodology_towers.pdf

Towers, A., Stephens, C. V., Dulin, P., Kostick, M., Noone, J., & Alpass, F. (2011). Estimating older hazardous and binge drinking prevalence using AUDIT-C and AUDIT-3 thresholds specific to older adults. *Drug and Alcohol Dependence, 117*(2-3), 211-218. doi:10.1016/j.drugalcdep.2011.02.008

Towers, A., Stevenson, B. S., Breheny, M., & Allen, J. (2015). Health, Work, and Retirement Longitudinal Study. In A. N. Pachana (Ed.), *Encyclopedia of Geropsychology* (pp. 1-9). Singapore: Springer Singapore.

Towers, A., Stevenson, B. S., Breheny, M., & Allen, J. (2016). Health, Work, and Retirement Longitudinal Study. In N. A. Pachana (Ed.), *Encyclopedia of Geropsychology* (pp. 1-9). Singapore: Springer Singapore.

Trinick, T., & Stevenson, B. S. (2009). *An evaluation of Te Poutama Tau 2008*. Retrieved from Wellington:

Tupara, H. (2009). *He Urupounamu E Whakahaerengia Ana E Te Whanau: Whanau Decision Processes.* (PhD Public Health). Massey University, Palmerston North.

Tzeng, J. M. (2000). Ethnically heterogamous marriages: The case of Asian Canadians. *Journal of Comparative Family Studies, 31*(3), 321-337.

Umana-Taylor, A. J. (2006). Ethnic Identity Formation During Adolescence: The Critical Role of Families. *Journal of Family Issues, 27*(3), 390-414. doi:10.1177/0192513x05282960

Umana-Taylor, A. J., Yazedjian, A., & Bamaca-Gomez, M. (2004). Developing the Ethnic Identity Scale Using Eriksonian and Social Identity Perspectives.

Valentine, H. (2009). *Kia Ngāwari ki te Awatea: The relationship between Wairua and Māori well-being: A psychological perspective.* (Doctor of Clinical Psychology). Massey University, Palmerston North, New Zealand.

Valles, S. A. (2012). Heterogeneity of risk within racial groups, a challenge for public health programs. *Preventive Medicine, 55*(5), 405-408. doi:http://dx.doi.org/10.1016/j.ypmed.2012.08.022

Valles, S. A., Bhopal, R., & Aspinall, P. (2015). Census categories for mixed race and mixed ethnicity: impacts on data collection and analysis in the US, UK and NZ. *Public Health, 3*(129), 266-270.

Waldon, J. (2003). Oranga Kaumātua: perceptions of health in older Māori people. *Pacific Health Dialogue, 10*(2), 79-86.

Walker, R. (1996). *Nga pepa a Ranginui: The Walker papers*. Auckland: Penguin Books.

Ware, J., Kosinski, M., Turner-Bowker, D., & Gandek, B. (2002). *How to Score Version 2 of the SF-12 Health Survey*. Retrieved from Lincoln, RI:

Weimand, B. M., Hall-Lord, M. L., Sällström, C., & Hedelin, B. (2012). Life-sharing experiences of relatives of persons with severe mental illness – a phenomenographic study. *Scandinavian Journal of Caring Sciences, 27*, 99-107. doi:10.1111/j.1471-6712.2012.01007.x

Wenn, J. (2007). *Kaupapa Hauora Māori: Ngā Whakahirahira o Ngā Kaumatua.* (Unpublished doctoral thesis). Massey University, Palmerston North.

Wetherell, M., & Mohanty, C. T. (2010). *The SAGE handbook of identities. [electronic resource]*: Los Angeles, [Calif.] ; London : SAGE, 2010.

Williams, J. (1960) Maori achievement motivation. In*: Vol. 5. Monographs on Maori Social Life and Personality* (pp. 113). Wellington: Victoria University.

Williams, J. (2000). *The nature of the Māori community*. Paper presented at the PSSM Conference, Wellington, New Zealand. https://web.archive.org/web/20100527001503/http://pssm.ssc.govt.nz/2000/papers/jwilliam.asp

Willson, A., Shuey, K., & Elder, J. G. (2007). Cumulative Advantage Processes as Mechanisms of Inequality in Life Course Health. *American Journal of Sociology, 112*(6), 1886-1924. doi:10.1086/512712

Wray, S., & Ali, N. (2014). Understanding generation through the lens of ethnic and cultural diversity. *Families, Relationships and Societies, 3*(3), 469-473. doi:10.1332/204674314X14110460471866

Yang, S., & Lust, B. (2009). *Discovering Child Language and Cognitive Growth*. Retrieved from Ithaca, NY: http://www.human.cornell.edu/hd/outreach-extension/upload/lust.pdf

Yao, E. S., Bullen, P., Meissel, K., Tiatia, J., Fleming, T., & Clark, T. C. (2022). Effects of Ethnic Classification on Substantive Findings in Adolescent Mental Health Outcomes. *Journal of Youth and Adolescence, 51*(8), 1581-1596. doi:10.1007/s10964-022-01612-6

Yao, E. S., Meissel, K., Bullen, P., Clark, T. C., Atatoa Carr, P., Tiatia-Seath, J., . . . Morton, S. M. B. (2022). Demographic discrepancies between administrative-prioritisation and self-

prioritisation of multiple ethnic identifications. *Social Science Research, 103*, 102648. doi:https://doi.org/10.1016/j.ssresearch.2021.102648

Zealand, S. N. (2006). Maori population estimates tables.

Zealand, S. N. (2014). *Ka mārō te aho tapu, ka tau te korowai: Te reo Māori findings from Te Kupenga 2013* (978-0-478-42922-0). Retrieved from Wellingon:

Zhou, L., You, Z., & Tang, Y. (2021). A new chaotic system with nested coexisting multiple attractors and riddled basins. *Chaos, Solitons & Fractals, 148*, 111057. doi:https://doi.org/10.1016/j.chaos.2021.111057