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**Determinants of Ethnic Identity among Adolescents:
Evidence from New Zealand**

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Abstract

Auckland, New Zealand, is among the most ethnically diverse cities in the world. Like most large cities, its population is also quite youthful. In this paper, we focus on the dynamics of self-declared ethnic identities of adolescents in Auckland, by using New Zealand Linked Census data for four inter-censal periods between 1991 and 2013. Our dataset links the same young person across two consecutive Censuses (that is, those aged 13-17 in one Census are aged 18-22 in the following Census five years later). We aim to capture the first conscious ethnic identity affiliation of adolescents, assuming that their ethnic identities are initially recorded by their parents, but subsequently determined by the adolescent themselves when they transition to adulthood. We classify our predictor variables into individual, family and neighbourhood-level variables. We find that an adolescent's ethnicity stated at the previous census, parents' ethnicity, and the ethnic makeup of the neighbourhood are all major determinants of ethnic-identity choices among adolescents in Auckland.

Keywords

ethnic identity
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JEL codes

J15, R23, Z13

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Disclaimer

The results in this paper are not official statistics. They have been created for research purposes from Census unit record data in the Statistics New Zealand Datalab. The opinions, findings, recommendations, and conclusions expressed in this paper are those of the authors, not Statistics New Zealand. Access to the anonymised data used in this study was provided by Statistics New Zealand under the security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular person, household, business, or organisation and the results in this paper have been confidentialised to protect these groups from identification and to keep their data safe. Careful consideration has been given to the privacy, security and confidentiality issues associated with using unit record census data.

1. Introduction

Ethnic mobility is defined as the social phenomenon whereby people change their ethnic identity/affiliation over time. This switching of ethnic identity can be triggered by changing incentives and circumstances that impact on the desire of an individual to belong to a specific ethnic group. Ethnic mobility plays an important role in social change but, due to scarcity of appropriate longitudinal data, the literature on (dynamic) ethnic mobility is much less extensive than the literature on (static) ethnic identity. Though the literature finds that individuals can affiliate themselves with more than one ethnicity and may change their ethnic affiliation over time (for example Carter *et al.* 2009, Simpson *et al.* 2016), there are relatively few studies to date looking into the factors associated with these changes. In most research applications it is assumed for convenience that ethnic affiliation is constant over time (Carter *et al.* 2009).

The extant literature on ethnicity looks mainly at the predictors of ethnic identity (for example Nelsen 1990, Phinney and Chavira 1992, Qian 2004, Casey and Dustmann 2010, Lee and Bean 2010) and less so at *changes* in ethnic identity. More research is needed in order to assess the prevalence of ethnic mobility, as well as to answer questions regarding the fluidity and causes of ethnic mobility (Brown *et al.* 2010). Extant studies on inter-ethnic mobility in New Zealand have been based on the longitudinal Survey of Family, Income and Employment (SoFIE) (see Carter *et al.* 2009) or on data that links individuals between censuses (Statistics New Zealand 2009, Didham 2016). In a report on inter-censal ethnic mobility, Statistics New Zealand (2009) identified significant changes in ethnic identity of individuals between 2001 and 2006. They also reported that as people age, their ethnic mobility declines. According to this report, the age group that had changed their ethnic identity the most were those aged between 5 and 14 years, followed by individuals belonging to the age group 15-24.

According to Phinney (1989, 1990, 1992), the formation of ethnic identity of an individual has three stages: (1) a stage of unexamined ethnic identity; (2) an exploration period and (3) ethnic identity achievement. Unexamined ethnic identity refers to the stage where individuals have not previously been exposed to issues of ethnic identity. In this stage, mostly in childhood, individuals are influenced by the dominant culture and ethnic attitudes from their parents or other adults. In the second stage, as they transition into adolescence, an individual explores and becomes aware of their own ethnicity through their experiences. This stage involves acquiring ethnic knowledge, for example by reading, mixing with people, visits to ethnic museums, or active participation in cultural events. This stage might result in complete absorption of one's own culture as well as dismissal of the values of the dominant culture. This stage is followed by the development of individual ethnic identity, where an individual accepts and internalizes their own ethnicity. Umaña-Taylor *et al.* (2009) add stages of resolution and affirmation before the stage of ethnic identity achievement among adolescents. According to them, the period of exploration results in adolescents feeling more independent in terms of decision making, which promotes resolution of ethnic identity as they are actively deciding what ethnicity means to them. They also add that exploration and resolution of ethnic identity

is facilitated by an adolescent's cognitive transitions. However, affirmation (that is, positive/negative feelings about one's ethnicity) is a social-context-driven process that depends largely on others' perception of one's ethnic group, and can be achieved at a young age prior to adolescence.

Though the international literature highlights the importance of studying the ethnic-identity transition of young adults (Brown *et al.* 2010), this age group has not yet been looked at explicitly in studies on ethnic identity or ethnic mobility in New Zealand. In this paper, we therefore focus our attention on this period of substantial transition for all people: the transition to adulthood. This offers a unique perspective, as adolescents are given the opportunity to define their own ethnic affiliation/s, often for the first time. Specifically, we look at adolescents aged 13 to 17 years in one Census, and capture their ethnicity (and thereby any ethnic mobility) in the following Census by means of linked longitudinal census data. Observing persistence or change in these adolescents' ethnic identity, we look at the extent to which their current ethnic identity is associated with their ethnic identity in the preceding Census, along with other factors.

We use Phinney's model of ethnic identity formation among children as the conceptual framework for our study. Following Phinney (1989, 1990), ethnic identity of the adolescent in the previous Census resembles the adolescents' stage of unexamined ethnic identity. The exploration period is the period between Censuses.¹ The adolescents' ethnic identity in the following Census is the stage of ethnic identity achievement. For example, an adolescent present in the census in both 1991 and 1996, may be assumed to still be in the stage of unexamined ethnic identity in 1991, then be in an exploration period between 1991 and 1996, and achieve his/her ethnic identity by 1996. We recognise that this characterisation of the stages of ethnic identity will not represent the experience of all, or necessarily even a majority, of the adolescents in our study. However, it is a useful theoretical construct to guide our empirical work.

The paper proceeds as follows. In Section 2, we discuss relevant studies on the ethnic identity of children and adolescents, with a particular focus on New Zealand research. Section 3 describes the data and Section 4 details the method. Section 5 presents and discusses the results, and Section 6 concludes.

2. Background

Most studies related to the ethnic identity of children in the U.S. have been done using broad ethnic categories, and do not capture the significant heterogeneity present within these broad categories. These studies also focus mainly on minority ethnic groups only. Rumbaut (1994) identified the main predictors of ethnic identity of the children as their sex, nativity (U.S born or foreign born), parents' nativity and professional status (dummy variables for parents in high-

¹ The inter-censal periods considered in our work are 1991-1996, 1996-2001, 2001-2006, and 2006-2013.

status professions), language and racial-ethnic discrimination (being treated less fairly than other groups based on race and ethnicity). Eschbach and Gómez (1998) examined the determinants of changing ethnic identification in a representative national sample of Hispanic high school students. They looked at students who changed their ethnic affiliation between the first and second waves of the High School and Beyond surveys in 1980 and 1982. They found that use of Spanish language and the Hispanic composition of the school were strongly related to switching to non-Hispanic ethnic identity. Ethnic group concentration was found to be significantly and negatively related to identity switching. Sex and family income were found to have little impact on the odds of switching identity.

In Canada, Frideres and Goldenberg (1982) found that, in terms of one's ethnic identity formation as well as ethnic identity change, family, sex and occupation play a significant role, family being the most important. According to them, one's ethnic identity develops as a response to structural conditions in the society, and also to adapt to the conditions related to the contest for scarce desirable goods. They also add that in Canada, a systematic relationship exists between ethnic affiliation and occupation, education and income. Tsang *et al.* (2003) conducted qualitative research examining the concept of ethnic identity through the experiences of satellite children² in Canada. They found that ethnic identity choices/responses were strongly influenced by whether the child intended to return to their country of origin. Moreover, language barriers, cultural barriers, perception of one's ethnic identity, and acceptance from the host (Canadian) society, also influenced the ethnic identity choices of these children.

In Australia, Rosenthal and Hrynevich (2007) studied the developmental changes in the nature of ethnic identity in younger and older adolescents of minority non-Anglo groups (of Greek and Italian origin) as well as the dominant Anglo society. Language, religion, social activities, maintenance of cultural traditions, family life, perception about their own ethnic group as well as attachment towards their own ethnic group were found to be associated with a child's ethnic identity.

The ethnic identity of children can be influenced by the ethnic traits of their parents (Casey and Dustmann 2010), although research on which parent affects ethnic identity of the children to the greater extent shows varied results. Among the relevant studies in the U.S., De Snyder *et al.* (1982) found that female children of Mexican-American couples tended towards identifying themselves as Mexicans more than did male children. Stephan and Stephan (1989) identified that the ethnic identity of children of intermarried couples is affected more by the minority parent. Nelsen (1990) showed the mother to be the most influential, whereas Waters (1989) stated that due to the common use of the father's surname, the father is more influential

² Children of ethnically Chinese immigrants to North America, mainly from Hong Kong and Taiwan, whose parents (mostly fathers) have returned to their country of origin after immigration, to pursue economic advantages, leaving the mother and the child to try and settle in the new country (Man 1994, Tsang *et al.* 2003).

in the ethnic identity formation of children of an intermarried couple. Saenz *et al.* (1995) identified that factors associated with the ethnic identity of the children of Asian-Anglo intermarried couples occur at three levels: (1) child (age, sex, generation, Asian language); (2) parent (ethnic group, Asian parent's sex, Asian parent's education) and (3) ethnic community (group size, ethnic heterogeneity, socio-economic status). Children with an Asian father had a greater tendency towards identifying themselves as Asian than those whose mother was Asian. This is similar to the theoretical literature on the ethnic identity formation of children of intermarried couples (Hwang and Murdock 1991). Lee and Bean (2010), using 2010 U.S. Census data, found that children of multi-racial parents often exhibit a single ethnicity, usually identifying themselves as belonging to the majority group, due to greater social acceptability and better opportunities. The ethnic identity of immigrant children was determined by their exposure to own-ethnic group members as well as non-group members, their family ties and their parents, exposure to natives, fluency in the minority parent's language and familiarity with the host country culture.

Ethnic mobility and identity may be affected by peer groups. In an exploratory study, Phinney and Chavira (1992) examined the changes in ethnic identity that occur in young adolescents within a sample of eighteen adolescents from three ethnic groups (Asian American, Black, and Hispanic). It was found that the ethnic identity of children was influenced by the ethnic group they belong to and the peer group they interact with. In a qualitative study in Europe, Tizard and Phoenix (1995) interviewed children with mixed parentage (one white parent, and one African or African-Caribbean parent) who were living in London. The authors found that school, social class and peer groups influenced the children's ethnic identity much more than the racial characteristics of their parents.

In another qualitative study, Kickett-Tucker (2009) found strong sense of self, Aboriginal culture, family, friends and Aboriginal language to be the important contributors of ethnic identity of both children and youths of urban Perth in Western Australia. Mowen and Stansfield (2016) observed prominent shifts in the racial identity of the immigrant children in San Diego and Miami from 1991 to 2013. Peer influence, and stress regarding social as well as educational performance and the need to maintain a positive dignity influenced the identities of these children. Moreover, they found a clear relation between shifts in racial identity of the immigrant children and their attachment with family and the values they assign to their self-worth and self-esteem. In a qualitative study in Australia, Kickett-Tucker (2008) found that peer interactions through school sport settings provided opportunities to Indigenous (Aboriginal) students to affirm their racial identity and self-esteem in a positive way. Aboriginal students participating in sports interacted with their own group members and hence collectively identified and expressed themselves positively as belonging to an Aboriginal group.

Ethnic community can also influence ethnic mobility. Saenz *et al.* (1995) found that children living in a neighbourhood containing more people belonging to their Asian parent's ethnic group, were more likely to identify themselves as Asian, while children living in

heterogeneous areas were more likely to identify themselves as Anglo. Fitzpatrick and Hwang (1992) established strong support for the relationship between social structure, especially group size and heterogeneity, and intergroup relations in the formation of ethnic identity. Qian (2004), using 1990 U.S. Census data, found that children's identification varied by minority concentration in their neighbourhood. Children of couples in which the minority spouse had part white ancestry tended more towards being identified as white.

In New Zealand, studies on ethnic mobility are very limited and mainly focus on an individual's self-identification process. In a cross-sectional study of inter-censal change, Coope and Piesse (2000) found there was considerable mobility between ethnic groups. For example, they found a 23 percent inflow and 6 percent outflow for the Māori ethnic group between 1991 and 1996. Possible reasons for ethnic mobility in New Zealand include changes in the ethnicity question between censuses, changes in the socio-political environment, changes in the political structure (Carter *et al.* 2009), ethnogenesis³ (Kukutai and Didham 2009) and increases in intermarriage (Callister *et al.* 2005, Howard and Didham 2005, Kukutai 2007, Callister *et al.* 2008).

Didham (2016) used New Zealand Linked Census (NZLC) data from 1981 to 2013 to investigate ethnic mobility (for Level 1 ethnic groups)⁴ in New Zealand. He considered both inflow and outflow of individuals and found that ethnic mobility affects a large proportion of all ethnic groups. He also found that ethnic mobility affects age groups in a different manner, as individuals move through educational, employment, partnering and peer-group changes throughout their life course.

In New Zealand, studies on ethnic mobility of the youth population are particularly limited. Kukutai (2007) showed that European mothers in European-Māori couples identify their child as Māori as often as Māori mothers do. Her finding challenges the assumption that minority ethnic identity is transmitted by minority parents only. Māori ethnic identity was found to be transmitted in a less predictable manner across generations as the parental union becomes more European (one partner identifying as both Māori and European and the other as European). Moreover, Kukutai (2007) stated that a child's Māori identity is consistent with patriarchal rules, with Māori paternity being more influential than Māori maternity in designing the child's Māori identity.

Kukutai (2008) then observed the responses to ethnic group and main ethnic group questions included in the first wave of the longitudinal Youth Connectedness survey in 2006. She focused on whether the ethnic identity response changed according to contextual factors, and found that affiliation changes might occur when children reach an age when they define their own ethnicity rather than having a parent do it for them.

³ The formation of new ethnic categories within a larger community, such as 'New Zealander'.

⁴ European, Māori, Pacific, Asian, Middle Eastern/Latin American/African (MELAA), and Other.

These New Zealand studies (Kukutai 2007, 2008) describe ethnic identification patterns but do not identify the primary causes of changes. Carter *et al.* (2009) examined changes in self-identified ethnicity among New Zealand adults (aged over 15), from 2002 to 2005. They looked at the proportion of people that changed their self-identified ethnicity over the first three years of SoFIE. They found that the biggest predictor of an individual's ethnicity at wave 2 was dependent on the individual's ethnicity at wave 1. Hence, self-declared ethnic identity is a social process with strong temporal persistence. They found that adults who changed their ethnic identity were more likely to be younger, overseas born, belong to deprived groups,⁵ and have poorer health.

In contrast with earlier work on New Zealand, in this paper we focus exclusively on young adolescents in New Zealand. We also use more disaggregated ethnic groups than earlier studies, which helps us better capture the heterogeneity within the broad ethnic groups used in previous studies (Mondal *et al.* 2018). In New Zealand, previous research on ethnic identity among children has mainly focused on the influence of having single/multiple ethnicities and multi-ethnic parents on ethnic identity of children (Kukutai 2007, 2008). Instead, our research looks into the predictors of self-declared ethnic identity choices made by adolescents residing in Auckland.

3. Data

Auckland is the most ethnically diverse region in New Zealand. Auckland is also relatively youthful: 35.9 percent of residents are aged under 25 years, compared with 34.2 percent for all of New Zealand (Statistics New Zealand 2013a). In Auckland, European (59.3 percent), Asian (23.1 percent), Pacific Peoples (14.6 percent), Māori (10.7 percent), MELAA⁶ (1.9 percent) and Other (1.2 percent) are the major ethnic groups (Statistics New Zealand 2013a).⁷ Auckland accounts for one-third of the New Zealand population, and has the largest population of the 16 regions of New Zealand. Because of its ethnic diversity and relative youthfulness, we chose Auckland as our area of focus.

We recognise that there is a key period during which an adolescent transitions from their ethnicity being recorded in official data by their parents, to their ethnicity being recorded by themselves. We infer that the most likely time for this transition is in late adolescence, and look at the ethnic affiliation of individuals (when they were a child) in one Census, in which their ethnicity was likely to have been recorded by their parent/s, followed by a Census in which their identity was likely to have been recorded by the individual themselves (once they

⁵ Measured by the New Zealand Deprivation Index (NZDep2001), which provides a neighbourhood-level (approximately 100 people) deprivation score (Salmond and Crampton 2002). The Index is a tool for measuring socio-economic position and health/social outcomes based on eight questions regarding income, home ownership, support, employment, qualifications, living space, communication and transport.

⁶ Middle Eastern/Latin American/African.

⁷ Percentages do not sum to 100 percent, as people can report more than one ethnicity.

have attained greater independence). Specifically, we take individuals aged between 18-22 in the current census who have been linked in the NZLC to the same individuals who were aged between 13 and 17 in the previous census.⁸

Data for this analysis were obtained from the 1991, 1996, 2001, 2006 and 2013 New Zealand Census of Population and Dwellings data for the Auckland region of New Zealand.⁹ The New Zealand Census of Population and Dwellings is usually conducted every five years, and collects a range of socio-demographic information on individuals present in New Zealand on census night who are usually resident in New Zealand. These census data include information about individual characteristics like usually-resident location, sex, age, ethnicity, education, occupation, marital status, and income level. These individual data can be aggregated to population statistics at several geographical scales. Successive censuses have been linked to create longitudinal datasets, which enable us to investigate changes in population characteristics, including ethnic identity, across time.¹⁰ The link rate for individuals from the 1991 to 1996 Census was 72 percent, 1996 Census to 2001 Census was 69.5 percent and from the 2001 to 2006 Census was 70.3 percent (Statistics New Zealand 2014).¹¹

Our analysis is based on data aggregated to the area unit level.¹² The Auckland region is made up of 413 land-based area units, of which 409 had a non-zero usually resident population throughout the period from 1991-2013. Area units with no usually resident population were excluded from the analysis. The unit record data were accessed within Statistics New Zealand's secure data laboratory to meet the confidentiality and security rules

⁸ Due to the seven-year gap between the 2006 and 2013 censuses, for the 2006-2013 linked Census we include individuals aged between 11 and 17 in 2006, who are aged between 18-24 in 2013.

⁹ The most recent population census was held on March 6, 2018. Early results from this census have been released since late 2019, but the 2018 data required for this paper were not available at the time the research was conducted.

¹⁰ The NZLC (New Zealand Linked Census) links adjacent censuses in pairs, so that the seven censuses from 1981 to 2013 are linked into six pairs (Didham 2016).

¹¹ A census pair ' $t, t-1$ ' refers to a pair of censuses where individual records in census (t) are linked to those of the previous census ($t-1$). For example, if we are looking at linking records from the 1996 Census to those from the 1991 Census, we will refer to this as the 1991–1996 census pair. Though the terms 'matching' and 'linking' are used interchangeably, a 'link' refers to a record pair where the connection has been assessed as probable.

A 'match' refers to a record pair where the connection is true. The matching process comprises of two parts: deterministic matching based on a set of key variables to find the unique matches, followed by probabilistic matching on the residuals. Deterministic matching uses a set of matching variables (sex, birth day, month and year, and area unit of residence) and matched records have the same unique values of the matching variables. In contrast, probabilistic matching evaluates all possible matches and uses statistical techniques to achieve matches. The link-rate for 2006-2013 is not reported anywhere.

¹² Area units are aggregations of meshblocks. They are non-administrative areas that are in between meshblocks and territorial authorities in size (Statistics New Zealand 2013b). In urban areas, area units are approximately the size of suburbs, and in our dataset they have an average population of 1530. In this paper, we have used 2013 area unit boundaries.

according to the Statistics Act 1975. In accordance with the strict confidentiality rules laid down by Statistic New Zealand, all counts, including numbers of observations in regression models, have been randomly rounded to base three.¹³

Ethnicity is the ethnic group or groups a person identifies with or has a sense of belonging to (Statistics New Zealand 2015). According to the New Zealand Standard Classification of Ethnicity, ethnicity is classified in a hierarchy of four levels (Statistics New Zealand 2013b). The Level 1 and Level 2 classification of ethnicity are shown in Table 1. We consider ethnic groups at a finer scale (Level 2) than those used in previous research in New Zealand (and comparable work elsewhere). This is important because the Asian and Pacific broad ethnic groups in particular mask substantial heterogeneity in characteristics. In contrast, past studies in other countries have focused on a small number of groups in their studies of ethnic identification (for example, only Hispanic, Asian-Anglo or Asian-American; see Phinney and Chavira 1992, Casey and Dustmann 2010, Mowen and Stansfield 2016) We explore the behaviours of all of the Level 2 ethnic groups in our study, as we feel that the opportunity of multi-ethnic affiliation and changing ethnic identity is not concentrated only within small or minority ethnic groups.

Data on self-reported ethnic identification are collected in all censuses and each person can choose a single or multiple response.¹⁴ We take every ethnicity that is reported for our sample of adolescents. Therefore, the adolescent's composite ethnicity is comprised of a binary variable (belongs to the ethnic group=1, otherwise=0) for each ethnic group. We do not include the 'not further defined' categories in our analysis. Moreover, due to the small number of individuals reporting as 'Tokelauan' and 'Other Pacific People', we combined these two groups. For the same reason, we also combined 'Middle Eastern', 'Latin American', 'African' and 'Other ethnicity' ethnic groups into a single group. These ethnicity assignments yield altogether 14 distinct ethnic groups.

¹³ Counts that are already a multiple of three are left unchanged. Those not a multiple of three are rounded to one of the two nearest multiples. For example, a seven will be rounded to either six (with probability 2/3) or nine (with probability 1/3).

¹⁴ The ethnic classifications have changed considerably between 1991 and 2013. Up to three responses were recorded for each individual in 1991 and 1996 compared with up to six in the later Censuses. The format and wording of the Census ethnicity question changed twice between 1991 and 2001. Some significant changes have been identified, including increased multiple responses in 1996 and a consequent reduction in single responses, and a tendency for respondents to answer the 1996 question on the basis of ancestry (or descent) rather than ethnicity (or cultural affiliation). Moreover, the treatment of responses of 'New Zealander' to the Census ethnicity question has also changed over time. In 2001, 'New Zealander' was counted in the New Zealand European category, whereas in 2006, New Zealander was instead included as a new category. The increase in counts for the New Zealand European category from 2006 to 2013 is partly attributable to fewer people identifying themselves as 'New Zealander' in 2013 (Statistics New Zealand 2017). These changes affect the comparability of ethnicity data in New Zealand over time. However, we deal with this complication by adding inter-censal fixed effects in our regression.

**Table 1: Ethnic Group Classification and Counts in Auckland
New Zealand 1991-2013**

Ethnic group code (Level 1)	Ethnic Group code description (Level 1)	1991	1996	2001	2006	2013	Ethnic group code (Level 2)	Ethnic Group code description (Level 2)	1991	1996	2001	2006	2013
01	European	625,614	1262,403	667,755	672,055	733,469	10	European not further defined	150	21	228	195	141
							11	NZ European	574,932	536,606	616,859	611,901	696,966
							12	Other European	50,532	725,776	50,668	59,959	36,362
02	Māori	85,926	105,213	127,704	137,304	142,767	21	NZ Māori	85,926	105,213	127,704	137,304	142,767
							03	Pacific Peoples	83,370	107,262	163,632	190,581	209,652
31	Samoaan	41,784	51,639	76,584	87,840	95,916							
							32	Cook Island Māori	17,466	21,234	31,077	34,371	36,546
							33	Tongan	12,456	17,958	32,535	40,140	46,971
							34	Niuean	9,354	11,466	16,038	17,667	18,555
							35	Tokelauan	504	627	1,488	1,848	1,959
							36	Fijian	1,506	3,174	4,155	5,847	8,493
							37	Other Pacific Island	300	1,164	1,755	2,868	1,212
04	Asian	18,984	49,211	80,958	134,462	96,766	40	Asian not further defined	<6	45	81	30	21
							41	Southeast Asian	1,806	6,561	9,363	15,909	10,911
							42	Chinese	9,738	23,505	38,025	60,186	39,456
							43	Indian	7,209	16,905	23,484	39,262	34,064
							44	Other Asian	231	2,240	10,086	19,105	12,335
05	MELAA	360	1,578	4,779	10,023	7,344	51	Middle eastern	282	1,194	3,624	6,897	3,759
							52	Latin American/Hispanic	33	204	474	1,194	2,658
							53	African	45	180	681	1,932	927
06	Other	108	198	279	3,687	510	61	Other ethnicity	108	198	279	3,687	510

Source: Statistics New Zealand (2013)

Notes: The data used for the Level 1 calculation have been constructed from Level 2 data sheets (using a bottom-up approach), so that the total responses counts at both levels are the same. In the case where the ethnicity count is less than six, data is suppressed and treated as zero according to the confidentiality rules of Statistics New Zealand.

4. Method

In our analysis, following Akerlof and Kranton (2000), each adolescent makes a choice in respect of each ethnic group ‘*i*’ (that is, they choose/do not choose to declare that they belong to ethnic group ‘*i*’). Akerlof and Kranton (2000) propose a general utility function that includes ‘identity’ (an individual’s sense of self) as a motivation for an individual’s behaviour. Individuals may choose their social categories and they have a choice over identity, and this choice might be more or less conscious. In this model, there might be costs associated with choosing a specific identity (for example, disapproval from individuals choosing other options). Akerlof and Kranton treat an individual’s identity, which is a basis for their utility function, as a function of their own given characteristics, the social category they belong to, and the behaviour towards them. We adopt this framework in developing our empirical model of the ethnicity choices of adolescents.

Given a set of m (=14 in our case) possible ethnicities from which an adolescent can choose, the classic approach is to assume that this choice is unique, that is, in the present context it would then be assumed that only one ethnicity can be selected. There are many choice models that have been developed to describe this situation, of which the multinomial logit model is one of the most popular (for example, Train 2009). However, we have already noted that individuals in New Zealand may identify with more than one ethnicity. In 2013 a maximum of six ethnicities could be stated. One way of modelling this situation is to consider every possible subset a unique choice. However, with adolescents being able to select up to six ethnicities out of 14, the number of subsets is very large (6476, including the case that none are selected) even though in practice many combinations are unlikely to be present in the data.¹⁵ This potentially large number of choices makes the multinomial logit model and related models unwieldy and computationally burdensome.

Another complication is that the choice of a particular ethnicity is likely to be dependent on what other ethnicities have been selected. What matters is whether the utility attached to identifying with several ethnicities simultaneously is the sum of utilities attached to each of these ethnicities or not. If there is linear additivity of utility associated with specific ethnicities, the multinomial choice model of selecting a subset of ethnicities can then be decomposed into a set of independent binary choice model for selecting each of the ethnicities. However, if adding a certain ethnicity leads to lower utility overall (for example, because it is costly to maintain links with several disparate networks) or higher utility overall (for example, because the ethnicities share the same language), the choice model becomes considerably more complicated. Estimation methods for this case have only been emerging in recent years and require sophisticated data mining algorithms (see, for example, Benson *et al.* 2018). We will

¹⁵ In 2013 about 90 percent of the population self-identified as belonging to only one ethnicity and only 0.05 percent self-identified as belonging to four or more ethnicities (Source: <https://www.stats.govt.nz/tools/nz-dot-stat>, Table: Ethnic group (detailed single and combination) by age group and sex, for the census usually resident population count, 2013; accessed 6/7/2019).

therefore adopt the assumption that selection of each ethnicity ‘*i*’ is independent of selection of any other ethnicity. This assumption reduces the multinomial subset choice model to a set of binary single choice models.

The theoretical underpinning of the ethnic choice model is the Random Utility Model (RUM) (McFadden 1984). The RUM has been used in many previous studies of choice (for example, Bhat and Guo 2004, 2007, Beine and Parsons, 2015). In the RUM, individuals are rational and attempt to maximise their utility. Individuals make decisions by comparing levels of utility associated with each possible alternative they have. In the ethnic choice model, individuals have m (=14) potential ethnic groups to affiliate themselves with (or not) and the choice depends on the characteristics of the chooser, as well as family and neighbourhood characteristics. In the ethnic choice model, $U_p(x)$ is the utility that person p obtains from choosing an ethnic group x (as opposed to not). Thus, utility level $U_p(x)$, can be represented as:

$$U_p(x) = W_p(x|Z, E) - C_p(x|Z, E) + V_p \quad (1)$$

where $W_p(x|Z, E)$ is the deterministic component of utility and is a function of observed characteristics (including non-ethnic characteristics (Z) and ethnic affiliations (E) assigned by the parents at the previous census), and $C_p(x|Z, E)$ is the individual’s cost of affiliating with ethnic group x . V_p represents unobserved individual-specific differences in utility. The unobserved component is assumed to be an independent and identically distributed (i.i.d.) random term drawn from an extreme value distribution. The individual adopts ethnicity x if and only if $U_p(x) > U_p(\text{not } x)$.

We base our empirical analysis on the assumption that a rational individual will always choose the option that gives them the maximum utility (McFadden 1984). We also assume that adolescents’ decisions to affiliate with each ethnic group is independent of their choices to affiliate with other ethnic groups, other than to the extent that E enters into the utility function in Equation (1). To overcome this apparent paradox, we assume that the instantaneous decision to adopt an ethnicity x at time t (the current census) depends on an adolescent’s previous ethnic affiliations at time $t-1$ (the previous census), but does not affect their instantaneous decisions about other ethnic affiliations. This assumption significantly simplifies the analysis, which would otherwise require a multinomial logit specification that would need to include all possible combinations of single and multiple-ethnic affiliations, as discussed above. Moreover, it is unclear whether a multinomial logit model (or similar) would meet the required independence of irrelevant alternatives (IIA) assumption.¹⁶ Some might argue that no choice is independent of other choices. However, as we include the individual’s ethnic identity at the

¹⁶ Other multinomial choice models such as the mixed logit model do not make this IIA assumption but are computationally burdensome when the number of potential choices (ethnicity combinations) is large.

previous census (most likely stated by the adolescent’s parent) as control variables in our analysis, we believe that we capture the most salient aspects of the interdependence of choices within the model.

Based on these assumptions, we use logistic regression to investigate the ethnic identity choices of adolescents. Our dependent variables are binary variables for each ethnic group, and represent whether or not the adolescent identifies with that group (1=identifies with the group, 0=otherwise), regardless of whether they also identify with one or more other groups. It is not possible to know who completes an individual’s Census form. Past studies have worked on the assumption that an adult, most probably a parent (Brunsma 2005), fills Census forms for children under the age of 15. In our analysis, the linked individuals are aged 13-17 years in the previous Census and aged 18-22 in the current Census. We assume that once they reach the age of 18, young people report their ethnic identity in the Census form themselves. Therefore, we expect to capture the determinants of a young person’s ethnic identity choice made by themselves, when they choose their ethnic identity for the first time.

We use data pooled across four pairs of linked censuses. Throughout this paper we use ‘previous’ to refer to data and individual ethnic choice from the first census in each inter-censal pair and ‘current’ for the same in the second census in each pair. We take as the dependent variable each adolescents’ ethnic response (1=identifies with the group, 0=otherwise) to each ethnic group, regardless of whether they also identify with one or more other groups, in the more recent census.

As noted in the literature review, the adolescents’ ethnicity can be affected by independent variables defined at the individual, family, or neighbourhood level. All independent variables have values as observed at the start of each inter-censal period. The individual-level independent variables included in our analysis are the adolescent’s ethnicity or ethnicities in the previous census, their age, sex, and whether they were born in New Zealand.¹⁷ Family-level variables are limited to the ethnic identity of their parents (with some caveats, see below). The neighbourhood-level variables included in our analysis are the percentage shares of each ethnic group,¹⁸ and the ethnic diversity of the area unit the adolescent resides in. We use the Entropy diversity measure as our measure of the ethnic diversity of each area unit (Mondal *et al.* 2019).¹⁹ We expect that adolescents are exposed to more ethnicities if

¹⁷ We derive the binary variable ‘New Zealand born’ (New Zealand born=1, otherwise=0) from the Census variable ‘Birthplace’.

¹⁸ These proportions are based on the total number of ethnicities reported in the area unit and not the total number of individuals.

¹⁹ The entropy diversity measure is calculated using the formula $D_a = -\sum_{g=1}^G \frac{P_{ga}}{P_a} \ln\left(\frac{P_{ga}}{P_a}\right)$, (where P_{ga} refers to the population of group g ($=1, 2, \dots, G$) in area a ($=1, 2, \dots, A$), and P_a is the total population of the area). To allow for the calculation of D_a even in the case of there being groups who have zero members at some point in time, we define $0 \cdot \ln(1/0) = \lim_{q \rightarrow 0} [q(\ln(1/q))] = 0$. See also Theil (1972).

they live in more ethnically diverse areas. This may influence their ethnic identity choices (such as socialising and spending time with ethnically diverse population).

The Census records who the child's parents in the households are, but these data are not available for the whole population. The information is not available for children who were coded as an adult, or who were not present at home in the previous census, or when there was a change in parents in the intervening period. Hence missing data may lead to selection bias in our regression models and we therefore create our own proxy variable for the ethnic identity of the parent (who was the census respondent) for all adolescents in our sample. To proxy for the parents' ethnicity, we identified the number of parent-aged males and females (aged 30 to 60 years) of each ethnicity, in each adolescent's household. We dropped households with more than one female or male adult from the analysis and hence limit the sample to the households with only one or two adults (and thereby assume that they are the parent/s).

To reduce the potential for over-fitting the regression models, we limit the explanatory variables for parents' ethnicities to include only ethnicities that match the dependent variable ethnicity. For example, in the model where Tongan is the dependent variable, we include only Tongan mother and Tongan father as explanatory variables, and not other ethnicity variables for the parents.

By definition, for adolescents in households with no adult females or no adult males have one parent's ethnicity undefined. To avoid any resulting bias, we include dummy variables to capture households with no adult females, and households with no adult males.

For the seven-year gap between 2006 and 2013 census, the variables we use in our study cover a seven-year period instead of five years. While this is a limitation of the study, it is not a serious one, as most of the variables are relatively time invariant or, in the case of age, are known with little measurement error. Moreover, we use inter-censal fixed effects in the analysis to control for inter-censal bias.²⁰

²⁰ We also ran the same regressions separately for each inter-censal period. The results are consistent with our results from the data pooled across all censuses except for the combined 'MELAA and Other' ethnic category. For example, for the years 1991-1996 and 1996-2001, mother's ethnicity is not statistically significant for this group. The same for the years 2001-2006 and 2006-2013 are statistically significant. Moreover, the odds of choosing 'MELAA and Other' ethnic category in the current census, having belonged to the same category in the previous census are much greater in 1991-1996 and 1996-2001, than that in 2001-2006 and 2006-2013. For the same reason, we use interaction effects between year dummy variables and the 'MELAA and other' category, and interactions between year dummies and the 'MELAA and other' ethnic group proportions in the area unit the individuals live in.

The standard for ethnicity statistics was developed in 2005. The ‘New Zealander’ response, which was previously included in the ‘European’ category, was moved to the ‘Other ethnicity’ category in 2006 (Statistics New Zealand 2007). Thus, as a result, the number of people reporting a European or New Zealand European ethnicity has reduced in size and proportion, with a subsequent increase in the ‘Other ethnicity’ category. This is because it was New Zealand Europeans who were most likely to call themselves ‘New Zealander’ in the Census (Statistics New Zealand 2007, Brown and Gray 2009). Considering the fact that we have combined the MELAA group with the ‘Other’ group in our analysis, we include interaction variables (interactions between individuals belonging to combined MELAA and Other ethnic group and their presence in each inter-censal period, and interactions between group proportion of combined MELAA and Other ethnic group in the area unit individuals reside in with their presence in in each inter-censal period) to account for any bias in the results that might arise due to the inter-censal issues.

Individuals residing in same area units are likely to be similar in terms of unobserved characteristics. Thus, our logistic regression uses standard errors clustered at the area unit level. In our model, n is the total number of individuals across area units, k is the number of clusters. Thus, n_k is number of individuals in cluster k and $\sum_k n_k = n$. For individual l in cluster k , Y_{lk} is the binary response for any given ethnic identity and X is a vector of m explanatory variables. Thus, our regression model can be expressed as:

$$\text{logit} \left(\frac{p_{lk}}{1-p_{lk}} \right) = \alpha + \beta'X + u_l + u_k ; l = 1 \dots n, k=1 \dots N \quad (3)$$

$$\text{where } u_l, \sim N(0, \sigma_l^2)$$

$$u_k \sim N(0, \sigma_k^2)$$

where α is the fixed intercept term, β'_m is the effect of variable X_m on the response, u_l is the stochastic error term associated with individual l , u_k is the component of the error term that is common to all individuals in area unit k . The error terms u_l and u_k are assumed normally distributed random variables with zero mean and constant variance. p_{lk} is the probability that binary response for individual l in group k (that is, Y_{lk}) is equal to 1, given X_m and the random effects u_l and u_k .

5. Results and Discussion

To find the determinants of adolescents’ ethnic identity choices, we run logistic regression with clustered standard errors for data pooled across all the censuses.²¹ We report the results across Tables 2A, 2B and 2C.²²

²¹ Results for analyses based on individual Census waves are available on request.

²² Tables 2A, 2B and 2C are reporting results from the same regression. We have broken down the results into different tables according to variables at different levels for easy readability.

Table 2A: Clustered Logistic Regression of Current Ethnicity – Effect of Previous Census Ethnicity

Variables	(1) NZ European	(2) Other European	(3) NZ Māori	(4) Samoan	(5) Cook Island Maori	(6) Tongan	(7) Niuean	(8) Fijian	(9) Other PI	(10) SE Asian	(11) Chinese	(12) Indian	(13) Other Asian	(14) MELAA
(1) NZ European	17.592*** (0.759)	1.893*** (0.112)	1.449*** (0.094)	0.924 (0.101)	0.621*** (0.084)	0.834 (0.133)	0.424*** (0.079)	1.213 (0.290)	0.480** (0.143)	0.278*** (0.062)	0.450*** (0.055)	0.567*** (0.093)	0.786 (0.270)	2.076*** (0.204)
(2) Other European	4.168*** (0.249)	11.550*** (0.833)	0.810** (0.086)	0.771* (0.113)	0.695* (0.153)	0.923 (0.239)	0.602* (0.182)	1.332 (0.470)	0.756 (0.270)	0.895 (0.248)	0.822 (0.163)	1.282 (0.329)	1.318 (0.570)	0.953 (0.134)
(3) NZ Māori	0.550*** (0.028)	1.952*** (0.104)	129.232*** (6.755)	1.181 (0.141)	2.049*** (0.255)	1.411** (0.193)	0.730* (0.129)	1.619* (0.411)	1.042 (0.259)	0.331*** (0.097)	1.191 (0.181)	0.695* (0.144)	1.262 (0.409)	0.478*** (0.058)
(4) Samoan	0.258*** (0.014)	1.264*** (0.103)	0.606*** (0.052)	322.146*** (37.246)	0.833 (0.145)	1.596*** (0.279)	1.462* (0.321)	1.145 (0.294)	2.849*** (0.684)	0.057*** (0.027)	3.145*** (0.430)	0.595*** (0.116)	0.659 (0.332)	0.237*** (0.046)
(5) Cook Island Māori	0.348*** (0.026)	0.869 (0.103)	0.785* (0.104)	1.427** (0.216)	483.660*** (70.503)	1.256 (0.264)	1.913*** (0.477)	0.881 (0.464)	6.022*** (1.452)	0.236*** (0.103)	1.135 (0.258)	0.738 (0.192)	0.237 (0.252)	0.374*** (0.103)
(6) Tongan	0.234*** (0.020)	0.854 (0.121)	0.742** (0.099)	1.372* (0.231)	1.141 (0.250)	444.389*** (59.565)	2.108** (0.643)	1.526 (0.599)	1.012 (0.457)	0.094*** (0.047)	0.245*** (0.101)	0.767 (0.233)	0.621 (0.415)	0.383*** (0.093)
(7) Niuean	0.292*** (0.026)	1.103 (0.169)	0.739*** (0.085)	1.400* (0.274)	1.795*** (0.403)	2.777*** (0.539)	1,060.290*** (206.153)	1.001 (0.498)	0.917 (0.391)	0.596 (0.270)	1.048 (0.253)	0.357** (0.177)	0.847 (0.641)	0.587* (0.187)
(8) Fijian	0.517*** (0.084)	2.128*** (0.387)	1.220 (0.273)	2.338** (0.827)	1.336 (0.657)	1.345 (0.651)	1.035 (0.312)	491.647*** (154.598)	2.256 (3.051)		1.718 (0.950)	5.890*** (1.474)	6.253*** (4.353)	0.471 (0.357)
(9) Other PI	0.436*** (0.101)	1.504 (0.378)	0.739 (0.275)	3.134*** (1.078)	3.367*** (1.304)	0.958 (0.360)	0.416*** (0.121)	5.634*** (3.675)	497.769*** (177.473)	0.347 (0.356)	0.613 (0.333)	0.578 (0.258)		0.174* (0.175)
(10) SE Asian	0.310*** (0.033)	0.547*** (0.120)	0.343*** (0.100)	0.228* (0.177)	0.117*** (0.053)	0.481 (0.284)	0.260** (0.175)			77.576*** (17.789)	9.444*** (1.804)	0.707 (0.234)	2.940** (1.547)	0.620** (0.137)
(11) Chinese	0.176*** (0.013)	0.351*** (0.060)	0.452*** (0.070)	0.623** (0.120)	0.319*** (0.126)	0.280*** (0.136)	0.480* (0.195)	0.946 (0.443)	0.771 (0.516)	3.343*** (0.751)	151.374*** (23.602)	0.521** (0.136)	1.337 (0.498)	0.726** (0.107)
(12) Indian	0.166*** (0.015)	0.556*** (0.087)	0.448*** (0.080)	0.461*** (0.126)	0.354*** (0.128)	0.719 (0.243)	0.277* (0.184)	16.165*** (4.282)	1.152 (0.641)	0.251*** (0.083)	0.570** (0.154)	271.978*** (44.847)	2.511** (1.112)	0.795 (0.120)
(13) Other Asian	0.348*** (0.041)	0.505*** (0.106)	0.996 (0.290)	0.370 (0.255)		1.216 (0.573)	0.546 (0.544)	0.200** (0.142)		0.840 (0.319)	2.686*** (0.620)	2.075*** (0.558)	210.174*** (74.211)	0.422*** (0.114)
(14) MELLA	7.261*** (0.512)	1.482*** (0.191)	2.772*** (0.342)	1.280 (0.329)	1.044 (0.417)	1.332 (0.630)	0.620 (0.351)	2.249 (1.251)	1.516 (0.823)	0.776 (0.254)	1.234 (0.304)	1.804** (0.487)	1.538 (0.634)	13.831*** (2.097)

Table 2A *continued*

Variables	(1) NZ European	(2) Other European	(3) NZ Māori	(4) Samoan	(5) Cook Island Maori	(6) Tongan	(7) Niuean	(8) Fijian	(9) Other PI	(10) SE Asian	(11) Chinese	(12) Indian	(13) Other Asian	(14) MELAA
MELAAD1	0.169*** (0.071)	0.911 (0.366)	0.468 (0.254)	0.167*** (0.104)										49.560*** (18.011)
MELAAD2	0.050*** (0.018)	3.362*** (1.473)	0.118* (0.141)	0.301** (0.144)						4.233* (3.587)		1.864 (1.956)		71.690*** (24.346)
MELAAD3	0.078*** (0.026)	0.822 (0.278)	0.207*** (0.071)	0.457 (0.336)		0.708 (0.509)				0.230** (0.150)	0.526 (0.572)	0.514 (0.654)		4.781*** (1.197)
Obs.	126,600	126,600	126,600	126,600	124,800	126,400	126,200	124,800	123,400	126,100	126,400	126,600	126,100	126,500
Pseudo R-squared	0.623	0.278	0.656	0.849	0.823	0.842	0.844	0.582	0.603	0.708	0.810	0.859	0.826	0.272

Notes

The table reports odds ratios.

We have dropped the three ‘not further defined’ ethnic groups. We have combined ‘Middle Eastern’, ‘Latin American’, ‘African’ and the ‘Other’ ethnic groups into one group MELAA. We have also combined the ‘Tokelauan’ with the ‘Other Pacific Islander’ ethnic group into one group ‘Other PI’. Thus, our analysis includes 14 Level 2 ethnic groups instead of 21.

Regressions have been run with inter-censal fixed effects.

*p<0.1; **p<0.05; ***p<0.01

Clustered Standard errors in parenthesis.

Tables 2A, 2B and 2C are reporting results from the same regression. We have broken down the results into different tables according to variables at different levels for easy readability.

Blank cells are where variables have been omitted due to perfect collinearity, usually due to small cell sizes.

MELAAD1 - Individuals who belonged to the combined ‘MELAA and Other’ ethnic group in the period 1991-1996

MELAAD2 - Individuals who belonged to the combined ‘MELAA and Other’ ethnic group in the period 1996-2001

MELAAD3 - Individuals who belonged to the combined ‘MELAA and Other’ ethnic group in the period 2001-2006

Table 2B: Clustered Logistic Regression of Current Ethnicity – Effect of Individual and Family-Level Variables

Variables	(1) NZ European	(2) Other European	(3) NZ Māori	(4) Samoan	(5) Cook Island Maori	(6) Tongan	(7) Niuean	(8) Fijian	(9) Other PI	(10) SE Asian	(11) Chinese	(12) Indian	(13) Other Asian	(14) MELAA
Sex	0.892*** (0.020)	0.935** (0.025)	0.989 (0.036)	1.002 (0.059)	0.808*** (0.066)	1.018 (0.089)	0.914 (0.106)	1.084 (0.158)	1.062 (0.158)	0.903 (0.084)	1.001 (0.067)	1.153 (0.110)	0.885 (0.119)	1.129*** (0.040)
Age	0.975*** (0.007)	1.006 (0.009)	0.952*** (0.011)	0.914*** (0.019)	0.973 (0.028)	0.949 (0.030)	0.955 (0.033)	1.007 (0.044)	0.924* (0.041)	0.972 (0.027)	0.983 (0.023)	0.993 (0.027)	1.024 (0.042)	1.063*** (0.013)
NZ Born	3.958*** (0.172)	0.210*** (0.012)	1.802*** (0.144)	1.450*** (0.182)	1.516*** (0.232)	0.989 (0.158)	1.158 (0.293)	1.151 (0.237)	1.101 (0.251)	0.860 (0.127)	0.968 (0.114)	1.006 (0.137)	0.523*** (0.105)	0.693*** (0.053)
Ethnicity Mother	2.550*** (0.099)	2.236*** (0.109)	8.586*** (0.869)	13.866*** (2.954)	12.729*** (3.493)	22.729*** (7.177)	17.484*** (7.271)	119.469*** (86.750)	48.204*** (43.846)	27.319*** (6.412)	20.000*** (4.003)	11.890*** (2.648)	43.653*** (19.545)	1.906*** (0.216)
Ethnicity Father	2.033*** (0.073)	2.872*** (0.161)	8.731*** (1.142)	7.157*** (1.328)	4.821*** (1.155)	10.978*** (2.529)	4.988*** (1.381)	41.613*** (32.645)	5.732*** (3.842)	4.658*** (1.443)	7.772*** (1.667)	9.726*** (2.047)	13.155*** (4.677)	1.800*** (0.187)
No Female Household	1.524*** (0.056)	1.544*** (0.076)	1.656*** (0.090)	2.410*** (0.201)	2.552*** (0.292)	1.814*** (0.242)	2.038*** (0.376)	2.196*** (0.437)	1.902*** (0.409)	4.066*** (0.514)	1.888*** (0.200)	2.279*** (0.290)	3.055*** (0.598)	1.084 (0.067)
No Male Household	1.541*** (0.044)	1.419*** (0.053)	1.640*** (0.071)	2.060*** (0.168)	2.098*** (0.224)	2.033*** (0.235)	2.392*** (0.360)	1.818*** (0.320)	1.514** (0.259)	1.530*** (0.198)	1.423*** (0.137)	2.018*** (0.235)	2.385*** (0.445)	0.992 (0.043)

Notes

The table reports odds ratios.

We have dropped the three ‘not further defined’ ethnic groups. We have combined ‘Middle Eastern’, ‘Latin American’, ‘African’ and the ‘Other’ ethnic groups into one group MELAA. We have also combined the ‘Tokelauan’ with the ‘Other Pacific Islander’ ethnic group into one group ‘Other PI’. Thus, our analysis includes 14 Level 2 ethnic groups instead of 21.

Regressions have been run with inter-censal fixed effects.

*p<0.1; **p<0.05; ***p<0.01

Clustered Standard errors in parenthesis.

Tables 2A, 2B and 2C are reporting results from the same regression. We have broken down the results into different tables according to variables at different levels for easy readability.

Blank cells are shown where variables have been omitted due to perfect collinearity, usually due to small cell sizes.

‘Ethnicity Mother’ and ‘Ethnicity Father’ are dummy variables that are equal to 1 when the parent has stated the same ethnicity as the ethnicity that is given by the dependent variable, and 0 otherwise.

Table 2C: Clustered Logistic Regression of Current Ethnicity: The Effect of Neighbourhood-Level Characteristics

Variables	(1) NZ European	(2) Other European	(3) NZ Māori	(4) Samoan	(5) Cook Island Maori	(6) Tongan	(7) Niuean	(8) Fijian	(9) Other PI	(10) SE Asian	(11) Chinese	(12) Indian	(13) Other Asian	(14) MELAA
Entropy	0.799*** (0.052)	1.260*** (0.081)	1.022 (0.105)	1.788*** (0.322)	1.666** (0.341)	2.020** (0.602)	2.461*** (0.755)	1.583 (0.599)	1.075 (0.517)	2.253*** (0.699)	0.954 (0.190)	1.263 (0.282)	1.836 (0.782)	1.779*** (0.222)
NZ European Gr	1.026*** (0.008)	1.030*** (0.010)	1.027** (0.011)	1.055*** (0.016)	1.043* (0.024)	1.113*** (0.028)	0.996 (0.028)	1.052 (0.037)	1.080** (0.041)	1.023 (0.034)	0.995 (0.020)	1.045* (0.025)	0.971 (0.046)	0.983 (0.015)
Other European Gr	1.052*** (0.009)	1.041*** (0.011)	1.012 (0.013)	1.062*** (0.020)	1.074** (0.031)	1.053 (0.034)	1.041 (0.039)	1.041 (0.054)	1.190*** (0.061)	0.985 (0.036)	1.005 (0.025)	1.043 (0.029)	1.036 (0.061)	0.982 (0.017)
NZ Māori Gr	1.009 (0.005)	1.017** (0.007)	1.035*** (0.009)	1.042*** (0.012)	1.049*** (0.018)	1.067*** (0.022)	1.009 (0.022)	1.024 (0.028)	1.108*** (0.033)	1.003 (0.024)	1.001 (0.016)	1.051*** (0.020)	0.960 (0.038)	0.992 (0.011)
Samoan Gr	1.016* (0.009)	1.023** (0.010)	1.022* (0.012)	1.059*** (0.017)	1.014 (0.024)	1.091*** (0.027)	0.986 (0.028)	1.056 (0.038)	1.090** (0.038)	1.009 (0.035)	0.985 (0.023)	1.031 (0.027)	0.958 (0.047)	0.981 (0.016)
Cook Island Māori Gr	1.009 (0.013)	1.001 (0.016)	1.019 (0.021)	1.083*** (0.032)	1.099** (0.041)	1.123*** (0.045)	0.981 (0.039)	1.076 (0.055)	1.045 (0.069)	0.970 (0.055)	1.014 (0.039)	1.021 (0.043)	0.969 (0.093)	0.916*** (0.029)
Tongan Gr	1.028*** (0.010)	1.007 (0.015)	1.038** (0.019)	1.052** (0.022)	1.060** (0.031)	1.178*** (0.038)	0.993 (0.035)	1.082* (0.048)	1.040 (0.055)	1.035 (0.048)	0.949* (0.026)	1.052 (0.037)	0.985 (0.067)	0.996 (0.027)
Niuean Gr	1.000 (0.017)	1.114*** (0.022)	1.010 (0.030)	1.080** (0.040)	1.084* (0.052)	1.103** (0.055)	1.137** (0.063)	0.941 (0.068)	1.210** (0.100)	1.125** (0.065)	1.095** (0.043)	1.011 (0.055)	1.065 (0.172)	0.952 (0.050)
Fijian Gr	0.972 (0.040)	1.183*** (0.070)	1.099 (0.078)	1.013 (0.115)	0.944 (0.122)	0.978 (0.139)	1.100 (0.167)	1.713*** (0.312)	0.976 (0.246)	0.638** (0.116)	1.020 (0.111)	1.231 (0.158)	0.733 (0.227)	0.861* (0.075)
Other Pi Gr	1.015 (0.039)	1.021 (0.043)	1.066 (0.050)	1.095 (0.096)	0.987 (0.091)	0.894 (0.111)	1.244** (0.112)	1.176 (0.163)	1.029 (0.147)	1.146 (0.139)	0.922 (0.128)	1.018 (0.116)	0.933 (0.170)	0.895 (0.081)
SE Asian Gr	0.988 (0.017)	1.024 (0.021)	1.030 (0.027)	1.022 (0.040)	1.081 (0.057)	1.050 (0.067)	1.002 (0.077)	1.030 (0.087)	1.020 (0.082)	1.139** (0.061)	1.045 (0.048)	1.052 (0.073)	0.973 (0.078)	1.046 (0.029)
Chinese Gr	1.022** (0.009)	1.032*** (0.011)	1.007 (0.014)	1.046** (0.022)	1.031 (0.030)	1.100*** (0.039)	0.987 (0.037)	0.984 (0.046)	1.159*** (0.055)	0.971 (0.037)	1.031 (0.024)	1.075*** (0.029)	0.991 (0.053)	0.967* (0.016)
Indian Gr	1.032*** (0.009)	1.020* (0.012)	1.037*** (0.014)	1.087*** (0.023)	1.063** (0.028)	1.109*** (0.037)	0.997 (0.037)	1.039 (0.048)	1.105* (0.061)	1.028 (0.036)	1.011 (0.026)	1.108*** (0.032)	0.932 (0.050)	0.971* (0.015)
Other Asian Gr	1.025 (0.017)	0.998 (0.023)	1.009 (0.031)	1.006 (0.052)	0.996 (0.071)	1.186** (0.083)	0.896 (0.094)	1.113 (0.106)	1.085 (0.110)	1.051 (0.065)	1.047 (0.050)	0.999 (0.065)	0.943 (0.077)	0.983 (0.026)

Table 2C continued

Variables	(1) NZ European	(2) Other European	(3) NZ Māori	(4) Samoan	(5) Cook Island Maori	(6) Tongan	(7) Niuean	(8) Fijian	(9) Other PI	(10) SE Asian	(11) Chinese	(12) Indian	(13) Other Asian	(14) MELAA
MELAA Gr	1.091*** (0.011)	1.051*** (0.017)	1.031* (0.018)	1.093*** (0.030)	1.059* (0.032)	1.144*** (0.044)	1.061 (0.044)	1.056 (0.052)	1.087 (0.081)	1.032 (0.044)	1.007 (0.026)	1.041 (0.039)	0.969 (0.059)	0.876*** (0.018)
MELAA Gr D1	0.979 (0.101)	0.971 (0.084)	0.904 (0.169)	1.427** (0.246)	1.601 (0.692)	0.607 (0.347)	1.532* (0.338)	1.425 (0.610)	0.697 (0.667)	2.527*** (0.495)	0.925 (0.336)	1.748*** (0.333)	0.455 (0.477)	0.981 (0.498)
MELAA Gr D2	0.893 (0.072)	0.913 (0.137)	1.100 (0.121)	1.157 (0.155)	1.194 (0.245)	1.445** (0.215)	1.259 (0.262)	1.258 (0.693)	0.852 (0.374)	0.869 (0.293)	1.379* (0.255)	1.154 (0.238)		2.093*** (0.381)
MELAA Gr D3	1.000 (0.042)	0.997 (0.056)	1.046 (0.059)	1.107 (0.093)	0.973 (0.109)	0.815* (0.095)	0.969 (0.166)	1.038 (0.156)	0.693* (0.152)	0.933 (0.122)	0.899 (0.082)	1.024 (0.116)	1.076 (0.209)	0.986 (0.061)

Notes

The table reports odds ratios.

We have dropped the three ‘not further defined’ ethnic groups. We have combined ‘Middle Eastern’, ‘Latin American’, ‘African’ and the ‘Other’ ethnic groups into one group MELAA. We have also combined the ‘Tokelauan’ with the ‘Other Pacific Islander’ ethnic group into one group ‘Other PI’. Thus, our analysis includes 14 Level 2 ethnic groups instead of 21.

*p<0.1; **p<0.05; ***p<0.01

Clustered Standard errors in parenthesis.

Tables 2A, 2B and 2C are reporting results from the same regression. We have broken down the results into different tables according to variables at different levels for easy readability.

‘Gr’ refers to group proportion. For example ‘Tongan Gr’ refers to ethnic group proportion of Tongan group in the area unit an individual resides.

Blank cells are where variables have been omitted due to perfect collinearity, usually due to small cell sizes.

MELAA Gr D1 - Group proportion of combined ‘MELAA and Other’ ethnic group in area unit in the period 1991-1996

MELAA Gr D2 - Group proportion of combined ‘MELAA and Other’ ethnic group in area unit in the period 1996-2001

MELAA Gr D3 - Group proportion of combined ‘MELAA and Other’ ethnic group in area unit in the period 2001-2006

Individual-level Characteristics

We find that ethnicity in the previous Census is statistically significant and positively related to the choice of each ethnic identity (Table 2A). Adolescents are highly likely to identify with the same ethnicity as they were identified with by their parents in the previous Census. The odds ratios are highest for this variable for all groups. For example, holding all other independent variables constant, the odds of choosing Niuean when they were recorded as Niuean in the previous census are about 1000 times the odds of choosing Niuean when they were not recorded as Niuean in the previous census.

We observe that odds of choosing an ethnicity is affected by whether or not the adolescent was also previously affiliated with other ethnic groups, both positively and negatively. These are the off-diagonal elements in Table 2A. Adolescents belonging to any of the Level 2 ethnic categories under Pacific People (for example, Samoan, Cook Island Māori, Tongan etc.) as well as Asian (for example, Indian and Chinese) ethnic groups in the previous census, had lower than average odds of identifying themselves as NZ Māori or New Zealand European in the current census. As the inter-censal changes might affect the results for the combined ‘MELAA and Other’ ethnic group, we include interaction terms in our model.²³ There was an increase in the ‘Other’ ethnic group in 2006, due to the fact that New Zealand European individuals were most likely to call themselves ‘New Zealander’, which was then included in the ‘Other ethnic’ group in 2006. The odds of choosing NZ European, Other European and combined MELAA and Other ethnic groups increase if the individual belonged to the combined ‘MELAA and Other’ category in the previous census.²⁴

The odds of being a Samoan, Cook Island Māori, Tongan, Fijian, Tokelauan or Niuean in the current census increases, if the child belonged to the ethnic groups under the Level 2 Pacific People category in the last census. However, the odds of choosing Cook Island Māori in the current census increases if the parent of the child reported that the child was NZ Māori in the previous census. Cook Island Māori people have a long history of inter-marriage with NZ Māori, and they have been to some extent absorbed into NZ Māori communities (Hooper 1961). Alternatively, our results might also be due to the fact that some New Zealand Māori can trace their ancestry to the Cook Islands (Walrond 2015).

We observe positive and significant complementarity between Chinese/ South East Asian. This might be because the Chinese foreign-born proportion in New Zealand come from China (51 percent), Malaysia (6 percent), Taiwan (5 percent) and Hong-Kong (4 percent) (New Zealand Ministry for Culture and Heritage 2015).

²³ By interacting the binary variable representing individuals belonging to the ‘MELAA and Other’ category with binary variables representing presence in each inter-censal period.

²⁴ We also ran the same regression for each inter-censal period separately. We found that the odds of choosing NZ European increases if a person belonged to the combined ‘MELAA and Other’ ethnic group in the previous census for the period 2006-2013, but not for 2001-2006.

We also observe positive and significant complementarity between Chinese/Samoan, and Indian/ Fijians. The complementarity between Chinese and Samoan ethnic identity can be attributed to the increasing cultural assimilation through intermarriages (Wai 2015). Coming to the two way complementarity between Fijian/ Indians, might be due to the fact the ancestors of the Fiji Indians in New Zealand were Indians who arrived in Fiji as labourers and gradually worked up the social and economic ladder, eventually settling in New Zealand after the political turmoil of 1987 and 2000 in Fiji (Friesen *et al.* 2005, Pio 2007, Leckie 2015). Moreover, Indo-Fijians or Fiji Indian ethnic group is one of the largest Fijian groups in New Zealand (Swarbrick 2015). This also might simply be because Fiji Indian, Fijian Indian and Indo-Fijian individuals might choose both Fijian and Indian ethnic group options.

Sex is statistically significant for some ethnic groups, but not others (Table 2B). *Ceteris paribus*, males are statistically significantly less likely to choose to affiliate with a NZ European (OR=0.89), Other European (OR=0.94), or Cook Island Māori (OR=0.81) ethnicity, but more likely to choose the MELAA or Other ethnicity (OR=1.13).

For age, the odds ratios are all close to one, varying from 0.91 (Samoan) to 1.06 (MELAA and Others) (Table 2B). This is not surprising because the sample of observations is already in a narrow age range (18-22). Age is statistically significant for NZ European (OR=0.98), NZ Māori (OR=0.95), Samoan (OR=0.91) and MELAA and others group (OR=1.06). NZ European, NZ Māori and Samoan are the most common ethnicities (see Table 1). Older adolescents have lower odds of choosing these common ethnicities than younger adolescents, because they may select an ethnicity away from that assigned by their parents as they identify with the ethnicity of a partner or the group they socialise with.

For place of birth (Table 2B), we find that adolescents who are born in New Zealand, have higher odds of reporting their ethnic identity as NZ European (OR=3.96), NZ Māori (OR=1.80), Samoan (OR=1.45) or Cook Island Māori (OR=1.52). In 2013, almost two-thirds of Pacific people living in New Zealand, were born in New Zealand, and 77.4 percent of the individuals living in New Zealand, who reported as Cook Islands Māori are New Zealand born (Statistics New Zealand 2014). People living in New Zealand and belonging to these ethnic groups are more likely to be born in New Zealand than any other country in the world. In 2013, around 81 percent of the adolescents of Samoan ethnicity, living in Auckland, were New Zealand born. Thus, it is likely that the odds of affiliating themselves with these ethnic groups increase if the adolescent is born in New Zealand. On the other hand, those with an Other Asian or MELAA ethnicity are mostly recent migrants to New Zealand. Hence the odds of New Zealand born selecting these ethnicities are relatively low (and significant at the 1 percent level).

Family-level Characteristics

For all ethnic groups, we find that parents' ethnicity, has a positive and significant effect (Table 2B). The odds ratios are high for these variables. For example, the log odds of affiliating themselves as Tongan are 22.7 times higher for those with a Tongan mother (than those without a Tongan mother).

For most groups, we find that the mother's ethnic identity has a larger coefficient than the ethnic identity of the father.²⁵ This is in line with the extant literature (Salisbury 1970; Nelsen 1990; Cholil 2009) that children's cultural identity is passed more along the maternal than the paternal side.

Neighbourhood-level Characteristics

The entropy index measures the diversity of the area unit the adolescent is located in. It can be seen from Table 2C that a young person is less likely to identify with being NZ European in an ethnically diverse area, (OR = 0.8). On the other hand, for those who identify with being Tongan, Niuean and SE Asian, the effect of diversity of the area unit has an odds ratio that is greater than two. Hence Table 2c shows that adolescents residing in more ethnically diverse areas have higher odds of choosing many of the ethnicities, with the exception of the New Zealand European group. New Zealand Europeans are the numerically dominant group in Auckland (59.3 percent in 2013, see Statistics New Zealand 2014). Thus, it might be that, when adolescents see more diversity around them, they feel more comfortable being different and adopting the non-dominant ethnicity (perhaps in addition to the dominant ethnicity). And, if they are in a less diverse area, adopting the non-dominant ethnicity would mark them out as different, which imposes a cost on them. So, in that case, they are less likely to adopt the non-dominant ethnicity.

Not surprisingly, the odds of choosing an ethnicity generally increase in area units where the ethnic group makes up a higher proportion of the ethnic mix. The one exception is the combined 'MELAA and Others' group (Table 2C). This can be seen from the highlighted main diagonal of this block of odds ratios. We also observe that odds of choosing an ethnicity is often affected by the ethnic group sizes of some other ethnic groups as well. This effect is shown by the off-diagonal elements in Table 2C. The statistically significant effects are mostly above average odds, in some cases similar to the off-diagonal effects shown in Table 2A. This reinforces the existence of complementarity between ethnic groups such as among Pacific Island communities and, interestingly, between New Zealand Māori and Indian ethnicities. Generally, they represent the co-location of some ethnic groups at the area unit level (Mondal *et al.* 2019).

²⁵ Except for NZ Māori. The coefficient size for NZ Māori mother is (8.59) and father is (8.73). They are statistically significantly different with a p-value <0.01.

6. Conclusions

The main objective of this paper is to identify the determinants of ethnic identity choices among adolescents in Auckland. We link adolescents between consecutive Censuses, where in the first Census their parents are likely to have recorded the adolescent's ethnicity, and in the second Census the adolescents are likely to have recorded their own ethnicity. To the extent that this assumption holds, we are capturing the ethnic affiliation choice at the time that the adolescent is first making this choice for themselves, that is, when they reach the stage of ethnic identity achievement as described by Phinney (1989, 1990).

We find significant relationships between the adolescents' ethnic identity and the ethnic identity assigned to them by their parents five to seven years previously, their age, sex, having been born in New Zealand, ethnic diversity of their area unit (suburb), and ethnic group-proportions in the area unit they live in, as well as their parents' ethnic identity. The results differ somewhat for different ethnicities, but we also identify patterns of complementarity between ethnicities and ethnic groups that accord with other research.

A limitation of this work might be that we did not link the parents' ethnicity directly to that of the adolescents. Instead we imputed the parental ethnicity variables. With our imputed parental ethnicity variables, we don't know the actual ethnicities of each adolescent's parents and so this is measured with error. However, any resulting measurement error is likely to bias the coefficients on parent's ethnicity towards zero - that is, the results will be over-conservative for this variable. Including only the households with no more than one female and one male adult in the analysis reduces this measurement error. Similarly, siblings may have an effect on an adolescent's choice of ethnic identity, but we did not control for this. As with parents, these data are available for a subset of the population.

Our analysis could be extended using the available data on parent's ethnicity and/or for siblings, present for a subsample of the census data, to check the consistencies with the results reported in this paper. Moreover, we combined the results for 'MELAA' and 'Other' ethnic groups, due to the small number of adolescents reporting these ethnicities. Future research could investigate these ethnicities in more detail, perhaps making use of qualitative methods given the small sample size. We were also unable to control for effects arising from the adolescent's 'peer group' as there are no variables in the Census that could capture peer group effects (but see, for example, Jugert *et al.* 2019). Despite these limitations, our work represents the most comprehensive investigation in New Zealand to date of the effects of individual, household and community-level variables on adolescents' ethnic identity choices.

Our study contributes to a small but growing literature on adolescent ethnic identity development in New Zealand and elsewhere. There have been several past studies about ethnic-self-identity formation among adolescents (Phinney 1989, 1990, Phinney and Chavira 1992) in relation to theories regarding different stages of identity formation. These studies are mainly

based on U.S. data, so our study contributes in a novel context. Moreover, our study provides a baseline for future analysis in exploring the influence of changes in social circumstances on self-identified ethnicity over time (that is, when moving from child to adolescent).

Understanding ethnic mobility is important, given the increasing ethnic diversity of Western countries like New Zealand. Increases in ethnic mixing and intermarriage will lead to increases in multiple ethnicity and potentially to increases in ethnic mobility. This study presents a novel attempt to facilitate understanding of these changes using linked inter-censal data for adolescents.

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