

Immigrant status and acculturation influence substance use among New Zealand youth

Abstract

Objective: To investigate the associations between generational status, acculturation and substance use among immigrant and non-immigrant secondary school students in New Zealand.

Methods: A nationally representative sample of secondary school students in New Zealand was selected using a two-stage cluster sample design. Of the 8,999 students in the sample, 23.81% were first-generation immigrants and 20.90% were second-generation immigrants; the remaining 55.29% students are collectively referred to as 'non-immigrant' peers. Logistic regression models adjusted the associations of interest for age, gender, ethnicity, socioeconomic status and experience of ethnic discrimination.

Results: First and second-generation immigrants showed significantly lower risks of smoking cigarettes compared with their non-immigrant peers. Similar trends were apparent for consuming alcohol and marijuana weekly. The inclusion of some characteristics suggestive of acculturation in multivariable models did not influence the relationship between generational status and smoking cigarettes, but attenuated the apparent protective effect of being a first-generation immigrant with regard to alcohol and marijuana use.

Conclusions and implications: The study shows the lower likelihood of substance use among newer immigrants in a nationally representative sample of New Zealand youth. Policies and health programs that build on this positive profile and reduce the risk of adverse changes over time require attention.

Key words: Substance use, immigrant paradox, acculturation, New Zealand

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The 'immigrant paradox' is a well-documented phenomenon that refers to the counterintuitive finding that immigrants show better outcomes (e.g. academic achievement, psychological wellbeing and healthier behaviours) than their non-immigrant peers, despite often facing socioeconomic hardship.¹⁻³ International research investigating this phenomenon has often examined risk behaviours, such as substance use, and how these differ between immigrant youth and their non-immigrant counterparts. For example, research in the United States has shown that immigrant

adolescents tend to engage in less tobacco, alcohol and drug use than their national peers.^{2,4-6} A recent Swedish study has shown a similar trend for alcohol use and binge drinking, but an inverse pattern for illicit drug taking, with immigrant adolescents being more likely to use these drugs than the Swedish majority population.⁷

Some studies suggest that the immigration paradox is less common in immigrants who have been in the host culture longer.^{1,3} One interpretation of this trend is linked to the selection of more healthy individuals and families

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during the immigration process. Acculturation is another possible explanation as it exerts an important influence on the behavioural patterns of immigrant adults and adolescents and may account for their adaptation outcomes. Studies have shown that the immigrant advantage deteriorates over time and across generations, suggesting a link to increasing contact with the majority population during the process of acculturation.^{1,3,8}

In addition, research has demonstrated that acculturation, when understood as greater participation in the wider society and adoption of mainstream norms, is a strong predictor of marijuana use among Hispanic background youth.⁹ Immigrants are more likely to engage in substance abuse when they become acculturated.^{5,10} These results suggest an inverse relationship between immigrant adaptation and acculturation: lower levels of acculturation are associated with better adaptation outcomes for immigrant youth. Supporting this, research has shown that more-acculturated Asian-American youth are more likely to smoke than their less-acculturated counterparts.¹¹

There are different conceptual and working definitions of the immigrant paradox and different types of comparison used to test the paradox. Three main approaches can be identified in the literature, each with increasingly stringent comparative criteria. In the first approach, the immigrant paradox is supported when immigrant groups show better outcomes than their non-immigrant peers.² This is the broadest approach because the conceptualisation of the immigrant paradox in any working definition always involves a simple comparison between immigrant and non-immigrant groups. In the second approach, a comparison between first and second-generation immigrants is included.¹² The paradox is that first-generation immigrants often have better outcomes than their non-immigrant peers, despite economic and cultural disadvantages, but that the advantage diminishes, if not ceases, by the second generation. Researchers using this approach compare first-generation immigrants with both non-immigrants and second-generation immigrants, with the expectation that first-generation immigrants do better than both of the other groups. The third approach is more stringent. Researchers using this approach also compare second-generation with non-immigrant groups, and expect that first-generation immigrants do better than both non-immigrants and second-generation immigrants, but also that second-generation and their non-immigrant counterparts do not differ.¹

The immigrant paradox has been investigated mainly with North American and European samples.^{5-7,13-15} This study aimed to investigate the immigrant paradox in a large nationally representative sample of students from secondary schools in New Zealand. It used the second approach, comparing first and second-generation immigrants to their non-immigrant peers, but also comparing first and second-generation immigrants. Specifically, the objectives were two-fold:

- to compare the level of substance use (i.e. cigarette, alcohol and marijuana use) of first and second-generation immigrant adolescents relative to other students in the survey (defined as 'non-immigrants' for the purpose of this study); and
- to assess the influence of a cluster of characteristics suggestive of acculturation on the immigrant paradox.

Based on past research, we expected that first and second-generation immigrant adolescents would show better outcomes (i.e. lower risks of substance use) than non-immigrant adolescents, and that acculturation variables may attenuate this relationship.^{1,3}

Methods

Survey background

A nationally representative sample of secondary school students in New Zealand was selected using a two-stage cluster sample design as part of the Youth'07 project (www.youth2000.ac.nz). New Zealand had 389 schools with more than 50 students in years 9 to 13 in 2006. From these schools, 115 were randomly selected and 96 agreed to participate in the 2007 survey, representing an 84% response rate. The participating schools reflected the general characteristics of secondary schools in New Zealand.¹⁶ In most schools, 18% of year 9 to 13 students (12,355) were randomly selected from the school's roll and invited to participate. In a few smaller schools up to 30% were selected. A total of 9,056 students formed the final Youth'07 sample, a 73% response rate. Ethics approval for the study was given by The University of Auckland's Human Subject Ethics Committee.

Most participating students (64%) were aged between 14 and 16 years, 20% were 13 years or less and 16% were 17 years or older. The students were demographically similar to the national population of secondary school students.¹⁶ The survey used Internet Tablets, hand-held computers with high-resolution touch screens. No keyboard data entry was required; students could both read questions/answers on the screen and hear them through headphones, and responses were made by touching the screen with a stylus.¹⁷ Students could skip any question or section of the survey at any point. A more detailed description of the methodology can be obtained elsewhere.¹⁶

Participants and immigrant generation variable

Along the lines of previous studies investigating effects of immigrant status,^{13,18} three comparative groups were created. Foreign-born students were defined as first-generation immigrants; New Zealand-born adolescents with at least one foreign-born parent were defined as second-generation immigrants. The reference ('non-immigrant') group was made up of New Zealand-born adolescents with New Zealand-born parents. A total of 8,999 students from the Youth'07 sample could be categorised in these three groups and made up the total sample for this study.

Measures

Table 1 describes the measures used in detail. A brief description of the main measures is provided below.

Explanatory variables: There were two constructs of interest in the present study: *immigrant generation* (as described above) and *acculturation*. Although acculturation can be understood in terms of both cultural maintenance and cultural contact,¹⁹ only the cultural contact dimension of acculturation is included in the present study. Our working definition of acculturation refers to the

movement towards engagement/participation in the host culture. We used four related variables to measure engagement/participation in New Zealand society:

- comfort in New Zealand European social settings;
- participation in New Zealand European traditional activities;
- English as the main language spoken at home; and
- length of time in New Zealand.

These variables have been used in previous studies of acculturation and health-related outcomes.^{5,10,20}

Outcome variables: Substance use was assessed using three questions related to cigarettes and marijuana smoking, and alcohol drinking on a weekly basis. The specific questions were: “How often do you smoke cigarettes?” (weekly or more often), “During the past 4 weeks, about how often did you drink alcohol?” (weekly or more often), and “In the past 4 weeks, about how often did you smoke marijuana?” (weekly or more often).

Control variables: Age, gender, ethnicity and the socioeconomic status (SES) of each student were included in the analyses as control variables. SES was measured both at an individual level and at a small geographic area level. In addition, a composite measure of discrimination by ethnicity (bullying and unfair treatment) was included as a control variable because research has shown that discrimination is a risk factor for substance use.²¹

Data analysis

All analyses used SAS version 9.2. Given the two-stage sample cluster design with unequal probabilities of selection, the data were weighted and the variance of effect estimates was adjusted to allow for correlated data from the same school. Descriptive analyses for the main variables were undertaken first. Multiple logistic regressions were then undertaken to address the objectives of the present study. A first set of logistic regressions, adjusted for age,

Table 1: Description of variables to be used in analyses.

Variable	Description	Coding
Immigrant variable		
Immigrant generation	First-generation (foreign-born students)	Two dummy variables
	Second-generation (New Zealand-born students with at least one foreign-born parent)	
	Non-immigrant (New Zealand-born students and parents)	Reference category
Control variables		
Age	Age in years	
Sex	Biological sex	Female=1, Male=0
Four indicators of students' socio-economic status (SES)	How many times has moved homes	Scale: 0, 1, 2, 3 or more times
	Parents or caregivers worry about having enough money to buy food	Scale: 0=never, 1=occasionally, 2=sometimes, 3=often, 4=all the time
	Alternatives rooms at home are used as bedrooms	Scale: 0=none, 1=other rooms that are not bedrooms, 2=garage or caravan, 3=living room
	Deprivation Index (NZDep) using 2006 New Zealand census data, which is an area-based socio-economic deprivation index calculated from nine variables using 2006 New Zealand census data: household income (two indicators), home ownership, single parent families, employment, educational qualifications, overcrowding, access to telephone, and access to car	Three groups: 1=low deprivation, 2=medium deprivation, 3=high deprivation
Discrimination	Three questions were used to assess experienced discrimination because of students' ethnicity: (1) Bullied at school because of the ethnic group or culture, (2) Unfair treatment by a health professional because of ethnicity, and (3) Unfair treatment by the police because of ethnicity	Experienced discrimination in at least 1 of these instances Dummy variable (1=yes, 0=no)
Substance use variables		
Smoking cigarettes	Frequent use of cigarettes (weekly or more often)	Dummy variable (1=yes, 0=no)
Alcohol use risk	Frequent use of alcohol (weekly or more often)	Dummy variable (1=yes, 0=no)
Marijuana use	Frequent use of marijuana (weekly or more often)	Dummy variable (1=yes, 0=no)
Acculturation variables		
Comfort in New Zealand	Comfortable in New Zealand European social surroundings	Dummy variable (1=yes, 0=no)
NZ celebration	Family celebrates NZ European special activities/traditions	Three groups: 1=a lot, 2=some, 3=not many/none
Main language	English main language spoken at home	Dummy variable (1=yes, 0=no)
Length of time in NZ	Length of time living in New Zealand	Students' age minus age when immigrated to New Zealand; for NZ-born length equals student's age

gender, ethnicity, and the SES and discrimination indices, examined the influence of immigration generation on the substance use outcome variables (Model 1). A second set assessed the effects of immigration generation and acculturation factors on substance use outcome variables (Model 2). Although acculturation factors might not be relevant for non-immigrant students, we kept this group in Model 2 for full comparison with Model 1.

Results

Sample characteristics

Of the 8,999 students in the study sample, 2,132 (23.81%) were first-generation immigrants, 1,876 (20.90%) were second-generation immigrants and 4,991 (55.29%) were non-immigrant students. Although smaller than the non-immigrant sample, the immigrant sample was still meaningful for research purposes. Only a minority of the participants came to New Zealand as refugees (n=101, 4.8%) and 17.3% (n=368) did not know if they came to New Zealand as refugees or not. Table 2 shows the demographic composition of the sample by immigrant generation group.

Risks of smoking cigarettes on a weekly basis

Table 3 presents the results from multiple logistic regression analyses for smoking. When immigrant generation was included in a single model (Model 1), being male, younger, from Asian or other ethnic groups, and from affluent neighbourhoods were associated with significantly lower risks of smoking weekly. In contrast, having alternative rooms used as bedrooms, frequently moving homes and experiencing ethnic discrimination was associated with significantly higher risks of smoking weekly. Supporting the immigrant paradox, first and second-generation immigrants also had significantly lower risks of smoking than their non-immigrant counterparts. First and second-generation immigrants did not differ in their risk of smoking.

Model 2 examined the relationship between immigrant generation and the risk of smoking when acculturation variables were also added to the model. None of the acculturation variables were significantly associated with risk of smoking, and adjusting for the effect of these variables did not change the observed effects of immigrant generation on smoking. That is, first and second-generation immigrants still had lower risks of smoking than their non-immigrant counterparts. All other variables remained significant after adding the acculturation variables.

Table 2: Demographic description of the sample by the immigrant generation variable.

	Immigrant generation						Total
	1 st generation		2 nd generation		Non-immigrant		
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Demographic variables							
Gender							
Male	1,169	54.93 (46.95-62.91)	1,010	53.83 (46.29-61.37)	2,677	53.78 (46.80-60.76)	4,856
Female	963	45.07 (37.09-53.05)	866	46.17 (38.63-53.71)	2,314	46.22 (39.24-53.20)	4,143
Age							
13	323	15.04 (12.74-17.34)	417	22.23 (19.45-25.02)	1,094	21.74 (19.95-23.53)	1,834
14	439	20.53 (18.92-22.15)	413	21.90 (19.85-23.95)	1,225	24.52 (22.94-26.09)	2,077
15	465	21.87 (20.14-23.59)	388	20.74 (19.08-22.39)	1,095	22.04 (20.74-23.33)	1,948
16	445	20.94 (18.59-23.28)	387	20.68 (18.73-22.63)	900	18.07 (16.92-19.23)	1,732
17	460	21.62 (19.35-23.90)	271	14.45 (12.36-16.54)	677	13.64 (12.30-14.97)	1,408
Ethnicity							
Asian	832	39.33 (29.17-49.49)	252	13.53 (9.57-17.49)	34	0.68 (0.37-0.99)	1,118
New Zealand (NZ) European	630	29.45 (23.05-35.85)	820	43.52 (36.53-50.52)	3,309	66.26 (62.37-70.16)	4,759
Māori	98	4.55 (2.85-6.25)	178	9.55 (7.67-11.44)	1,401	28.10 (24.35-31.85)	1,677
Other	320	15.06 (12.51-17.61)	75	3.98 (2.98-4.99)	129	2.62 (2.12-3.13)	524
Pacific	246	11.06 (6.07-17.13)	549	29.41 (20.39-38.42)	116	2.34 (1.56-3.11)	911
Outcome variables							
Weekly smoking							
No	1,839	94.82 (93.74-95.91)	1,569	93.19 (91.97-94.41)	4,182	90.86 (89.68-92.05)	7,590
Yes	102	5.18 (4.09-6.26)	115	6.81 (5.59-8.03)	421	9.14 (7.95-10.32)	638
Weekly alcohol drinking							
No	1,695	87.84 (85.57-90.12)	1,415	84.03 (81.56-86.49)	3,642	79.01 (77.51-80.50)	6,752
Yes	236	12.16 (9.88-14.43)	268	15.97 (13.51-18.44)	962	20.99 (19.50-22.49)	1,466
Weekly smoking marijuana							
No	1,791	96.83 (95.74-97.93)	1,529	95.69 (94.73-96.65)	4,157	94.58 (93.62-95.53)	7,477
Yes	59	3.17 (2.07-4.26)	69	4.31 (3.35-5.27)	237	5.42 (4.47-6.38)	365

Risks of drinking alcohol on a weekly basis

Table 4 presents the results from multiple logistic regression analyses for drinking alcohol on a weekly basis. In Model 1, being female, younger, from Asian, the Pacific or other ethnic groups, and from affluent neighbourhoods (marginally, $p=0.057$) were associated with lower risks of drinking alcohol weekly. Frequently moving homes, parents worrying about having enough money to buy food (marginally, $p=0.055$) and experiencing ethnic discrimination were associated with higher risks of drinking alcohol. First-generation immigrants had significantly lower risks of drinking alcohol than their non-immigrant counterparts. No differences were found in risks of alcohol use between second-generation immigrants and both first-generation immigrants and non-immigrants. Thus, the immigrant paradox was only partially supported for the risks of drinking alcohol.

When acculturation variables were added (Model 2), being uncomfortable in New Zealand European social surroundings

and speaking English at home were significantly associated with risks of drinking. After the addition of the acculturation variables, however, the difference between first-generation immigrants and non-immigrants became non-significant, with the attenuation of the protective effect of being a first-generation immigrant. Adding the acculturation variables had little impact on the estimated effect of being a second-generation immigrant. All other variables in Model 1 remained significant after adding the acculturation variables.

Risks of smoking marijuana on a weekly basis

Table 5 presents the results from the multiple logistic regression analyses for smoking marijuana on a weekly basis. Being female, younger, and from Asian or other ethnic groups were associated with significantly lower risks of weekly use of marijuana. Having alternative rooms used as bedrooms, frequently moving homes and experiencing ethnic discrimination was associated with

Table 3: Multiple logistic regression models examining the joint effect of immigrant generation and acculturation factors on the risk of smoking on a weekly basis among adolescents in New Zealand.

	Model 1			Model 2		
	OR	95% CI	p-value	OR	95% CI	p-value
Gender (reference Female)						
Male	0.61	(0.49-0.76)	<0.0001	0.61	(0.49-0.76)	<0.0001
Age (reference 17 years)						
13	0.32	(0.23-0.45)	<0.0001	0.27	(0.17-0.41)	<0.0001
14	0.45	(0.34-0.60)		0.44	(0.31-0.62)	
15	0.71	(0.54-0.94)		0.70	(0.53-0.93)	
16	0.90	(0.71-1.14)		0.90	(0.70-1.16)	
Ethnicity (reference NZ European)						
Asian	0.58	(0.39-0.88)	<0.0001	0.69	(0.43-1.13)	<0.0001
Māori	2.24	(1.73-2.90)		2.27	(1.77-2.93)	
Pacific	1.42	(0.98-2.06)		1.46	(0.96-2.22)	
Other	0.78	(0.46-1.31)		0.92	(0.55-1.54)	
SES						
Alternatives used as bedrooms vs. no alternatives rooms used	1.40	(1.13-1.75)	0.0024	1.42	(1.14-1.78)	0.0022
Has moved homes	1.44	(1.31-1.59)	<0.0001	1.47	(1.33-1.63)	<0.0001
Parents worry about having enough money to buy food	1.04	(0.95-1.14)	0.4323	1.03	(0.94-1.14)	0.4991
Low vs. high deprivation	0.64	(0.46-0.90)	0.0295	0.61	(0.44-0.84)	0.0109
Medium vs. high deprivation	0.87	(0.67-1.12)		0.82	(0.63-1.08)	
Experienced ethnic discrimination	2.79	(2.15-3.61)	<0.0001	2.74	(2.07-3.61)	<0.0001
Immigrant generation						
1 st generation vs. non-immigrant	0.58	(0.42-0.81)	0.0008	0.50	(0.25-1.00)	0.0073
2 nd generation vs. non-immigrant	0.69	(0.51-0.91)		0.71	(0.53-0.95)	
1 st generation vs. 2 nd generation	0.85	(0.58-1.26)		0.70	(0.32-1.53)	
Acculturation						
Comfortable in New Zealand European social surroundings vs. uncomfortable				1.01	(0.80-1.27)	0.9698
Family celebrates a lot vs. not many/none				1.28	(0.87-1.87)	0.3086
Family celebrates some vs. not many/none				1.08	(0.73-1.61)	
English spoken at home vs. another language				1.36	(0.77-2.41)	0.2886
Time in NZ				0.98	(0.92-1.05)	0.5473

significantly higher risks of weekly use of marijuana. Although the estimates of the risks of using marijuana were similar to those for the other substances (with a trend for the immigrant paradox), the comparatively small numbers of students using marijuana meant that effects were not statistically significant. None of the acculturation variables were associated with risks of marijuana use, and the trends found in Model 1 remained broadly the same after inclusion of the acculturation variables in Model 2.

Discussion

A growing number of studies have shown the counterintuitive finding, known as immigrant paradox, that immigrants show better adaptation outcomes than their national peers, and that the advantage deteriorates over time and generation.¹ This study investigated whether the immigrant paradox was apparent in the prevalence of substance use in a nationally representative sample of

New Zealand secondary school students. In line with this paradox, first and second-generation immigrants showed lower risks of smoking cigarettes than their non-immigrant peers. Similarly, first-generation immigrants showed lower risks of drinking alcohol than their non-immigrant counterparts and a similar trend was also observed for using marijuana weekly, but no statistically significant differences were found between second-generation immigrants and non-immigrants. The findings were significant and consistent after controlling for several socio-demographic and related variables, including age, gender, ethnicity, SES, and the experience of ethnic discrimination. The consistent trend for the immigrant paradox in smoking risk even after adding acculturation factors in the analyses is in line with other studies.²⁰ This indicates that smoking risk is lower among immigrant youth (compared to their non-immigrant peers) even if they have a higher engagement/participation in New Zealand culture.

Table 4: Multiple logistic regression models examining the joint effect of immigrant generation and acculturation factors on the risk of drinking alcohol on a weekly basis among adolescents in New Zealand.

	Model 1			Model 2		
	OR	95% CI	p-value	OR	95% CI	p-value
Gender (reference Female)						
Male	1.34	(1.15-1.57)	0.0003	1.37	(1.17-1.60)	<0.0001
Age (reference 17 years)						
13	0.15	(0.12-0.21)	<0.0001	0.16	(0.12-0.22)	<0.0001
14	0.24	(0.19-0.32)		0.27	(0.21-0.36)	
15	0.47	(0.38-0.59)		0.51	(0.41-0.62)	
16	0.72	(0.59-0.88)		0.74	(0.61-0.90)	
Ethnicity (reference (NZ European)						
Asian	0.23	(0.16-0.31)	<0.0001	0.28	(0.20-0.40)	<0.0001
Māori	1.48	(1.24-1.76)		1.44	(1.20-1.72)	
Pacific	0.46	(0.31-0.68)		0.48	(0.32-0.72)	
Other	0.80	(0.58-1.11)		0.90	(0.63-1.29)	
SES						
Alternatives used as bedrooms vs. no alternatives rooms used	1.18	(0.99-1.40)	0.0654	1.17	(0.98-1.39)	0.0873
Has moved homes	1.20	(1.10-1.30)	<0.0001	1.23	(1.13-1.34)	<0.0001
Parents worry about having enough money to buy food	1.06	(1.00-1.13)	0.0552	1.07	(1.00-1.14)	0.0561
Low vs. high deprivation	1.27	(0.99-1.62)	0.0569	1.24	(0.96-1.60)	0.2249
Medium vs. high deprivation	1.29	(1.05-1.59)		1.21	(0.96-1.52)	
Experienced ethnic discrimination	2.25	(1.84-2.76)	<0.0001	2.08	(1.66-2.59)	<0.0001
Immigrant generation						
1 st generation vs. non-immigrant	0.74	(0.62-0.87)	0.0008	1.04	(0.77-1.41)	0.3593
2 nd generation vs. non-immigrant	0.88	(0.74-1.06)		0.89	(0.74-1.06)	
1 st generation vs. 2 nd generation	0.83	(0.65-1.07)		1.18	(0.86-1.63)	
Acculturation						
Comfortable in New Zealand European social surroundings vs. uncomfortable				0.80	(0.69-0.93)	0.0029
Family celebrates a lot vs. not many/none				1.13	(0.88-1.45)	0.1886
Family celebrates some vs. not many/none				0.98	(0.72-1.34)	
English spoken at home vs. another language				1.75	(1.02-2.99)	0.0419
Time in NZ				1.04	(1.00-1.09)	0.0662

The lower risks of substance use for the first-generation immigrants compared to their non-immigrant peers, combined with the overall trends towards similar risks of substance use for second-generation immigrants and non-immigrants supports the immigrant paradox.^{2,12} It appears that differing levels of acculturation are contributing to the differences between first-generation and non-immigrant youth groups for risks of substance use, which is not the case for second-generation immigrants. However, the extent to which the relationships between immigrant generation and risks of substance use were influenced by acculturation variables could not be explored adequately given the relatively imprecise estimates in statistical models in a study that was not powered to undertake such analyses. Drawing on the findings from previous research,⁸⁻¹⁰ there is a need to further explore in more focused studies the factors that may mediate the pathway through which newer migrants retain or lose the protective effect of lower risks of substance use.

Care needs to be taken when interpreting these findings. First, the variables used to measure acculturation in this study examine only one dimension of the acculturation process (contact and participation in the wider host society). This acculturation dimension was used because other studies have suggested that the decrement of the immigrant advantage over time and across generations is linked to increasing contact with the host society.^{1,3,8} However, the present analysis tells us nothing about the second dimension of acculturation referent to the maintenance of the traditional heritage culture.¹⁹ The cultural contact and cultural maintenance dimensions of acculturation have been shown to be orthogonal in New Zealand immigrant youth and both independently exert influence on adaptive outcomes.²² Consequently, measures of both cultural contact and maintenance should be included in future studies on the immigrant paradox. Second, it is worth noting that

Table 5: Multiple logistic regression models examining the joint effect of immigrant generation and acculturation factors on the risk of smoking marijuana on a weekly basis among adolescents in New Zealand.

	Model 1			Model 2		
	OR	95% CI	p-value	OR	95% CI	p-value
Gender (reference Female)						
Male	1.72	(1.34-2.19)	<0.0001	1.76	(1.35-2.30)	<0.0001
Age (reference 17 years)						
13	0.33	(0.19-0.58)	<0.0001	0.41	(0.23-0.74)	<0.0001
14	0.65	(0.40-1.04)		0.80	(0.46-1.37)	
15	1.20	(0.82-1.75)		1.37	(0.91-2.04)	
16	1.03	(0.68-1.57)		1.08	(0.71-1.66)	
Ethnicity (reference (NZ European)						
Asian	0.43	(0.22-0.83)	<0.0001	0.53	(0.27-1.05)	<0.0001
Māori	2.09	(1.56-2.79)		2.05	(1.53-2.75)	
Pacific	1.17	(0.72-1.88)		1.13	(0.66-1.92)	
Other	0.80	(0.43-1.49)		0.98	(0.50-1.91)	
SES						
Alternatives used as bedrooms vs. no alternatives rooms used	1.56	(1.13-2.15)	0.0066	1.43	(1.03-1.99)	0.0343
Has moved homes	1.30	(1.13-1.49)	0.0003	1.38	(1.18-1.60)	<0.0001
Parents worry about having enough money to buy food	1.07	(0.94-1.21)	0.3086	1.06	(0.92-1.22)	0.4045
Low vs. high deprivation	0.87	(0.61-1.22)	0.5523	0.78	(0.55-1.11)	0.3440
Medium vs. high deprivation	1.00	(0.70-1.43)		0.90	(0.62-1.31)	
Experienced ethnic discrimination	3.70	(2.82-4.87)	<0.0001	3.75	(2.76-5.09)	<0.0001
Immigrant generation						
1 st generation vs. non-immigrant	0.65	(0.42-0.99)	0.1307	1.11	(0.54-2.28)	0.8736
2 nd generation vs. non-immigrant	0.88	(0.63-1.23)		0.93	(0.66-1.32)	
1 st generation vs. 2 nd generation	0.73	(0.46-1.17)		1.19	(0.56-2.56)	
Acculturation						
Comfortable in New Zealand European social surroundings vs. uncomfortable				1.00	(0.78-1.37)	0.8375
Family celebrates a lot vs. not many/none				0.69	(0.41-1.16)	0.3371
Family celebrates some vs. not many/none				0.76	(0.44-1.34)	
English spoken at home vs. another language				1.84	(0.80-4.19)	0.1494
Time in NZ				1.09	(0.98-1.20)	0.0996

while the impact of immigrant generation was evident even after ethnicity was controlled, more nuanced analyses are required to identify the particular influences of ethnicity, ethnic discrimination and experiences of racism and social exclusion that can also influence risk-taking behaviour through a variety of pathways. Further research with better measurements of acculturation and ethnic discrimination, as well as longitudinal designs that follow young people over time, could add more insight into the factors and pathways that mediate the immigrant paradox.

Another limitation of this study is the inclusion of only substance use variables. Such variables are dependent on the social relations of the students and are clearly influenced by peer pressure, which is expressed by their strong links with externalising behaviours.²³ Therefore, one could argue that first-generation (and even second-generation) immigrants do not have established social networks in the new country of residence that would increase their exposure to cigarettes, alcohol and marijuana. Increasing the social contact with non-immigrant peers would potentially increase the contact with drugs and alcohol. Future studies should thus examine whether the immigrant paradox would still hold in New Zealand when internalising variables (e.g. depression, attempted suicide, somatising, unhealthy dieting) are considered. The extent to which the immigrant paradox may be apparent in other externalising behaviours (e.g. motor vehicle risk behaviours, unsafe sexual health behaviours, and violence and delinquency) is also worth further exploration.

Notwithstanding these limitations, the present study contributes to the literature by demonstrating the associations between immigrant status and risk behaviours. These findings may be used to develop policies and health programs aimed to reinforce and maintain the low risk of substance abuse among earlier generation immigrants. Future studies should further examine the associations between immigrant status, acculturation and health, keeping in mind that acculturation should not be seen as a stressful situation in isolation.²⁴

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