EPIDEMIOLOGY
The Links Between Ethnicity, Cultural Identity and Alcohol Use, Abuse and Dependence in a New Zealand Birth Cohort
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Abstract — Aims: To examine the role of ethnicity and cultural identity in alcohol use and misuse in a birth cohort of over 1000 young people. Methods: Data on ethnicity, cultural identification, alcohol use, alcohol abuse/dependence (AAD), socio-economic factors and childhood adversity were gathered as part of a longitudinal study of a New Zealand birth cohort (the Christchurch Health and Development Study). Results: Those reporting Māori ethnicity had rates of alcohol use and AAD that were 1.47–1.63 times higher than the rates found in the non-Māori people. However, there was little evidence to suggest that rates of alcohol use and AAD differed according to Māori cultural identity. Generalized estimating equation regression analyses adjusting for socio-economic disadvantage and childhood adversity slightly reduced the magnitude of these associations, but they remained statistically significant [AAD: odds ratio = 1.52; 95% confidence interval (CI): 1.13–1.52; consumption: incidence rate ratio = 1.31; 95% CI: 1.13–1.52]. Conclusion: (a) Māori ethnicity was found to be associated with modestly increased risks of alcohol use and AAD (b) the higher rates of alcohol use and AAD among the Māori members of the cohort could not be explained by a combination of socio-economic factors and greater exposure to environmental factors known to influence the risk of alcohol use and misuse.

INTRODUCTION
Increasing attention is being directed toward the global burden caused by the hazardous consumption of alcohol (Rehm et al., 2003a,b; World Health Organization, 2006). Of particular interest is the identification of local patterns of potentially hazardous drinking (Connor et al., 2005a; Slack et al., 2009), and the extent to which local variation in drinking patterns may be linked to adverse outcomes. In New Zealand, a key issue in alcohol research is whether ethnic differences in patterns of alcohol use contribute to the prevailing social disadvantage and disproportionate health burden experienced by Māori (Brady, 2000; Bramley et al., 2003; Connor et al., 2005a,b).

According to the survey data collected using the Alcohol Use Disorders Identification Test, Māori are significantly more likely than non-Māori to have a potentially hazardous drinking pattern (Ministry of Health, 2008; Ministry of Social Development, 2010). Age-standardized prevalence rates observed over three different survey collection periods indicated that Māori are more likely than non-Māori to: (a) show a pattern of higher consumption of alcohol than their non-Māori peers; (b) initiate alcohol use at a younger age; (c) engage in binge drinking; (d) engage in a higher rate of risky behaviours while being under the influence of alcohol and (e) have experienced harmful effects due to their own alcohol use (Ministry of Health, 2009). Similarly, Te Rau Hinengaro: The New Zealand Mental Health Survey reported that one in four Māori (26.5%) had over their life time experienced a substance disorder and that excessive alcohol use was the principal cause of psychiatric admission for Māori men and the second cause for Māori women during the latter part of the twentieth century (Pomare et al., 1995; Oakley Browne et al., 2006). Other studies have corroborated these findings and confirmed that the local burden attributable to alcohol consumption in New Zealand is not evenly distributed across ethnicities (Connor et al., 2005a,b).

The associations between Māori ethnicity and alcohol use raise a number of significant issues, particularly with respect to the factors that place Māori at greater risk of alcohol use and dependence. Three explanatory frameworks are commonly used to account for the inter-ethnic differences in alcohol use by New Zealanders, the overview of each of which we now present.

The first framework is based on social deprivation theories. On a wide range of indices, Māori are subject to greater socio-economic disadvantage than non-Māori (Chapple, 2000; Marie et al., 2011). Therefore, it could be argued that the lower socio-economic status of Māori compared with other New Zealanders leads Māori to feature disproportionately in rates of alcohol use and dependence. This framework suggests that Māori are no more likely to engage in excessive alcohol use than non-Māori experiencing similar socio-economic circumstances.

A second explanatory framework emerges from social learning theory and suggests that the asymmetry in the ethnic patterns of alcohol use may be linked to an ecological ‘at risk’ model of familial adversity (Ramey and Ramey, 1998; Repetti et al., 2002). From this perspective, the elevated rate of alcohol use and dependence among Māori arises from members of this ethnic group being over-exposed during childhood and adolescence to the adverse factors known to be associated with hazardous substance use in later life. Research indicates that, besides socio-economic disadvantage, Māori have greater exposure to negative childhood and related experience compared with non-Māori (Ministry of Social Development, 2004; Marie et al., 2009). Therefore, independent of socio-economic disadvantage, the higher exposure of Māori to adverse environmental factors may explain the higher rate of alcohol use and dependence among Māori.

The third framework has its primary focus on Māori cultural identity. This perspective suggests that contemporary ethnic disparities are a direct result of historical and
structural processes originating from the colonial settlement of New Zealand (Durie, 1997). Examples of these processes include psychoactive substances such as alcohol being introduced into communities and the imposing of a Western value system upon Māori. According to this framework, Māori have experienced cultural dislocation and impairments to identity, which in turn has led to the ethnic differential in patterns of alcohol consumption and dependence (Clarke and Ebbett, 2010). Arguably, this is the most dominant explanation for the current ethnic disparities in alcohol use and dependence as it serves as a cornerstone principle of both the whanau ora initiative and current alcohol interventions specifically targeting Māori (Huriwai, 2002). In order to mitigate substance-related problems, these interventions place emphasis on (re)introducing Māori to beliefs and practices aimed at strengthening cultural identity and well-being (Huriwai et al., 2001).

Against this background, this research used the data gathered over the course of a New Zealand longitudinal birth cohort study to explore the extent to which the ethnic differences in alcohol consumption and dependence can be explained by socio-economic differences, social learning processes and variations in cultural identity.

METHODS

The data were gathered during the course of the Christchurch Health and Development Study (CHDS). In this study a birth cohort of 1265 children (635 males and 630 females) born in the Christchurch (New Zealand) urban region in mid-1977 was studied at birth, 4 months, 1 year and annually up to age 16 years and again at ages 18, 21 and 25 years. Information from a variety of sources was used including parental interviews, teacher reports, self-reports, psychometric assessments and medical and other data records (Fergusson et al., 1989; Fergusson and Horwood, 2001). The present analyses were based on those individuals for whom data on ethnic identity were available from the age 21 assessment (n = 1011, 79.9% of the original cohort).

Ethnicity and cultural identity

At age 21 years, the respondents were asked about their ancestry, cultural identification, level of participation in Māori cultural domains and proficiency in the Māori language (Broughton et al., 2000). On the basis of this questioning, 11.1% of the sample members self-identified as New Zealand Māori [in the 2006 New Zealand census, 14.6% of the population were reported to have self-identified as New Zealand Māori (Statistics New Zealand, 2007b)]. A further breakdown of this group showed 45.9% reporting sole Māori identity and 54.1% reporting Māori ethnic identity and identity with another ethnic group. For the purposes of the present analyses, those reporting sole Māori identity were classified as having a sole Māori cultural identity, while those reporting both the Māori identity and another ethnic identity were classified as having Māori/other cultural identity. In addition, both the groups were combined to form a Māori ethnicity group. All the other participants were classified as being non-Māori. The descriptors of ‘sole Māori’, ‘Māori/other ethnic identity’ and ‘non-Māori’ were originally recommended by Pomare et al. (1995) in their analyses examining ethnic trends in public health epidemiology. Comparisons of the sole Māori and the Māori/other groups showed consistent differences between the groups across several aspects of participation in Māori culture (Broughton et al., 2000).

Alcohol outcomes, ages 16–30

At the age 18, 21, 25 and 30 year assessments, the participants were questioned as to the frequency with which they had used alcohol during the year prior to the assessment, the amount of alcohol usually consumed in a drinking session and the extent to which they reported symptoms of DSM-IV (American Psychiatric Association, 1994) alcohol abuse and alcohol dependence since the previous assessment. For the purposes of the present study, these questions were used to form two measures of alcohol-related outcomes during the period 16–30 years. These measures included:

1. Alcohol abuse/dependence (AAD), ages 16–18, 18–21, 21–25 and 25–30. At ages 18, 21, 25 and 30 years, the study participants were interviewed on a structured mental health interview designed to assess aspects of mental health and psychosocial adjustment. As part of these assessments, components of the Composite International Diagnostic Interview (World Health Organization, 1993) were used to assess DSM-IV symptom criteria for AAD. For the purposes of the present analysis, the participants who met the criteria for AAD during the assessment period (16–18; 18–21; 21–25 years; 25–30) were classified as having had AAD during that period.

2. Number of standard drinks consumed during a usual drinking session, ages 18, 21, 25 and 30. At each assessment, the cohort members were questioned as to the number and type of drinks consumed during a ‘typical’ drinking session during the 12 months prior to the interview. This information concerning the type of beverage and amount consumed was used to calculate the number of standard drinks (each 10 g unit of alcohol) consumed during a usual drinking session for each participant at each assessment.

Confounding factors

Socio-economic background

The socio-economic background of the cohort members was assessed using several indicator measures chosen from the database of the study. These included:

Maternal age
Assessed at the survey child’s birth.

Paternal education (at birth)
The education level of the natural father of each participant was assessed at the time of the survey child’s birth using a three-point scale that reflected the highest level of educational achievement attained.

Family living standards (0–10 years)
At each year an assessment of the material living standards of the family was obtained via interviewer rating on a five-
point scale that ranged from ‘very good’ to ‘very poor’. These were averaged over the 10-year period to give a measure of family living standards during this period.

Family socio-economic status (at birth)
This was assessed at the time of the survey child’s birth using the Elley-Irving scale (Elley and Irving, 1976) of socio-economic status for New Zealand.

Family functioning factors
Measures of family functioning were also chosen from the study database. These measures included:

Parental illicit drug use (0–11 years)
The cohort members were classified as having a parent history of illicit drug use if one of his/her parents was reported to have a lifetime history of illicit drug use.

Parental alcoholism (0–15 years)
A dichotomous measure of whether or not the young person’s parents reported experiencing alcoholism or problems with alcohol at any point in their lives.

Parental criminality (0–15 years)
The cohort members were classified as having a parent history of criminality if one of his/her parents was reported to have a lifetime history of criminality.

Family adversity measure (0–15 years)
A measure of family adversity was calculated using a count measure of 38 different measures of family disadvantage during the period 0–15 years, including measures of disadvantaged parental background, poor pre-natal health practices and perinatal outcomes and disadvantaged child-rearing practices (Fergusson et al., 1994).

RESULTS

Associations between AAD, alcohol consumption and ethnicity/cultural identity
Tables 1 and 2 show the cohort divided into Māori (n = 114) and non-Māori (n = 897) groups. For each group, the table reports a number of summary statistics describing patterns of alcohol outcomes including (a) AAD at ages 16–18, 18–21, 21–25 and 25–30 and (b) the number of standard drinks consumed at ages 18, 21, 25 and 30. These statistics include the percentage meeting DSM-IV diagnostic criteria for AAD during each assessment interval; and the mean number of self-reported standard drinks consumed during a ‘usual’ drinking session during the 12 months prior to each assessment. In addition, the tables show estimates of the odds ratio (OR) and incidence rate ratio (IRR), which provides an approximate measure of the risks of a given outcome among Māori compared with the risks for non-Māori, derived from generalized estimating equation (GEE) models. In both the comparisons, there was evidence of modest associations between ethnicity and alcohol outcomes, with those reporting Māori identity having odds of AAD that were 1.63 [95% confidence interval (CI): 1.21–2.18] times higher than the odds seen in the non-Māori participants, and rates of alcohol consumption that were 1.47 (95% CI: 1.28–1.69) times higher than the rates for non-Māori during the period 15–30 years.

In order to examine the differences amongst the two Māori cultural identity groups (see Methods section), further analyses using GEE models compared the two alcohol outcomes amongst those individuals in the sole Māori (n = 52) and the Māori/other identity (n = 62) groups. Tables 3 and 4 show the results of the comparisons between the sole Māori and the Māori/other identity groups, which revealed no significant difference for AAD and only a marginally significant difference (P < 0.10) for alcohol consumption. Because no significant differences were found between the two Māori identity groups, for the purposes of statistical precision, all subsequent analyses were conducted using the two-group classification of ethnicity (Māori and non-Māori groups).

Tests of socio-economic and social learning explanations
To examine the extent to which the ethnic differences in AAD and alcohol consumption could be explained by socio-

| Table 1. Rates of AAD, ages 15–18, 18–21, 21–25 and 25–30, by ethnicity |
|-----------------------------|-----------------|------------------|
| % Meeting criteria for alcohol abuse/dependence | Māori (n = 114) | Non-Māori (n = 897) |
| Ages | | |
| 15–18 | 29.2 | 20.8 |
| 18–21 | 43.9 | 26.8 |
| 21–25 | 32.7 | 20.5 |
| 25–30 | 8.6 | 14.6 |

Population-averaged OR (95% CI) = 1.63 (1.21–2.18); P < 0.01.

| Table 2. Rates of alcohol consumption, ages 18, 21, 25 and 30, by ethnicity |
|-----------------------------|-----------------|------------------|
| Mean (SD) number of standard drinks consumed in a ‘usual’ drinking session | Māori (n = 114) | Non-Māori (n = 897) |
| Age | | |
| 18 | 7.98 (8.16) | 5.44 (4.87) |
| 21 | 9.62 (13.72) | 6.77 (6.64) |
| 25 | 9.15 (10.69) | 5.55 (6.60) |
| 30 | 6.75 (6.97) | 4.97 (6.14) |

Population-averaged IRR (95% CI) = 1.47 (1.28–1.69); P < 0.0001.

| Table 3. Rates of AAD, ages 15–18, 18–21, 21–25 and 25–30, by cultural identity |
|-----------------------------|-----------------|------------------|
| % Meeting criteria for alcohol abuse/dependence | Sole Māori (n = 52) | Māori/other identity (n = 62) |
| Ages | | |
| 15–18 | 39.2 | 21.0 |
| 18–21 | 42.3 | 45.2 |
| 21–25 | 35.3 | 30.5 |
| 25–30 | 4.2 | 12.3 |

Test of group difference LR $\chi^2 (1) = 0.42$, P > 0.50.
economic factors and social learning processes, the associations between ethnicity and alcohol outcomes were adjusted for socio-economic and childhood factors using a two-stage regression approach.

The first stage GEE model fitted to the data controlled the associations between ethnicity and each alcohol use outcome (AAD; alcohol consumption) for measures of socio-economic status including maternal age, paternal education, socio-economic status at birth and average family living standards up to age 10 (see Methods section). All the covariate factors were entered into the models simultaneously. In the second stage of the analysis, the first-stage models were extended to include a series of childhood and family factors that were known on the basis of previous research into this cohort to be associated with alcohol use outcomes. These factors included parental alcohol problems, parental criminal offending, parental illicit drug use and a measure of family adversity (see Methods section). Again, all the covariate factors were entered into the models simultaneously.

The results of these analyses are shown in Table 5, which reports ORs and IRRs for the associations between ethnicity and alcohol outcomes after adjustment for (a) socio-economic factors and (b) socio-economic and childhood/family factors. The table shows that adjustment for socio-economic factors reduced slightly the magnitude of the association between ethnicity and both: AAD and alcohol consumption; however, the associations remained statistically significant (AAD: OR = 1.59; 95% CI: 1.17–2.17; consumption: IRR = 1.36; 95% CI: 1.17–1.56).

In both the cases, adjustment for both socio-economic and childhood/family factors again reduced slightly the magnitude of the associations between ethnicity and alcohol outcomes, but both the associations remained statistically significant (AAD: OR = 1.52; 95% CI: 1.11–2.10; consumption: IRR = 1.31; 95% CI: 1.13–1.52).

The implication of the findings in Table 5 is that the modest associations between ethnicity and alcohol outcomes shown in Tables 1–2 could not be wholly explained by the greater exposure of young Māori to socio-economic disadvantage and childhood/family adversity.

**DISCUSSION**

This research has used data gathered over the course of a study of a New Zealand longitudinal birth cohort to examine associations between ethnicity, alcohol consumption and AAD.

### Table 4. Rates of alcohol consumption, ages 18, 21, 25 and 30, by cultural identity

<table>
<thead>
<tr>
<th>Mean (SD) number of standard drinks consumed in a ‘usual’ drinking session</th>
<th>Cultural Identity</th>
<th>Mean (SD) number of standard drinks consumed in a ‘usual’ drinking session</th>
<th>Cultural Identity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sole Māori (n = 52)</td>
<td>Māori/other identity (n = 62)</td>
<td>Sole Māori (n = 52)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>9.33 (8.42)</td>
<td>6.94 (7.86)</td>
<td>9.33 (8.42)</td>
</tr>
<tr>
<td>21</td>
<td>10.60 (8.82)</td>
<td>9.31 (16.84)</td>
<td>10.60 (8.82)</td>
</tr>
<tr>
<td>25</td>
<td>10.18 (11.63)</td>
<td>8.26 (9.82)</td>
<td>10.18 (11.63)</td>
</tr>
<tr>
<td>30</td>
<td>8.14 (7.18)</td>
<td>5.58 (6.63)</td>
<td>8.14 (7.18)</td>
</tr>
</tbody>
</table>

Test of group difference LR $\chi^2 (1) = 3.04$, $P < 0.10$.

In agreement with previous research (Connor et al., 2005a,b), there were consistent trends for the cohort members reporting Māori identity to have significantly higher rates of alcohol consumption and AAD from adolescence to adulthood compared with the non-Māori cohort members. However, among those reporting Māori identity, rates of alcohol use and AAD did not significantly differ between those reporting a sole Māori identity and those reporting a Māori/other identity, suggesting that there was little evidence to support the notion that patterns of alcohol use and misuse varied according to cultural identity. This conclusion is contrary to the assumptions underpinning the foregoing cultural identity framework whereby it is assumed that the less one identifies as Māori, the more likely they will be to engage in behaviours regarded as being Western in origin, including the consumption of alcohol (Durie, 1997; Clarke and Ebbett, 2010).

Two additional explanations for the higher rate of alcohol use and misuse by Māori are that this population has higher exposure to socio-economic disadvantage and family adversity, with these factors combining to place Māori at increased risks of later alcohol misuse. These explanations were not strongly supported by the present analysis, which showed that, even following extensive statistical adjustment for socio-economic and childhood factors, Māori remained at a modest but statistically significant increased risk of symptoms of AAD (OR = 1.52; 95% CI: 1.11–2.10) and also consumed more alcohol (IRR = 1.31; 95% CI: 1.13–1.52; See Table 5).

### Table 5. Associations between ethnicity and AAD and alcohol consumption (ages 15–30) after control for (a) socio-economic factors and (b) socio-economic and family functioning factors

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Model controlling for socio-economic factors</th>
<th>Model controlling for socio-economic factors and family functioning factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol abuse/dependence ages 15–30</td>
<td>OR/IRR 95% CI P-value</td>
<td>OR/IRR 95% CI P-value</td>
</tr>
<tr>
<td>Standard drinks consumed during usual drinking session ages 18–30</td>
<td>1.59 1.17–2.17 &lt;0.01</td>
<td>1.52 1.11–2.10 &lt;0.05</td>
</tr>
</tbody>
</table>

To this end, it is important to note that the strength of cultural identity did not influence the intra-ethnic variations in patterns of alcohol use, nor did social deprivation and ecological ‘at risk’ frameworks adequately explain the inter-ethnic variations in alcohol use and dependence. Together, these results suggest the presence of unmeasured factors or alternative pathways that...
may contribute to the increased risk of alcohol use and dependence among Māori. Evidently, although there may be overlap in the risk factors and life trajectories that lead both young Māori and non-Māori to potentially hazardous alcohol use (Boden and Fergusson, 2011), there may also be factors that contribute to ethnic patterns of divergence. While the precise nature of these factors is unclear, recent evidence has suggested that genetic factors may play an important role in influencing the differential patterns of alcohol consumption and risk of alcohol misuse (Kendler et al., 2010; Whitfield et al., 2004; Heath et al., 2011). Further research has suggested that these differential patterns may be linked to ethnic differences. For example, Edenberg (2007) suggests that ethnic variation in the distribution of alleles related to alcohol metabolism may be linked to observed inter-ethnic differences in alcohol-related outcomes such as alcohol use disorders. Future research may help to elucidate whether genetic factors may play a role in the increased alcohol intake and increased risk of AAD among Māori.

The WHO Committee dedicated to address the global burden caused by excessive alcohol consumption has stated that effective evidence-based alcohol policies need to factor in the local composition of alcohol problems including the cultural, legal and economic mores of specific nations (World Health Organization, 2006). The results of the present study suggest that improvements in the social and economic status of Māori may contribute, to some extent, to reducing the alcohol-related health burden experienced by Māori. However, it must also be noted that exposure to socio-economic deprivation and family adversity by Māori did not fully explain the association between ethnicity and alcohol outcomes, indicating the need for further research. In addition, it should be noted that initiatives aimed at addressing excessive alcohol consumption and alcohol-related harm that target improving economic and environmental conditions are likely to be of benefit to the population as a whole.

The present study has a number of limitations. First, the data were gathered on a specific cohort, born in a specific region and studied over a specific historical period. Although the socioeconomic and demographic profile of Christchurch does not differ greatly from that of other large New Zealand cities (Statistics New Zealand, 2007a, 2012), it should also be noted that the proportion of Māori in the CHDS cohort was somewhat smaller than is found in the population of New Zealand as a whole (Statistics New Zealand, 2007b, 2012). This may reflect the fact that there is a somewhat smaller proportion of Māori among residents of the South Island of New Zealand, and it is unclear whether the differing demographic profile of Māori in the South Island may have influenced the results of the present study. Moreover, the present findings may be limited both by the accuracy of self-reported alcohol use and outcomes among cohort members, and by the choice of measures used to assess alcohol use and dependence. In addition, the number of Māori studied was limited \((n = 114)\) and no corresponding measures related to cultural identity were used to assess non-Māori cohort members. It may have also been of interest to conduct comparative analyses examining outcomes of individuals reporting other ethnic affiliations; however, the number of participants in the present cohort indicating additional affiliations was too small.

With these limitations and strengths in mind, two major conclusions about the ethnic differences in the potentially hazardous consumption of alcohol in New Zealand emerge. First, Māori ethnic identification is associated with increased risks of alcohol use and abuse/dependence. Second, although the higher rate of alcohol use and dependence by Māori can be partially attributed to a combination of socio-economic and environmental impacts, further research is required to reveal additional contributing factors.

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