Ethnic Differences in Adolescent Mental Health Problems: Examining Early Risk Factors and Deviant Peer Affiliation

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Abstract

Using life-course longitudinal data from the Christchurch Health and Development Study (CHDS), we examined ethnic differences in rates of psychiatric disorder among New Zealand adolescents, comparing New Zealand Māori to their European peers. The CHDS includes a large birth cohort of New Zealand children who have been regularly assessed throughout childhood, adolescence, and adulthood. Ethnicity (New Zealand Māori versus non-Māori) was assessed at age 14 years. Internalizing and externalizing disorders were assessed at age 15, 16, and 18 years. A diverse range of risk factors were included to test if differences in mental health difficulties were explained by greater exposure to early life-course challenges. We found significant differences in rates of mental disorder during adolescence between New Zealand Māori and non-Māori, but these differences were largely explained by early developmental challenges and adolescent peer affiliations. Differences across the two ethnic groups in rates of internalizing disorders were explained by the increased exposure amongst Māori to socioeconomic disadvantage during childhood, while differences in externalizing disorders were explained by greater exposure amongst Māori to childhood family adversity and deviant peer affiliation during adolescence. The findings point to the significant influence of cumulative early life-course risk factors in accounting for the ethnic differences between Māori and non-Māori in the development of adolescent internalizing and externalizing disorders.

Keywords: longitudinal study; adolescent mental health; Māori ethnicity; deviant peer affiliation
In an attempt to better understand the ecological predictors of mental health problems in children and adolescents, a number of studies have examined differences in rates of mental illness diagnoses and self-reported symptomology according to ethnicity. Typically, these studies contrast ethnic minority groups with that of the ethnic majority. However, the results across studies have been very inconsistent. For example, McLaughlin, Hilt, and Nolen-Hoeksema (2007) examined internalizing and externalizing symptoms in a large cohort of European American, African American, and Hispanic/Latino American adolescents from the north-east of the United States (U.S.) and found that Hispanic American females reported the highest levels of depressive symptoms, Hispanic American females and African American males reported the highest levels of anxiety symptoms, and African American males reported the highest levels of aggression. However, a similar study comparing the same ethnic groups with slightly older youth from the mid-south of the U.S. found few significant differences between groups, with African Americans showing the lowest risk for psychiatric disorders (Roberts, Roberts, & Xing, 2006). A recent study with children and adolescents from Hawaii (Okamura et al., 2016) compared internalizing symptoms across a number of different Asian ethnicities with native Hawaiian and White young people. The authors found no significant differences across the ethnic groups when examining self-report data from the children and adolescents, but parents from each of the ethnic minority groups reported that their children had higher rates of internalizing symptoms compared to the parents of the White ethnic majority children. While the majority of this research has been done with samples from the United States, studies from other countries have also produced mixed results, with some studies showing ethnic minorities have greater prevalence of mental health difficulties (e.g., Jakel, Leyendecker, & Agache, 2015; Nielsen & Krasnik, 2010), and other studies documenting specific ethnic minority groups that seem protected from mental health issues (Stansfeld et al., 2004).
These contradictory findings seem to extend to research with indigenous populations. Indigenous ethnic groups can be distinguished from other ethnic minority groups due to the history of occupation, settlement, colonialization, and campaigns for recognition of identities and protection of rights that they have experienced (Martinez Cobo, 1983). In an early study comparing Native American youth from the Appalachian region with European American peers, Costello and colleagues found Native American youth to have slightly lower rates of overall prevalence of psychiatric disorders, but they were more likely to report substance use/dependence (Costello, Farmer, Angold, Burns, & Erkanli, 1997). In contrast, Whitbeck and colleagues found substantial differences, primarily for externalizing disorders, when comparing prevalence rates across Native American adolescents from the mid-west to national prevalence rates (Whitbeck, Johnson, Hoyt, & Walls, 2008).

Two international studies, one from Norway (Minsky, et al., 2006) and one from Chile (CaCaqueo-Urizar, Urzua, & De Munter, 2014) found no differences in mental health difficulties between the indigenous ethnic minority samples and ethnic majority samples. In New Zealand, studies have documented increased rates of psychiatric disorders in the adolescent years for New Zealand Māori (the indigenous people group) compared to non-Māori ethnic groups. For example, van Kessel, Myers, Stanley, and Reed (2012) found an over-representation of young Māori being admitted to a regional inpatient child and adolescent psychiatric unit relative to the local population. Over a 10-year period admissions by those of Māori descent increased compared to a decrease in admissions for European adolescents. Patterns of adolescent Māori mental health in a community setting also indicate that Māori youth have a higher prevalence of psychiatric symptoms compared to their New Zealand (NZ) European counterparts. Studies have found that Māori adolescents are more likely than non-Māori adolescents to experience both internalizing and externalizing difficulties (Noel, Denny et al., 2013; Fergusson, Poulton et al., 2003), and are more likely to have made a suicide attempt or die by suicide, compared to NZ European adolescents (Beautrais & Fergusson, 2006; Clark et al., 2008).
These ethnic differences in rates of adolescent mental health disorders could be linked to ethnic differences in exposure to risk factors for psychopathology in childhood and adolescence. There are a number of well researched early risk factors for psychopathology, and in New Zealand, Māori have higher rates of exposure to these early risk factors than non-Māori, but these have not consistently been examined as explanatory factors (e.g., Marie, Fergusson, & Boden, 2014). For example, children from low SES families are more likely to exhibit symptoms of both internalizing and externalizing disorders (Carter & Imlach Gunasekara, 2012; Evans & Cassels, 2014). Exposure to parental instability and maladjustment, and family instability or dysfunction represents another set of risk factors associated with poor mental health outcomes for adolescents (Marie, Fergusson, & Boden, 2009; Wynd, 2013).

Children from disadvantaged and high-risk environments are also more likely to develop affiliations with deviant peers (Fergusson & Horwood, 1999; Kendler, Myers, & Dick, 2015), and deviant peer affiliation is associated with adolescent depressive symptoms and internalizing problems more generally (Barrera et al., 2002; Fergusson, Wanner, Vitaro, Horwood, & Swain Campbell, 2003), as well as externalizing behaviors such as alcohol and substance abuse (Fahnhorst & Winters, 2005), property crime and violent crime (Fergusson, Swain-Campbell, & Horwood, 2002; Keijsers et al., 2012), and conduct disorder and oppositional defiant disorder (Boden, Fergusson, & Horwood, 2010; Buehler, 2006). This suggests that peer affiliations with deviant youth during adolescence may be an important contextual predictor of adolescent internalizing and externalizing behaviors, but what about the role of ethnicity? No other research is currently available regarding ethnic differences in deviant peer affiliation between NZ Māori and European adolescents, and research on deviant peer affiliation amongst other ethnic minorities in other countries has been limited. In American samples, Deutsch, Crockett, Wolff, and Russell (2012) found that deviant peer affiliation mediated the associations between low parental control and delinquency for both African American and European American youth, and Laird, Pettit, Dodge, and Bates (2005) found mean level differences in externalizing behaviors between African American and European American youth.
American and European American boys and girls, but the associations with deviant peer affiliations were similar.

Against this background, the current study employs longitudinal data collected from birth to age 21 years as part of the Christchurch Health and Development Study (CHDS) to examine the relationships between ethnicity (assessed at age 14 years) and mental disorder in later adolescence (15-18 years). More specifically, the present study examined:

1. the linkages between Māori ethnicity and rates of mental disorder during adolescence (ages 15-18 years);
2. the extent to which any associations between Māori ethnicity and risks of mental disorders during adolescence were maintained after controlling for childhood socioeconomic disadvantage, childhood adversity, and deviant peer affiliation.

METHOD

Participants and Procedure

Data were gathered during the course of the Christchurch Health and Development Study (CHDS), a longitudinal study of a birth cohort of 1265 children (635 males, 630 females) born in the Christchurch (New Zealand) urban region in mid-1977. The cohort has been assessed at birth, 4 months, 1 year and annually to age 16 years, and again at ages 18, 21, 25, 30, and 35 years (Fergusson & Horwood, 2001, Fergusson, Horwood, Shannon, & Lawton, 1989). For the purposes of the present study, no data obtained later than age 21 were used. The majority of study information was collected on the basis of extensive interviews with cohort members and/or their parents who provided signed consent (parent consent from birth and cohort members from age 12), and all information is fully confidential. All aspects of the study have been approved by the Canterbury (NZ) Ethics Committee, and all interviewers
underwent comprehensive training and asked questions only as written to ensure fidelity in each
assessment.

**Māori ethnicity**

When cohort members were age 14, their parents were asked which ethnic categories best described
their child’s cultural identification. If the parent’s answer indicated that their child identified exclusively
as ‘Māori’ or identified mixed heritage which included ‘Māori’, then the child was classified as Māori. On
the basis of this questioning, 9.75% \((n = 97)\) of cohort members were classified as being of Māori
ethnicity at age 14 years.

**Mental health disorders, ages 15, 16, and 18 years**

Beginning at age 15, and repeated at ages 16 and 18 years, cohort members were asked a series of
questions designed to assess DSM-III-R/DSM-IV symptom criteria for a series of mental health disorders.
Please see Fergusson, Horwood, & Lynskey (1993) for details of psychometric properties of these
measures.

**Major depression.** Using items from the Comprehensive International Diagnostic Interview
(CIDI) (World Health Organization, 1993), participants who met DSM criteria for major depression during
the 12 months prior to each assessment at ages 15, 16 and 18 years were classified as having major
depression during the period (6.0% of the cohort at age 15; 8.1% at age 16; 17.3% at age 21).

**Anxiety disorders.** Also using items from the CIDI, participants who met DSM criteria for at least
one anxiety disorder (including: generalised anxiety disorder, social phobia, specific phobia, panic
disorder, and agoraphobia) during the 12 months prior to each assessment at ages 15, 16 and 18 years
were classified as having an anxiety disorder during that period (10.9% of the cohort at age 15; 21.0% at
age 16; 16.9% at age 21).

**Suicidal ideation.** Custom-written survey items were used to assess the extent to which cohort
members had experienced suicidal ideation on at least one occasion during the 12 months prior to each
assessment at ages 15, 16 and 18 years (7.5% of the cohort at age 15; 10.8% at age 16; and 11.3% at age 18).

Conduct disorder. At ages 15 and 16, both the parent and child versions of the Early Delinquency Scale (SRED; Moffit & Silva, 1988) were used to assess the DSM-III-R symptom criteria for conduct disorder (4.9% of the cohort at age 15; 6.5% at age 16). At age 18, conduct disorder was assessed using items from the Self-Report Delinquency Instrument (SRDI; Elliot & Huizinga, 1989)(4.7% of the cohort).

Alcohol use disorder. At ages 15 and 16, custom-written survey questions supplemented by the administration of the Rutgers Alcohol Problems Index (White & Labouvie, 1989), assessed whether cohort members met DSM-III-R criteria for alcohol abuse or alcohol dependence (3.6% of the cohort at age 15; 5.4% at age 16). At age 18, items from the CIDI were used to assess the extent to which cohort members met DSM-IV criteria for alcohol abuse or alcohol dependence (19.9% of the cohort).

Illicit drug use disorder. At ages 15 and 16, a series of custom-written survey items were used to assess the extent to which cohort members met DSM-III-R criteria for illicit drug (including cannabis) abuse/dependence (1.8% of the cohort at age 15, and 2.9% of the cohort at age 16). At age 18, items from the CIDI were used to assess the extent to which the cohort member met DSM-IV criteria for illicit drug abuse/dependence (11.2% of the cohort).

Covariate factors

To examine the life-course experiences that may explain the associations between ethnicity and later mental disorder, a number of variables were abstracted from the CHDS database. These variables were those that: a) were known to be associated with ethnicity, and/or b) were likely to be predictors of adolescent mental health disorders. These included the following: family socioeconomic characteristics at the time of birth of the cohort member, parental and family adversity measures assessed from birth
to age 21 years, and deviant peer affiliations assessed repeatedly at ages 15, 16, and 18 years. These measures are described in detail in the supplemental online appendix.

**Statistical analyses**

The data were analysed using logistic Generalized Estimating Equation (GEE) models, over a series of steps. In the first step of the modelling procedure, the bivariate associations between ethnicity and each of the six individual mental disorders (major depression; anxiety disorder; suicidal ideation; conduct disorder; alcohol use disorder; illicit substance disorder), and three composite measures (internalizing disorder; externalizing disorder; overall disorder) were computed.

Then, in order to examine the extent to which the associations between ethnicity and the three composite outcome measures could be explained by covariate factors, the models were extended to include sets of covariate factors, in three blocks (socioeconomic status; family adversity; and deviant peer affiliations). All models were fitted using SAS 9.3 and Stata 12.0. See the supplemental online appendix for further details.

**RESULTS**

**Associations between ethnicity at birth and mental health disorders, ages 15, 16, and 18 years.**

Table 1 shows the cohort classified into two groups (Māori and non-Māori) based on parent-report when cohort members were 14 years old. For each group, the Table shows the percentage of participants who met the criteria for three internalizing disorders (major depression; anxiety disorder; suicidal ideation) and three externalizing disorders (conduct disorder; alcohol use disorder; illicit substance disorder) during the 12 months preceding each assessment. In addition, Table 1 shows the population-averaged rate of each disorder over the three assessment periods, and an estimate of the odds ratio (OR) and 95% confidence interval (CI). Table 1 shows:
1. Māori cohort members had generally higher rates of internalizing disorders than non-Māori. For major depression, Māori had significantly higher rates of depression, whereas the difference was marginal for both anxiety disorder and suicidal ideation. Inspection of the ORs show that Māori had rates of internalizing disorder that were 1.54 to 1.77 times higher than non-Māori.

2. On the other hand, there were consistent and statistically significant differences between Māori and non-Māori across all three externalizing disorders. Inspection of the ORs show that Māori had rates of externalizing disorder that were 1.82 to 3.47 times higher than non-Māori.

3. No statistically significant ethnicity x age interactions were found.

The three measures of internalizing disorders, and the three measures of externalizing disorder were combined into single measures representing the rate of individuals meeting criteria for at least one of the disorders. In addition, an aggregate measure of “any mental disorder” was created by combining the internalizing and externalizing disorder measures. The associations between ethnicity and these combined measures, as well as the population-averaged rates over the three assessment periods are shown in Table 2:

1. The rate of internalizing disorders increased for both Māori and non-Māori over the course of the study. However while Māori rates of internalizing disorders were only approximately 4% higher than those of non-Māori at age 15, ethnic differences in the rate of internalizing disorders increased substantially by age 18, with Māori having rates of externalizing disorders that were approximately 14% higher than non-Māori. Overall, Māori had odds of Internalizing disorders that were 50% higher than non-Māori (OR 1.50, 95% CI 1.07-2.01, p<.05).

2. Ethnic differences in rates of externalizing disorders were more consistent throughout the study, with Māori rates of externalizing disorder ranging between being approximately 10-15% higher than those of non-Māori throughout the study. Overall, these results indicate that the odds of
externalizing disorder were 2.3 times higher for Māori than for non-Māori (95% CI 1.59-3.40, p<.001).

3. Similarly, for the prevalence of any mental disorder, there was evidence of consistent differences between Māori and non-Māori at each age measured, with Māori having rates of any mental disorder ranging between approximately 6%-16% higher than those of non-Māori throughout the study. Overall the odds of Māori having any mental disorder during adolescence were 1.6 times greater than those of non-Māori (95% CI 1.14-2.19, p<.01).

**Ethnic differences in socioeconomic disadvantage, childhood exposure to adversity, and deviant peer affiliation**

One explanation for the results shown in Table 1 and Table 2 is that these differences reflect between-group differences in exposure to a series of factors related to childhood socioeconomic disadvantage, adverse childhood and adolescent family conditions, and the influence of deviant peer affiliations in adolescence. In order to examine this issue, Māori and non-Māori cohort members were compared across a series of measures of: a) socioeconomic disadvantage obtained during childhood; b) exposure to adversity in childhood; and c) deviant peer affiliations measured at the time of each assessment (ages 15, 16, and 18 years). The results of these comparisons are shown in Table 3, which shows means scores and percentages for Māori and non-Māori cohort members on the measures described above, as well as estimates of Cohen’s $d$ to demonstrate the size of the difference between groups. Table 3 shows:

1. Māori cohort members were significantly more likely than non-Māori cohort members to have: a) lower levels of family SES at birth; lower levels of maternal and paternal education; and were more likely to have been born into a single-parent family.

2. Cohort members who were classified as Māori were also significantly more likely to have been exposed to a range of adverse childhood circumstances, including: a) parental history of alcohol problems, criminality, and illicit drug use; b) childhood physical abuse; c) a greater number of
changes to parental figures in the family; and d) a lower average standard of living during early and middle childhood (0 to 10 years). Conversely, Māori cohort members did not differ from non-Māori in terms of exposure to childhood sexual abuse.

3. Māori cohort members were also significantly more likely to affiliate with deviant peers at each of the assessments at age 15, 16, and 18 years, as compared with non-Māori.

**Adjustment for socioeconomic disadvantage, childhood exposure to adversity, and deviant peer affiliation**

In order to examine the extent to which the factors shown in Table 3 could account for the higher rates of internalizing, externalizing and overall mental health disorder amongst Māori cohort members, the models described in Table 2 (above) were extended to include the measures listed in Table 3 (above), over a series of steps (see Data Analysis in the supplemental online appendix). The results of this modelling procedure are shown in Table 4, which shows estimates of the OR and 95% CI for the difference between Māori and non-Māori cohort members in risks of mental health disorders, after adjustment at each step, and reports on statistically significant covariate factors. The Table shows:

1. After adjustment for socioeconomic factors, the association between ethnicity and internalizing disorders was reduced to statistical non-significance, while the association between ethnicity and overall mental disorder was reduced to marginal significance. The association between ethnicity and externalizing disorders was reduced in magnitude, but remained statistically significant.

   Statistically significant covariate factors included: maternal education and maternal age at birth.

2. Further adjustment for childhood exposure to adversity reduced the magnitude of the association between ethnicity and overall mental disorder to statistical non-significance. Again, after adjustment, the association between ethnicity and externalizing disorders was reduced in magnitude, but remained statistically significant. Statistically significant covariate factors included:
parental illicit drug use, criminal offending and alcohol problems; childhood physical abuse; changes in parents; and family living standards.

3. Finally, adjustment for deviant peers in adolescence reduced the magnitude of the association between ethnicity and externalizing disorders to statistical non-significance. After adjustment, Māori cohort members had odds of externalizing disorder that were 1.30 times higher than non-Māori (as compared with 2.33 times higher before adjustment).

The results of these analyses suggest that the differences between Māori and non-Māori cohort members in mental health disorders in late adolescence could be explained by increased exposure to adverse childhood socioeconomic, family, and related circumstances in childhood amongst Māori members of the cohort, and via higher levels of affiliation with deviant peers in adolescence.

**DISCUSSION**

Similar to studies with adult populations (e.g., Baxter et al., 2006), the present study found that NZ Māori cohort members of the Christchurch Health and Development Study had higher rates of both internalizing and externalizing psychiatric disorders in adolescence compared to non-Māori participants. These results are consistent with findings from another NZ longitudinal study which indicated that amongst adolescents aged 17 to 18, Māori had odds of any mental disorder that were 1.8 times higher than those of non-Māori (Fergusson, Poulton, et al. 2003). Ethnic differences were also found for a range of early socioeconomic risk factors, parental maladjustment, and family adversities. These findings are consistent with other New Zealand data sets that show Māori children are exposed to higher rates of early risk factors (Cotterell & von Randow, 2008; Wynd, 2013). For example, from 2012 to 2014 approximately 33% of Māori children were found to be living in poverty compared to 16% of NZ European children (Perry, 2015). Māori young people also make up approximately half of all children and youth exposed to child maltreatment (Families Commission, 2009). As Māori are more likely than
non-Māori to be exposed to both socioeconomic disadvantage and parental and family related childhood adversities it seems they are then more likely to experience the cumulative effect of these risk factors and their risk of psychopathology during adolescence rises accordingly.

Two risk factors assessed at birth, maternal education and maternal age, explained the association between ethnicity and internalizing disorders in adolescence. These findings replicate previous studies (Frigerio et al., 2009; Langton, Collishaw, Goodman, Pickles & Maughan, 2011; Mok, Antonsen, Pedersen, & Webb 2017); and while these risk factors point to potential sources of the intergenerational transmission of internalizing mental disorders, elucidating the processes by which these risk factors impact adolescent mental health is difficult as they likely represent markers or proxy variables for early psychosocial, socioeconomic, and/or inherited vulnerabilities that are more directly linked with mental health. Both of these maternal variables are associated with a wide variety of child development outcomes and their influence has been tied to poorer caregiving (Fergusson & Woodward, 1999) and models of cumulative stress (Langton et al., 2011; Kjeldsen, Janson, Stoolmiller, Torgersen, & Mathiesen, 2014).

The association between ethnicity and externalizing disorders was fully explained by a combination of variables measured from birth through early adolescence including socioeconomic, parental adjustment, family stability, parenting, and finally deviant peer affiliations (unadjusted odds ratio = 2.33; odds ratio for Model 4 = .032). The combination of these variables suggests a developmental cascade where early risk, parental maladjustment, family instability, and punitive parenting practices channels young people towards unhealthy peer affiliations which further increases the likelihood of externalizing disorders. While there is currently no other research available on ethnic differences in deviant peer affiliation in a New Zealand context, these findings are comparable to those of Padilla-Walker et al., (2011) who found higher levels of perceived deviant peer affiliation amongst Latino American adolescents when compared to European American adolescents. However, other
studies have found no significant ethnic differences in rates of deviant peer affiliation (Deutsch et al., 2012; Laird et al., 2005). Regardless of ethnic differences, deviant peer affiliation is consistently a significant predictor of a variety of externalizing behaviors. Studies using person-centered as opposed to variable-centered methodologies suggest that consistent or increasing association with deviant peers is associated with an earlier start and higher and more stable trajectories of externalizing problems (Laird, et al. 2001; van Lier et al. 2007). A recent intervention study with middle school students has provided preliminary evidence that a curriculum approach to encouraging healthy friendships can reduce deviant peer affiliations and later delinquency (Delay, Ha, Van Ryzin, Winter, & Dishion; 2016).

The results of this study suggest that vulnerable families may benefit from intervention across multiple areas, which supports recent New Zealand initiatives that aim to unify interventions across the range of available services (Boulton, Tamehana, & Brannelly, 2013). Previous studies also suggest that childhood socioeconomic disadvantage and childhood adversity are risk factors for deviant peer affiliation (Fergusson & Horwood, 1999), which adds further support to the need for early intervention in these areas. Finally, targeted interventions aimed at reducing or preventing deviant peer affiliation in adolescence may also help to reduce incidences of adolescent anti-social behavior associated with adolescent psychopathology. For example, interventions that include parent education and strengthening of parental monitoring have been shown to reduce adolescent deviant peer involvement and reduce incidences of adolescent delinquent behavior (Degarmo & Forgatch, 2005; Dishion, Bullock, & Granic, 2002). However, as Māori children are more likely to experience these socioeconomic and family situated psychosocial risk factors than their European New Zealand peers, it seems especially important that interventions are accessible and culturally appropriate to Māori so that there is effective recruitment and engagement for these families (Gifford, Pirikahu, & Families Commission New Zealand, 2009). As Māori are known to experience disparities in accessing and engaging with health care
providers (Reid & Robson, 2006), it is also important that efforts are made to identify and address the
issues that contribute to the poorer access to healthcare seen amongst Māori. This requires close
inspection and improvement of the philosophy, design, and implementation of these interventions
(Cunningham, 2010)

This study has a number of strengths including a long-term prospective design, multiple
measures of psychiatric problems across late adolescence, and inclusion of a wide variety of covariates
from diverse domains of life-course experiences. Thus, the findings of this study point to a possible
explanation for the inconsistencies in results across previous research when examining group
differences in mental health challenges based on ethnicity. Few studies have the potential to examine
such a diverse range of life-course risk factors, along with ethnicity, when comparing outcomes.
However, when studies incorporate more rigorous assessment of correlated early life-course risk
factors, the ethnic differences seem to be largely reduced (Goebert et al., 2000; Hishinuma et al., 2005).
In terms of limitations, the small sample size of Māori is a limitation of this study. This may have limited
the precision of estimation of differences in rates of mental disorder between Māori and non-Māori
adolescents. Furthermore, the study is subject to the general limitations of self-report.

Collectively, these findings suggest that many of the risk factors and life processes that place
Māori at risk of mental disorders during adolescence seem to be the same as those that place non-Māori
at risk of disorder, with a large proportion of the ethnic differences in mental disorders during
adolescence appearing to be the result of higher exposure amongst Māori to childhood socioeconomic
disadvantage, childhood adversity, and adolescent deviant peer affiliation. These findings are similar to
those of international studies, which indicate that childhood adversity, social disadvantage and deviant
peer affiliation are risk factors that are common to increased risks of maladjustment and mental
disorder in a range of cultural settings (Deković, Wissink, & Meijer, 2004; López & Guarnaccia, 2000;
Repetti, Taylor, & Seeman, 2002). Nevertheless, the higher exposure of Māori children to such a diverse
range of early risk factors points to the ongoing need for effective early intervention which may have
long-term benefits in reducing rates of adolescent psychiatric disorders.

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Chinese American, Filipino American, Japanese American, native Hawaiian, and white youth.


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<th>Disorder</th>
<th>Age</th>
<th>Māori %</th>
<th>%</th>
<th>Non-Māori</th>
<th>Unadjusted Odds (95% CI)</th>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Population averaged (%)</td>
<td>13.7</td>
<td>9.5</td>
<td>1.54</td>
<td>(0.99-2.41)</td>
<td>.057</td>
<td></td>
</tr>
<tr>
<td>Conduct</td>
<td>Age 15</td>
<td>14.4</td>
<td>3.9</td>
<td></td>
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<tr>
<td>Disorder</td>
<td>Age 16</td>
<td>13.6</td>
<td>5.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Alcoho Use Disorder</td>
<td>Population Averaged (%)</td>
<td>Population Averaged (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>---------------------</td>
<td>-------------------------</td>
<td>-------------------------</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>15</td>
<td>7.7</td>
<td>13.4</td>
<td>15.5</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>16</td>
<td>11.2</td>
<td>4.5</td>
<td>9.0</td>
<td></td>
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</tr>
<tr>
<td>18</td>
<td>27.5</td>
<td>3.47</td>
<td>1.82</td>
<td></td>
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</tr>
<tr>
<td>15</td>
<td>6.3</td>
<td>10.4</td>
<td>2.35</td>
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<td></td>
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<tr>
<td>16</td>
<td>5.4</td>
<td>4.7</td>
<td>4.7</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>18</td>
<td>19.8</td>
<td>10.3</td>
<td>10.3</td>
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</tr>
</tbody>
</table>

Note: Age 14 $N = 995$ (Māori $n = 97$);
### Table 2.

*Associations between ethnicity and categories of mental disorder, ages 15, 16 and 18 years*

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Age</th>
<th>Māori %</th>
<th>Non-Māori %</th>
<th>Ratio (95% CI)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internalizing Disorders</td>
<td>Age 15</td>
<td>23.1</td>
<td>18.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age 16</td>
<td>36.0</td>
<td>29.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age 18</td>
<td>44.0</td>
<td>30.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population averaged (%)</td>
<td></td>
<td>34.3</td>
<td>26.1</td>
<td>1.50</td>
<td>.019</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(1.07-2.09)</td>
<td></td>
</tr>
<tr>
<td>Externalizing Disorders</td>
<td>Age 15</td>
<td>19.0</td>
<td>6.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age 16</td>
<td>19.4</td>
<td>9.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age 18</td>
<td>38.5</td>
<td>23.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population averaged (%)</td>
<td></td>
<td>25.4</td>
<td>12.9</td>
<td>2.33</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(1.59-3.40)</td>
<td></td>
</tr>
<tr>
<td>Any Disorder</td>
<td>Age 15</td>
<td>28.4</td>
<td>22.0</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Age 16</td>
<td>41.9</td>
<td>33.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age 18</td>
<td>58.2</td>
<td>42.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population averaged (%)</td>
<td></td>
<td>42.7</td>
<td>32.5</td>
<td>1.58 (1.14-2.19)</td>
<td>.006</td>
</tr>
</tbody>
</table>
Table 3.

Ethnic differences (Māori vs non-Māori) in socioeconomic indicators, family adversity, and deviant peer affiliations (ages 15, 16, and 18 years)

<table>
<thead>
<tr>
<th>Variables (Mean (SD) or %)</th>
<th>Māori</th>
<th>Non-Māori</th>
<th>Cohen’s d</th>
<th>p^1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Socioeconomic indicators</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socioeconomic Level (at birth)</td>
<td>4.29 (1.38)</td>
<td>3.50 (1.41)</td>
<td>0.56 (0.29-0.65)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Maternal Education Level</td>
<td>1.39 (0.62)</td>
<td>1.74 (0.79)</td>
<td>-0.45 (-0.58- -0.40)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Maternal Age (at Birth)</td>
<td>23.15 (4.29)</td>
<td>26.06 (4.77)</td>
<td>-0.62 (-1.47- -0.30)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Single Parent Status at Birth</td>
<td>16.5%</td>
<td>5.7%</td>
<td>0.43</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Childhood adversity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parental Illicit Drug Use</td>
<td>41.1%</td>
<td>23.0%</td>
<td>0.42</td>
<td>&gt;.001</td>
</tr>
<tr>
<td>Parental Alcohol Abuse</td>
<td>24.5%</td>
<td>10.6%</td>
<td>0.43</td>
<td>&gt;.001</td>
</tr>
<tr>
<td>Parental Criminal Offending</td>
<td>27.7%</td>
<td>11.5%</td>
<td>0.48</td>
<td>&gt;.001</td>
</tr>
<tr>
<td>Childhood Physical Abuse (to 16 years)</td>
<td>2.62 (0.70)</td>
<td>2.82 (0.58)</td>
<td>-0.34 (-0.48- -0.30)</td>
<td>.002</td>
</tr>
<tr>
<td></td>
<td>Mean 1 (SD)</td>
<td>Mean 2 (SD)</td>
<td>t-value</td>
<td>p-value</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------</td>
<td>------------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Childhood Sexual Abuse (to 16 years)</td>
<td>0.33 (0.83)</td>
<td>0.30 (0.82)</td>
<td>0.04</td>
<td>.781</td>
</tr>
<tr>
<td>Changes in Parents (to 14 years)</td>
<td>1.80 (2.21)</td>
<td>1.03 (2.06)</td>
<td>0.37</td>
<td>&gt;.001</td>
</tr>
<tr>
<td>Standard of Living (0-10 years)</td>
<td>31.31 (4.34)</td>
<td>28.27 (4.44)</td>
<td>0.69</td>
<td>.001</td>
</tr>
</tbody>
</table>

**Deviant Peer Affiliation Ages 15, 16 and 18**

<table>
<thead>
<tr>
<th></th>
<th>Mean 1 (SD)</th>
<th>Mean 2 (SD)</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deviant Peer Affiliation Age 15</td>
<td>105.53 (10.84)</td>
<td>99.42 (9.71)</td>
<td>0.62 (-1.60)</td>
<td>&gt;.001</td>
</tr>
<tr>
<td>Deviant Peer Affiliation Age 16</td>
<td>104.24 (10.84)</td>
<td>99.56 (9.81)</td>
<td>0.47 (-1.78)</td>
<td>&gt;.001</td>
</tr>
<tr>
<td>Deviant Peer Affiliation Age 18</td>
<td>103.48 (12.04)</td>
<td>99.63 (9.64)</td>
<td>0.39 (-2.08)</td>
<td>&gt;.001</td>
</tr>
</tbody>
</table>

1 t-test for means; chi-square test of independence for percentages
Table 4. Odds ratios (and 95% confidence intervals) for the association between ethnicity and mental health disorders, adjusted for socioeconomic indicators, childhood adversity and deviant peer affiliation

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Model 1: Unadjusted</th>
<th>Model 2: After Adjustment for SES Factors¹</th>
<th>Model 3: After Adjustment for SES Factors¹ and Childhood Adversity Factors²</th>
<th>Model 4: After Adjustment for SES Factors¹ and Deviant peer affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio (95% CI)</td>
<td>(95% CI) p</td>
<td>(95% CI) p</td>
<td>(95% CI) p</td>
</tr>
<tr>
<td>Internalizing</td>
<td>1.50 (1.07-2.09)</td>
<td>.02 (0.89-1.79)</td>
<td>.19 --</td>
<td>--</td>
</tr>
<tr>
<td>disorders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Externalizing</td>
<td>2.33 (1.59-3.40)</td>
<td>&lt;.001 (1.33-2.89)</td>
<td>.001 1.54</td>
<td>.03 1.30</td>
</tr>
<tr>
<td>disorders</td>
<td></td>
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</tr>
<tr>
<td>Overall</td>
<td>1.583 (1.14-2.19)</td>
<td>.006 (0.71-1.41)</td>
<td>.09 1.00</td>
<td>.99 --</td>
</tr>
<tr>
<td>disorders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Significant (p < .05) covariate factors include: maternal education and maternal age

² Significant (p < .05) covariate factors include parental illicit drug use; parental alcohol problems; parental criminal offending; childhood physical abuse; changes in parents; and family living standards