

CULTURAL IDENTITY AND PREGNANCY/PARENTHOOD BY AGE 20: EVIDENCE FROM A NEW ZEALAND BIRTH COHORT

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Abstract

Ethnic differences in fertility and timing of role transition to parenthood have been the focus of extensive research. The present study examined the associations between ethnic identity and pregnancy/parenthood by age 20 among a longitudinal birth cohort of New Zealanders born in 1977. Those participants of sole Māori identity reported higher rates of both early pregnancy and parenthood than either non-Māori or those of Māori/other ethnic identity. Control for a range of socio-economic and family functioning factors reduced the magnitude of the associations between ethnic identity and pregnancy/parenthood. However, even after controlling for socio-economic and family functioning factors, sole Māori individuals were still at greater risk of pregnancy/parenthood by age 20. Similar results were found for an alternative measure of the extent of Māori identity. It was concluded that higher rates of early pregnancy/parenthood among Māori are associated with factors relating to cultural identity. However, the mechanisms by which cultural identity may be linked to early pregnancy/parenthood are unclear.

INTRODUCTION

In recent years there has been considerable interest in ethnic differences in fertility rates in industrialised nations (Kollehlon 2003, Lindstrom 2003, Kaufman et al. 2007), with research showing that fertility rates and timing of role transition to parenthood by ethnic minorities are often at variance with those of the majority population (Coley and Chase-Lansdale 1998, Higginbottom et al. 2006, Whitley and Kirmayer 2008). Further research has examined the role of early age of parenting and parenthood in contributing to ethnic disparities between groups in industrialised nations (Singh et al. 2001, Hobcraft and Kiernan 2001, Robson and Berthoud 2006).

In New Zealand it has been well documented that women of Māori ethnicity are more likely to become parents at an earlier age than non-Māori women (Dickson et al. 2000, Woodward et al. 2001, Mantell et al. 2004, Statistics New Zealand 2004, Khawaja et al. 2006). For

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example, rates of teen pregnancy among young Māori are approximately four times higher than those of their non-Māori peers (Dickson et al. 2000, Bean 2005, Statistics New Zealand 2005, Ministry of Social Development 2008b). Between the years 2001 and 2003 half of all Māori women who gave birth were under the age of 26, with the 20 to 24 years age group having a fertility rate 2.7 times that of non-Māori women. Furthermore, data show that the median age of childbirth in 2003 was 26.2 years for Māori women and 30.1 years for non-Māori women (Ministry of Social Development 2008a, 2008b; Statistics New Zealand 2005, 2008). In addition, while non-Māori women over the past few decades have increasingly chosen to delay reproduction, a trend seen in other industrialised nations, there has been no increase in childbearing among Māori women over the age of 30 (Bean 2005, Ministry of Social Development 2008b).

In contrast to females, less is known about the demographic profile and parenthood experiences of Māori males who father children at an early age. International research suggests, however, that adolescent fathers often share a similar profile to that of adolescent mothers, with adolescent fathers also having lower levels of educational attainment, and exposure to socio-economic deprivation and family adversity in childhood (Coley and Chase-Lansdale 1998, Quinlivan and Condon 2005, Tan and Quinlivan 2006). Although a number of New Zealand studies have investigated the sexual and reproductive health of young Māori males, these generally report on early age of onset of sexual initiation (Fenwicke and Purdie 2000), contraceptive use (Clark et al. 2006) and sexual health status (Ministry of Health 2001).

The earlier age of first parenthood among Māori is likely to be one of the factors that contributes to the higher rate of socio-economic disadvantage experienced by Māori, leading to continuing ethnic disparities between Māori and other New Zealanders (Statistics New Zealand 2007b, Ministry of Social Development 2008b). This view is supported by international and New Zealand-derived research showing that early age of parenthood is related to lower educational achievement, higher rates of welfare receipt and lower income levels, leading to an elevated risk of experiencing poverty and material deprivation (Klepinger et al. 1995, Moore et al. 1995, Coley and Chase-Lansdale 1998, Hofferth et al. 2001, Singh et al. 2001, Hobcraft and Kiernan 2001, Robson and Berthoud 2006, Woodward et al. 2006, Boden et al. 2008). For these reasons, understanding early pregnancy and parenting by Māori is of significant theoretical and public policy importance. Broadly speaking, there are three theoretical perspectives that may explain the higher rates of early onset of pregnancy and parenthood by Māori.

The first perspective is based on the fact that, on a wide range of indices, Māori are subject to greater socio-economic disadvantage than non-Māori (Poata-Smith 1997, Chapple et al. 1997, Chapple 2000, Statistics New Zealand 2007, Ministry of Social Development 2008b). There is also considerable evidence to suggest that individuals from socially disadvantaged backgrounds become parents at an earlier age (Coley and Chase-Lansdale 1998, Woodward et al. 2001, Boden et al. 2008). Therefore, it may be that the earlier age of parenthood among Māori reflects the relative socio-economic positioning of Māori in New Zealand.

A second perspective regarding the differences between Māori and non-Māori in early pregnancy rates involves an ecological “at risk” model of familial adversity (Ramey and Landesman Ramey 1998, Repetti et al. 2002). Research indicates that, separate from economic disadvantage, Māori have greater exposure to negative childhood and related experience when compared to non-Māori (Fergusson 1998, Ministry of Social Development

2008a, 2008b, Fanslow et al. 2007). Exposure to family adversity in childhood has also been linked to early parenthood (Coley and Chase-Lansdale 1998, Quinlivan and Condon 2005, Tan and Quinlivan 2006).

A third perspective is based on the culture concept. Within New Zealand it is commonly held that Māori and non-Māori hold different normative value systems involving alternative conceptions of the character and role of gender relations and family (Metge 1990, Durie 1994). In recent years, Māori culture revitalisation has been actively promoted across a broad spectrum of fields, with emphasis being directed towards strengthening the cultural identity of individuals, families and tribal groupings (Greenland 1991, Durie 1995, 1998, Webster 1998, Rata 2005, Marie et al. 2008). It could therefore be suggested that Māori and non-Māori hold different values regarding the optimum timing of human reproduction. Specifically, it is possible that some Māori may place a premium on early reproduction, whereby early pregnancy and parenthood has become institutionalised, via its normalisation, as a contemporary marker of strength of Māori cultural identity.

Against this background, the present study uses data from a longitudinal study of a birth cohort of New Zealand-born children in order to examine the associations between ethnic identity and early parenthood. Early parenthood and parenting is defined here as occurring before the age of 20 years. In the present paper, the term “ethnic identity” is used to denote Māori identity or non-Māori identity, while “cultural identity” denotes subgroups (sole Māori; Māori/other identity) within Māori ethnic identity. The specific aims of this study were to examine:

- differences in the rates at which Māori and non-Māori became parents before the age of 20 (this analysis included data for both females and males)
- the extent to which ethnic and differences in early parenthood could be explained by socio-economic factors, family factors and cultural identity.

METHODS

The data were gathered during the course of the Christchurch Health and Development Study (CHDS), a birth cohort of 1,265 children (635 males, 630 females) born in the Christchurch (New Zealand) urban region in mid-1977, which has been studied at birth, 4 months, 1 year and annually to age 16 years, and again at ages 18, 21 and 25 years. Information from a variety of sources has been used, including: parental interviews, teacher reports, self-reports, psychometric assessments, and medical and other record data (Fergusson and Horwood 2001, Fergusson et al. 1989). The analyses reported here were based on the 992 study participants (78% of the original sample) for whom information was available concerning pregnancy and parenthood outcomes to age 20. All study information was collected on the basis of signed and informed consent from study participants.

Ethnic and Cultural Identity

At age 21 years 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 sample members self-identified as New Zealand Māori. A further break-down 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 Māori identity and

another ethnic identity were classified as having Māori/other cultural identity. All other participants were classified as being non-Māori. The descriptors “sole Māori”, “Māori/other cultural 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 Māori/other group showed consistent differences between the groups in terms of participation in eight different domains of Māori culture, spanning language and engagement with traditional cultural practices ($p < .05$). For the purposes of the present investigation, the responses to each of the eight individual cultural items were summed to create a measure of the extent to which each cohort member was involved in Māori culture. The continuous measure was then dichotomised by splitting the group at its median, creating two groups: those high in Māori cultural identity ($n = 66$) and those low in Māori cultural identity ($n = 48$). The two groups were then combined with the non-Māori group in order to create a three-group classification of the extent to which cohort members indicated participation in Māori cultural activities.

Pregnancy and Parenthood to Age 20

At each assessment from age 15 onwards cohort members were asked about their history of pregnancy/parenthood since the previous assessment. Specifically, female cohort members were asked whether they had become pregnant, while male cohort members were asked whether they had got a partner pregnant. In addition, both female and male cohort members were asked whether they had become a parent. These data were used to form two dichotomous measures of pregnancy/parenthood to age 20: the percentage of those reporting having got pregnant / having got a partner pregnant at least once by age 20, and the percentage of those reporting becoming a biological parent at least once by age 20. By age 25, 17.1% of the cohort reported having got pregnant / got a partner pregnant, and 8.0% reported having become a parent.

Covariate Factors

Socio-economic background. The socio-economic background of cohort members was assessed using several indicator measures chosen from the database of the study, as follows.

- Maternal age: this was assessed at the survey child’s birth.
- Maternal age at first childbirth: this was assessed at the survey child’s birth.
- Maternal and paternal education (at birth): this was assessed at the time of the survey child’s birth using a three-point scale, which reflected the highest level of educational achievement attained. This scale was: 1 = parent lacked formal educational qualifications; 2 = parent had secondary-level educational qualifications; 3 = parent had tertiary-level qualifications.
- Average family income (0–10 years): to provide a measure of the average level of income available to each family over the period from the child’s birth to age 10 years, income estimates for each year to age 10 were first re-coded into decile categories, and the resulting measures were then averaged over the 10-year period to produce a measure of the family’s averaged income decile rank.

- 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. This scale classifies socio-economic status into six levels on the basis of paternal occupation, ranging from 1 = professional occupations to 6 = unskilled occupations.
- Family living standards (0–10 years): at each year a global assessment of the material living standards of the family was obtained by means of an interviewer rating. Ratings were made on a five-point scale that ranged from “very good” to “very poor”. These ratings were summed over the 10-year period and divided by 10 to give a measure of typical family living standards during this period.

Family functioning and individual factors. Measures of family functioning and individual adjustment were also chosen from the study database. These measures included the following.

- Parental illicit drug use, alcohol problems, and criminality (0–15 years): when sample members were aged 11, information was obtained from parents as to whether any parent had a history of either illicit drug use or criminal offending. At age 15 parental alcohol problems were assessed via parental report. This information was used to construct a series of three dichotomous measures reflecting whether the young person had been exposed to parental illicit drug use, parental criminality or parental alcohol problems.
- Childhood sexual abuse: at ages 18 and 21 years sample members were questioned about their experience of sexual abuse during childhood (< 16 years) (Fergusson et al. 1996). Questioning spanned an array of abusive experiences, from episodes involving non-contact abuse (e.g. indecent exposure) to episodes involving attempted or completed intercourse. Using this information, a four-level scale was devised reflecting the most extreme form of sexual abuse reported by the young person at either age. This classification was: no sexual abuse; non-contact abuse only; contact sexual abuse not involving attempted or completed intercourse; attempted/completed oral, anal or vaginal intercourse.
- Exposure to harsh/abusive physical punishment (childhood physical abuse; 0–16 years): at ages 18 and 21 sample members were asked to describe the extent to which their parents used physical punishment during childhood (Fergusson and Lynskey 1997). Separate questioning was conducted for mothers and fathers. This information was used to create a four-level scale reflecting the most severe form of physical punishment reported for either parent: parents never used physical punishment; parents rarely used physical punishment; at least one parent used physical punishment on a regular basis; at least one parent used physical punishment too often or too severely, or treated the respondent in a harsh or abusive manner.
- Inter-parental violence (0–16 years): at the age of 18, sample members were questioned concerning their experience of inter-parental violence during their childhood (prior to age 16 years) using a series of eight items derived from the Conflict Tactics Scale (CTS: Straus 1979). Separate questioning was conducted for both father-initiated and mother-initiated inter-parental violence. An overall measure was created by summing the responses for both father- and mother-initiated violence.

- 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 prenatal health practices and perinatal outcomes, and disadvantageous child-rearing practices (Fergusson et al. 1994).
- Child conduct problems (7–9 years): when sample members were aged 7–9 years, information on child behaviour problems was obtained from parental and teacher report. Parental reports were obtained from the child’s mother using items from the Rutter et al. (1970) and Conners (1970) parental questionnaires. The child’s class teacher was asked to complete a combined version of the Rutter et al. (1970) and Conners (1969) teacher questionnaires. Factor analysis of the item-level report data showed that it was possible to select items from these reports that formed uni-dimensional scales reflecting the extent of parent-reported and teacher-reported conduct problems in three domains of behaviour (Fergusson and Horwood 1993, Fergusson et al. 1991). The parent and teacher reports were summed and the resulting scores averaged over the three-year period to produce a scale score measure reflecting the child’s tendencies to conduct problems at ages 7–9 ($\alpha = .97$).

Statistical Analyses

The associations between ethnic/cultural identity and both (a) pregnancy by age 20 and (b) parenthood by age 20 were modelled in several steps using logistic regression methods with design variates representing the three groups (sole Māori; Māori/other identity; non-Māori). In the first step, tests of pair-wise statistically significant differences between the three groups on both outcomes were obtained using Wald chi-square tests derived from logistic regression models. The parameter estimates provided by the models were also used to calculate odds ratios (ORs) and 95% confidence intervals (CIs) for the sole Māori and Māori/other identity groups relative to non-Māori. Then, in order to examine whether the associations between ethnic/cultural identity and pregnancy/parenthood differed according to gender, the associations between the identity design variates and the measures of pregnancy and parenthood were estimated for each gender group by fitting a series of nested logistic regression models of the form:

$$\text{Logit}(Y_i) = B_0^k + B_1^k X_{1j} + B_2^k X_{2j} \quad \text{EQ1}$$

where $\text{logit}(Y_i)$ was the log odds of pregnancy or parenthood by age 25, X_{1j} was a design variate scored 1 if the individual was sole Māori and 0 otherwise, and X_{2j} was a design variate scored 1 for those of Māori/other identity and 0 otherwise. In this model, the intercept parameters B_0^k and slope parameters for predictor B_1^k and B_2^k were permitted to vary with gender k ($k = 1, 2$). The parameters B_0^k thus represent the main effects of gender, and the parameters B_j^k represent the effect of cultural identity within levels of gender. Tests of gender equality were based on the test of the null hypothesis that $H_0: B_j^1 = B_j^2$.

In the second step of the analyses, the associations between identity and (a) childhood socio-economic factors and (b) family functioning and individual factors were modelled using logistic and multiple regression methods, again with design variates representing the three identity groups (sole Māori; Māori/other identity; non-Māori). Tests of pair-wise statistically

significant differences between the three groups on each measure were obtained using Wald chi-square tests derived from logistic regression models and F tests from multiple regression models.

In the third step of the analyses, in order to control for potentially confounding factors related to childhood socio-economic adversity, the logistic regression models fitted in the first step were extended to include the measures of socio-economic background described above, using forward and backward methods of variable elimination to arrive at stable and parsimonious models. The parameters of the fitted models were used to calculate adjusted ORs and 95% CIs, and adjusted rates of pregnancy and parenthood were calculated using the method described by Lee (1981). Then, tests of gender equality were performed using nested logistic regression models as described above.

In the fourth step of the analyses, potential confounding factors relating to family functioning and individual factors (described above) were entered into the models, again using methods of forward and backward variable elimination to arrive at stable models, with adjusted ORs and adjusted rates of pregnancy and parenthood being calculated on the basis of the fitted model parameters. Nested logistic regression models were once again used to obtain tests of gender equality.

Finally, in order to examine the extent to which pregnancy/parenthood prior to age 20 was associated with an alternative measure of cultural identity based on the extent to which cohort members indicated their participation in Māori cultural activities, the analyses above were repeated after substituting the original cultural identity measure with the alternative measure.

RESULTS

Associations between Ethnic/Cultural Identity and Pregnancy/Parenthood Outcomes by Age 20

Table 1 shows the sample classified into three groups on the basis of cultural/ethnic identification reported at age 21: sole Māori identity ($n = 52$), Māori/other identity ($n = 63$), and non-Māori ($n = 877$). For each group the table shows rates of pregnancy and parenthood outcomes to age 20 years; separate results are presented for females and males, and for the total sample. The table also reports on pair-wise tests of significance. Inspection of the table shows the following.

1. By age 20 sole Māori had significantly increased ($p < .05$) rates of pregnancy and parenthood relative to both those of Māori/other identity and non-Māori. This was true for both females and for the overall measure; for males, sole Māori and those of Māori/other identity had rates of pregnancy that did not differ significantly. Sole Māori had odds of pregnancy that were 4.97 times (95% CI: 2.79–8.83) those of non-Māori, while participants of Māori/other identity had rates of pregnancy that were 2.19 times (95% CI: 1.22–3.94) those of non-Māori. Also, sole Māori had rates of parenthood by age 20 that were 7.73 times (95% CI: 4.06–14.69) those of non-Māori, while participants of Māori/other identity had rates of pregnancy that were 3.43 times (95% CI: 1.69–6.97) those of non-Māori.
2. Although the reported rates of pregnancy/parenthood were higher for females than for males in all groups, the relative risk (odds) of pregnancy/parenthood for the sole Māori

and Māori/other groups relative to non-Māori were generally very similar for males and females. These impressions were confirmed by fitting a nested logistic regression model to the data for males and females (see Methods). This analysis showed that: (a) females had significantly higher ($p < .05$) rates of pregnancy and parenthood than males; and (b) the associations between Māori identity and pregnancy/parenthood were not significantly different between males and females.

Table 1 Associations between Ethnic/Cultural Identity and Pregnancy/Parenthood Outcomes by Age 20

Outcome	Ethnic/cultural identity		
	Sole Māori	Māori/other identity	Non-Māori
Females	(n = 23)	(n = 37)	(n = 455)
% pregnant by age 20	60.9 ^a	29.7 ^b	19.6 ^b
OR (95% CI)	6.40 (2.68–15.25)	1.74 (0.83–3.65)	1 –
% became a parent by age 20	43.4 ^a	21.6 ^b	8.4 ^c
OR (95% CI)	8.44 (3.47–20.53)	3.03 (1.29–7.09)	1 –
Males	(n = 29)	(n = 25)	(n = 422)
% partner pregnant by age 20	34.5 ^a	24.0 ^a	9.7 ^b
OR (95% CI)	4.88 (2.13–11.18)	2.93 (1.11–7.73)	1 –
% became a parent by age 20	24.1 ^a	12.0 ^b	3.4 ^c
OR (95% CI)	9.04 (3.34–24.42)	3.87 (1.04–14.38)	1 –
Overall	(n = 52)	(n = 63)	(n = 877)
% pregnant/partner pregnant by age 20	46.2 ^a	27.4 ^b	14.7 ^c
OR (95% CI)	4.97 (2.79–8.83)	2.19 (1.22–3.94)	1 –
% became a parent by age 20	32.7 ^a	17.7 ^b	5.9 ^c
OR (95% CI)	7.73 (4.06–14.69)	3.43 (1.69–6.97)	1 –

Notes: The results of pair-wise comparisons of the rate of each outcome across the three groups are indicated by the superscripts. Different superscripts (^a, ^b, ^c) indicate that the groups were significantly different ($p < .05$) in their rates of pregnancy/parenthood. Similar superscripts indicate that groups were not significantly different in their rates of pregnancy/parenthood; Wald chi-square from logistic regression.

Associations between Ethnic/Cultural Identity and Covariate Factors

Table 2 shows the associations between ethnic/cultural identity and measures of: (a) family socio-economic background; and (b) family functioning and individual factors. The associations were tested for significance using multiple regression models for continuous measures and logistic regression models for dichotomous measures. The table shows the following.

Table 2 Associations between Ethnic/Cultural Identity and: (a) Family Socio-economic Factors in Childhood; (b) Family Functioning and Individual Factors; and (c) Measures of Sexual Behaviour and Contraception

Measure	Ethnic/cultural Identity		
	Sole Māori (n = 52)	Māori/other identity (n = 63)	Non-Māori (n = 877)
Measures of family socio-economic factors			
Mean (SD) maternal age	23.1 ^a (4.3)	23.6 ^a (4.2)	26.3 ^b (4.8)
Mean (SD) maternal age at first childbirth	21.0 ^a (3.4)	21.8 ^a (3.9)	24.1 ^b (4.2)
% mother lacked formal educational qualifications	72.0 ^a	61.0 ^a	46.4 ^b
% father lacked formal educational qualifications	67.4 ^a	60.0 ^a	44.3 ^b
Mean (SD) family living standards ages 0–10 ²	3.2 ^a (0.41)	3.0 ^b (0.44)	2.8 ^c (0.45)
Mean (SD) family socio-economic status at birth ²	4.5 ^a (1.31)	4.1 ^a (1.38)	3.5 ^b (1.41)
Mean (SD) family income decile rank ages 0–10	3.7 ^a (2.1)	4.7 ^b (1.9)	5.3 ^c (2.1)
Measures of family functioning and individual factors			
% parental history of illicit drug use	33.2 ^{a,b}	41.7 ^a	22.1 ^b
% parental history of alcohol problems	20.7 ^{a,b}	25.4 ^a	10.6 ^b
% parental history of criminal offending	30.2 ^a	27.6 ^a	11.1 ^b
% exposed to childhood contact sexual abuse	5.8 ^a	9.7 ^a	6.0 ^a
% exposed to regular or severe physical punishment	42.3 ^a	25.8 ^b	15.6 ^b
Mean (SD) exposure to inter-parental violence	10.8 ^a (3.5)	9.8 ^b (3.3)	9.1 ^b (2.1)
Mean (SD) family adversity score	12.2 ^a (6.4)	11.0 ^a (6.0)	6.6 ^b (4.9)
Mean (SD) conduct problems score ages 7–9	52.0 ^a (8.1)	52.3 ^a (10.7)	49.4 ^b (7.2)

Notes: 1. The results of pair-wise comparisons of the rate of each outcome across the three groups are indicated by the superscripts. Different superscripts (^a, ^b, ^c) indicate that the groups were significantly different ($p < .05$) in their rates of pregnancy/parenthood. Similar superscripts indicate that groups were not significantly different in their rates of pregnancy/parenthood.

2. Higher numbers correspond to increasing disadvantage.

1. For the measures of family socio-economic status in childhood, pair-wise tests of significance showed that those in the sole Māori and Māori/other identity groups had significantly greater likelihood of being exposed to socio-economic adversity than non-Māori ($p < .05$). In addition, those of sole Māori identity had significantly ($p < .05$) greater likelihood of being exposed to lower family living standards and a lower family income than those in the Māori/other identity group.
2. Across most of the measures of family functioning and individual factors, pair-wise tests showed that those in the sole Māori and Māori/other identity groups had a significantly greater likelihood of being exposed to adverse personal and family circumstances than non-Māori ($p < .05$). In addition, those of sole Māori identity had significantly ($p < .05$) greater likelihood of being exposed to regular or severe physical punishment and exposure to inter-parental violence than those in the Māori/other identity group. However, there were no significant differences between groups on the measure of exposure to childhood sexual abuse ($p > .05$).

Adjustments for Socio-Economic Factors and Childhood/Family Factors

To examine the extent to which differences among ethnic/cultural identity groups for pregnancy and parenthood could be explained by potentially confounding socio-economic factors and social learning processes detailed in Table 2, the associations between identity and pregnancy and parenthood were adjusted for socio-economic and childhood factors using a two-stage regression approach.

The first-stage model fitted to the data controlled the associations for measures of socio-economic status, including maternal age, paternal education, socio-economic status at birth, average family living standards to age 10, and average family income to age 5 (see Methods). In the second stage of the analysis, the first-stage model was extended to include a series of childhood and family functioning factors, including exposure to childhood sexual and physical abuse, exposure to inter-parental violence, parental alcohol problems, parental criminal offending, parental illicit drug use, childhood conduct disorder, and a measure of family adversity (see Methods).

The results of this analysis are shown in Table 3, which reports adjusted rates and ORs for the associations between ethnic/cultural identity and the overall measures pregnancy/parenthood by age 20 after adjustment for (a) socio-economic factors and (b) socio-economic and childhood/family factors. The table shows the following.

1. After adjustment for socio-economic factors, the associations between identity and pregnancy/parenthood by age 20 were reduced in magnitude. However, examination of the pair-wise tests of significance suggests that individuals in the sole Māori group still had significantly elevated rates of pregnancy and parenthood by age 20 relative to both the Māori/other identity and non-Māori groups. Sole Māori had odds of pregnancy that were 2.77 (95% CI: 1.44–5.31) times those of non-Māori after adjustment for socio-economic factors, and odds of parenthood that were 3.47 (95% CI: 1.62–7.43) times those of non-Māori. However, participants of Māori/other identity did not differ significantly from non-Māori after adjustment for socio-economic factors, with odds of pregnancy that were 1.47 (95% CI: 0.77–2.82) times those of non-Māori, and odds of parenthood that were 1.93 (95% CI: 0.86–4.31) times those of non-Māori. For both pregnancy and

parenthood by age 20, statistically significant ($p < .05$) covariate factors included maternal education level, family income to age 10, and family living standards to age 10.

- Adjustment for both socio-economic factors and childhood/family functioning factors further weakened the magnitude of the associations between identity and pregnancy/parenthood by age 20. Again, however, examination of the pair-wise tests of significance suggested that individuals in the sole Māori group still had significantly ($p < .05$) elevated rates of pregnancy and parenthood by age 25 relative to both the Māori/other identity and non-Māori groups. Sole Māori had odds of pregnancy that were 2.56 (95% CI: 1.20–5.49) times those of non-Māori after adjustment for socio-economic and family functioning factors, and odds of parenthood that were 3.43 (95% CI: 1.39–8.45) times those of non-Māori. However, participants of Māori/other identity did not differ significantly from non-Māori after adjustment for socio-economic and family functioning factors, with odds of pregnancy that were 1.00 (95% CI: 0.48–2.10) times those of non-Māori, and odds of parenthood that were 1.40 (95% CI: 0.57–3.40) times those of non-Māori. For both pregnancy and parenthood by age 20, statistically significant ($p < .05$) covariate factors included family adversity score and exposure to childhood sexual abuse. However, tests of gender equality using nested logistic regression techniques (see Methods) showed that differences in pregnancy and parenthood by age 20 between females and males in the sole Māori group were not statistically significant ($p > .60$).

Table 3 Associations between Ethnic/Cultural Identity and Pregnancy/Parenthood Outcomes by Age 20, after Adjustment for (a) Socio-economic Factors, and (b) Both Socio-economic and Family Functioning Factors

Outcome	Ethnic/cultural Identity		
	Sole Māori	Māori/other identity	Non-Māori
(a) Adjusted for socio-economic factors			
% pregnant/partner pregnant by age 25	32.4 ^a	20.7 ^b	15.2 ^b
Adjusted OR (95% CI)	2.77 (1.44–5.31)	1.47 (0.77–2.82)	1 –
% became a parent by age 25	17.6 ^a	11.2 ^b	6.4 ^b
Adjusted OR (95% CI)	3.47 (1.62–7.43)	1.93 (0.86–4.31)	1 –
(b) Adjusted for socio-economic factors and family functioning			
% pregnant/partner pregnant by age 25	29.4 ^a	15.4 ^b	15.4 ^b
Adjusted OR (95% CI)	2.56 (1.20–5.49)	1.00 (0.48–2.10)	1 –
% became a parent by age 25	16.1 ^a	8.2 ^b	6.2 ^b
Adjusted OR (95% CI)	3.43 (1.39–8.45)	1.40 (0.57–3.40)	1 –

Note: The results of pair-wise comparisons of the rate of each outcome across the three groups are indicated by the superscripts. Different superscripts (^a, ^b, ^c) indicate that the groups were significantly different ($p < .05$) in their rates of pregnancy/parenthood. Similar superscripts indicate that groups were not significantly different in their rates of pregnancy/parenthood; Wald chi-square from logistic regression.

SUPPLEMENTARY ANALYSES

The analyses above focused on the associations between pregnancy and parenthood by the age of 20 and cultural identity as nominated by cohort members. To examine whether the results were robust to other conceptualisations of cultural identity, the data were re-analysed using the three category measure of the extent to which cohort members reported participating in Māori cultural activities (see Methods). The following results were obtained.

1. Pair-wise tests of significance showed that, before adjustment for confounding factors, those in the high Māori cultural identity group had rates of pregnancy and parenthood prior to age 20 that were significantly ($p < .05$) greater than both those in the low Māori cultural identity group and non-Māori. In addition, those in the low Māori cultural identity group had rates of pregnancy and parenthood before age 20 that were significantly ($p < .05$) greater than those for non-Māori. Those in the high Māori cultural identity group had odds of pregnancy prior to age 20 that were 5.80 times (95% CI: 3.47–9.72) those of non-Māori, whereas those in the low Māori cultural identity group had odds of pregnancy prior to age 20 that were 1.16 times (95% CI: 0.53–2.53) those of non-Māori. Those in the high Māori cultural identity group also had odds of parenthood prior to age 20 that were 7.36 times (95% CI: 4.10–13.20) those of non-Māori, whereas those in the low Māori cultural identity group had odds of parenthood prior to age 20 that were 2.69 times (95% CI: 1.16–6.27) those of non-Māori.
2. After adjustment for both confounding factors related to family socio-economic status and family functioning, pair-wise tests of significance showed that those in the high Māori cultural identity group had rates of pregnancy and parenthood prior to age 20 that were significantly ($p < .05$) greater than those in the low Māori cultural identity group and non-Māori. However, there were no significant differences between those in the low Māori cultural identity group and non-Māori ($p > .05$). After adjustment, those in the high Māori cultural identity group had odds of pregnancy prior to age 20 that were 2.76 times (95% CI: 1.43–5.31) those of non-Māori, whereas those in the low Māori cultural identity group had odds of pregnancy prior to age 20 that were 0.53 times (95% CI: 0.17–1.59) those of non-Māori. Further, after adjustment, those in the high Māori cultural identity group also had odds of parenthood prior to age 20 that were 2.83 times (95% CI: 1.27–6.28) those of non-Māori, whereas those in the low Māori cultural identity group had odds of parenthood prior to age 20 that were 1.29 times (95% CI: 0.41–4.07) those of non-Māori. Tests of gender equality using nested logistic regression techniques (see Methods) showed that differences in pregnancy and parenthood by age 20 between females and males in the high Māori cultural identity group were not statistically significant ($p > .60$).

DISCUSSION

This research has used data gathered over the course of a longitudinal study to examine ethnic and cultural differences in rates of early pregnancy and parenthood in a New Zealand birth cohort. The central concern of this analysis was to examine the relative contributions of cultural, socio-economic and family functioning factors to the higher rates of early pregnancy and parenthood among Māori. The analysis focused on pregnancy and parenthood before the age of 20, because pregnancy and parenthood before this age have been linked with a range of adverse outcomes (e.g. Boden et al. 2008).

Two major findings emerged from these analyses. First, respondents having a sole Māori cultural identity had odds of early pregnancy and parenthood that were over seven times higher than those of non-Māori, while those of Māori/other cultural identity had odds of early pregnancy and parenthood that were over three times higher than non-Māori. These results were evident for both males and females. Also, those of sole Māori cultural identity had rates of pregnancy and parenthood that were significantly ($p < .05$) greater than those of Māori/other cultural identity. Similar findings were obtained using an alternative method of classifying Māori identity. These findings are consistent with the view that cultural identity plays an important role in ethnic differences, since rates of early pregnancy/parenthood increased steadily with increasing Māori cultural identity.

Further analysis suggested that, in part, the associations between cultural identity and early pregnancy/parenthood were due to socio-economic and family-related factors. After adjustment for these factors, those of sole Māori identity had rates of early pregnancy and parenthood that were more than three times higher than those of non-Māori and those of Māori/other identity. Again, similar results were found for males and females, and these findings were replicated in a supplementary analysis using an alternative measure of Māori identity.

Collectively these findings suggest that the higher rates of early pregnancy and parenthood among Māori are a consequence of a combination of socio-economic, family and cultural factors that combine to place young Māori at significantly increased risks of early pregnancy and parenthood. The implications of these conclusions are discussed below.

Although it has been argued that early parenting has been constructed as a problem by the health profession (e.g. Barker 1998), there is evidence that draws links between early age of pregnancy and greater likelihood of negative outcomes for offspring and parents (Coley and Chase-Lansdale 1998, Fergusson and Woodward 1999, Singh et al. 2001, Hobcraft and Kiernan 2001, Mantell et al. 2004, Ministry of Social Development 2008a, Robson and Berthoud 2006, Woodward et al. 2006, Boden et al. 2008). The results of the present study suggest that Māori, and in particular individuals of sole Māori cultural identity, are at increased risk of early pregnancy/parenthood. It could therefore be argued that at least some of the social disadvantage experienced by Māori in New Zealand may be due in part to increased rates of early pregnancy/parenthood among those of sole Māori cultural identity.

For example, evidence suggests that the children of young mothers may be predisposed to early parenting themselves, and in under-resourced family environments this association may lead to perpetuating a cycle of inter-generational disadvantage (Coley and Chase-Lansdale 1998, Ellis et al. 2003). The association between cultural identity and early pregnancy/parenthood may also have implications for child health outcomes. Evidence suggests that delaying first parenthood increases the likelihood of healthy child development and greater adult self-sufficiency (Fergusson and Woodward 1999), implying that the children of young Māori parents may be at greater risk of poorer developmental and health outcomes. The potential links between early parenting by Māori and continuing ethnic disparities between Māori and other New Zealanders requires further in-depth investigation.

As mentioned previously, there is a notable gap in the literature regarding the role of Māori men in parenting. The results of the present study suggest that the factors that predicted pregnancy and parenthood for males were the same as those for females, suggesting that the effects of family background, socio-economic circumstances and cultural identity are similar

for males and females. Further research is required to examine the role of fathers in terms of the life outcomes of children among Māori.

Although the results of the present study suggest a link between Māori cultural identity and early pregnancy/parenthood, it is unclear what factors associated with cultural identity are responsible for increased rates of pregnancy and parenthood among young people of sole Māori identity. For example, it may be possible that there is a link between Māori cultural identity and sexual and reproductive decision making by young Māori. While recent evidence suggests that a large proportion of young Māori who are sexually active use contraception regularly (Clark et al. 2006), evidence also suggests that young Māori may be at greater risk than non-Māori of contracting sexually transmitted infections (Rose et al. 2005), implying that young Māori may differ from other New Zealanders in terms of their use of contraceptives. Also, some suggest that because family life is regarded differently in Māori culture, it may be possible that earlier pregnancy and parenthood are valued and expected behaviours in contemporary Māori society (e.g. Metge 1990, Durie 1994). On the other hand, it could be argued that the increased rates of pregnancy/parenthood among sole Māori reflect reduced levels of pregnancy and parenthood among the majority culture, suggesting that demographic trends towards delayed parenthood are not reflected among sole Māori (Shirley et al. 1997). However, further research is needed to examine the specific aspects of Māori cultural identity that may influence earlier pregnancy and parenthood.

The present findings are subject to a number of caveats. In particular, the findings are based on a particular cohort born in a specific geographic region and studied over a specific time period. The extent to which the findings can be generalised to other cohorts, times and regions is not known. In particular, although the cohort is representative of the Māori population of Canterbury at the time at which the data were collected, the extent to which the cohort is representative of the Māori population as a whole is unclear. A further limitation of the study is that the measurement of cultural identity was limited and that a more comprehensive assessment may have produced different results. It could also be argued that the findings of the present study may have been affected by historical trends, such as changes in overall fertility rates (Ministry of Social Development 2008b) that affected pregnancy and birth rates among the cohort during the period to age 20 years.

However, three strengths of the study should also be acknowledged. First, as stated previously, the sample of Māori involved in this research is generally representative of the Māori population in the region in which the data have been collected. Second, it is the first study, to our knowledge, to report on young Māori male contributions to childbearing. Third, the study reports on early parenting and parenthood among Māori in the context of contemporary Māori cultural revitalisation.

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