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### **Early motherhood and subsequent life outcomes**

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## Abstract

**Background:** Early motherhood has been linked with a number of adverse outcomes, including mental health difficulties and barriers to completing educational qualifications and workforce participation. The present study examined the extent to which these linkages could be explained by the influence of social, family, and background factors that were associated with early motherhood.

**Methods:** Data were gathered as part of the Christchurch Health and Development Study, a 25-year longitudinal study of a birth cohort of New Zealand children. Information was obtained on: (a) the history of pregnancy and parenthood for female participants over the period 15-21 years; (b) measures of DSM-IV mental disorders and suicidal behaviour over the interval 21-25 years; (c) measures of educational achievement over the interval 21-25 years; (d) measures of welfare dependence, workforce participation, and income over the interval 21-25 years; and (e) childhood, family and related confounding factors.

**Results:** Early motherhood was associated with higher levels of mental health disorders, lower levels of educational achievement, higher levels of welfare dependence, lower levels of workforce participation, and lower income. Control for confounding factors reduced the associations between early motherhood and later mental health disorders to statistical non-significance. However, the associations between early motherhood and later educational achievement and economic circumstances persisted after control for potentially confounding factors.

**Conclusions:** The findings suggest that early motherhood puts young women at risk for educational underachievement and poorer economic circumstances. The linkages between early motherhood and later mental health difficulties can largely be accounted for by childhood, family, and related circumstances that occurred prior to parenthood.

**Keywords:** females, adolescents, parenthood, mental health, education, welfare dependence, employment, income, longitudinal study

Over the last three decades a large amount of research has addressed the issue of motherhood in adolescence and early adulthood. One aim of this research has been to examine the extent to which early motherhood may play a role in limiting the later life opportunities of young women by affecting their mental health, and by placing barriers in the way of attaining educational qualifications and workforce participation (Caldwell & Antonucci, 1997; Corcoran, 1998; Osofsky, Hann, & Peebles, 1993; Phipps-Yonas, 1980; Simkins, 1984; Wellings, Wadsworth, Johnson, Field, & Macdowall, 1999; Zuckerman, Amaro, & Beardslee, 1987).

A number of studies have suggested that early motherhood may be related to poorer mental health outcomes. For example, Schmidt and colleagues (Schmidt, Wiemann, Rickert, & Smith, 2006) found that adolescent mothers experienced a significant increase in depressive symptoms in the first year of motherhood. Troutman and Cutrona (1990) found that adolescent girls who became mothers reported a significantly greater level of somatic symptoms of depression than members of a matched control group. Also, Horwitz et al. (1996), in a longitudinal study of African American women who had become mothers during adolescence, found a two-fold increase in the incidence of depression twenty years after the birth of the first child. Deal and Holt (1998), using the US National Maternal and Infant Health Survey, found that adolescent mothers experienced higher rates of depression than adult mothers.

Studies have also suggested that early motherhood may be related to poorer educational outcomes and a greater risk of economic difficulties. For example, Hofferth et al. (2001) found that teenage mothers completed 1.9-2.2 years fewer schooling than women who first gave birth after age 30. Similarly, Moore et al. (Moore et al., 1993a) reported that lower ages at first birth were strongly associated with increasing risks of poverty for women at age 27, while Grindstaff (1988) showed that women who gave birth as adolescents were more likely to become welfare dependent. Nanchahal and colleagues (Nanchahal et al., 2005), using a (UK) national cross-sectional sample, found that although there had been improvements in the education and economic outcomes of young mothers from the years 1990 to 2000, young mothers were still at an elevated risk of failing

to achieve educational qualifications and being welfare dependent. Also, Olausson and colleagues (Olausson, Haglund, Weitoft, & Cnattingius, 2001), using a sample comprised of all females born in Sweden from 1941 to 1970, found that women who had given birth as teenagers had lower levels of educational attainment and were more likely to receive disability or welfare benefits.

In general, existing studies of early motherhood and later outcomes suffer from three limitations, including: (a) the use of selected samples and specialized populations; (b) the use of cross-sectional designs in which measures of early parenthood and background and contextual factors were obtained retrospectively; and (c) a lack of control for a wide range of measures of social, family, and individual factors that may be correlated with early parenthood and also contribute to later adverse mental health, educational, and economic outcomes. The best research design to examine these issues is a longitudinal design in which prospectively assessed measures of early motherhood are related to subsequent mental health, achievement, and economic outcomes, taking into account social, family, and related factors.

Two studies have not suffered from the limitations mentioned above. Hobcraft and Kiernan (2001), using data from the longitudinal UK National Child Development Study, found that motherhood before age 23 was associated with socio-economic deprivation and welfare dependency at age 33. Also, Moffitt (2002), using a longitudinal sample of mothers of twins, found that mothers who were aged 15-20 years at first birth were more likely to experience substance abuse problems, and had lower levels of income and higher levels of dependence on benefits, than older mothers. However, in each of these studies, younger mothers were compared with older mothers on all outcomes, which required comparing women of differing ages. This difference in the timing of the exposure measure (age of first motherhood) may cause difficulties in determining the magnitude of the discrete effects of early motherhood. One approach to dealing with this issue would be to compare mothers and non-mothers of the same age.

Against this background, the purpose of the current study was to examine linkages between early motherhood and subsequent life course opportunities in a birth cohort of young women in

New Zealand studied to the age of 25, comparing those women who became mothers prior to age 21 with those who did not. In New Zealand, the median age at first motherhood was 28 years in 2006 (Statistics New Zealand, 2007), suggesting that women who became mothers for the first time prior to age 21 were comparatively very young in terms of the overall population. The study had two aims:

1. To examine the associations between early motherhood and mental health, educational achievement, and economic outcomes in the period from ages 21 to 25 years, and;
2. To determine the extent to which these linkages could be explained by the influence of social, family, and background factors that were associated with early motherhood.

### Method

The data used in these analyses were gathered over the course of the Christchurch Health and Development Study (CHDS), a longitudinal study of a birth cohort of 1265 children born in the Christchurch (NZ) urban region who have been studied from birth to age 25 years (Fergusson & Horwood, 2001; Fergusson, Horwood, Shannon, & Lawton, 1989). All data were collected only on the basis of signed consent from research participants. The study had ethical approval from the Canterbury Ethics Committee.

#### *Early motherhood*

Participants were interviewed at ages 15, 16, 18, and 21 about pregnancies occurring since the previous assessment. Those women who reported having had a live birth by age 18, and who did not choose to have the baby adopted by another family, were classified as having been mothers prior to age 18 ( $n = 22$ ; 4.3% of the sample). Also, those women who reported having had a live birth by the age of 21 (and did not choose to have the baby adopted) were classified as having been mothers between the ages of 18 and 21 ( $n = 64$ ; 12.5% of the sample).

### *Mental health outcomes ages 21-25*

At age 25, components of the Composite International Diagnostic Interview (CIDI: World Health Organization, 1993) were used to assess DSM-IV symptom criteria for major depression (MD), anxiety disorders (including Generalized Anxiety Disorder, specific phobia, social phobia, agoraphobia and panic disorders), and substance dependence (including alcohol, cannabis, and other illicit drugs). For the purposes of the present analysis, participants were classified as having MD if they met DSM-IV diagnostic criteria for a MD episode at any time during the interval from 21-25 years. Similarly, participants were classified as having anxiety disorder if they met criteria for any anxiety disorder during the interval. Also, participants were classified as having substance dependence if they met DSM-IV criteria for alcohol, cannabis, or other illicit drug dependence during the interval.

Suicidal behaviour during the period 21-25 years was assessed by asking participants whether they had ever thought about killing themselves or had attempted suicide during the assessment period and the frequency of such thoughts or attempts. Those individuals who reported having any suicidal thoughts, or who reported having attempted suicide at least once in the assessment interval were classified as having suicidal ideation.

In addition, a measure of the total number of mental disorders experienced during ages 21 to 25 was obtained by summing the number of the above disorders experienced by the cohort members ( $M = 0.65$ ,  $SD = 0.97$ ).

### *Educational outcomes ages 21-25*

Cohort members were questioned concerning their history of enrolment in tertiary education and training and any educational/vocational qualifications obtained since age 21. This information was used to classify participants on three dichotomous measures of educational achievement over the interval 21-25 years: attaining no educational qualifications prior to age 25, attainment of any

tertiary educational/vocational qualification, or completion of a university degree (Bachelor's level or above).

#### *Economic outcomes ages 21-25*

Participants were questioned about their receipt of social welfare benefits during the period 21-25 years. The percentage of cohort members who reported receiving an unemployment benefit, domestic purposes benefit (available to single parents with dependent children), or a sickness or invalids' benefit at any point in the period 21-25 years served as the outcome measure.

In addition, participants were also questioned as to their patterns of employment and unemployment during the period 21 to 25 years. Participants who reported being in paid employment at the time of assessment, either full- or part-time, were classified as being in paid employment at age 25.

Also, at age 25 participants were asked to estimate their personal gross income and family gross income from all sources over the previous 12 months. This estimate served as the measures of personal and family income (in New Zealand dollars) at age 25 (personal income,  $M = 28,539$ ;  $SD = 18,688$ ; family income,  $M = 48,980$ ;  $SD = 32,543$ ).

#### *Covariate factors*

A series of covariate factors were chosen from the database of the study on the basis of their association with motherhood prior to age 21, or on the basis of their association with the outcome measures. These covariate factors included the following.

*Measures of family socio-economic background.* (a) Maternal and paternal education were recorded at birth using a three-point scale reflecting the mother's and father's highest level of educational attainment. (b) A measure of family material living standards from ages 0-10 was obtained using a global assessment made via interviewer rating. Ratings were made on a five point

scale that ranged from 1 = very good to 5 = 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. (c) Family socio-economic status (SES) at birth was assessed using a six-point scale, developed for New Zealand by Elley and Irving (1976). The measure assessed paternal occupation on a scale ranging from 1 = professional (high) to 6 = unskilled (low).

*Measures of family functioning.* (a) Childhood sexual abuse (0-16 years): At age 18 and 21 years, participants were questioned about their experience of sexual abuse in childhood (<16 years) (Fergusson, Lynskey, & Horwood, 1996). For the purposes of the present analysis, participants were classified as having experienced childhood sexual abuse if they reported at either age 18 or 21, any episode of abuse involving physical contact with a perpetrator. (b) Childhood physical abuse (0-16 years): At age 18 and 21 years participants were questioned about the extent to which their parents used physical punishment during childhood (<16 years) using a 5-point scale (Fergusson & Lynskey, 1997). Participants were classified as having experienced physical child abuse if they reported at either age 18 or 21, that at least one parent had regularly used physical punishment, had used physical punishment too often or too severely, or had treated them in a harsh and abusive manner. (c) Parental history of substance abuse: When participants were aged 11 and 15 years, parents were questioned about their involvement in illicit drug use and alcohol abuse. Participants were classified as having a parental history of substance abuse if any parent reported a history of using illicit drugs or alcohol abuse. (d) Parental history of criminal offending: When participants were aged 15 years, parents were questioned about their involvement in criminal offending. Participants were classified as having a parental history of criminal offending if any parent reported a history of criminal offending. (e) Number of years in a single parent family: At each assessment to age 16, the parents of participants were queried as to the present composition of their family, and were asked whether any changes to that family due to cohabitation, marriage, divorce, separation, or the death of a parent or step-parent, had taken place during the assessment period. For the purposes

of the present study, cohort members were classified as having been exposed to single parenthood during a particular year if their parent reported a period of single parenthood during that year. Reports of single parenthood were then summed across the period 0-16 years to calculate an estimate of the number of years exposed to single parenthood. (f) Family adversity measure: A measure of family problems 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 disadvantageous child-rearing practices (Fergusson, Horwood, & Lynskey, 1994)

*Childhood behaviour and educational achievement.* (a) Childhood conduct problems: Conduct problems were assessed at age 7, 8, and 9 years using a scale that combined items from the Rutter (Rutter, Tizard, & Whitmore, 1970) and Conners (Conners, 1969, 1970) child behaviour rating scales. Separate ratings were obtained from the child's parent and class teacher. Parent and teacher ratings were summed for each year and then averaged over the interval from 7-9 years to provide a robust measure of the child's tendencies to conduct problems. The reliability of the resulting scale, assessed using coefficient  $\alpha$ , was .97. (b) IQ: Intelligence was assessed at ages 8 and 9 (and averaged across these ages) using the Revised Wechsler Intelligence Scale for Children (WISC-R: Wechsler, 1974).

*Adolescent adjustment and educational outcomes.* (a) Neuroticism: Neuroticism was assessed using a short form version of neuroticism scale of the Eysenck Personality Inventory (Eysenck & Eysenck, 1964) administered when cohort members were aged 14 years. (b) Depression (15 years): At age 15, young people were administered a mental health interview that combined components of the Diagnostic Interview Schedule for Children (DISC) (Costello, Edelbrock, Kalas, Kessler, & Klaric, 1982) and other measures to assess a range of DSM-III-R disorders in the cohort over the

previous 12 months. This information was used to construct DSM-III-R diagnoses of major depression. (c) Grade point average (GPA): GPA was measured at each assessment from age 11-13 years. The child's class teacher was asked to rate the child's performance in each of five areas of the curriculum (reading, handwriting, written expression, spelling, mathematics) using a 5-point scale ranging from very good to very poor. To provide a global measure of the child's educational achievement over the interval from 11-13 years, the teacher ratings were summed across years and curriculum areas and then averaged to provide a teacher rating grade point average for each child. The reliability of this measure was  $\alpha = .96$ . (d) School problems: Problems with school, including issues with teachers, peers, or problem behaviour were assessed at age 15 via parent's ratings of the nature and severity of 5 kinds of school problems. A total school problems score was obtained by summing the number of problems identified by parents. (e) School Certificate passing grades: A measure of secondary school achievement was provided by a count of the number of pass (A, B or C) grades attained in School Certificate examinations; School Certificate was a national series of examinations available to all students that was usually undertaken in the 3<sup>rd</sup> year of high school (age 15-16 years).

### *Sample size and sample bias*

The present analyses were based on the cohort of female participants for whom full information on pregnancy history and motherhood prior to age 21, and mental health, educational, and economic outcomes to age 25 was available ( $n = 515$ ). This sample represented 82% of the original cohort of 630 females.

The following approaches were used to address possible selection bias resulting from sample attrition and missing data. First, missing data estimation methods were used to impute ability scores for those children with missing values on the GPA measure. Missing value estimation was conducted using the impute procedure of Stata 8.0 (StataCorp, 2003) under the assumption that

the data were missing at random. Second, to address issues of selection bias, the data weighting methods described by Carlin, Wolfe, Coffey and Patton (1999) were applied using a two-stage process. In the first stage, the obtained samples with complete data in each analysis were compared with the remaining participants on a series of socio-demographic measures collected at birth. This analysis suggested that there were small but statistically significant ( $p < .05$ ) tendencies for the obtained samples to under-represent individuals from socially disadvantaged backgrounds characterized by low maternal education and low socio-economic status. In the second stage, the sample was stratified on the basis of these characteristics to estimate the probability of inclusion in the sample for each analysis, and were reanalyzed with the data for each individual weighted by the inverse of the probability of sample inclusion. These analyses produced essentially the same pattern of results to those reported here, suggesting that the conclusions of this study were unlikely to have been influenced by selection bias.

## Results

The data on early motherhood and later outcomes were analysed in several stages, the results of which are presented below. First, descriptive information about the participants will be presented. Following this, descriptions of the bivariate associations between early motherhood and later outcomes will be presented. Then, the associations between early motherhood and a range of potentially confounding factors will be examined, followed the results of analyses that examine the associations between early motherhood and later outcomes, net of confounding factors.

### *Characteristics of early motherhood*

As mentioned previously, 4.3% of the sample ( $n = 22$ ) reported becoming mothers for the first time prior to age 18, and 12.5% of the sample reported becoming mothers for the first time between ages 18 and 21 ( $n = 64$ ). Of the 86 women reporting becoming mothers prior to age 21, nine were

married at the time of the birth of their first child (10.5%), while 63 (73%) were cohabitating with their partners. Also, 86% of mothers prior to age 21 ( $n = 74$ ) reported that their pregnancies had been unplanned. These findings suggest that, for the most part, participants who reported having become a mother prior to age 21 had had unplanned pregnancies, and were unmarried, though the majority were cohabitating with a partner.

*Associations between early motherhood and subsequent mental health, educational, and economic outcomes, ages 21-25*

Table 1 shows the cohort of 515 young women classified into three groups defined by their age at first parenthood: those becoming parents before 18 ( $N = 22$ ); those becoming parents over the interval 18-21 ( $N = 64$ ), and those not becoming parents by age 21 ( $N = 429$ ). For each group the table reports on measures of mental health and life outcomes over the period from ages 21 to 25. Each comparison is tested for linear trend, and the association between early parenthood and later outcomes is described by the product moment correlation. The Table shows:

1. *Mental health.* The Table shows that with increasingly early age at parenthood there were increases in rates of major depression ( $r = -.11, p < .01$ ), anxiety disorder ( $r = -.11, p < .01$ ), suicidal ideation ( $r = -.16, p < .01$ ), and suicide attempt ( $r = -.16, p < .01$ ). However, early parenthood was unrelated to substance dependence ( $r = -.05, p > .60$ ). Finally, there is a clear trend for overall rates of mental disorder to increase with increasingly early parenthood, with those becoming parents before 18 having rates of disorder that were over twice those who did not become parents ( $r = -.17, p < .001$ ).
2. *Educational outcomes.* Early motherhood was associated with a number of educational outcomes from ages 21-25. Early motherhood was significantly associated with lower rates of: attaining educational qualifications ( $r = -.37; p < .01$ ); gaining a tertiary qualification ( $r = .15, p < .001$ ); and gaining a university degree ( $r = .19, p < .001$ ).

3. *Economic circumstances.* Early motherhood was also associated with a number of economic outcomes from ages 21-25. Early motherhood was significantly associated with: higher rates of welfare dependence ( $r = -.29, p < .0001$ ); lower rates of paid employment at age 25 ( $r = .24, p < .0001$ ); lower personal income at age 25 ( $r = .26, p < .0001$ ); and lower family income at age 25 ( $r = .18, p < .0001$ ).

These results imply that those women who became mothers at an early age were typically disadvantaged in the areas of education and economic circumstances, when compared with those women who did not become mothers. The results also suggest that women who became mothers at an early age were at greater risk of mental health problems, including major depression, anxiety disorder, suicidal ideation and suicide attempt, and were likely to experience a greater burden of mental disorder.

INSERT TABLE 1 HERE

*Childhood, family, and related correlates of early parenthood*

Table 2 shows the associations between the three-group early parenthood measure and a series of variables describing: (a) socio-economic background; (b) family functioning prior to age 16; (c) child behaviour and educational attainment; and (d) adolescent adjustment and educational outcomes. With the exceptions of measures of childhood sexual abuse and physical abuse, all of these measures describe conditions and circumstances that prevailed prior to age of 15 years. Note that the earliest birth for this cohort occurred at age 16. Each comparison is tested for linear trend using the Mantel-Haenszel chi square measure for dichotomous responses, and one way analysis of variance for linear trend for continuous measures. The Table shows:

1. Socio-economic background: In all cases, increasingly early age of first parenthood was associated with increasing socio-economic disadvantage. Correlations between age at first parenthood and socio-economic measures ranged from  $-.14$  to  $-.27$ .

2. Family Functioning: There was consistent evidence linking exposure to child abuse and family dysfunction to increased risks of early parenthood. Correlations between age at first parenthood and family functioning measures ranged from  $-.17$  to  $-.42$ .
3. Childhood behavioural adjustment and educational achievement: Increasingly early age of first parenthood was associated with increased rates of conduct problems and lower intelligence. The correlations between childhood problems, educational achievement and age at first parenthood ranged from  $.17$  to  $-.22$ .
4. Adolescent adjustment and educational outcomes: Finally, age at first parenthood was related to a series of measures of adolescent adjustment measures and educational outcomes including personality, mental disorders, and educational achievement. In all cases early parenthood was associated with increased rates of adolescent problems and difficulties. The correlations between age at first parenthood and adolescent adjustment measures ranged from  $-.08$  to  $.35$ .

The results in Table 2 raise the clear possibility that the associations between early parenthood and mental health, educational, and economic outcomes shown in Table 1 may be explained by the common effects of the potentially confounding factors in Table 2

INSERT TABLE 2 HERE

*Associations between motherhood prior to age 21 and subsequent outcomes, after adjustment for covariate factors*

The preceding analyses raise the possibility that the increased risks of poorer outcomes at ages 21 to 25 for those becoming parents at an earlier age may be explained by the childhood and family factors identified in Table 2, rather than the direct effects of early motherhood on later outcomes.

To address this issue, we conducted further analyses in which the associations between motherhood prior to age 21 and outcomes from ages 21-25 were adjusted for by the social, background, and

family factors listed in Table 2. For dichotomous measures, logistic regression analyses were conducted, while for continuous measures multiple regression analyses were used. For the count measure of number of mental disorders, Poisson regression was used. The results of these analyses are presented in Table 3, which shows covariate-adjusted means and percentages for each outcome measure that was significantly associated with early motherhood in Table 1. Table 3 shows:

1. *Mental health.* After adjustment for potentially confounding factors, the associations between early motherhood and later risks of mental health disorders were no longer statistically significant (major depression,  $B = .07$ ,  $SE = .22$ ,  $p > .70$ ; anxiety disorder,  $B = .02$ ,  $SE = .23$ ,  $p > .90$ ; suicidal ideation,  $B = .15$ ,  $SE = .27$ ,  $p > .50$ ; suicide attempt,  $B = .22$ ,  $SE = .49$ ,  $p > .60$ ). In addition, the association between motherhood prior to age 21 and number of mental disorders ages 21 to 25 was no longer statistically significant ( $B = -.00$ ,  $SE = .11$ ,  $p > .90$ ).
2. *Education.* After adjustment for potentially confounding factors, the associations between early motherhood and later education outcomes were reduced in magnitude, but remained statistically significant. The association between early motherhood and (a) attaining no educational qualifications by age 25; (b) attainment of tertiary qualifications during the period ages 21 to 25; and (c) the attainment of a university degree during ages 21 to 25, all remained statistically significant (no qualifications,  $B = 1.3$ ,  $SE = .27$ ,  $p < .0001$ ; tertiary qualifications,  $B = -.51$ ,  $SE = .25$ ,  $p < .05$ ; university degree,  $B = -1.60$ ,  $SE = .63$ ,  $p < .05$ ).
3. *Economic outcomes.* After adjustment for potentially confounding factors, the associations between motherhood prior to age 21 and later economic outcomes were reduced in magnitude, but remained statistically significant. Even after controlling for covariate factors, there remained a statistically significant association between early motherhood and later: (a) higher rates of welfare dependence ( $B = .73$ ,  $SE = .24$ ,  $p < .01$ ); (b) lower rates of paid employment at age 25 ( $B = -.48$ ,  $SE = .22$ ,  $p < .05$ ); (c) lower personal income at age 25 ( $B = -6.7$ ,  $SE = 1.8$ ,  $p < .001$ ); and (d) lower family income at age 25 ( $B = -7.5$ ,  $SE = 3.1$ ,  $p < .05$ ).

Collectively, these results suggest that the association between early motherhood and later outcomes varies according to the outcome in question. For mental health outcomes, it appears that associations with early motherhood can be explained by the influence of social, family, and background factors that are associated with early motherhood. However, the results also suggest that, even after accounting for social, family, and background factors, early motherhood was associated with lower rates of attainment of qualifications, including tertiary qualifications and university degrees, as well as lower income, lower rates of paid employment, and higher rates of welfare dependence.

INSERT TABLE 3 HERE

#### *Supplemental analyses*

It may be suggested that the results above have been biased by the inclusion in the analyses of women who became pregnant but did not become parents during the periods prior to either age 18 or age 21. These women included those who had had miscarriages or who had had elective abortions. In order to account for this possibility, the analyses described above were repeated, excluding the 59 women who had had a miscarriage or abortion but had not become parents prior to ages 18 or 21. The results of these analyses were consistent with those described above:

1. After adjustment for confounding factors, early motherhood was not significantly associated with any of the mental health outcomes (all p values > .05).
2. After adjustment, the associations between early motherhood and education and economic outcomes were reduced in magnitude but remained statistically significant (all p values < .05).

## Discussion

In this paper we have used data gathered over the course of a 25-year longitudinal study to examine the extent to which exposure to early parenthood (prior to age 21) was associated with adverse later outcomes, including mental health problems, educational disadvantage, and economic disadvantage during early adulthood. The key findings of this study and their implications are reviewed below.

### *Associations between early motherhood and later outcomes*

With one exception, the study findings show the presence of correlations between early motherhood and later mental health, educational, and economic outcomes. As a general rule, those becoming mothers prior to age 21 reported more mental health problems, had poorer educational achievement, lower income, and higher rates of welfare dependence. These associations also varied with age of first motherhood, with those becoming mothers prior to age 18 experiencing greater disadvantage than those giving birth between 18 to 21 years. These findings support and reinforce a large body of literature that has identified young parents as an “at risk” population for mental health problems, educational underachievement, and economic disadvantage (Caldwell & Antonucci, 1997; Corcoran, 1998; Osofsky et al., 1993; Phipps-Yonas, 1980; Simkins, 1984; Wellings et al., 1999; Zuckerman et al., 1987).

An important issue raised by these findings concerns the extent to which early motherhood acts as a causal factor to increase risks of mental health problems, educational underachievement, and economic disadvantage. In this study we were able to control the associations between early motherhood and later outcomes for a large number of prospectively assessed covariates that spanned socio-demographic factors, family factors, and child and adolescent factors. These analyses led to two quite distinct sets of conclusions.

*Mental health outcomes*

First, the findings suggested that the associations between early motherhood and mental health problems were likely to be non-causal, and to reflect the fact that those becoming early parents were an at risk population for mental health problems, with this at risk status being evident before pregnancy and parenthood. As a group, those becoming mothers before age 21 tended to come from more disadvantaged backgrounds, had higher exposure to child abuse and family dysfunction, and also experienced greater adjustment problems in adolescence. When due allowance was made for these pre-parenthood factors, the associations between early motherhood and later mental health became small and statistically non-significant. These findings suggest that, for this cohort, early motherhood was not a factor that increased susceptibility to mental health problems including depression, anxiety, substance use disorders, and suicidal ideation.

A factor that needs to be taken into account in appraising this result is the high rate of abortion in New Zealand. In particular, current estimates suggest that in the region of 12% of pregnancies to women under 21 years are terminated (Abortion Supervisory Committee, 2002), with mental health issues being the grounds for termination in 98% of terminations. In a previous paper (Fergusson, Horwood, & Ridder, 2006), we have reported that young women having terminations had higher rates of mental health problems than those becoming pregnant and not seeking terminations. Given this evidence, one explanation for the apparent lack of association between early motherhood and mental health is that this association is partially determined by a selection process in which young women who are prone to mental health problems are more likely to seek abortions. This would result in those who continue with pregnancy and who become mothers being a selected population who are resilient to mental health problems. This conjecture suggests that the lack of association we have found between early motherhood and later mental health may vary with social context, and the availability of abortion services.

*Educational and economic outcomes*

While there was no evidence to suggest that early parenthood had adverse effects on mental health, there was clear evidence to suggest that this experience led to disadvantage to women who became mothers before age 21. Specifically, these women had lower than expected levels of educational achievement, were more likely to be welfare dependent, and had substantially lower personal and family income than those who did not become pregnant prior to age 21. Furthermore, there was clear evidence to suggest that the earlier the transition to parenthood, the greater the disadvantage to the woman. Thus, young women who became pregnant prior to age 18 experienced greater disadvantage than those who became pregnant between ages 18 and 21.

These findings reinforce widely-held concerns about the adverse effects of early pregnancy on the life course opportunities for young women (e.g. Grindstaff, 1988; Hofferth & Reid, 2002; Moore, Hofferth, & Wertheimer, 1979; Moore et al., 1993b; Nanchahal et al., 2005; Olausson et al., 2001). The findings of the present study suggest that, irrespective of family background and personal factors, early motherhood creates significant barriers in the way of young women's participation in education and involvement in the workforce, thus limiting their future opportunities.

As noted previously, in the context of New Zealand society, becoming a mother prior to age 21 is comparatively young, with the median age at first motherhood being 28 years in 2006 (Statistics New Zealand, 2007). These considerations would suggest that women who become mothers prior to age 21 may be well behind their age peers in terms of their educational outcomes and participation in the paid workforce. However, it is also unclear to what extent this early disadvantage extends through the life course. It may be conjectured, for example, that when the children of early mothers are older, these women may have the increased freedom to make gains in education and paid workforce participation that narrow this gap. Further research is needed to examine whether the disadvantages faced by those becoming mothers earlier in life carry over through the life course.

### *Limitations*

As with all studies, the findings of the present study should be considered in light of the limitations of the study. Specifically, the present study examined a particular birth cohort, located in a particular place (New Zealand), and at a particular point in time. It is possible that the results of the present study reflect to some extent the social and economic conditions that obtained in New Zealand during this period of their lives, and may not apply equally well to other groups, in other times and at other locations. In addition, the data in the study were derived from self-report, and may therefore be biased toward reporting more socially desirable outcomes.

### *Conclusions*

Notwithstanding the above limitations, the results of this 25-year study confirm the view that women who become mothers earlier in life are at risk of experiencing poorer mental health, reduced educational achievement, and barriers to participation in paid employment. However, for mental health outcomes and enrolment in higher education, these issues largely reflect the influence of family, social, and background factors that influence early motherhood, rather than the specific effects of early motherhood *per se*.

## References

- Abortion Supervisory Committee. (2002). Annual Report to Parliament [reprinted in "Demographic Trends 2002": Statistics New Zealand]. Retrieved January 21, 2004, from <http://www.stats.govt.nz>
- Caldwell, C. H., & Antonucci, T. C. (1997). Childbearing during adolescence: Mental health risks and opportunities. In J. Schulenberg, J. L. Maggs & K. Hurrellmann (Eds.), *Health risks and developmental transitions during adolescence* (pp. 220-245). New York, NY: Cambridge University Press.
- Carlin, J. B., Wolfe, R., Coffey, C., & Patton, G. C. (1999). Tutorial in Biostatistics. Analysis of binary outcomes in longitudinal studies using weighted estimating equations and discrete-time survival methods: Prevalence and incidence of smoking in an adolescent cohort. *Statistics in Medicine*, *18*, 2655-2679.
- Conners, C. K. (1969). A teacher rating scale for use in drug studies with children. *American Journal of Psychiatry*, *126*(6), 884-888.
- Conners, C. K. (1970). Symptom patterns in hyperkinetic, neurotic and normal children. *Child Development*, *41*(3), 667-682.
- Corcoran, J. (1998). Consequences of adolescent pregnancy/parenting: A review of the literature. *Social Work in Health Care*, *27*(2), 49-67.
- Costello, A., Edelbrock, C., Kalas, R., Kessler, M., & Klaric, S. A. (1982). *Diagnostic Interview Schedule for Children (DISC)*. Bethesda, MD: National Institute of Mental Health.
- Deal, L. W., & Holt, V. L. (1998). Young maternal age and depressive symptoms: results from the 1988 National Maternal and Infant Health Survey. *Am J Public Health*, *88*(2), 266-270.
- Elley, W. B., & Irving, J. C. (1976). Revised socio-economic index for New Zealand. *New Zealand Journal of Educational Studies*, *11*(1), 25-36.
- Eysenck, H. M., & Eysenck, S. B. G. (1964). *Manual of the Eysenck Personality Inventory*. London: London University Press.

- Fergusson, D. M., & Horwood, L. J. (2001). The Christchurch Health and Development Study: Review of findings on child and adolescent mental health. *Australian and New Zealand Journal of Psychiatry*, 35(3), 287-296.
- Fergusson, D. M., Horwood, L. J., & Lynskey, M. T. (1994). The childhoods of multiple problem adolescents: A 15-year longitudinal study. *Journal of Child Psychology & Psychiatry & Allied Disciplines*, 35(6), 1123-1140.
- Fergusson, D. M., Horwood, L. J., & Ridder, E. (2006). Abortion in young women and subsequent mental health. *Journal of Child Psychology & Psychiatry*, 47(1), 16-24.
- Fergusson, D. M., Horwood, L. J., Shannon, F. T., & Lawton, J. M. (1989). The Christchurch Child Development Study: A review of epidemiological findings. *Paediatric & Perinatal Epidemiology*, 3(3), 278-301.
- Fergusson, D. M., & Lynskey, M. T. (1997). Physical punishment/maltreatment during childhood and adjustment in young adulthood. *Child Abuse & Neglect*, 21(7), 617-630.
- Fergusson, D. M., Lynskey, M. T., & Horwood, L. J. (1996). Childhood sexual abuse and psychiatric disorder in young adulthood: I. Prevalence of sexual abuse and factors associated with sexual abuse. *Journal of the American Academy of Child & Adolescent Psychiatry*, 35(10), 1355-1364.
- Grindstaff, C. F. (1988). Adolescent marriage and childbearing: the long-term economic outcome, Canada in the 1980s. *Adolescence*, 23(89), 45-58.
- Hobcraft, J., & Kiernan, K. (2001). Childhood poverty, early motherhood and adult social exclusion. *Br J Sociol*, 52(3), 495-517.
- Hofferth, S. L., & Reid, L. (2002). Early childbearing and children's achievement and behavior over time. *Perspect Sex Reprod Health*, 34(1), 41-49.
- Hofferth, S. L., Reid, L., & Mott, F. L. (2001). The effects of early childbearing on schooling over time. *Fam Plann Perspect*, 33(6), 259-267.

- Horwitz, S. M., Bruce, M. L., Hoff, R. A., Harley, I., & Jekel, J. F. (1996). Depression in former school-age mothers and community comparison subjects. *Journal of Affective Disorders*, 40(1-2), 95-103.
- Moffitt, T. E. (2002). Teen-aged mothers in contemporary Britain. *Journal of Child Psychology and Psychiatry*, 43(6), 727-742.
- Moore, K. A., Hofferth, S. L., & Wertheimer, R., 2nd. (1979). Teenage motherhood: its social and economic costs. *Child Today*, 8(5), 12-16.
- Moore, K. A., Myers, D. E., Morrison, D. R., Nord, C. W., Brown, B., & Edmonston, B. (1993a). Age at first childbirth and later poverty. *J Res Adolesc*, 3(4), 393-422.
- Moore, K. A., Myers, D. E., Morrison, D. R., Nord, C. W., Brown, B., & Edmonston, B. (1993b). Age at first childbirth and later poverty. *Journal of Research on Adolescence*, 3(4), 393-422.
- Nanchahal, K., Wellings, K., Barrett, G., Copas, A. J., Mercer, C. H., Macmanus, S., Macdowall, W., Fenton, K. A., Erens, B., & Johnson, A. M. (2005). Changes in the circumstances of young mothers in Britain: 1990 to 2000. *J Epidemiol Community Health*, 59(10), 828-833.
- Olausson, P. O., Haglund, B., Weitoft, G. R., & Cnattingius, S. (2001). Teenage childbearing and long-term socioeconomic consequences: a case study in Sweden. *Fam Plann Perspect*, 33(2), 70-74.
- Osofsky, J. D., Hann, D. M., & Peebles, C. (1993). Adolescent parenthood: Risks and opportunities for mothers and infants. In C. Zeanah (Ed.), *Handbook of infant mental health* (pp. 106-119). New York, NY: Guilford Press.
- Phipps-Yonas, S. (1980). Teenage pregnancy and motherhood: a review of the literature. *Am J Orthopsychiatry*, 50(3), 403-431.
- Rutter, M., Tizard, J., & Whitmore, K. (1970). *Education, Health and Behaviour*. London: Longmans.

- Schmidt, R., Wiemann, C. M., Rickert, V. I., & Smith, E. (2006). Moderate to severe depressive symptoms among adolescent mothers followed four years postpartum. *Journal of Adolescent Health, 38*(6), 712-718.
- Simkins, L. (1984). Consequences of teenage pregnancy and motherhood. *Adolescence, 19*(73), 39-54.
- StataCorp. (2003). *Stata Statistical Software: Release 8.0*. Texas: Stata Corporation, College Station.
- Statistics New Zealand. (2007). Facts for mothers' day. *Corporate Communications* Retrieved 22 May, 2007, from <http://www.stats.govt.nz/products-and-services/media-releases/corporate-communications/facts-mothers-day.htm>
- Troutman, B. R., & Cutrona, C. E. (1990). Nonpsychotic postpartum depression among adolescent mothers. *Journal of Abnormal Psychology, 99*(1), 69-78.
- Wechsler, D. (1974). *Manual for the Wechsler Intelligence Scale for Children - Revised*. New York: Psychological Corporation.
- Wellings, K., Wadsworth, J., Johnson, A., Field, J., & Macdowall, W. (1999). Teenage fertility and life chances. *Rev Reprod, 4*(3), 184-190.
- World Health Organization. (1993). *Composite International Diagnostic Interview (CIDI)*. Geneva, Switzerland: World Health Organization.
- Zuckerman, B. S., Amaro, H., & Beardslee, W. R. (1987). Mental health of adolescent mothers: The implications of depression and drug use. *Journal of Developmental & Behavioral Pediatrics, 8*(2), 111-116.

Table 1. Associations between early motherhood and mental health, education, and economic outcomes ages 21-25.

Outcome	No early motherhood (n = 429)	Motherhood ages 18-21 (n = 64)	Motherhood by age 18 (n = 22)	Correlation with age at first parenthood r	p <sup>1</sup>
<u>Mental Health outcomes ages 21-25</u>					
% Major depression	25.2	28.1	54.6	-.11	<.01
% Anxiety disorder	21.7	29.7	45.5	-.11	<.01
% Suicidal ideation	10.5	14.1	36.4	-.16	<.01
% Suicide attempt	1.4	4.5	9.1	-.16	<.01
% Substance dependence	7.0	4.7	13.6	-.05	>.60
Mean (SD) number of mental disorders	0.66 (1.01)	0.81 (1.10)	1.59 (1.50)	-.17	<.001
<u>Educational outcomes ages 21-25</u>					
% No qualifications by age 25	6.5	22.3	59.1	-.37	<.01
% Gained tertiary qualification	50.2	29.7	27.3	.15	<.001
% Gained university degree	29.3	1.6	4.6	.19	<.001
<u>Economic circumstances</u>					
% Welfare dependent ages 21-25	29.6	60.9	81.8	-.29	<.0001
% In paid employment age 25	82.1	65.6	40.9	.24	<.0001
Mean (SD) personal income age 25, in NZ\$000	30.8 (19.0)	16.8 (11.8)	17.1 (8.7)	.26	<.0001
Mean (SD) family income age 25, in NZ\$000	51.7 (33.8)	36.1 (20.8)	33.3 (20.1)	.18	<.0001

<sup>1</sup> Mantel-Haenszel  $\chi^2$  test of linearity for percentages; one way ANOVA for means.

Table 2. Associations between motherhood prior to age 21 and social, family, and childhood characteristics (0-15 years).

Covariate Factor	No early motherhood	Motherhood by age 21	Motherhood by age 18	Correlation with age at first parenthood r	p <sup>1</sup>
<u>Socio-demographic background</u>					
% Mother lacked formal educational qualifications	45.4	67.2	95.5	-.18	<.0001
% Father lacked formal educational qualifications	46.8	60.3	76.5	-.14	<.01
Mean (SD) family living standards ages 0-10 <sup>2</sup>	2.8 (0.4)	3.1 (0.4)	3.4 (0.4)	-.27	<.0001
Mean (SD) SES category at birth <sup>2</sup>	3.3 (1.4)	4.2 (1.3)	4.9 (1.2)	-.21	<.0001
<u>Family functioning</u>					
% Childhood contact sexual abuse	7.4	17.9	36.4	-.17	<.0001
% Childhood physical abuse	12.4	32.8	36.4	-.17	<.0001
% Parental history of substance abuse	30.0	47.0	68.4	-.17	<.0001
% Parental history of criminal offending	8.9	32.3	31.6	-.21	<.0001
Mean (SD) number of years in single-parent family	1.49 (3.24)	4.20 (4.61)	5.90 (4.53)	-.28	<.0001
Mean (SD) family adversity score	6.2 (4.6)	11.3 (5.7)	17.1 (7.1)	-.42	<.0001

Covariate Factor	No early motherhood	Motherhood by age 21	Motherhood by age 18	Correlation with age at first parenthood r	p <sup>1</sup>
<u>Childhood behaviour/educational achievement</u>					
Mean (SD) conduct problems score ages 7-9	47.5 (5.6)	51.5 (8.2)	53.0 (7.0)	-.22	<.0001
Mean (SD) IQ ages 8-9	103.8 (15.3)	99.3 (15.9)	92.3 (1.5)	.17	<.001
<u>Adolescent Adjustment</u>					
Mean (SD) neuroticism score age 14	14.8 (4.0)	16.1 (4.5)	15.7 (3.9)	-.08	<.05
% History of depression by age 15	6.7	18.0	26.3	-.13	<.0001
Mean (SD) GPA ages 11-13 <sup>2</sup>	2.3 (0.8)	2.6 (0.8)	2.8 (0.5)	-.16	<.0001
Mean (SD) school problems score age 15 <sup>2</sup>	0.2 (0.6)	0.3 (0.6)	0.7 (1.0)	-.19	<.001
Mean (SD) number of school certificate passing grades age 15	3.8 (2.1)	1.9 (2.2)	1.0 (1.6)	.35	<.0001

<sup>1</sup> Mantel-Haenszel  $\chi^2$  test of linearity for percentages; one way ANOVA for means.

<sup>2</sup> Higher numbers indicate poorer outcomes

Table 3. Associations between early motherhood and mental health, education, and economic outcomes ages 21-25, after adjustment for covariate factors.

Outcome	No early motherhood	Motherhood by age 21	Motherhood by age 18	p <sup>1</sup>	Significant Covariates <sup>2</sup>
<u>Mental Health outcomes ages 21-25</u>					
% Major depression	27.8	29.1	30.4	>.70	5, 6, 10
% Anxiety disorder	23.9	24.3	24.6	>.90	5, 8, 10
% Suicidal ideation	12.9	14.6	16.4	>.50	6, 8
% Suicide attempt	2.3	2.9	3.4	>.60	5, 6
% Substance dependence	4.9	3.2	2.1	>.20	6
Mean (SD) number of mental disorders	0.70	0.71	0.71	>.90	5, 6, 8, 10
<u>Educational outcomes ages 21-25</u>					
% No qualifications by age 25	19.6	39.3	61.8	<.0001	9, 11
% Gained tertiary qualification	37.9	28.0	19.8	<.05	2, 9
% Gained university degree	25.9	5.8	5.8	<.05	1, 2, 4, 9
<u>Economic circumstances</u>					
% Welfare dependent ages 21-25	47.6	63.4	77.9	<.01	3, 5, 7, 12
% In paid employment age 25	71.9	62.1	51.1	<.05	3, 8
Mean personal income age 25	30.0	23.3	16.7	<.001	3, 9
Mean family income age 25	50.5	42.9	35.4	<.05	3, 11

<sup>1</sup> Wald  $\chi^2$  for percentages and count measures; t-test for means.

<sup>2</sup> **Significant Covariates**

1. maternal education
2. paternal education
3. average family living standards ages 0-10
4. SES category at birth
5. childhood sexual abuse
6. childhood physical abuse
7. parental history of substance abuse
8. family adversity score
9. IQ
10. neuroticism age 14
11. mean GPA ages 11-13
12. mean number of school certificate passing grades age 15