

**Early Motherhood and Long-Term Economic Outcomes: Findings From a 30-Year
Longitudinal Study**

Sheree J. Gibb, David M. Fergusson, L. John Horwood, Joseph M. Boden

Christchurch Health and Development Study

University of Otago, Christchurch

Christchurch, New Zealand

Corresponding author:

David M. Fergusson, Christchurch Health and Development Study, University of Otago,

Christchurch, PO Box 4345, Christchurch, New Zealand

Phone: +643 372 0406 Fax: +643 372 0407 Email: dm.fergusson@otago.ac.nz

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Abstract

The present study examined linkages between early motherhood (before age 20) and long-term economic disadvantage, using data from a birth cohort of 509 women New Zealand-born women followed to age 30. Associations between early motherhood and economic outcomes were examined using linear and logistic regression models and were adjusted for a range of pre-pregnancy factors. The findings suggested that early motherhood was associated with several indicators of economic disadvantage at age 30, including: working fewer hours; welfare dependence; lower personal incomes; and exposure to economic hardship. These associations remained statistically significant even after extensive adjustment for confounding factors. These findings suggest that having a child before age 20 leads to long-term economic disadvantage that persists for at least a decade.

There is a large body of literature examining the causes and consequences of early motherhood. Previous studies have reported that early motherhood is associated with a range of negative outcomes, including educational underachievement, poverty, poor health, and others. In particular, it has been suggested that becoming a mother during the adolescent or teenage years is associated with poor economic circumstances in adulthood, including higher risks of welfare dependence, lower incomes, lower levels of employment, and lower living standards (Boden, Fergusson, & Horwood, 2008; Chevalier & Viitanen, 2003; Corcoran, 1998; Hobcraft & Kiernan, 2001; Jeon, Kalb, & Vu, in press; Moore et al., 1993; Paranjothy, Broughton, Adappa, & Fone, 2009; Walker & Zhu, 2009). For example, Chevalier and Viitanen (2003) found that women who became mothers before age 18 had significantly less labour market experience at age 33 than other women and earned significantly lower incomes. Similarly, Moore et al (1993) reported that younger age at first birth was associated with higher levels of poverty at age 27, and Olausson et al (2001) found that Swedish women who became mothers before age 20 were more likely to become welfare dependent than women who first became mothers between the ages of 20 and 24.

Causal Explanations of the Associations

An important issue in this area of research is the extent to which the poor economic outcomes experienced by early mothers can be explained by pre-pregnancy differences between early mothers and other women. Previous studies have suggested that early motherhood is associated with a range of personal and background factors that differentiate early mothers from other women. Compared to other women, women who

become pregnant at an early age: are more likely to have been raised by a single mother; have more disadvantaged childhood family backgrounds; are more likely to have had behavioural problems during childhood and adolescence; and have lower pre-pregnancy levels of cognitive ability and academic achievement (for examples see Coley & Chase-Lansdale, 1998; Imamura et al., 2007; Woodward, Fergusson, & Horwood, 2001).

These reports of pre-pregnancy differences between early mothers and other women have raised questions about whether the associations between early motherhood and economic outcomes are causal, or whether they merely reflect pre-pregnancy differences between the two groups of women. For the most part there are two main causal explanations of the associations between early motherhood and poverty (see, for example, Chevalier & Viitanen, 2003; Hobcraft & Kiernan, 2001; Walker & Zhu, 2009). These explanations differ in terms of whether they view early motherhood as a cause or an indicator of poverty.

The first explanation views early motherhood as an indicator, rather than a cause, of poverty. This explanation suggests that women who become mothers at an early age differ from other women in a number of important ways, with early mothers being more likely to have experienced a deprived family background, childhood abuse, early alcohol and drug use, and other such negative early life events. According to this explanation it is these early life events, rather than early motherhood itself, that lead to poor economic outcomes (Geronimus & Korenman, 1992). In support of this explanation there is some evidence to suggest that the associations between early motherhood and poor economic outcomes can be accounted for, at least in part, by the more disadvantaged early life circumstances and other background factors experienced by early mothers prior to their

entry into motherhood (Boden, et al., 2008; Goodman, Kaplan, & Walker, 2004; Jeon, et al., in press; Lee, 2010). For example, Goodman et al (2004) found that many of the negative outcomes associated with teenage motherhood were greatly reduced, or even disappeared, after accounting for observed and unobserved characteristics associated with selection into teenage motherhood.

The second explanation suggests that early motherhood is a cause of poverty and states that becoming a mother at an early age disrupts lifecourse development and leads to later economic difficulties. In order to examine this possibility it is necessary to control for the differences in family background and other factors between early mothers and other women. One approach used in previous papers has been to compare early mothers to a group of women who were not early mothers, but are in other ways similar to the women who became early mothers, such as women who became pregnant early but had a miscarriage, or sisters of the women who became early mothers. However, these approaches tend to underestimate the effects of early motherhood on economic outcomes as there remain important pre-pregnancy differences between early mothers and these comparison groups (Ashcraft & Lang, 2006). A better way to address this issue is to compare early mothers with other women while controlling for a wide range of individual level pre-pregnancy factors that are associated with early motherhood. Several studies using this approach have reported that, even after extensive control for pre-pregnancy factors, early pregnancy and motherhood remain significantly associated with later economic disadvantage (Boden, et al., 2008; Hobcraft & Kiernan, 2001; Hoffman, Foster, & Furstenberg, 1993; Lee, 2010). For example, a study by Lee (2010) reported that, when teenage mothers and other women are matched on a range of background characteristics

including demographics, parental background, childhood family factors, personality, religiosity and cognitive ability, teenage motherhood remained a significant predictor of poor economic outcomes.

Limitations of Previous Studies

Most previous studies of the associations between early motherhood and poverty have not been able to provide reliable information about the causal relationship between early motherhood and economic outcomes due to limitations in their study design. Previous studies have tended to suffer from two limitations: i) they have not controlled for a wide range of potential sources of confounding such as childhood and family background factors; and ii) they have used cross-sectional designs in which background factors and early motherhood were assessed retrospectively. One approach to addressing these limitations is to use prospective longitudinal data and to limit confounding by controlling for a wide range of background factors. Only a small number of studies have examined the associations between early motherhood and economic outcomes using this approach. One such study by Hobcraft and Kiernan (2001) reported that earlier age at first birth is associated with a range of negative outcomes at age 33 including: lower income; higher likelihood of receiving welfare benefits; and greater likelihood of living in social housing. These associations persisted even after control for a wide range of childhood background factors including childhood poverty, parental background, family structure, childhood personality, and academic ability. Similarly, Boden et al (2008) compared women who became mothers before the age of 21 with women who were not mothers by the age of 21 while controlling for childhood and family background factors

including childhood family socioeconomic status and living standards, childhood abuse, parental education, and academic ability, and found that early motherhood was associated with lower educational achievement and poorer economic circumstances at age 25.

However, although these studies have used longitudinal data and have controlled for potential sources of confounding such as childhood and family background, they still have some limitations. Both studies considered only a small and limited range of economic outcomes. In addition, the cohort used in Hobcraft and Kiernan's study was born in 1958, with most participants becoming mothers during the late 1970s or 1980s. It is not clear to what extent the results of this study would generalise to more modern cohorts raised during a period in which there was a greater awareness of the consequences of early childbearing and additional support for young mothers. While the study by Boden used a younger cohort, economic outcomes were assessed within a short to medium-term timeframe after entry into motherhood. As a consequence the economic disadvantages reported in Boden's study may have been transient and reflect disruptions associated with pregnancy and birth, and the effects of having young children in the household, rather than reflecting a long-term economic disadvantage associated with early motherhood.

The Current Study

This study uses prospective longitudinal data to examine the associations between early motherhood and long-term economic outcomes in a birth cohort of 509 women studied from birth to age 30. The aims of the study are:

- i) To examine whether motherhood before the age of 20 is associated with poor economic outcomes at age 30.
- ii) To adjust the associations between early motherhood and economic outcomes for potential sources of confounding, including family and parental background, IQ and academic achievement, behavioural problems, substance use, and others.

Methods

Data and Participants

Data were drawn from the Christchurch Health and Development Study, a longitudinal study of a birth cohort of 1265 individuals born in Christchurch, New Zealand in 1977 and followed to age 30. At age 30 the sample consisted of 987 individuals representing 80% of the remaining live cohort (See Sample loss and bias, below). The sample of participants used for this study was restricted to women who completed the age 30 follow-up ($N = 509$).

Measures

Early motherhood. At ages 15, 16, 18, 21, 25 and 30, participants were asked whether they had become pregnant since the last interview. If participants reported becoming pregnant, they were questioned about the outcome of the pregnancy (miscarriage or stillbirth, abortion, live birth kept by mother, live birth subsequently adopted out). These data were cross-checked against a full pregnancy and birth history taken at age 30. Participants who reported having a live birth before age 20 that was not

adopted out were classified as being an early mother. Overall, 12.2% of participants were classified as early mothers.

Economic outcomes. The following economic outcome measures were constructed from data collected at age 30.

Work hours. Participants were asked to report the number of hours worked in each of their current paid jobs. The hours were summed to provide a total for all hours worked in paid employment. This measure had a mean of 28.0 and a standard deviation of 19.2.

Welfare dependency. Participants were asked whether they currently received any welfare benefits. Those who reported receiving the domestic purposes, unemployment, sickness or invalid's benefit were classified as being welfare dependent. Overall 11% of participants were welfare dependent.

Annual income. Participants were asked to report their personal gross income from all sources for the 12 months prior to the age 30 assessment (for the year 2006-2007) as one of the following income bands: zero income or loss; 1-5,000; 5,001-10,000; 10,001-15,000; 15,001-20,000; 20,001-25,000; 25,001-30,000; 30,001-40,000; 40,001-50,000; 50,001-70,000; 70,001-100,000; 100,001 or more. These responses were converted to single point estimates by taking the mid-point of the relevant income band. Incomes in the top band were set to \$120,000. Incomes reported in currencies other than New Zealand dollars were converted to New Zealand dollars using Purchasing Power Parities (OECD, 2007). After currency conversion, incomes above NZ\$120,000 were truncated to NZ\$120,000. Annual incomes had a median of \$35,000 and a standard deviation of \$32,350. By way of comparison, median annual incomes for women in this

age group in New Zealand in the year 2007 were approximately \$32,916 (Statistics New Zealand, 2013).

Economic hardship. At age 30 participants' economic living standards were assessed using the Economic Living Standards Index short form (ELSI) (Jensen, Spittal, & Krishnan, 2005). Participants who had a total ELSI score of 16 or below were classified as experiencing economic hardship (scores of 16 or less cover the categories of 'some hardship', 'moderate hardship' and 'severe hardship' specified in the ELSI manual (Jensen, et al., 2005)). Overall, 10% of participants were classified as experiencing economic hardship.

Money for everyday needs. Participants were asked to rate how well their total family income meets their everyday needs for such things as accommodation, food, clothing and other necessities on a four point scale where '1' was 'not enough money', '2' was 'just enough money', '3' was 'enough money' and '4' was 'more than enough money'. Participants who reported having 'not enough money' were classified as not having enough money for everyday needs (7% of sample).

Unable to save. Participants reported their ability to save on their combined family income on a three point scale where '1' was 'impossible to save', '2' was 'can save with difficulty' and '3' was 'easy to save'. Participants who reported that it was 'impossible to save' were classified as being unable to save (20% of sample).

Covariates. The following measures were used as covariate factors in the analyses.

Maternal age. Participants were classified into two groups based on whether their mother was aged under 20 years at the time of the participant's birth. Overall 10% of participants had a mother aged under 20.

Maternal education. Participants' mothers were questioned about their highest educational qualification at the time of the participant's birth. This information was used to classify participants into two groups on the basis of whether their mother had any formal qualifications (high school or tertiary qualifications) at the time of their birth. Overall 48% of participants were born to mothers with no formal educational qualifications.

Single parent family. At the birth interview participants' mothers were questioned about their current living arrangements. This information was used to classify participants into two groups on the basis of whether they were born into a single parent family or not. Overall, 8% of participants were born into a single parent family.

Ethnicity. At age 14 participants' parents were questioned about the ethnic identities of themselves and the survey participant. If parents identified either themselves or the participant as being of Māori ethnicity, participants were classified as coming from a Māori ethnic background. Overall, 12% of participants were classified as coming from a Māori ethnic background at age 14.

Childhood sexual abuse. At ages 18 and 21 participants were questioned about their exposure to sexual abuse during childhood (before age 16). This information was used to construct a four-level scale representing the most extreme form of childhood sexual abuse reported by the participant at either age 18 or 21: no abuse (77% of sample); non-contact abuse only (5%); contact abuse not involving attempted or completed

intercourse (8%); attempted or completed oral, anal or vaginal intercourse (10%) (Fergusson, Horwood, & Lynskey, 1996).

Childhood physical punishment. At ages 18 and 21 participants were questioned about the extent to which their parents had used physical punishment during the participant's childhood (before age 16). This information was used to construct a four-level scale representing the most extreme form of childhood physical punishment reported at either age 18 or 21: parents never used physical punishment (5% of sample); parents rarely used physical punishment (79%); at least one parent used physical punishment regularly (8%); at least one parent used physical punishment too often or severely, or treated the participant in a harsh or abusive manner (8%) (Fergusson, Boden, & Horwood, 2008).

IQ. At ages 8 and 9 participants were assessed with the Revised Wechsler Intelligence Scale for Children (Wechsler, 1974). The measure used in the present analysis was the average of the total IQ scores at ages 8 and 9 and had a reliability (split-half) of .95.

Teacher-rated academic performance. At ages 11, 12 and 13, participants' school teachers were asked to rate the participant's performance in reading, handwriting, written expression, spelling and mathematics using a five-point scale ranging from very good to very poor. Ratings were averaged across years and curriculum areas to provide a global measure of academic performance. This measure had a reliability of $\alpha = .96$.

Conduct and attention problems. Measures of conduct and attention problems were obtained from assessments conducted at ages 7, 8, and 9 using scales which measured the extent to which participants tended to engage in: a) oppositional, aggressive

or conduct disordered behaviours; and b) inattentive, restless or hyperactive behaviours. Scale items were based on items from the Rutter (1970) and Conners (1969, 1970) parent and teacher questionnaires. Separate ratings for conduct problems and attention problems were obtained from the participant's parent and the participant's class teacher. Parent and teacher ratings were summed for each year and then averaged over the interval from 7 to 9 years. The reliability of the conduct problem measure, assessed using coefficient alpha, was .97, while the reliability of the attention problems measure was .93.

Deviant peer affiliations. At age 14, participants were questioned about the extent to which their friends engaged in deviant behaviours including nicotine, alcohol and illicit drug use, violent and property offending, and truancy and suspension from school. Scores on these items were summed to provide an overall measure of deviant peer affiliations.

Alcohol use. At age 14, participants were asked to report the number of times that they had drunk alcohol in the last three months. Participants who reported drinking alcohol on at least one occasion during the last three months were classified as using alcohol at age 14 (42% of sample).

Cannabis use. At age 14, participants were asked whether they had used cannabis in the last year. Participants who reported using cannabis in the last year were classified as using cannabis at age 14 (3% of sample).

Statistical Methods

Associations between early motherhood and economic outcomes were tested for statistical significance by fitting linear (for the continuous outcomes: work hours and income) or logistic regression models (for the dichotomous outcomes: welfare dependent;

economic hardship; enough money for everyday needs; ability to save) in which the outcome was modelled as a function of early motherhood. For continuous outcomes the model fitted was of the form:

$$Y_i = B_0 + B_1X_i + U_i$$

where Y_i was the score on economic outcome Y for the i th individual and X_i was early motherhood for the i th individual. For dichotomous outcomes the model fitted was of the form:

$$\text{logit}(Y_i) = B_0 + B_1X_i$$

where $\text{logit}(Y_i)$ was the log odds of the economic outcome Y for the i th individual, and X_i was early motherhood for the i th individual. In these models the coefficient B_1 represents the effect of early motherhood on the economic outcome.

In order to adjust the associations between early motherhood and economic outcomes for confounding, the models described above were extended to include a series of covariate factors. All covariates were initially included, and then the model was gradually refined to include only those covariates that were significant ($p < .05$) predictors of the outcome. For continuous outcomes the extended model was of the form:

$$Y_i = B_0 + B_1X_i + \sum B_jZ_{ij} + U_i$$

and for dichotomous outcomes it was of the form:

$$\text{logit}(Y_i) = B_0 + B_1X_i + \sum B_jZ_{ij}$$

where Z_{ij} were a set of covariate factors for individual i , and the interpretations of all other variables are similar to those in the original models. In these extended models the coefficient B_1 represents the effect of early motherhood on the economic outcome net of the effects of the covariate factors.

Odds ratios were calculated for dichotomous outcomes using the formula e^{BI} where e is the base of natural logarithms and BI is the regression coefficient for early motherhood.

For continuous outcomes, adjusted means were calculated using the least squares method. For dichotomous outcomes, adjusted proportions were calculated using the methods described by Lee (1981). All statistical analyses were conducted in SAS 9.1 for Windows.

Sample Loss and Sample Bias

Over the course of the study there has been a gradual loss of participants due to participant refusal, death, and inability to trace participants. The present analyses are based on a sample of 509 women who were assessed at age 30.

The gradual loss of participants over the course of the study raises questions about the extent to which the results of this paper may be influenced by sample bias due to non-random sample loss. To examine this, missing data were imputed using methods of multiple imputation (Rubin, 1987; Schafer, 1999). This was achieved using the ‘PROC MI’ and ‘PROC MIANALYZE’ procedures in SAS 9.1, which use methods of multiple imputation to impute missing data and then use these data in the analysis to adjust standard error estimates under the assumption that there was no bias in the estimation of the missing data. The results of this re-analysis were not substantively different to those of the original analysis and, in all cases, led to the same conclusions. For this reason the remainder of the paper reports the results of the original (non-imputed) analyses.

Results

Table 1 shows the scores on a range of economic outcomes at age 30 for two groups of women: those who became mothers before age 20, and those who were not mothers by age 20. For each outcome, the table shows the odds ratio (*OR*, for the dichotomous outcomes) or the regression coefficient (*B*, for the continuous outcomes) for the effect of early motherhood on the economic outcome, and the 95% confidence interval for the parameter. The table also shows the *p*-values for significance for the effect of early motherhood from the regression model.

For all of the outcome measures, women who became mothers before the age of 20 had significantly ($p < .05$) poorer economic circumstances at age 30 than women who were not mothers by age 20. Specifically, compared to women who were not mothers by age 20, women who were mothers by age 20 worked fewer hours ($B = 10.5$), were more likely to receive welfare benefits ($OR = 6.0$), had lower incomes ($B = 14.5$), were more likely to experience economic hardship ($OR = 6.4$), were more likely to report that they did not have enough money for everyday needs ($OR = 4.0$), and were more likely to report that they found it impossible to save ($OR = 3.8$). In all cases these differences were statistically significant (all $p < .001$).

TABLE 1 HERE

Table 1 showed that women who became mothers before age 20 had significantly poorer economic outcomes at age 30 than women who were not mothers by age 20. However, early motherhood may be associated with a range of factors including family background and early life circumstances that may explain the relationships between early motherhood and poor economic outcomes. To examine this, Table 2 shows the scores for

women who were early mothers and women who were not early mothers on a range of measures including family and parental background, childhood behaviour, academic and cognitive ability, and adolescent substance use. The table shows that women who became mothers before age 20 differed from women who were not mothers by age 20 in a number of ways. Compared to women who were not mothers by age 20, early mothers: were more likely to have been raised by a mother who was young ($p < .001$), had no formal educational qualifications ($p < .001$), and was a single parent ($p < .001$); were more likely to be of Māori ethnicity ($p < .001$); were more likely to have experienced sexual abuse before age 16 ($p < .001$); had lower IQ ($p < .003$) and academic achievement ($p < .03$); had higher levels of childhood conduct problems ($p < .001$) and attention problems ($p < .001$); were more likely to affiliate with deviant peers at age 14 ($p < .02$); and were more likely to have used alcohol by age 14 ($p < .02$).

TABLE 2 HERE

Table 2 showed that women who become mothers before age 20 differ from other women in a number of ways including family background, childhood behaviour, and cognitive and academic ability. This suggests that the associations between early motherhood and economic outcomes reported in Table 1 need to be adjusted for the potential sources of confounding in Table 2. To achieve this, the regression models from Table 1 were extended to include the series of covariate factors listed in Table 2. Table 3 summarises the results of the models. The table shows the adjusted scores on a range of economic outcomes for women who were mothers by age 20, and women who were not

mothers by age 20. The scores have been adjusted for the background and other factors listed in Table 2. For each outcome, the table also shows the adjusted odds ratio (for dichotomous outcomes) or the adjusted regression coefficient (for continuous outcomes) and 95% confidence interval for the parameter. The table also shows the p-values for significance for the adjusted effect of early motherhood from the regression models.

The table shows that, after adjustment for confounding, there remained significant ($p < .05$) differences in economic outcomes between the two groups of women. Specifically, compared to other women, women who became mothers before age 20: worked fewer hours ($B = 7.2$); were more likely to receive welfare benefits ($OR = 4.9$); had lower annual income ($B = 9.6$); were more likely to experience economic hardship ($OR = 4.4$); were more likely to report not having enough money for everyday needs ($OR = 3.5$); and were more likely to report that it was impossible to save ($OR = 3.3$). In all cases these differences were statistically significant (all $p < .02$).

TABLE 3 HERE

Supplementary Analyses

A limitation of the above analyses is that the conclusions may be sensitive to i) the ways in which early motherhood is measured, and ii) the specific covariate factors that are included in the models. To examine this issue, a series of supplementary analyses were conducted to examine the impact of changes to sample and measures on the conclusions of the analysis.

Measurement of early motherhood. In all of the analyses reported so far, early motherhood was defined as motherhood before the age of 20. However it is possible that the definition of early motherhood that was used may have had an impact on the conclusions of the analysis. To examine this, additional analyses were conducted to examine the impact of changing the measurement of early motherhood. This was done in two ways. First, parallel analyses to those reported above were run using different cut-off points for the early motherhood category (ages 19, 22, 25). Second, the analysis was re-run using the age at which participants first gave birth as the independent variable. In both cases, the results of these analyses led to the same general conclusions as those from the original analysis, suggesting that the conclusions are not substantively affected by the way in which early motherhood is measured.

Inclusion of additional covariate factors. The analyses reported so far in this paper have adjusted the associations between early motherhood and economic outcomes for a range of covariate factors thought to be associated with early motherhood and economic outcomes. However, it is possible that there are other covariate factors not included in the analysis that may potentially explain the associations between early motherhood and economic outcomes. To examine this, supplementary analyses were conducted to examine the impact of including additional covariate factors in the analysis. The regression models described previously were extended to include a wider range of factors that may act as potential covariates. These included: additional measures of family and parental background (parental history of offending; parental history of illicit drug use; parental history of alcohol problems; paternal highest educational achievement; maternal age; maternal highest educational achievement; family socioeconomic status at

the time of the participant's birth; family living standards age 0-10; exposure to childhood adversity; ethnicity); and additional measures of child and adolescent behaviour (neuroticism age 14; novelty seeking age 16; conduct problems age 7-9; parental attachment age 15). The data were then re-analysed using this extended list of covariates. Very few of the additional covariates were significant ($p < .05$) in the analysis and the results of the analysis led to the same general conclusions as the original analysis, suggesting that the conclusions are not substantively affected by the failure to include a broad enough range of covariate factors.

Parallel analyses for males. The analyses reported so far in this paper have examined the effects of early motherhood on later economic outcomes amongst females. This raises questions about the extent to which early fatherhood may have a similar impact on the economic outcomes of males. In an attempt to examine this, consideration was also given to running parallel analyses to examine the impact of early fatherhood on males. However, the small number of males who reported becoming fathers before the age of 20 ($N = 23$) meant that it was not possible to draw any reliable conclusions from the analysis.

Discussion

This paper examined the impact of becoming a mother before age 20 on economic circumstances at age 30. The major findings of the study are reviewed below.

Becoming a mother before the age of 20 had a negative impact on economic circumstances at age 30. Compared to women who were not mothers by age 20, women

who became mothers before age 20: worked fewer hours in paid employment; were more likely to be welfare dependent; had lower personal incomes; were more likely to experience economic hardship; were more likely to report that they did not have enough money for everyday needs; and were more likely to report that it was impossible for them to save. These associations persisted even after extensive control for confounding due to family background, early childhood experiences, personality, and other background factors. In some cases, the differences in economic outcomes between early mothers and other women were substantial. For example, after adjustment for confounding, women who became mothers before age 20 were almost 5 times more likely to be welfare dependent at age 30, and earned almost \$10,000 less per year, than women who were not mothers by age 20.

Sensitivity analyses revealed that these conclusions were unchanged by variations in the definition and measurement of early motherhood, and the inclusion of additional covariate factors, suggesting that the impact of early motherhood on later economic outcomes is robust.

The findings from this study are consistent with previous literature which has reported that early motherhood is associated with a range of negative life outcomes including poor economic circumstances (Boden, et al., 2008; Chevalier & Viitanen, 2003; Corcoran, 1998; Hobcraft & Kiernan, 2001; Jeon, et al., in press; Moore, et al., 1993; Paranjothy, et al., 2009; Walker & Zhu, 2009). While the negative impact of early motherhood on economic circumstances was reduced by controlling for potential sources of confounding, after adjustment there remained significant associations between early motherhood and all of the economic outcome measures. This suggests that the poor

economic circumstances experienced by early mothers are not the result of pre-motherhood differences between early mothers and other women, and instead suggests that becoming a mother before the age of 20 increases a woman's risks of experiencing poor economic circumstances at age 30, regardless of her background prior to becoming a mother.

An important contribution of this study is that it revealed that the economic disadvantages associated with early motherhood persist for at least a decade, with women who become mothers before the age of 20 suffering long-term economic disadvantage that is still evident 10 years after their entry into motherhood. This suggests that the economic disadvantage associated with early motherhood is not a transient effect produced by disruptions associated with pregnancy and birth, or the demands of caring for young children. Instead it suggests that becoming a mother before age 20 results in a range of long-term economic disadvantages that extend beyond the immediate post-birth period and early childhood years.

These findings suggest that policies and initiatives aimed at mitigating or reducing economic disadvantage should include some component aimed at deferral of pregnancy. Indeed, it has been suggested that comprehensive social programs aimed at reducing economic inequality should be accompanied by the widespread provision of relationship skills and life skills training that teaches and encourages young women to be able to avoid early pregnancy (Sawhill, 1998), rather than the basic provision of information regarding birth control.

While this study found that early motherhood was associated with later economic disadvantage, it did not provide any information about the ways in which early

motherhood leads to economic disadvantage. One possibility is that having a child before age 20 interferes with important life tasks that are being completed around this age, such as completing education or entering the job market. Failure to complete any of these tasks may limit an individual's later opportunities for economic success (Moore, et al., 1993).

A limitation of this study is that it used data from a birth cohort of individuals born at a specific place and time (Christchurch, New Zealand in mid-1977). It is not clear to what extent the results of the current study would generalise to cohorts born in other places and times where social and economic conditions may be different to those experienced by the current cohort.

This limitation notwithstanding, the findings from the current study suggest that becoming a mother before the age of 20 leads to long-term economic disadvantage that persists for at least a decade.

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Sheree J. Gibb, David M. Fergusson, L. John Horwood, Joseph M. Boden

Christchurch Health and Development Study

University of Otago, Christchurch

Christchurch, New Zealand

Corresponding author:

David M. Fergusson, Christchurch Health and Development Study, University of Otago,

Christchurch, PO Box 4345, Christchurch, New Zealand

Phone: +643 372 0406 Fax: +643 372 0407 Email: dm.fergusson@otago.ac.nz

References

- Ashcraft, A., & Lang, K. (2006). The Consequences of Teenage Childbearing *NBER Working Paper Series*. Cambridge, MA: National Bureau of Economic Research.
- Boden, J. M., Fergusson, D. M., & Horwood, L. J. (2008). Early motherhood and subsequent life outcomes. *The Journal of Child Psychology and Psychiatry*, *49*(2), 151-160.
- Chevalier, A., & Viitanen, T. K. (2003). The Long-Run Labour Market Consequences of Teenage Motherhood in Britain. *Journal of Population Economics*, *16*(2), 323-343.
- Coley, R. L., & Chase-Lansdale, P. L. (1998). Adolescent Pregnancy and Parenthood: Recent Evidence and Future Directions. *American Psychologist*, *53*(2), 152-166.
- Conners, C. K. (1969). A teacher rating scale for use in drug studies with children. *American Journal of Psychiatry*, *126*, 884-888.
- Conners, C. K. (1970). Symptom patterns in hyperkinetic, neurotic, and normal children. *Child Development*, *41*, 667-682.
- Corcoran, J. (1998). Consequences of Adolescent Pregnancy/Parenting: A Review of the Literature. *Social Work in Health Care*, *27*(2), 49-67.
- Fergusson, D. M., Boden, J. M., & Horwood, L. J. (2008). Exposure to childhood sexual and physical abuse and adjustment in early adulthood. *Child Abuse and Neglect*, *32*, 607-619.
- Fergusson, D. M., Horwood, L. J., & Lynskey, M. T. (1996). Childhood sexual abuse and psychiatric disorder in young adulthood: II. Psychiatric outcomes of childhood

- sexual abuse. *Journal of the American Academy of Child and Adolescent Psychiatry*, 35(10), 1365-1374.
- Geronimus, A. T., & Korenman, S. (1992). The Socioeconomic Consequences of Teen Childbearing Reconsidered. *The Quarterly Journal of Economics*, 107(4), 1187-1214.
- Goodman, A., Kaplan, G., & Walker, I. (2004). Understanding the Effects of Early Motherhood in Britain: the Effects on Mothers *IFS Working Papers, W04/70*: Insititute for Fiscal Studies.
- Hobcraft, J., & Kiernan, K. (2001). Childhood poverty, early motherhood and adult social exclusion. *British Journal of Sociology*, 52(3), 495–517.
- Hoffman, S. D., Foster, E. M., & Furstenberg, F. F. (1993). Reevaluating the Costs of Teenage Childbearing. *Demography*, 30(1), 1-13.
- Imamura, M., Tucker, J., Hannaford, P., Oliveira da Silva, M., Astin, M., Wyness, L., . . . Temmerman, M. (2007). Factors associated with teenage pregnancy in the European Union countries: a systematic review. *European Journal of Public Health*, 17(6), 630-636.
- Jensen, J., Spittal, M., & Krishnan, V. (2005). ELSI Short Form: User Manual For a Direct Measure of Living Standards: Ministry of Social Development.
- Jeon, S. H., Kalb, G., & Vu, H. (in press). The Dynamics of Welfare Participation among Women Who Experienced Teenage Motherhood in Australia. *The Economic Record*.
- Lee, D. (2010). The early socioeconomic effects of teenage childbearing: A propensity score matching approach. *Demographic Research*, 23, 697-736.

- Lee, J. (1981). Covariance adjustment of rates based on the multiple logistic regression model. *Journal of Chronic Diseases*, 34, 415-426.
- Moore, K. A., Myers, D. E., Morrison, D. R., Nord, C. W., Brown, B., & Edmonston, B. (1993). Age at first childbirth and later poverty. *Journal of Research on Adolescence*, 3(4), 393-422.
- OECD. (2007). Purchasing Power Parities (PPPs) for OECD Countries since 1980 Retrieved 4 June 2008, from <http://www.oecd.org/std/ppp>
- Olausson, P. O., Haglund, B., Weitoft, G. R., & Cnattingius, S. (2001). Teenage Childbearing and Long-Term Socioeconomic Consequences: A Case Study in Sweden. *Family Planning Perspectives*, 33(2), 70-74.
- Paranjothy, S., Broughton, H., Adappa, R., & Fone, D. (2009). Teenage pregnancy: who suffers? *Archives of Disease in Childhood*, 94, 239-245.
- Rubin, D. B. (1987). *Multiple Imputation for Nonresponse in Surveys*. New York, NY: John Wiley & Sons.
- Rutter, M., Tizard, J., & Whitmore, K. (1970). *Education, health and behaviour*. London: Longmans.
- Sawhill, I. V. (1998). Teen Pregnancy Prevention: Welfare Reform's Missing Component *Brookings Policy Brief Series*. Retrieved from <http://www.brookings.edu/research/papers/1998/11/metropolitanpolicy-sawhill>
- Schafer, J. L. (1999). Multiple imputation: a primer. *Statistical Methods in Medical Research*, 8, 3-15.
- Statistics New Zealand. (2013). NZ.Stat. Retrieved 1 August 2013 <http://nzdotstat.stats.govt.nz/wbos/index.aspx>

Walker, I., & Zhu, Y. (2009). *The Causal Effect of Teen Motherhood on Worklessness*.

Canterbury: University of Kent.

Wechsler, D. (1974). *Wechsler intelligence scale for children- Revised*. New York: The

Psychological Corporation.

Woodward, L., Fergusson, D. M., & Horwood, L. J. (2001). Risk factors and life processes

associated with teenage pregnancy: Results of a prospective study from birth to

20 years. *Journal of Marriage and Family*, 63(4), 1170-1184.

Table 1. Economic Outcomes at Age 30, by Motherhood Status at Age 20.

	Motherhood status age 20		<i>OR/B</i> (95% CI)	<i>p</i>
	Not mother (<i>N</i> = 447)	Mother (<i>N</i> = 62)		
Economic outcomes age 30				
Weekly work hours (mean)	29.3	18.8	10.5 (5.5-15.6)	<.0001
Welfare dependence (%)	7.8	33.9	6.0 (3.2-11.3)	<.0001
Total personal income last 12 months (mean, NZ\$000)	43.7	29.2	14.5 (7.2-21.8)	<.0002
Experiencing economic hardship (%)	6.9	32.3	6.4 (3.4-12.2)	<.0001
Not enough money for everyday needs (%)	5.2	17.7	4.0 (1.8-8.6)	<.0006
Impossible to save (%)	17.0	43.6	3.8 (2.2-6.6)	<.0001

OR = odds ratio; *B* = regression coefficient; 95% CI = 95% confidence interval for *OR/B*

Table 2. Covariate Factors Associated With Early Motherhood

Covariate factors (%)	Motherhood status age 20		<i>p</i>
	Not mother	Mother	
<u>Maternal factors</u>			
Participant's mother was aged <20 years	7.6	21.0	<.0008
Participant's mother had no formal educational qualifications	47.2	75.8	<.0001
<u>Family factors</u>			
Born into single parent family	4.3	21.0	<.0001
Māori ethnic background	10.7	22.8	<.009
<u>Abuse exposure</u>			
Contact sexual abuse before age 16	15.9	33.9	<.0007
Parents used frequent/severe physical punishment before age 16	4.5	8.1	>.22
<u>Individual childhood and adolescent factors</u>			
Lowest quartile IQ age 8/9	24.2	41.9	<.003
Lowest quartile academic achievement age 11-13	22.6	36.2	<.03
Highest quartile conduct problems age 7-9	19.1	46.7	<.0001
Highest quartile attention problems age 7-9	20.7	40.0	<.0001
Highest quartile deviant peer affiliations age 14	23.4	39.3	<.02
Alcohol use age 14	41.1	58.9	<.02
Cannabis use age 14	2.9	7.1	>.10

Table 3. Adjusted Associations Between Economic Outcomes at Age 30 and Motherhood Status at Age 20^a

Economic outcomes age 30	Motherhood status age 20		<i>OR/B</i> (95% CI)	<i>p</i>	Significant covariates ^b
	Not mother	Mother			
Weekly work hours (mean)	29.0	21.8	7.2 (2.2-12.2)	<.006	1 3
Welfare dependence (%)	7.9	28.3	5.4 (2.7-10.6)	<.0001	5
Total personal income last 12 months (mean, NZ\$000)	43.6	33.9	9.6 (2.1-16.9)	<.02	3 4 6 7
Experiencing economic hardship (%)	7.4	23.0	4.4 (2.1-9.1)	<.0001	1 2 3
Not enough money for everyday needs (%)	5.1	15.6	3.5 (1.6-7.9)	<.003	2
Impossible to save (%)	17.3	40.4	3.3 (1.9-5.9)	<.0001	1

OR = odds ratio; *B* = regression coefficient; 95% CI = 95% confidence interval for *OR/B*

^a Associations have been adjusted for the covariate factors in Table 2

^b Significant covariates: 1=IQ age 8/9; 2=childhood sexual abuse; 3=childhood frequent or severe physical punishment; 4=teacher-rated academic ability age 11-13; 5=attention problems age 7-9; 6=alcohol use age 14; 7=illicit drug use age 14.