

# **Social disadvantage and teenage motherhood: A cohort perspective**

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**DRAFT ONLY**

## **Abstract**

In 1968 Campbell stated that:

The girl who has an illegitimate child at the age of 16 suddenly has 90% of her life's script written for her. She will probably drop out of school..., not be able to find a steady job...; she may feel impelled to marry someone she might not have otherwise chosen. Her life choices are few, and most of them are bad (1968: 238).

These negative consequences reported by Campbell continue to be found in many cross-sectional studies in the US, Europe and the UK (for discussion see Berthoud and Robson 2001; SEU 1999; Luker 1996; Furstenberg 1987).

However, with advances in statistical modelling methods and the availability of longitudinal data, often of large scale and at the national level, researchers in the US and UK have been able to control for the difference in young mothers' backgrounds. All of these studies have led to significant improvement in the methodology for studying teenage motherhood and pave the way for continued efforts in this area. On balance their results suggest that there are negative consequences associated with teenage motherhood, but these are much smaller than previously thought and can be moderated through social and personal support. Once we control for the selection effects of teenage motherhood it is suggested that teenage motherhood is a consequence, not just a cause, of social disadvantage.

In Australia Bradbury (2006) has attempted to control for the selection effect of motherhood on subsequent outcomes by using women who miscarriage as a comparison group. His findings suggest that teenage motherhood has no negative impact on education, labour market activity, income or location. In order to explore this issue further this paper uses a propensity score matching (PSM) technique on data from HILDA waves 1 through 5. This technique allows matching of women who have a teenage birth with those who do not based on variables observed prior to childbearing, thus separating out the effect of motherhood on subsequent life events such as training, relationship formation and fertility.

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## Introduction

In 1968 Campbell stated that in the US:

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However, with advances in statistical modelling methods and the availability of longitudinal data, often of large scale and at the national level, researchers in the US and UK have been able to control for the difference in young mothers' backgrounds. All of these studies have led to significant improvement in the methodology for studying teenage motherhood and pave the way for continued efforts in this area. On balance their results suggest that there are negative consequences associated with teenage motherhood, but these are much smaller than previously thought and can be moderated through social and personal support. Once we control for the selection effects of teenage motherhood it is suggested that teenage motherhood is a consequence, not just a cause, of social disadvantage.

In order to explore this issue further this paper uses a propensity score matching (PSM) technique on data from HILDA collected from waves 1 through 5. This technique allows matching of women who have a teenage birth with those who do not based on variables observed prior to childbearing, thus separating out the effect of motherhood on subsequent life events such as training, relationship formation and fertility. The results are presented for 10 year birth cohorts from those born in the 1920s to the 1970s to control for change over time.

## Measuring the consequences of teenage motherhood

It can be argued that because teenage mothers generally come from more disadvantaged backgrounds their future disadvantage may be a result of their past – rather than as a direct effect of a teenage birth, per se. In order to determine the direct effect of the consequences of teenage motherhood it is necessary to find a control group for the women who do become teenage mothers who have similar background characteristics. The background characteristics are not limited to the individual but also relate to familial and societal factors. A diagrammatic framework to study the consequences of teenage motherhood would look something like that in Figure 1. Here, there is a relationship between background socio-economic characteristics and teenage motherhood (selection effect) AND a relationship between teenage motherhood and socio-economic outcomes (direct effect). It is important in our analysis of consequences that we can tease out the effect of both of these relationships.

Initial advances in the estimation of consequences of teenage motherhood were made in the early 1990s when Geronimus and Korenman (1992 and 1993) and Hoffman, Foster and Furstenberg (1993) compared teenage mothers with their sisters (or cousins) who had children at a later age. The assumption in this sister-pair comparison is that the sisters' will have a shared history, thus the analysis controls for many background characteristics. The

results of these studies indicated that controlling for family background in this way lead to a reduction in the negative effects of teenage motherhood that had been found by controlling for observable characteristics using regression.

Another way to control for the selection effect of teenage motherhood is to use a “natural experiment” such as miscarriage or twins. Grogger and Bronars (1993) use the birth of twins as a teenager as a counterfactual to a singleton birth. They argue that the twin birth can be used to model the effect of an unplanned (or random) birth. Their results support those of Geronimus and Korenman. Similarly, Hotz (et al. 1997; et al. 2005) use miscarriage as an instrument to determine the difference in outcomes between those teenagers who had a birth and those were spared one as a result of miscarriage. This approach asks the question ‘What would a teen mother’s life be like if she did not become a mother so young?’ Again, they find that the negative consequences of teenage motherhood are smaller than previously found and that any negative effects are short-lived.

In Australia, Bradbury (2006) has used the natural experiment of miscarriage to control for the selection effect of motherhood on subsequent outcomes using the Australian Longitudinal Survey of Women’s Health. His findings suggest that teenage motherhood has no negative impact on education, labour market activity, income or location. However, Bradbury (2006) does find that becoming a young mother impacts the type of relationships that young mothers have by reducing the likelihood of marriage.

The weight of evidence then appears to have shifted from teenage motherhood acting as a cause of disadvantage to a consequence. That is, poorer outcomes for teenage mothers are a result of their backgrounds not their young age at birth. Levine and Painter (2003) argue that studies that use sisters or miscarriages suffer form problems in identifying their control groups. For example, using sister-pairs means that the sample will be drawn from larger families and may not be representative of all families (Levine and Painter 2003). Are teenage mothers who were only children substantially different from those from larger families? Also, Geronimus and Korenman (1993) found that their sister-pairs differed systematically on some characteristics even though their apparent family background was the same. There is also some question about the extent to which siblings received the same treatment within families.

The studies based on comparing teen mothers to those who miscarried depend on the assumption that miscarriage is a random event. Levine and Painter (2003, along with others Wolfe et al. 1999, Goodman, Kaplan and Walker 2004) question this assumption. They propose the use of a propensity score matching method to identify a control group based on a range of observable characteristics. This has the benefit of allowing us to use full samples in existing longitudinal data collections (such as HILDA) and employing the rich set of characteristics that are collected. This paper uses such a PSM technique (described below) to assess the following hypotheses reflective of the community discourse surrounding teenage motherhood:

H1: Teenage mothers have more children

H2: Teenage mothers are less likely to marry

H3: Teenage mothers are more likely to divorce

H4: Teenage mothers are less likely to complete high school

H5: Teenage mothers are less likely to complete a post-school qualification

## Data and method

Data for this paper are drawn from waves 1 through 5 of HILDA. Outcomes are measured at wave 5 or at age 30. The sample includes only women, and the age and sex of all children (at home or away from home) have been matched to their mother in order to determine timing of first birth.

**Table 1: Teenage mothers by birth cohort**

	1920	1930	1940	1950	1960	1970	Total
Teenage mother (n)	53	109	175	219	170	120	846
Teenage mother (%)	11.5	19.4	21.3	19.3	12.7	11.3	15.6
Not teenage mother (n)	408	452	645	916	1,173	944	4,588
Not teenage mother (%)	88.5	80.6	78.7	80.7	87.3	88.7	84.4

### Propensity score matching

As noted above, it has been found that teenage mothers generally come from more disadvantaged backgrounds than do those teenagers who do not become teenage mothers. To control for this selection effect of teenage motherhood I use a propensity score matching method. This method allows us to compare the outcomes for young women who become teenager mothers (the treated) with women who do not (the controls) based on their propensity to become a teenage mother due to their background characteristics.

The method provides a measure of the average treatment effect on the treated (ATT) that allows comparison of teenage mothers (the treated) with women who are not teenage mothers (the controls). PSM is a non-parametric method, therefore relationships are not required to follow a linear form. This gives the method some advantage over OLS which is often used to control for background characteristics in models of this type. The method is useful for analysing the effect of policy changes and has been used in a variety of settings. Aassve (et al. 2007) use PSM to examine the effect of divorce on income and material well-being. The method has also been used to study young fathers (Single-Rushton 2005) and young mothers in the US (Levine and Painter 2003) and the UK (Ermisch and Pevalin 2003).

The data requirements for using PSM are to identify treatment, matching, and outcome variables. In this case the treatment variable is teenage motherhood where 1 indicates that the woman had her first birth prior to her 21<sup>st</sup> birthday. This age has been selected as a cut off as it indicates women who chose to continue their pregnancy to term when they were aged less than 20 years.

The selection and description of the matching and outcome variables continues below.

### Choosing matching variables

In order to control for characteristics of the individual prior to first birth matching variables need to be measured prior to first birth. The main requirement for these matching variables is that they are measured prior to the treatment. The characteristics often thought to impact on teenage fertility include, family make up, parental education, parental employment, growing up in a single parent family, living outside the parental home, and ethnicity.

### *Cohort or generational differences*

To control for the effect of different social settings I use age of respondent in the matching model. As shown in Table 1 the propensity to become a teenage mother is different at different periods of history as represented by the respondents of HILDA.

### *Family background*

To control for family structure I use variables to indicate whether the respondent has any siblings, if they are the oldest sibling, their parents were separated or divorced prior to their first birth, they lived with both parents at age 14 and they left home before their first birth.

### *Parents occupation and education*

An often used proxy for socio-economic status is a combination of parental education and employment. For the matching model I use variables that indicate whether the respondents' mother and father were employed at age 14. I also use an indicator of whether the respondents' mother and father had attained a post-school qualification.

### *Ethnicity*

The ethnicity measures used are: whether the respondent reports indigenous status, was born in Australia, and if their first language spoken at home was English. All Australian born respondents are coded as speaking English first at home as they were not asked about language spoken at home.

### *Relationships*

I have generated a variable to indicate whether the respondent was ever legally married prior to the birth of their first child. This is not necessarily the relationship within which the child was born. This variable is not included in the matching when marriage is the outcome variable. Further work needs to be conducted to refine this measure to get a better measure of the relationship status prior to first birth. Ideally controls would be included for the relationship type within which the first birth occurred (married, cohabiting, single), in addition to a variable that indicates ever having been married prior to first birth. Use of the accurate date variables collected in HILDA is required for the creation of these variables.

## **Choosing outcome variables**

### *Fertility*

The hypothesis, as stated above, is that teenage mothers have more children than do women who do not become teenage mothers. If women start having children earlier they have the potential to have more children through a longer childbearing period. When measuring fertility there is an issue as to what might be an appropriate comparison population. Here I run the analysis separately comparing teenage mothers with all women, then teenage mothers with other mothers. To account for censoring, as some cohorts will not have completed childbearing I use a measure of fertility at age 30. Choosing this cut off allows analysis of younger women (born in the early 1970s) as their experience is the most recent. It is important to remember that there is still some censoring of this cohort results should be treated with caution.

### *Marriage and divorce*

We would expect that teenage mothers might have higher rates of marriage if they hold family oriented values. However their marriage prospects depend on the marriageability of their partners. The literature suggests a greater propensity for early relationship breakdown

and to partner with men who are poorly educated or unemployed. (Ermisch & Pevalin 2005). In addition teenage mothers have been found to be less likely to marry (Bradbury 2006). I use two measures to explore relationships. As with the matching variable there is scope for further refinement of these measures using accurate date information. Again, to control for censoring I use age 30 as a cut point. I measure whether they have ever been married at age 30. Marriage is high among the teen mothers for each cohort up to the 1970s. While not quite at the level of the teenage mothers, marriage by age 30 is also high for all other women (Table 2).

To measure divorce I constrain the sample to include only those ever married by age 30. The difference between teenage mothers and other women is stark.

### *Education*

To measure education I use ever completed high school (year 12 or equivalent) and ever completed a post-school qualification. Again, teenage mothers show decidedly poorer outcomes when measured on average.

**Table 2: Outcome measures by birth cohort**

	1920	1930	1940	1950	1960	1970
<b>Number of births by age 30 (mean for all women)</b>						
Not teenage mother	1.65	1.99	1.78	1.25	1.10	0.83
Teenage mother	3.09	3.59	3.16	2.63	2.70	2.84
<b>Number of births by age 30 (mean for mothers only)</b>						
Not teenage mother (parity >0)	1.82	2.16	1.99	1.49	1.32	1.51
<b>Ever married by age 30 (%)</b>						
Not teenage mother	85	92	90	81	72	54
Teenage mother	98	96	97	93	81	55
<b>Ever divorced by age 30 (% if ever married by age 30)</b>						
Not teenage mother	3	5	10	15	18	14
Teenage mother	10	12	25	33	41	46
<b>Completed high school (%)</b>						
Not teenage mother	13	21	28	46	54	72
Teenage mother	4	10	7	18	14	18
<b>Completed a post-school qualification (%)</b>						
Not teenage mother	17	31	42	54	58	64
Teenage mother	2	18	22	33	38	27

## **Results**

The results as presented in Table 3 show the following patterns.

### *Fertility*

When comparing teenage mothers with all women they have a greater number of children by age 30. This pattern persists and even grows over time. This is to be expected as women in the more recent cohort delay childbearing – in many cases until after age 30. For women born in the 1960s and 1970s becoming a teenage mother is more selective than for previous generations of women. The effect of the matching is to reduce the difference in nearly all cohorts. However the differences are still significant.

When compared with other mothers only (removing women with parity 0), teenage mothers still achieve higher fertility by age 30 for each cohort. When compared with other mothers the more recent cohorts (1960s and 1970s) are not as different as when compared to all women as women who have children prior to age 30 at all are still somewhat early child bearers for these cohorts. For the women born in the 1940s and 1950s the effect of a teenage birth on fertility by age 30 is the smallest. This is no doubt due to the earlier and higher birth rates prevalent for women during the 1950s and 1960s – the period when these women would have become mothers. Again, the difference in fertility at age 30 between teenage mothers and other mothers is diminished by matching but is still significant.

### *Marriage and divorce*

For the measures of marriage and divorce matching has the effect of increasing the difference between teenage mothers and other women for some birth cohorts. Age at marriage has also been rising in Australia over this period. However, there is no consistent pattern with regard to the differences between teenage mothers and other women. For women born in the 1930s and 1970s there is no significant difference between teenage mothers and other women in the rate of marriage by age 30.

Divorce is constrained so that only women who have been married by age 30 are included in the analysis. The results show that for women married by age 30, the difference in divorce rates is higher for teenage mothers than for other women for each of the birth cohorts after the 1940s. Apart from women born in the 1950s the difference increases over time. There are problems with this measure due to the length of time that women may have been exposed to divorce.

### *Education*

The results for education are perhaps the most interesting. When we use high school completion as an indicator, there is a very different pattern across the cohorts. For women born prior to 1940 there is no significant difference in high school completion for teenage mothers compared with other women. This is perhaps because high school completion was not great for any women of this period. Small differences start to emerge for women born in the 1940s and 1950s where teenage motherhood leads a reduction in the rate of high school completion by 15 and 19 percentage points respectively. As high school completion for women becomes more widespread and important the differences between teenage mothers and other women grows to 40 percentage points for women born since the 1960s.

A similar pattern is reflected when we consider completion of a post-school qualification – no significant difference for women born prior to 1940, the moderate differences thereafter. The big difference between post-school and high school completion is that the rate of post-school completion for teenage mother is more like those of other women than the rate of high school completion. For women born in the 1940s 1950s and 1960s the difference is in the order of 15 percentage points.

For both of the education indicators the matching has reduced the difference between teenage mothers and other women.

**Table 3: Treatment effect of outcome measures by birth cohort**

	1920	1930	1940	1950	1960	1970
<b>Number of births by age 30 (for all women)</b>						
Unmatched	1.44	1.60	1.38	1.38	1.60	2.01
ATT	1.03	1.30	1.19	1.27	1.67	2.01
<b>Number of births by age 30 (for mothers only)</b>						
Unmatched	1.27	1.43	1.17	1.14	1.38	1.32
ATT	1.23	1.37	1.02	1.02	1.27	1.28
<b>Ever married by age 30</b>						
Unmatched	0.13	0.05	0.06	0.12	0.09	0.02
ATT	0.17	0.03	0.08	0.11	0.11	0.13
<b>Ever divorced by age 30 ( if ever married by age 30)</b>						
Unmatched	0.06	0.07	0.15	0.18	0.23	0.33
ATT	-0.06	0.09	0.18	0.13	0.32	0.40
<b>Completed high school</b>						
Unmatched	-0.09	-0.11	-0.22	-0.28	-0.40	-0.53
ATT	-0.04	-0.05	-0.15	-0.19	-0.40	-0.42
<b>Completed a post-school qualification</b>						
Unmatched	-0.15	-0.13	-0.20	-0.22	-0.20	-0.38
ATT	-0.06	-0.14	-0.13	-0.15	-0.13	-0.34

Shaded: Not significant at <0.05 level

Note: high school trim is 5 for 1920.

## Discussion

This paper is concerned with answering the question “Does early childbearing lead to greater social disadvantage?” While the analysis so far is preliminary, there is some support for the idea that the effect of early childbearing on later life is more persistent than recent research may suggest. However, controlling for background characteristics through matching reduces some of that difference.

In terms of the hypotheses stated for this paper we can conclude the following

H1: Teenage mothers have more children → TRUE

H2: Teenage mothers are less likely to marry → FALSE

H3: Teenage mothers are more likely to divorce → TRUE

H4: Teenage mothers are less likely to complete high school → TRUE

H5: Teenage mothers are less likely to complete a post-school qualification → TRUE

However the results do show that secondary schooling does not provide the best measure of comparison of educational outcomes for teenage mothers. The difference between teenage mothers and other women in completion of post-school qualifications is smaller than that found for high school completion and changes little over time. This suggests that for young women with children training outside a high school setting has been more successful than attempting to complete high school – a qualification that may have little relevance for many teenage mothers.

This preliminary analysis highlights the need for further investigation. It raises more questions than it answers. Refinement of measures is necessary as is some modification to the specification of the models. In particular, the matching variables are few in number and including interaction effects between these variable will lead to greater efficiency of the matching. This means that the assignment of the treated to controls is balanced and there is no systematic differences occurring between the groups.

Using the full relationship history information available from HILDA would also enable the refinement of the measures used. In particular, information related to relationships, including cohabitations, both for matching variables and outcomes would improve the model specifications. In addition measures of the paternity of children of the mother can be determined from fertility and relationship histories and would allow another useful measure of family formation patterns. An alternative measure for divorce might be to examine the extent to which women divorce after a set duration of marriage.

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**Figure 1: Possible analytic framework for studying the effect of direct and selection effects on outcomes for teenage mothers**



