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The effects of teenage childbearing on the short- and long-term health behaviors of mothers

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Abstract A national sample of US teenagers combined with a complementary sample of US adults are used to examine the effects of teenage childbearing on health behaviors by comparing female siblings in both the teenage sample and a sample of adults. Additionally, miscarriage information available in the teenage sample is used to form comparison groups. Unlike previous estimates of the effects of teenage childbearing on health behaviors, the results using these US samples and research designs suggest that teenage childbearing has negligible effects on several measures of unhealthy behaviors for mothers and may be protective for drug use and binge drinking.

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1 Introduction

There has been considerable policy and public interest in the consequences of teenage childbearing for mothers, fathers, and the children. While there is a large body of research that examines the economic and educational effects of teenage childbearing for the mothers and children, less work has examined whether teenage motherhood affects the health behaviors of the mothers. On the one hand, since teenage motherhood is often thought to reduce life opportunities and may increase disadvantage, we may expect the mothers to engage in a variety of risky behaviors. On the other hand, motherhood may change the priorities of the young women, leading to fewer risky behaviors. There has been very little research that has examined this question empirically, with only one paper that attempts to estimate causal effects (Webbink et al. 2008), which uses Australian data and sibling comparisons to find negative effects on health behaviors in later life.

This paper contributes to the small literature focused on estimating the effects of teenage childbearing on health behaviors by using a national sample of US adolescents who are followed into early adulthood as well as a separate national sample of US adults. The rich information available in the adolescent dataset includes complete pregnancy histories, and the availability of a subset of female siblings allows two distinct methodologies to be used—instrumental variables as well as family fixed effects. Information on miscarriages as well as "late miscarriages" is used to allow the construction of better control groups for the young mothers in the full sample (Fletcher and Wolfe 2009; Ashcraft and Lang 2006). To complement the analysis and compare with recent findings, female sibling pairs are also used as comparison groups both in the sample of young adults and the complementary, separate sample of older adults. Overall, in contrast to the findings using Australian data (Webbink et al. 2008), the results suggest that teenage childbearing has negligible effects on the smoking behaviors or obesity of the mothers and also suggests protective effects of drug use and binge drinking in the short term.

2 Background

A large body of research has examined the economic and educational impacts of teenage pregnancy and childbearing on the mothers, fathers, and children. The first results compared teen mothers to other women and found substantial effects. For example, Moore and Waite (1977) estimated that teenager mothers complete 1 to 4 fewer years of schooling. More recent studies attempted to construct better comparison groups by using data on pairs of sisters (Geronimus

and Korenman 1992) and found smaller effects.[1] A second group of recent students used reports of teen miscarriage within an instrumental variable approach and found no effects or counterintuitive positive effects (Hotz et al. 2005). However, Ashcraft and Lang (2006) and Fletcher and Wolfe (2009) question the validity of miscarriage as an instrument and instead compare teenage mothers with teenagers who became pregnant and miscarried late in the term. The results from these analyses suggested modest, negative effects on economic and educational outcomes.[2]

While there is a relatively large literature examining the effects of teenage motherhood on economic and educational outcomes, very little work has examined health outcomes. The effects of teenage motherhood are ambiguous in many models of the derived demand for unhealthy behaviors, such as smoking. For example, we may posit this reduced-form demand as a function of price, income, stress,[3] "addictive stock", preferences, among other factors (Becker et al. 1994):

$$\text{smoke}_t = f\left(\text{prices, income, stress, smoke}_{t-1}\text{, preferences}\right)$$

Teenage motherhood has been linked with lower educational attainments and lower income, which could reduce the demand for unhealthy behaviors through the budget constraint (e.g. Webbink et al. 2011). In contrast, mental health is also often negatively affected through these channels, so that tobacco consumption (or binge drinking or over eating) could be a coping mechanism for the increased stress involved in parenthood (e.g. Kassel et al. 2003). On the other hand, teen parenthood may reorient preferences toward the future (lower discount rate), which may reduce the demand for unhealthy behaviors. Finally, it could be that risky behaviors lead to reproductive outcomes (e.g. Rees et al. 2001), so that these behaviors should be controlled in the analysis. Overall, the effects of early parenthood on short and long term health behavior choices are ambiguous and empirical analysis is needed to uncover the net effects.

The only paper in the economics literature that attempts to estimate the effects of teenage motherhood on health outcomes is Webbink et al. (2008). The authors estimate within-family specifications on an Australian sample of older female siblings, twins, and identical twins and find that teenage childbearing leads to adverse health behaviors. In particular, they find teenage mothers smoke longer, are less likely to quit smoking, and are more likely to be overweight. These effects are stronger for women over 40, and the evidence suggests that part of the effects stem from the "lower quality" of their spouses.

[1] See also Holmlund (2005) for a more recent examination of sibling difference specifications.

[2] There is also a small literature examining the effects of teenage fatherhood. Nock (1998) uses brother comparisons and Fletcher and Wolfe (2011) use information of the young mens' partners' miscarriages.

[3] Although the economics literature typically does not focus on stress as a predictor of smoking, the medical literature has shown evidence that many unhealthy behaviors are undertaken as a coping mechanism to reduce stress (Kassel et al. 2003).

However, there are weaknesses of the within-family research design. The basic assumption is that, controlling for observable characteristics, one sister (or twin) randomly becomes a teenager mother and the other does not, and thus the difference in outcomes between the sisters is the causal effect of teenage childbearing. Also of interest, but yet unknown, is whether the differences in health behaviors occur early after teenage motherhood or only appear later and whether the results are similar in other contexts, such as the USA.

This paper begins to fill in the gap in knowledge of both the short- and long-term effects of teenage childbearing on unhealthy behaviors by utilizing two of the most prominent empirical strategies in this literature—instrumental variables and within-sister comparisons. Findings are qualitatively similar between estimation strategies and indicate that teenage childbearing has negligible effects on several unhealthy behaviors of young mothers and may be protective for drug use and binge drinking. Using a separate national sample of older adults from the USA, sister comparisons also suggest limited negative consequences of teenage childbearing on health behaviors, but, like previous literature, the quality of spouse is lower for teenage mothers.

3 Empirical methods

This paper uses two complementary datasets and two complementary empirical approaches to examine the associations between teen childbearing and both short term (young adult) and long term (adult) health behaviors. Thus, the primary statistical relationship of interest is:

$$\text{outcome} = \beta_0 + \beta_1 \text{TeenBirth} + \beta_2 X + \varepsilon \tag{1}$$

Researchers are typically concerned that, even after controlling for many observable characteristics (X), the estimate of β_1 may still be biased by unobservable characteristics that affect both the likelihood of giving birth as a teenager and the outcomes of interest (typically adult wages or years of schooling). The most common approach to addressing this issue is to control for a rich vector of characteristics and argue that the residual bias is small. Two other approaches have been proposed in the last two decades. The first approach uses within-family comparisons to further control for unobservable characteristics that differ between individuals who give birth as a teenager and those who do not:

$$\text{outcome} = \beta_0 + \beta_1 \,\text{TeenBirth} + \beta_2 Z + \tau_\text{f} + \varepsilon \tag{2}$$

Indeed, both sister pairs and brother pairs have been used to examine the associations between teenager parenthood and adult outcomes (Geronimus and Korenman 1992; Webbink et al. 2008; Nock 1998). Limitations with this approach include both the paucity of data that can support this design as well as the potential of unobservable characteristics that vary between siblings that affect both the likelihood of teenage parenthood and the outcome of interest.

A second approach uses an instrumental variable design that was pioneered by Hotz et al. (2005), where miscarriages are used to instrument for live birth status for a sample of women who became pregnant as a teenager.[4] Thus, the following system of equations is estimated:

$$\text{outcome} = \beta_0 + \beta_1 \,\text{TeenBirth} + \beta_2 X + \varepsilon \tag{3}$$

$$\text{TeenBirth} = \delta_0 + \delta_1 \text{Miscarriage} + \delta_2 X + \upsilon \tag{4}$$

Of course, miscarriage status is a very strong predictor (the F-statistic is always greater than 50 in this sample) of whether a teen gives birth, however there are limitations to the approach because of potential violation of the exclusion restriction (i.e. that miscarriage status can be excluded from Eq. 3). First, having a miscarriage is often a traumatic event that could have direct effects on the outcome of interest. Second, as outlined in Ashcraft and Lang (2006), there is a timing issue with using miscarriages in this setup because some individuals who had a miscarriage would have chosen to have an abortion instead of having a live birth. Ashcraft and Lang (2006) show that this issue would tend to bias the results toward finding "benefits" of live births. Indeed, Hotz et al. (2005) present some evidence of positive effects of teenage motherhood on later outcomes. Fletcher and Wolfe (2009) instead use "late" miscarriage status to attempt to circumvent the issue outlined in Ashcraft and Lang (2006) and find small negative effects of teenage motherhood on several adult outcomes, such as years of schooling. This paper will be able to compare the results using each of these methods to examine the potential effects of teenage motherhood on the short- and long-term health behaviors of the mother.

4 Data

The first dataset used in the analysis is the restricted version of the National Longitudinal Study of Adolescent Health (Add Health). Two samples are created from this dataset. For the instrumental variable specifications, I select a sample of young women who became pregnant as an adolescent. There are 4,943 pregnancies reported by women in the sample by Wave III of data collection (when the respondents were on average 22 years old). The sample is narrowed by focusing on first pregnancies (leaving 3,633 pregnancies) and on pregnancies that ended before age 18 years and 9 months (leaving 1,089 observations). Other exclusions include women who report still being in high school at Wave 3, women who gave birth to only one twin, and women whose pregnancy had not ended at the time of the interview, leaving approximately 1,050 observations.[5] I combine reported miscarriages and still-births into one category—"miscarriages."

[4] See Fletcher and Wolfe (in press) for an application of this approach to teenage fatherhood.

[5] I impute data for parental education and family income for nearly 300 individuals and include a dummy variable for individuals with missing data.

In addition to using miscarriage status as an instrument, this paper also follows previous research (Ashcraft and Lang 2006; Fletcher and Wolfe 2009) by limiting the sample to individuals who either had a live birth or a miscarriage (i.e., abortions are dropped from the analysis). Thus, the adolescents who serve as the controls in some of the estimates below are those who report a miscarriage while a teen. However, since a number of these adolescents might have chosen to have an abortion had they not had a miscarriage, I also conduct an analysis in which only those who had a "late" miscarriage serve as the control group. This further reduces the possible bias of comparing those who gave birth to those who would have terminated their pregnancy in the absence of a miscarriage (Ashcraft and Lang 2006; Fletcher and Wolfe 2009). Using both of these two comparison groups narrows the range of estimates of the effect of giving birth while a teen on unhealthy behavior outcomes as young adults.

Table 1 provides summary statistics for this "Birth Outcome" sample. Conforming with the other national datasets, pregnancies end in live births, abortions, and miscarriages (or stillbirths) for 59%, 25%, and 16% of the

Table 1 Summary statistics, Add Health. Sample of women who experience a teen pregnancy

Variable	Obs	Mean	Std Dev	Min	Max
Birth outcomes					
Live birth	1050	0.59	0.49	0	1
Miscarriage	1050	0.16	0.36	0	1
Abortion	1050	0.25	0.44	0	1
Outcomes					
Smoke	1046	0.39	0.49	0	1
Marijuana use	1045	0.20	0.40	0	1
Binge drink	1041	0.35	0.48	0	1
BMI	1000	27.44	7.08	13	56
Overweight	1000	0.55	0.50	0	1
Obese	1000	0.29	0.46	0	1
Novelty seeking score	970	−0.19	1.01	−2	3
Individual characteristics					
Age	1050	21.69	1.65	18	27
White	1050	0.43	0.50	0	1
Black	1050	0.34	0.47	0	1
Hispanic	1050	0.18	0.38	0	1
PPVT test score	1050	96.08	12.67	54	132
Family characteristics					
Family income	1050	35.87	26.92	0	426
Parent education	1050	12.74	2.15	0	17
Parent married	1050	0.60	0.45	0	1
Parent missing data	1050	0.38	0.49	0	1
Pregnancy variables					
Used birth control	1025	0.40	0.49	0	1
Age pregnancy ended	1050	17.29	1.10	13.25	18.66675
Conception before age 15	1050	0.08	0.27	0	1
Smoke during pregnancy	1033	0.20	0.40	0	1
Drink during pregnancy	1030	0.09	0.28	0	1
Drugs during pregnancy	1031	0.07	0.26	0	1
Weeks pregnant	1007	23.95	15.13	0	40

sample, respectively. However, one might be worried about misreporting in pregnancy outcomes, as abortions could be a stigmatized outcome and miscarriages could be misreported intentionally as well as unintentionally(if the women is never aware of the pregnancy). Misreporting could potentially bias results if it is related to characteristics that might predict young adult health behavior outcomes. Indeed, potential biases in self-reports of pregnancy outcomes have been raised in previous work (for example, Hotz et al. 2005). In comparison to many other datasets, two differences in the Add Health data are worth noting. First, survey respondents in the Add Health used computer-assisted personal interview technology for sensitive questions. Thus, responses were gathered using laptop computers rather than verbally indicated to the interviewer. This feature of the survey design is in contrast with other surveys for which biases in self-reported pregnancy outcomes have been shown (for example, the National Survey of Family Growth, National Longitudinal Study of Youth). One might expect this design feature to reduce misreporting of abortions because of the reduced effect of stigma. Second, the self-reported pregnancy outcomes in the Add Health data match more closely with official Vital Statistics than other datasets. For example, 25% of first pregnancies for this sample are reported to end in abortion and 16% end in miscarriage, compared with 18% and 7%, respectively, in Hotz et al. (2005). Elam-Evans et al. (2003) use CDC surveillance data to report an abortion ratio of 361 per 1,000 live births to women aged 15–19 in 2000 (not counting miscarriages). The implied ratio in the Add Health is 298 per 1,000 live births. Although a generic issue in most research examining the associations between pregnancy outcomes and health behaviors, these differences suggest the potential for some remaining bias in the results below, though this bias depends on whether misreporting is associated with the determinants of health behaviors. The results should be viewed in the context of these potential biases.

Of the women in this sample (who have all experienced a teen pregnancy), at Wave 3, 39% report tobacco use in the previous month, 20% report marijuana use in the previous month, and 35% report binge drinking (five or more drinks in a sitting) in the past year. The average body mass index for the sample is 27.44, which is overweight. Fifty five percent of the sample is classified as overweight (BMI>25) and 29% is classified as obese (BMI>30).

Table 2 stratifies the summary statistics by each of the pregnancy outcomes. The raw means suggest that, even conditional on this sample of women who experienced a teen pregnancy, those who elected to have an abortion were more advantaged than those who had a miscarriage or live birth (t-tests shown in the final columns). Women who had an abortion scored higher on an achievement test (Peabody Picture Vocabulary Test), were from families with higher incomes, and had more educated parents than women who miscarried or had a live birth. Table 2 also shows that, consistent with evidence from the medical literature, individuals who consume tobacco, alcohol, or illegal drugs during pregnancy are at higher risk for miscarriage as well as abortion. Although these differences will be controlled in the analysis, it could be the case that omitted health behaviors could produce correlations in pregnancy

Table 2 Summary statistics, Add Health. Sample of women who experience a teen pregnancy. Stratified by birth outcome

Variable	Mean			1 vs 2	2 vs 3	1 vs 3
	$N \sim 620$	$N \sim 265$	$N \sim 165$			
Birth outcomes						
Live birth	1	0	0			
Miscarriage	0	0	1			
Abortion	0	1	0			
Outcomes						
Smoke	0.37	0.42	0.44			
Marijuana use	0.15	0.30	0.22	***	*	**
Binge drink	0.28	0.47	0.39	***		***
Overweight	0.58	0.45	0.58	***	***	
Obese	0.32	0.20	0.35	***	***	
Novelty seeking score	−0.33	−0.06	0.12	***	*	***
Individual characteristics						
Age	21.79	21.63	21.43			**
White	0.42	0.44	0.47			
Black	0.37	0.33	0.27			***
Hispanic	0.18	0.14	0.23		**	
PPVT test score	94.53	100.17	95.24	***	***	
Family characteristics						
Family income	32.38	44.19	35.52	***	***	
Parent education	12.42	13.43	12.79	***	***	**
Parent married	0.57	0.62	0.69			**
Parent missing data	0.43	0.29	0.35	***		*
Pregnancy variables						
Used birth control	0.39	0.42	0.37			
Age pregnancy ended	17.33	17.18	17.27	*		
Conception before age 15	0.07	0.11	0.07	**		
Smoke during pregnancy	0.15	0.27	0.28	***		***
Drink during pregnancy	0.03	0.21	0.10	***	***	***
Drugs during pregnancy	0.03	0.16	0.10	***	*	***
Weeks pregnant	33.16	9.80	12.76	***	***	***

$^{***}p = 1\%$, $^{**}p = 5\%$, $^{*}p = 10\%$

outcomes and health behavior outcomes following the pregnancy.[6] In addition, in much of the analysis, the focus will be on a comparison between live births and miscarriages rather than live birth and non live births (miscarriages and abortions).

The second sample used in the analysis is constructed by collecting all females in the sample who have a sister who is also followed in the sample.[7]

[6]For example, some of the non-smokers during pregnancy may have temporarily quit, planning to resume smoking after the conclusion of the pregnancy. If those individuals are more likely to have a miscarriage (e.g. due to being less healthy from past smoking), this omitted health behavior-related factor could introduce an association between miscarriage and smoking post-pregnancy resolution. Readers should view the results with this concern in mind.

[7]Though in principle it would be valuable to attempt to combine the IV and fixed effects methods using typically used data, in practice this is difficult because of the need for a large number of sister pairs where both sisters experienced a teenage pregnancy and one sister gave birth and the other did not.

Table 3 Summary statistics, Add Health. Sample of sister pairs

Variable	Wave	Obs	Mean	Std Dev	Min	Max
Teen birth	3	1442	0.10	0.30	0	1
Smoke	3	1442	0.29	0.45	0	1
Marijuana use	3	1441	0.17	0.38	0	1
Binge	3	1420	0.37	0.48	0	1
BMI	3	1355	26.57	6.79	15	59
Overweight	3	1355	0.48	0.50	0	1
Obese	3	1355	0.24	0.43	0	1
Novelty seeking	3	1327	−0.25	0.96	−2	3
Age	3	1442	21.82	1.74	18	26
Family income	1	1442	43.74	47.63	0	800
Maternal education	1	1442	12.92	2.16	8	17
Parent age	1	1442	41.38	6.21	23	75
Married parents	1	1442	0.68	0.44	0	1
Mom employed	1	1442	0.70	0.42	0	1
Parent missing information	1	1442	0.38	0.49	0	1
Smoke	1	1442	0.24	0.43	0	1
Binge	1	1442	0.22	0.41	0	1
Marijuana use	1	1442	0.11	0.32	0	1
BMI	1	1442	22.39	4.41	13	47
PVT score	1	1442	97.73	13.44	47	146
Birth weight		1442	6.59	1.45	3	12
General health	1	1442	2.22	0.95	1	5
Missing Xs	1	1442	0.24	0.43	0	1

There were approximately 1,800 such females, nearly 1,500 of whom were followed longitudinally. Table 3 provides summary statistics for the female sibling sample. Ten percent of the sample reported a teenage birth; the family fixed effects specification will use this group compared with their sisters. In the full sample, 29% report smoking, 17% report marijuana use, and 37% report binge drinking as a young woman. This sample is slightly less heavy than the "Birth Outcome" sample, with an average BMI of 26.6, 48% rate of overweight, and 24% obese. Dividing the sample by the presence of a live birth by age 18 for those families with discordant live birth status in Table 4, we see similar test scores, birth weight and self reported health preceding the birth. On the other hand, the sister who gives birth as a teenager was more likely to use marijuana than the sister who does not experience a teen birth. Comparing the raw means, we find evidence that teen mothers are slightly more likely to pursue risky behaviors such as smoking and binge drinking but no more likely to smoke marijuana at Wave 3.

The third sample used in this paper is created from the first wave of the Midlife Development in the United States (MIDUS) dataset.[8] The MIDUS is a nationally representative survey of 7,000 individuals aged 25–74 in the US in 1994–5. Included in the 7,000 individuals were over-samples of twins and siblings, with a subsample of 1,900 twins and over 500 siblings of the

[8] http://www.midus.wisc.edu/midus1/

Table 4 Summary statistics, Add Health. Sample of sister pairs who are discordant for teenage births

Variable	Wave	Mean	
		Teen births	No teen births
		$N \sim 120$	$N \sim 110$
Smoke	3	0.33	0.30
Marijuana use	3	0.17	0.17
Binge	3	0.29	0.27
BMI	3	27.28	27.20
Overweight	3	0.60	0.56
Obese	3	0.26	0.27
Novelty seeking	3	−0.23	−0.10
Age	3	21.70	21.98
Family income	1	31.88	32.50
Maternal education	1	12.30	12.31
Parent age	1	40.03	40.42
Married parents	1	0.52	0.53
Mom employed	1	0.57	0.58
Parent missing information	1	0.41	0.36
Smoke	1	0.26	0.26
Binge	1	0.21	0.25
Marijuana use	1	0.20	0.13
BMI	1	22.69	22.78
PVT score	1	92.64	92.10
Birth weight		6.78	6.71
General health	1	2.52	2.41
Missing Xs	1	0.32	0.26

Note: No variables are statistically different between groups

respondents in the main sample. The MIDUS asked questions about current health behaviors as well as the age at first birth of the women in the sample. Women who reported a birth before age 20 are categorized as having a "teen birth." The analysis samples focus on the 900 female twins or siblings included in the survey, approximately 500 are twins. Table 5 presents basic summary statistics for the MIDUS sample of female sisters. The average age of the sample is nearly 49. Approximately 22% of the sample is obese, 29% of those with a teen birth versus 20% with no teen birth. Twenty-two percent of the sample currently smokes cigarettes, 33% of the teen birth sample versus 18% of the non-teen birth sample. These descriptive statistics suggest large differences in health behaviors, which will be revisited in the regression analysis.

5 Results

5.1 Empirical estimates using birth outcomes of teenage pregnancies

Table 6 begins the empirical analysis and uses the birth outcome sample. The first column compares health outcomes between individuals who give birth as

Table 5 Descriptive statistics, MIDUS sample. Full sample of female siblings and stratified by teen birth status

Variable	Full sample			Teen birth sample			No teen birth sample		
	Observations	Mean	Std. Dev	Observations	Mean	Std. Dev	Observations	Mean	Std. Dev
Teen birth	972	0.23	0.42	226	1.00	0.00	746	0.00	0.00
Body mass index	900	26.12	5.50	211	27.39	6.27	689	25.74	5.18
Obese	900	0.22	0.42	211	0.29	0.45	689	0.20	0.40
Current smoker	972	0.22	0.41	226	0.33	0.47	746	0.18	0.39
Alcohol abuse	929	0.01	0.12	214	0.02	0.14	715	0.01	0.11
Marijuana use	935	0.03	0.17	217	0.06	0.23	718	0.02	0.15
Spouse education	766	13.88	3.04	161	12.09	2.93	605	14.35	2.89
Currently married	972	0.76	0.43	226	0.66	0.47	746	0.79	0.41
Age	972	48.55	12.08	226	49.56	11.67	746	48.24	12.19
Black	923	0.05	0.21	212	0.06	0.24	711	0.04	0.20
Other race	923	0.02	0.14	212	0.03	0.18	711	0.02	0.13
Twin	972	0.56	0.50	226	0.63	0.48	746	0.54	0.50

Table 6 Effects of teenage childbearing on health behaviors. Evidence using sample who experienced a teen pregnancy

Specification	OLS	2SLS	OLS	OLS
Sample	Birth/no birth	B/A/M	Birth or miscarriage	Birth or miscarriage
				Late miscarriages
Smoke	−0.006	0.064	0.024	−0.014
	(0.042)	(0.081)	(0.058)	(0.081)
Observations	968	968	712	654
Binge drink	−0.135***	−0.127	−0.134*	−0.074
	(0.049)	(0.092)	(0.070)	(0.075)
Observations	963	963	709	651
Marijuana use	−0.102***	−0.027	−0.063	−0.071
	(0.036)	(0.056)	(0.039)	(0.060)
Observations	966	966	710	652
Novelty seeking scale	−0.200**	−0.372**	−0.319***	−0.307**
	(0.083)	(0.147)	(0.109)	(0.137)
Observations	905	905	665	618
Overweight	0.063	0.000	0.019	0.015
	(0.043)	(0.086)	(0.064)	(0.079)
Observations	925	925	676	623
Obese	0.081**	−0.024	0.016	−0.012
	(0.035)	(0.076)	(0.053)	(0.074)
Observations	925	925	676	623

Controls: Age, indicator for conception <15 years old, smoke during pregnancy, drug use during pregnancy, and alcohol use during pregnancy. Each cell is a separate regression. B/A/M: sample includes births, abortions, and miscarriages

*** $p = 1\%$, ** $p = 5\%$, * $p = 10\%$

a teen with teenagers who become pregnant but experienced a miscarriage or abortion. Control variables include age and factors that may lead to miscarriage, including tobacco, alcohol, or drug use while pregnant and an indicator for conception before age 15 (Fletcher and Wolfe 2009). Estimates suggest a small and statistically insignificant association between teenage childbearing and tobacco use. The second column follows Hotz et al. (2005) and uses miscarriage as an instrumental variable. As shown in Ashcraft and Lang (2006), this specification will provide an upper bound of the effect. Additionally, Ashcraft and Lang (2006) also argue against including other control variables in the IV models because of the unknown bias it may generate, and instead argue to only include measures related to miscarriage rates.

In the case of tobacco use, the estimate suggests a 6 percentage point increase from a live birth, though the estimate is not statistically significant. In column 3, the sample is limited to only those individuals who either experience a live birth or a miscarriage (i.e., individuals who experience an abortion as teenagers are not included). Following the discussion in Ashcraft and Lang (2006) and Fletcher and Wolfe (2009), this estimate lies between the result in columns 1 and 2 and suggests a small and statistically insignificant relationship between young adult smoking and teenage childbearing. Finally, in column 4, the sample is limited to teenagers who experienced a live birth or those

who experienced a late miscarriage. Again, the results suggested a negligible relationship between current smoking status and teenage childbearing.

The results for binge drinking as a young adult are presented in the second row of Table 6. The baseline results suggest a 13.5 percentage point reduction for women who gave birth as a teen. Interestingly, the upper bound of the estimate shown in column 2 is nearly a 13 percentage point reduction. Comparing women who gave birth to women who miscarried in column 3 also suggests a 13 percentage point reduction of teenage childbearing on the likelihood of binge drinking. Only when the comparison group is reduced to those who experience a late miscarriage does the effect shrink, to 7.4 percentage points, which is still a sizable, though not statistically significant, estimate.

The results for marijuana use in the previous month are presented in the third row of Table 6. The baseline estimates suggest a 10 percentage point reduction for women who give birth as a teenager. The upper bound effect estimated using miscarriage as an instrument in column 2 suggests a nearly 3 percentage point reduction, though the effect is not statistically significant. The birth vs. miscarriage comparison in column 3 suggest a 6.3 percentage point reduction in marijuana use, though it is significant at the <15% level. The final estimate, which compares women who had live births with those who had late miscarriages produces a 7 percentage point reduction in marijuana use, though the result is not statistically significant.

As a summary measure of propensity to take risks, a nine-item scale of novelty seeking is examined in the fourth row of Table 6.[9] Results suggest between a 0.2 and 0.37 of a standard deviation reduction in this scale for those who give birth to a child in comparison to women who get pregnant and experience a miscarriage or abortion. Finally, Rows 5 and 6 in Table 6 examine the relationships between weight outcomes and teenage childbearing. Results again do not suggest robust relationships.

5.2 Empirical estimates using comparisons between sisters

To complement the results in Table 6 and to allow more direct comparisons with Webbink et al. (2008), Table 7 presents results that use a sub-sample of females who have a sister also surveyed longitudinally. Baseline estimates in column 1 use OLS analysis that control for a limited number of individual and family characteristics, including age, family income, parental education, age, marital status and maternal employment status. The baseline results indicate a statistically insignificant 4.5 percentage point increase in smoking for women who give birth as a teenager. Estimates in column 2 extend the controls to include prior smoking, drinking, marijuana use, and obesity measures as well as a measure of verbal ability, birth weight, and prior general health. With these extended controls, the estimate falls to under 2 percentage points and

[9]The scale, a novelty seeking measure proposed by Hu et al. (2006), is the standardized sum of nine questions shown in the Appendix.

Table 7 Effects of teenage childbearing on health behaviors. Evidence using sister pairs from Add Health

Specification	Baseline	Controls	Fixed effects	Fixed effects/Xs
Sample	Sisters	Sisters	Sisters	Sisters
Smoke	0.045	0.016	−0.010	−0.008
	(0.042)	(0.037)	(0.074)	(0.071)
Observations	1442	1442	1442	1442
Binge drink	−0.066	−0.057	0.030	0.031
	(0.040)	(0.041)	(0.089)	(0.087)
Observations	1427	1427	1427	1427
Marijuana use	0.022	−0.004	−0.013	−0.020
	(0.034)	(0.036)	(0.059)	(0.058)
Observations	1448	1448	1448	1448
Novelty seeking scale	0.003	−0.093	−0.126	−0.138
	(0.094)	(0.094)	(0.245)	(0.250)
Observations	1331	1331	1331	1331
Overweight	0.098**	0.091**	0.074	0.077
	(0.045)	(0.041)	(0.094)	(0.087)
Observations	1362	1362	1362	1362
Obese	0.020	0.007	−0.018	−0.021
	(0.042)	(0.036)	(0.075)	(0.068)
Observations	1362	1362	1362	1362

Each cell is a separate regression. Baseline controls: age, family income during high school, maternal education, parent age, family structure during high school, maternal employment. Extended controls: baseline controls plus, Wave 1 smoking, drinking, drug use status, birth weight, PVT score, Wave 1 self reported health status, Wave 1 BMI. Fixed effects column control for age. Fixed effects/Xs column controls for age and extended controls

$^{***}p = 1\%$, $^{**}p = 5\%$, $^{*}p = 10\%$

is not statistically significant. The estimates in column 3 use within-sibling comparisons and show a 1 percentage point reduction in the likelihood of smoking. These results are similar to the earlier results in Table 6, indicating negligible effects of teen childbearing on smoking as a young adult. Likewise, the estimates in column 4, which also controls for within-family covariates (the "extended controls" from above) does not change the results.

In the second row of Table 7, the baseline estimates show a nearly 7 percentage point reduction in the likelihood of binge drinking in the prior year, and adding further controls in column 2 reduces the estimate slightly to nearly 6 percentage points, though the estimates are not statistically significant. The results with family fixed effects switch sign and are not statistically significant.

In the third row, marijuana use is examined. While the baseline estimates suggest a 2 percentage point increase, the estimate with extended controls is close to zero, and neither estimate is statistically significant. The family fixed effects results in column 3 also indicate a 1 percentage point reduction, though it is also not statistically significant.

A summary of propensity to take risks is used in row 4. The estimates are generally similar to those in the previous table, suggesting that teenage childbearing reduces novelty seeking by 0.1 to 0.15 standard deviations, though the results are not statistically significant. Finally, the results for overweight and

obesity are also not statistically significant once fixed effects are controlled, which generally align with previous results that use the teen pregnancy sample. Overall, one could not reject no short term effects of teenage pregnancy on health behaviors using sibling comparisons.

Finally, in order to examine longer term effects on health behaviors as well as compare more directly with previous literature (Webbink et al. 2008), the results using the MIDUS dataset are presented in Table 8. In row 1, current smoking status is examined. The baseline regression in column 1 suggests that teen mothers are over 16 percentage points more likely to smoke in mid-life than non-teen mothers. However, in column 2, when family fixed effects are controlled, the relationship is eliminated. Dividing the sample by age, there is some evidence that younger teen mothers are more likely to smoke, but the relationship is not statistically significant. In column 5, twin fixed effects are estimated, again showing no relationship between teen motherhood and current smoking status.

In row 2, there is some evidence that teen mothers are less likely to report alcohol abuse problems than non-teen age mothers, which is similar to the results for binge drinking presented above on the young adults sample. In row 3, the results for marijuana use are also not statistically significant once fixed effects are controlled. Rows 4 and 5 suggest that teen mothers are less likely to be married and less likely to be obese later in life, after family fixed effects are controlled. Finally, similar to Webbink et al. (2008), teen mothers are found to be more likely to marry less educated husbands. Overall, while

Table 8 Effects of teenage childbearing on health behaviors. Evidence using sister pairs from MIDUS

Specification	OLS	Fixed effects	Fixed effects	Fixed effects	Fixed effects
Sample	Females	Females	Age < 45	Age > 45	Twins
Smoke	0.162***	−0.012	0.077	−0.061	−0.010
	(0.038)	(0.048)	(0.091)	(0.060)	(0.067)
Observations	923	972	382	590	546
Alcohol abuse	0.009	−0.023∗	−0.034	−0.022	−0.043∗
	(0.010)	(0.013)	(0.030)	(0.016)	(0.025)
Observations	913	929	360	569	508
Marijuana use	0.037**	0.016	0.030	0.013	0.013
	(0.017)	(0.017)	(0.051)	(0.013)	(0.029)
Observations	918	935	362	573	511
Obese	0.072**	−0.038	−0.089	−0.046	−0.087
	(0.037)	(0.047)	(0.081)	(0.062)	(0.057)
Observations	884	900	350	550	483
Married	−0.115 ∗ **	−0.047	−0.068	−0.015	−0.070
	(0.036)	(0.058)	(0.116)	(0.068)	(0.080)
Observations	923	972	382	590	546
Spouse education	−2.265 ∗ **	−1.410 ∗ **	−0.690	−1.620 ∗ **	−1.172 ∗ **
	(0.304)	(0.390)	(0.615)	(0.496)	(0.449)
Observations	740	766	321	445	441

Each cell is a separate regression. Baseline controls: age, race; fixed effects columns control for age
***$p = 1\%$, **$p = 5\%$, *$p = 10\%$

teen mothers are found to be less likely to be married and have "lower quality" spouses if they are married, the results estimating health behavior effects using a sample of US females in mid-life do not correspond to existing literature for Australian females.

6 Conclusions

This paper begins to fill in the gap in knowledge of the shorter term as well as longer term effects of teenage childbearing on unhealthy behaviors by utilizing two of the most prominent empirical strategies in this literature—instrumental variables and within-sister comparisons—as well as two national samples from the US. Each method has known limitations: sibling difference methods are not able to pinpoint the reasons for fertility differences and assumes these differences arise due to chance; the method of comparing individuals who miscarry with those who give birth is subject to potential biases from misclassification of pregnancy outcomes and the possibility that individuals who miscarry differ with those who give birth in ways that also affect future health behaviors. The instrumental variable results, while not the focus of the paper, also contribute to wide confidence intervals. With these limitations in mind, the use of multiple methods and data sources that lead to similar results is useful and novel in this literature and may increase confidence in the results. While not always statistically significant, findings are qualitatively similar between estimation strategies and indicate that teenage childbearing has negligible effects on several unhealthy behaviors of young mothers and may be protective for drug use and binge drinking.

These results substantially differ from the only other evidence in the economic literature by Webbink et al. (2008). Some of the discrepancy could arise because the samples are quite different—25-year-old women in the USA vs. 40-year-old women in Australia. However, using a similar sample from the US (MIDUS) also supports no negative effects on health behaviors. Cross-country institutional and normative differences could also partially explain the differences in findings. For example, the teenage birthrate in the US is nearly triple the rate in Australia (54.4 vs. 19.8 per 1,000 women aged 15–19[10] (Singh and Darroch 2000)). The high proportion of teenage mothers in the US may create fewer social sanctions and thus fewer health behavior impacts. While speculative, this conjecture is consistent with the findings.[11]

[10]Singh and Darroch (2000) also show that the abortion ratio (per 100 pregnancies) is quite different between countries; the ratio in the mid 1990s in Australia was 54.1 while the ratio in the US was 34.9.

[11]Additionally, Webbink et al. suggest that a primary explanation for the effects on unhealthy behaviors operate through the choice of spouse; while the same relationship between teenage childbearing and spousal education is found in the US sample, still no health behavior effects are found.

Overall, the evidence presented in this paper is suggestive of potential beneficial aspects of early childbearing and may indicate that having a child reorients the priorities of young women toward pursuing fewer risky and unhealthy activities. Future research is needed to determine the potential mechanisms of these associations.

Appendix

Novelty seeking scale

How true do you think each of the following statements is of you?
I often try new things just for fun or thrills, even if most people think they are a waste of time.
When nothing new is happening, I usually start looking for something exciting.
I can usually get people to believe me, even when what I'm saying isn't quite true.
I often do things based on how I feel at the moment.
I sometimes get so excited that I lose control of myself.
I like it when people can do whatever they want, without strict rules and regulations.
I often follow my instincts, without thinking through all the details.
I can do a good job of "stretching the truth" when I'm talking to people.
I change my interest a lot, because my attention often shifts to something else.

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