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Educational Attainment: An Analysis of Teenage Parenthood and Dropout Prevention Programs

Abstract

This paper explores how teenage parenthood affects students' high school education attainment, and evaluates the effectiveness of dropout prevention programs that offer on-site childcare. I use data from the High School Longitudinal Study (2009), collected by the National Center for Educational Statistics through the US Department of Education. These data combine survey responses from students, their parents, and school staff. Using school fixed effects and instrumental variable estimation I evaluate the impact of teenage parenthood on the probability of dropout. Female students with a child have, on average, 13.8 percentage points higher likelihood of dropping out of high school. The increased probability is offset by the existence of a dropout prevention that provides childcare. Among female students with children, attending a school with a dropout prevention program that provides childcare is associated with a 28.0 percentage point lower probability of dropping out of high school.

Keywords

Analysis of Education, Education and Inequality, Child Care, Children, Youth

Megan McCook '23
Senior Honors Thesis

This paper explores how teenage parenthood affects students' high school education attainment, and evaluates the effectiveness of dropout prevention programs that offer on-site childcare. I use data from the High School Longitudinal Study (2009), collected by the National Center for Educational Statistics through the US Department of Education. These data combine survey responses from students, their parents, and school staff. Using school fixed effects and instrumental variable estimation I evaluate the impact of teenage parenthood on the probability of dropout. Female students with a child have, on average, 13.8 percentage points higher likelihood of dropping out of high school. The increased probability is offset by the existence of a dropout prevention that provides childcare. Among female students with children, attending a school with a dropout prevention program that provides childcare is associated with a 28.0 percentage point lower probability of dropping out of high school.

JEL Classification: I21, I24, J13

Introduction

In 2015, the US The Centers for Disease Control and Prevention reports 232,000 teenage births to teenage mothers. Roughly half of teenage mothers continue their education and go on to earn their high school diploma. In comparison, around ninety percent of non-teenage mothers will receive their high school diploma. Dropout prevention programs that offer childcare may be valuable to teenage parents because these students may not have family members or friends available to watch their child during the school day. The programs complement the decision for students to remain in the classroom to complete their high school education which, in turn, makes the opportunity to continue into higher education more accessible.

In this paper, I investigate the effectiveness of dropout prevention programs for high school students, a potential mediating factor that could decrease the likelihood a student drops out of high school and one that is not highly focused on with the empirical literature. I use the High School Longitudinal Study (2009) from the National Center for Education Statistics to empirically analyze the effects being a teenage parent has on the likelihood of dropping out of high school. I implement school fixed effects to account for unobserved differences across schools that may be correlated with both students, dropout risk and presence of dropout prevention programs, with a specific focus on dropout prevention programs that provide childcare services to students. I hypothesize that having a child while in high school increases the probability of the student dropping out. Furthermore, I hypothesize that the effect may be minimized if there is a dropout prevention program that offers childcare to students who are teenage parents.

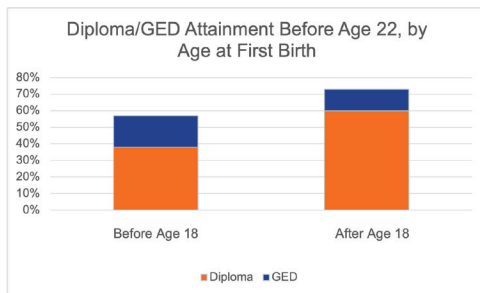
Arguably the most impactful policy to change the educational experiences for women is Title IX. As part of the 1972 amendment to the Civil Rights Act, Title IX first prevented schools that receive federal funding from excluding pregnant teenagers from the classroom (Guldi, 2016). This policy led to further program and policy improvements because the presence and experiences of pregnant students in the classroom highlighted educational policies that made continuing education inaccessible to teenage parents. For example, pregnancy is often associated with hyperemesis gravidarum, more commonly known as morning sickness. Hyperemesis gravidarum or other medical experiences that go along with pregnancy may make it difficult for students to be present to school on time or may require them to leave the classroom at various points, making their attendance different from peers (SmithBattle, 2007). Schools also realized the need to adjust their attendance policy for teenage parents who needed to attend prenatal medical appointments during school hours. To further understand the effects of Title IX, Guldi (2016) compares the trends of female high school dropout rates from 1970 to 1980 which captures a period of time before the policy and then a few years after for the effects of its implementation to be observed. Guldi notes the lack of data that exists and is accessible regarding the topic of teenage mothers prior to the time around Title IX. By signing the Title IX legislation, education became more accessible as a quasi-public good (Macchia et al., 2021). The opportunity cost of education therefore decreased, resulting in higher investment in education. These changes were present for all women, but most notably for black teenage others (Guldi, 2016).

A successful transition into parenthood is dependent on both support and maturity (Assini-Meytin, Garza & Green, 2022). Pregnancies may be planned or unplanned, and different attitudes towards the pregnancies based on if they were wanted, unwanted or mistimed (National

Center for Health Statistics). “American Sexual Behavior” reports that older teens, ages 17 to 19, would be more upset if they were to get pregnant. This is possibly due to how older teenage girls may have more viable education or career goal paths than younger girls, ages 15 to 16.

Therefore the pregnancy could put more of a barrier on the plans of the older girls because they are closer to either completing high school or beginning college careers. Graph A:

Diploma/GED Attainment Before Age 22, by Age at First Birth illustrates the differences in high school and GED completion for young parents. The National Longitudinal Study of Youth - 1997 Cohort reports the trends of diploma or GED completion. Before age 18 is the time-frame in which a student would still be in high school but having a child before 18 is associated with less high school diplomas and GEDs in comparison to older than age 18. Only 57% of female students who had a child before the age of 18 received a high school diploma or GED. 73% of the students who had their first child between ages 18 and 19 received their GED or high school diploma. 60.2 percent of teenage girls, ages 15 to 17, from the National Center for Health Statistics, said that they would feel ‘very upset’ if they were to get pregnant in 2002. The majority of the surveyed students would be upset if they were to get pregnant, but there are around five-percent who said that they would be pleased about a pregnancy.



Graph A: Adapted from Child Trend’ analyses of data from the National Longitudinal Study of Youth - 1997 Cohort

In their longitudinal study, Assini-Meytin, Garza and Green find that the socioeconomic future of a teenage mother is partially dependent on the degree of their adult identity. Ages 18 and 19 are near the end of the students' high school years and may possibly make it more accessible to receive a diploma or GED, and these students may have more associations with their adult identity (Assini-Meytin, Garza & Green, 2022). Assini-Meytin, Garza and Green (2022) also contribute to the literature on teenage parenthood by finding that a teenage mother's ability to continue their education relates to if they have personal support from their family, but this is not statistically significant to their socioeconomic future. However, it may be theorized that there are in fact signals from a teenage mother's education level to her socioeconomic status' future, which has been a strong focus of the prior literature on teenage parenthood (Fletcher and Wolfe, 2009).

Hendrick and Maslowsky (2019) use a multiple-group path model approach and create conceptual models for which a mother's education level indicates her child's risk for teenage childbearing. It is hypothesized that the lower the education level, the higher the risk for the child to experience teenage childbearing. It is then the case that if a child's parent was a teenager during the pregnancy, then the risk for their teenage childbearing is increased. This cycle is often continuous due to different resources and attitudes that are passed between the generations. As found in epidemiology studies, childbirth during teenage years is associated with higher risk of poor health for the mother and child (Paranjothy, Broughton & Adappa). Therefore, it may not be possible for the mother to return to continue her high school education during the time of the pregnancy or to return after the birth. Poor health results in costly medical bills, making pursuing a secondary education less likely as well due to the socioeconomic stress.

The Personal Responsibility and Work Opportunity Reconciliation Act did not reduce the risk or the rate of school dropout rates (Hao & Cherlin, 2004). Understanding why the welfare reform did not decrease school dropout rates is challenging to study because there are many social connotations and perspectives associated with teenage pregnancy that cannot fully be isolated from the policy change. As included in Levine and Painter's (2003) research, President Bill Clinton argued, "Our most serious social problem is the epidemic of teen pregnancies and births where there is no marriage," and this created a national, social standard that teenage pregnancies were some sort of disease that were ruining society. The Personal Responsibility and Work Opportunity Reconciliation Act itself uses language that alludes to negative consequences. By the establishment of the policy, there is the implication that non-marital, teenage pregnancies are going to the futures for the teenage parents in the hope that there will be changes in the attitudes and perspectives around sexual activity and contraceptive usage (Hao & Cherlin, 2004).

In order to measure the differences between mothers and teenage mothers, whether or not a woman experiences a miscarriage has been used as an instrumental variable. However, it is argued that miscarriages are not random among pregnant women, but rather there are environmental factors that are associated with varying rates of miscarriages (Fletcher & Wolfe, 2009). Another incomplete part of the prior literature is that the focus of social, educational and economic changes are on the mother of the child and incoherently addresses the father's position. As mentioned, it is assumed that the mother's priorities will change after their pregnancy and birth, and they will be the dominant provider for the child, but the engagement of their partner is not often included in the conclusions on the subject.

The time frame in which studies are conducted and the privacy of students are two further reasons why prior literature has struggled with researching teenage pregnancy. In an attempt to address the qualitative elements that play a role in the experience of teenage pregnancy, SmithBattle (2007) utilizes interviews over six different points during the pregnancy to create profiles of the families and take field notes during the longitudinal study. However participants in the study were dependent on whether there was a parent or guardian that would agree to the teenager's participation, as it is the case that consent is necessary due to the age of the sample. This signals that the subject pool for research regarding teenage pregnancies is restricted. Following teenage mothers ten months after their pregnancy to learn about their thoughts and feelings also only provides the researcher with ten months of postpartum information (SmithBattle, 2007). It may be the case that the prior literature that does a snapshot analysis of socioeconomic status or educational degree is incomplete in a short time frame after the pregnancy because life outcomes may change later on. This paper plans to contribute to these shortcomings by using longitudinal data to capture these changes.

Empirical Approach

Data and Data Sources

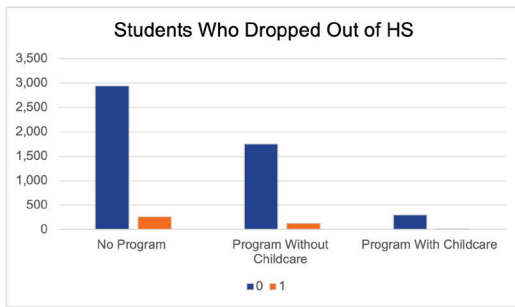
This paper uses the panel dataset from the High School Longitudinal Study of 2009. The study was conducted through the National Center for Education Statistics in the U.S. Department of Education's Institute for Education Sciences with over 23,000 respondents. The sample population of respondents were Freshman students in both private and public schools in the United States in the Fall of 2009. Their information was collected through computerized web-questionnaire surveys. The students' parents, school counselors, mathematics and science teachers and administrators also completed surveys. For the student, the 2009 base year

questionnaire included questions to collect information such as demographics, school attitudes, plans for high school, future educational expectations and potential career goals. Parents, teachers, and administrators completed sections as well, discussing household composites, highest degree of education completed, income, and school climate and policies. A first follow-up was done in 2012, a second in 2016, and then high school transcripts collected from 2013-2014 and any postsecondary transcripts collected in 2017-2018. Follow-up years of the study includes similar identifying characteristic questions, as well as expansions such as extracurriculars, employment, and updated plans for future college choices.

Appendix A illustrates the portions of the survey questionnaires with the selected and participation rates for each section. In the base year, there were 944 selected school respondents and 21,444 completed student questionnaires. Participants were able to skip questions or sections of the survey. Science and mathematics assessments were also taken during the survey to evaluate the students' performances within the curriculum they are taught. Teachers, counselors and administrators reported school characteristics for knowledge of the curriculum. Appendix B provides a portion of the discoused information about the schools that were of interest in the study, as well as those that took part. To account for variation within the sample selection survey, schools of different private and public statuses, locales, and regions were included in the study. The majority school type that responded to the survey were public schools. The majority of schools were in a Suburban locale. The region with the highest participation was the South. Specific state responses are not accessible through the public use-data.

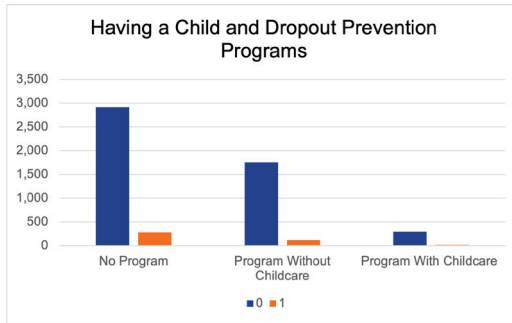
The paper looks to explore the effects of teenage parenthood on dropout status for high school students. I first generate a dummy variable indicating the dropout status of each student

based on the status of the student in the fourth wave, collected in February 2016. The *Dropout* variable is coded with a 1 if the student did not receive a High School credential, in comparison to students who did receive a high school diploma, Generalized Development Test (GED), or some other certificate completion. This paper chooses to focus mostly on the effects of teenage parenthood of female students. The *Female* variable indicates if a student is female or non-female. I generate *HasChildHS* to determine if a student was or was not a parent in their high school years. The variable indicates if the date of birth for their child was earlier than the date of their fourth wave high school completion date. Prior to any sample restriction, there are



Graph 1: Students Who Dropped Out of High School. Data taken from the National Center for Education Statistics.

The left bars (0) indicate that a student did not dropout of high school. The right bars (1) indicate that a student did dropout of high school. There are 13 students who dropped out of high school in a school with a dropout prevention program that provided childcare services.



Graph 2: Having a Child and Dropout Prevention Programs. Data taken from the National Center for Education Statistics. The left bars (0) indicate that a student did not have a child during their high school years. The right bars (1) indicate that a student did have a child during their high school years. There are 19 students who had a child in high school and attended a school with a dropout prevention program that provided childcare services.

497 students whose first child was born before they completed high school or dated their dropout status. I first distinguish between schools that have some existent dropout program and those who do not have a dropout prevention program in order to evaluate the programs' effects on dropout rates. I then generate the variable *DOPP* for schools that do have an existent dropout prevention program. I use *DOPP* to specify the difference between schools that have a dropout prevention with childcare and schools that have a childcare program without childcare.

Table 1: Summary Statistics:

Has Child HS	425
Underrepresented Minority	2,256
Math Scores	Mean: 48.03 Min: 24.40 Max: 82.19
Behavior	334
Expects to Dropout	30
Sibling in College	1,924

Sibling Dropped Out	221
Young Mom	443
No Dad	1,100
Religion	2,406
Act Out	124
DOPP No Childcare	3,262
DOPP Has Childcare	2,129
Family Income	
Min: >\$15,000 and <= \$35,000	1,311
Max: >\$235,000	11

Source: National Center for Education Statistics, 2009 High School Longitudinal Study. DOPP No Childcare, DOPP Childcare, Has Child HS, Family Income, Behavior, Young Mom and URM are out recorded from 5,391 observations. Others are recorded through the parent responses. Parent responses contain less observations. Expects to Dropout, Siblings in College, Siblings Dropout, Actout, Religion, No Dad are recorded from 5,313 observations.

Graph 1: Students Who Dropped Out of High School depicts the relationship between the types of dropout prevention programs that existed for students who dropped out of high school. The most common program in the surveyed schools is actually the existence of no program at all. There are almost 300 students from the survey who dropped out of high school where there is no existent program. Around 125 students dropped out of high school where there is an existent program, but it was one that did not provide childcare. There are 13 students who dropped out of a school where there are childcare services with the dropout prevention program.

Graph 2: Having a Child and Dropout Prevention Programs then depicts the relationship between students who do or do not have a child and the school's status with a dropout prevention program. 281 students who have a child attend a school where there is no existing dropout prevention program. Around 1,750 students who do not have a child attend a school where there is a dropout program, but does not provide childcare services. Finally, only 19 students who have a child attend a school where there is a dropout program that provides childcare services. These summary statistics allude to the limited number of schools that have childcare services in their dropout prevention programs, despite teenage parenthood being acknowledged

as a significant reason why students dropout of high school and do not complete their diploma or GED (CDC).

The other covariates in the model are *Under Represented Minority*, which indicates a student from a historically underrepresented group, *ExpectDropout*, indicating if a student does not believe they will complete high school, as well as *SiblingCollege* and *SiblingDropout* to indicate and trends that may be an influence within a family. I also include *Income* as a representation of socioeconomic status in 2008. The variable is based on ranges through \$20,000 integers and ranges between less than or equal to \$15,000 and greater than \$235,000. The *ActOut* variable is a report from the parent regarding the students' behavioral issues. One issue with the variable is that it is limited in observations. There are 124 parents who reported that their child has a lot of difficulty with their behavioral issues, but there were 1,250 missing responses with parents who did not respond. Parents not responding to the survey are a limitation to a full understanding of the data due to the limited observations. To account for the limited observations, we generate a variable indicating if the parent did not respond to the questions asked. We then use this variable in the process of generating the binary variables such as *ActOut*, so that 0 includes parents who do not have a lot of difficulty with their child's behavior, and parents who did not respond. Therefore we are able to correct a potential issue of limited observations.

I use the following candidate instrumental variables for instrumental variable estimation: the age of the student's mother, the presence of a father figure in the student's household, religious activity, and the parent's evaluation of their student's behavior. I generate *YoungMom* from the dataset's variables indicating the students' parents' birth years, and restrict it to biological mother. I compare the students' date of birth with the mothers' date of birth and

define a young mother up until the age of twenty-two. I use twenty-two as the definition of young mom in order to account for variation between young mom and teenage parent, and because of precedents done in generational risk research (Hendrick and Maslowsky, 2019). I use the binary variable, *NoDad*, that is an indicator of whether there was some sort of father figure in the household during the student's youth years. *Religion* indicates if the student takes part in any religious organization. Finally, I record any behavioral issues through reports done by the parents in which they indicate if they have been contacted by the school three or more times regarding the student's behavior.

Econometric Model

In this paper, I utilize a linear regression model, fixed effects model, and instrumental variable estimation model (IV) to model the effects of teenage parenthood on the probability of dropping out of high school. I begin by running probit regression to ensure there is no strong presence of reverse causality between having a child and childcare services as part of a dropout prevention program. In this model I use *childcare*, the existence or non-existence of a childcare program, as the dependent variable, and *HasChildHS* as the independent variable, along with the model's covariates. I find that having childcare services as part of a school's dropout prevention program does not predict teenage parenthood.

I then first run a linear regression with a variance-covariance matrix of the estimators standard errors. I estimate the model:

$$DroppedOut_i = \beta_0 + \beta_1 Female + \beta_2 UnderrepresentedMinority + \beta_3 Female \times UnderrepresentedMinority + \beta_4 Female \times HadChildHS + \beta_5 Female \times HadChildHS \times DropoutPreventionProgram + \beta_6 MathTest + \beta_7 Behavior + \beta_8 ExpectedDropout + \beta_9 Income + \beta_{10} SiblingInCollege + \beta_{11} SiblingDroppedOut + \epsilon_i$$

where epsilon serves as the error term for any unobservable characteristics. I interact *Female* and *Underrepresented Minority* to measure any additional impacts that may exist for the historically underrepresented groups. The interaction between *Female* and *HasChildHS* is included to measure the effects that having a child has on female students in comparison to female students who do not have children. It is also a way to measure the dropout comparisons between female and non-female students who both have children. The last interaction term between *Female*, *HasChildHS*, and *DropoutPreventionProgram* is a measurement of the mediating effects of dropout prevention programs. Through this interaction term, we are able to see the different dropout outcomes for female and non-female students, students who do and do not have a child during high school, and for those students who attend a school with a dropout prevention program with child and students who attend a school with a dropout prevention program without childcare.

I then implement fixed effects by using a School Identification variable. The inclusion of fixed effects eliminate bias for any of the differences that may exist across the schools themselves that are unobservable in the data. Due to data restrictions, these unobservables may include school population, unemployment rates in the community, or other support programs that may already exist but are not noted in the data. There are more schools than the 1,151 schools that took part in the survey but also many differing characteristics between the 1,151 schools. Fixed effects therefore eliminates bias in analysis for any of the unobservable characteristics for the schools. The model is restricted to schools in which there was at least one teenage parent at the school during the time of the longitudinal survey. The fixed effects model therefore includes 307 clusters in the school identifications in the sample.

I next use instrumental variable estimation with four candidate instrumental variables: the age of the student's mother, the presence of a father figure in the student's household, religious activity, and the parent's evaluation of their student's behavior. For the instrumental variable estimation, I use a limited information maximum likelihood model. Limited information maximum likelihood (LIML) is a justified approach because it has a median that is closer to its beta estimator than the mean or median of a two-stage least squares regression analysis, and is better suited to reduce bias when using potentially weaker instruments (Stock, Wright, Yogo, 2002).

Results

The regression results are presented in Table 2. Consistent between the Control, Fixed Effects and LIML IV estimation, being female decreases the likelihood that a student drops out of high school. For the fixed effects model with limited information maximum likelihood estimation, being female is associated with a 6.9683 percentage point decrease for the likelihood of dropping out of high school. For the fixed effects model without LIML, being female is associated with a 3.33 percentage point decrease in the likelihood of dropping out of high school. In the same model, being female and having a child in high school is associated with a 13.206 percentage point increase of dropping out of high school. Dropping out of high school is more likely for female students with children than female students who do not have children. Similarly, a non-female student also experiences an increase in the likelihood of dropping out of high school by 13.765 percentage points.

The results in Table 3 evaluates the dropout likelihood for effects being female and non-female students, students who do and do not have a child during high school, and for those students who attend a school with a dropout prevention program with child and students who attend a school with a dropout prevention program without childcare. There is no significant

relationship on the likelihood of dropout in the fixed effects model for a female student who has a child but does not attend a school with a dropout prevention program that provides childcare services. In contrast, a female student who has a child and attends a school that provides childcare services within its dropout prevention program experiences a decrease in the likelihood that they dropout of high school by 28.028 percentage points. For the LIML model, there are statistically significant impacts of dropout prevention programs when interacted with the student characteristics. The existence of the dropout prevention programs with childcare or without childcare are not statistically significant on their own. There was no significant impact experienced by non-female students who had a child and attended a school with childcare services within its dropout prevention program for the prior models. In LIML, being non-female, having a child and having childcare services at the school is associated with a 92.066 percentage point decrease in the likelihood that the student drops out of high school. A female student who also has a child and attends a school with a dropout prevention program with

Table 2: Results	(1) Pooled	(2) School Fixed Effects	(3) IV Estimation - LIML
Female	-0.0327835** (.015244)	-0.0333031** (0.0155395)	-0.0696833** (.0270837)
URM	.0463561** (.0199142)	.0225435 (.0191796)	-.0083463 (.0142919)
Female x URM	-.044421* (.0253012)	-.0381352 (.0265475)	-.0577059*** (.0272403)
Female x Has Child HS			
Non-female, Has Child	.1360834* (.0743247)	.1375608* (.0774943)	
Female, Has Child	.1414372*** (.0499351)	.1320552*** (.0502512)	
Math Scores	-.0442253*** (.0006929)	-.0039958*** (.0007618)	-.0010102 (.0012218)
No Behavior Issues Reported	.0467605 (.0319638)	.0317198 (.0319637)	-.0030723 (.0363688)
Behavior Issues Reported	.0495467*** (.0168773)	.0375694** (.0187102)	.012521 (.0191893)
Expects to Dropout	-.0191414 (.0565824)	-.0699583 (.0765859)	.0437649 (.080504)
Income	-.00144 (.0017405)	-.0006335 (.0019763)	.0034669 (.0026893)
Sibling in College	-.0401082*** (.0122387)	-.0333483*** (.0127651)	-.0078107 (.0113212)
Sibling Dropped Out	.0646678** (.0282266)	.0597406** (.0294153)	-.0101837 (.0994689)
DOPP No Childcare			.013721 (.0432379)
DOPP Has Childcare			.0090093 (.0914196)
Has Child HS			1.073789** (.4342421)
School Fixed Effects	No	Yes	Yes

* p<.1, **p<.05, ***p<.01

Results from model predicting the probability of dropping out of high school. Standard errors robust to arbitrary heteroskedasticity and clustering on school presented in parenthesis below each coefficient estimate.

childcare services experiences a 93.752 percentage point decrease in the likelihood of dropping out of high school. This result offsets the impacts experienced for females in the pooled model, where being female and having a child is associated with a 14.144 percentage point increase of dropping out of high school. It is therefore possible that the presence of the dropout prevention program with childcare services is a mediating factor for the students with children in their opportunities to continue their high school education.

Table 3: Regression Results of Female or Non-Female, Has Child or No Child, and DOPP with Child or DOPP no Childcare

nale x Has Child x Dropout Prevention Program	Control Models	F.E. Model	F.E. with LIML
Non-Female, No Child, DOPP no Childcare	-.0373359* (.021547)**	-.0607343* (.0327876)	
Non-Female, No Child, DOPP Has Childcare	-.0630563 (.0283725)	-.1917872** (.0803347)	
Non-Female, Has Child, DOPP no Childcare	.1793412 (.1441964)	.1476083 (.1451938)	
Non-Female, Has Child, DOPP Has Childcare	.0306746 (.20124)	-.038588 (.236259)	-.9206597** (.4690968)
Female, No Child, DOPP no Childcare	.0052563 (.0166273)	-.0199211 (.0339844)	
Female, No Child, DOPP Has Childcare	-.0387667*** (.0143898)	-.1556686** (.0740052)	
Female, Has Child, DOPP no Childcare	.0083763 (.0813857)	-.0101029 (.0791141)	
Female, Has Child, DOPP Has Childcare	-.1500923** (.0699445)	-.280283*** (.0978951)	-.9375241** (.4310733)

* p<.1 , **p<.05 , ***p<.01

Academic success of students may also play a role in their decision to complete or not to complete high school. Education is an investment that some may or may not be interested in pursuing, also relating to why some students may choose to drop out of high school. Fairly consistent and statistically significant from the results in Table 2, an increase in the average Math Score is associated with a decrease in the likelihood that a student drops out of high school. In the school fixed effects model, improvements in the mean Math Score is associated with a 3.996 percentage point decrease in their likelihood of dropping out. For the control and fixed effects

models, there is a statistically significant relationship between their sibling's high school and college status and the student's high school completion. A student who has a sibling in college experiences a 3.335 percentage point decrease in the likelihood they drop out of high school in the fixed effects model. However a student who has a sibling who also dropped out and did not receive some sort of high school credential experiences a 5.974 percentage point increase in the likelihood that they do drop out of high school.

Discussion

In this paper I utilized econometric analysis to evaluate the effects that dropout prevention programs with childcare could have on receiving a high school diploma for teenage parents. The results are consistent with the paper's hypothesis and research question, finding that the presence of a dropout prevention program with childcare services decreases the likelihood that a female student with a child drops out of high school. In this analysis, there were also positive effects on students not dropping out of high school when in the presence of a school with a dropout prevention program with childcare services, despite themselves not being parents, such as non-female students who do not have a child but attend a school with childcare services. Restricted data regarding the school's identification may be able to compare the different dropout prevention programs that exist in the schools. It may be the case that a school has another dropout prevention program in addition to one that provides childcare services. The presence of another program may have spillover effects that are observed in this analysis for non-female students without children. More focused case-studies may be helpful in understanding the specific effects that different dropout prevention programs are evoking.

This paper finds that female students with children are more likely to drop out of high school when having a child than non-female students with children. This alludes to issues in the educational system that prohibit the success of female students who are having a child during

their high school years because their needs are different than non-female students. Female students may need to leave classes due to morning sickness, appointments with doctors, or for similar maternity leave protocols, increasing their time away from the classroom. For many, this may seem like the end to their education if the school is not able to accommodate their specific needs. Therefore policies that address issues such as different attendance policies for pregnant students are necessary to best accommodate these students in their continued education. These policies fall within a well-rounded family planning approach. Access to family planning in its different forms shape expectations about individual's futures, such as planning into the future with academic or career plans (Jones & Pineda-Torres, 2021).

Academic investment and perception are also valuable for teenage parents. Higher Math Scores are associated with decreases in the probability that a student will drop out of high school. The coefficient was statistically significant until the limited information maximum likelihood model, but maintained its negative value. Students who invest themselves academically are more likely to complete an education, especially a high school diploma. In the case of teenage parents, a female student who becomes pregnant and does not see themselves as a high academic achiever, may choose to not continue their education because they do not see much value or meaning from a diploma or GED (Guidli, 2016). This decision may be different for a female student who becomes pregnant but is a high academic achiever; they may feel more confident in the abilities to continue their education. This type of student may already have academic or career goals and may find themselves more motivated to work towards their diploma or GED while being pregnant, in comparison to students who do not see education as a valuable investment. Therefore implementation of policies such as female STEM programs or other

academic motivations may be able to assist pregnant teenage females as an aid to understanding the value of education.

None of the models indicate statistical significance for the family's income. The prior literature has paid most attention to the socioeconomic outcome of the teenage parent later in their lives and has found that being or not being a teenage parent based on education level is a good predictor for future socioeconomic outcomes (Fletcher and Wolfe, 2009). This paper finds that income is not a statistical predictor of having a child in high school for female students, but still leaves the possibility that it is a predictor of future income through the means of educational attainment. Individuals with lower family incomes are historically less likely to go to college than those of higher income (U.S. Department of Commerce). Therefore there may be a multiplier effect present for children of teenage parents because they are predicted to be of lower socioeconomic status, and they themselves are more likely to be teenage parents, limiting the access and likelihood of a college education.

The relationship a student's sibling has with their academics may also play a role in their individual experiences. Both sibling relationships with either high school or college are statistically significant before instrumental variable implementation. Students who have siblings in college experience a decrease in their likelihood that they will drop out of high school. Students who have siblings who dropped out of high school experience an increase in their likelihood of also dropping out of high school. The data does not specify if the student surveyed was an older or young sibling. Therefore it cannot be concluded that a student will follow the steps of their sibling since we do not know who would either dropout or graduate first, but there is a strong relationship between students, their sibling, and their high school degree completion.

High school education is a public good that may begin to seem unattainable for female students who have children during their high school years. The cost of childcare would be more for what most high school students would be making from income in their early years of work. If students do not have support from family, friends, or their school, they could not have the means to pay for childcare services while also attending school. The cost of education therefore rises, leading to female students with children to increase their likelihood of dropping out. If schools provided resources such as childcare services in their school as part of their dropout prevention program, the cost of the parent's education would not be as high as it was when they had to pay for these services on their own. Therefore to keep the cost of education low and high school diplomas or GED accessible, schools can implement programs with these childcare services.

The results find that female students have a negative relationship with the likelihood of dropping out, unless they have a child during high school. Their likelihood of dropping out of high school then increases. Non-female students who have children also experience similar increases in the likelihood of dropping out but the relationship is less statistically significant in comparison to female students. However, female students who have a child and attend a school with a dropout prevention program with childcare services experience a decrease in their likelihood of dropping out of high school. This alludes to the mediating effects dropout prevention programs with childcare services have on female students who have a child during their high school years. The dropout prevention program with childcare services assists in offsetting the negative effects having a child has on female students' academic attainment. This paper therefore contributes to the literature in its analysis of the positive educational attainment effects teenage parents receive from childcare services in a dropout prevention program. Further

studies that can expand the literature in educational attainment may focus on evaluating the effectiveness of the variety of dropout prevention programs that exist in the United States, and how further policy may be implemented to make those that report positive results more accessible.

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Appendix

Appendix A: Summary of HSLs:09 base-year response rates: 2009.

Ingles, S.J., Pratt, D.J., Herbert, D.R., Burns, L.J., Dever, J.A., Ottem, R., Rogers, J.E., Jin, Y., and Leinwand, S. (2011). *High School Longitudinal Study of 2009 (HSLs:09). Base-Year Data File Documentation* (NCES 2011-328). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved March 9, 2023 from <http://nces.ed.gov/pubsearch>.

Table ES-1. Summary of HSLs:09 base-year response rates: 2009

Instrument	Selected	Participated	Weighted percent	Unweighted percent
School	1,889	944	55.5	50.0
School administrator ¹	944	888	94.9	94.1
School counselor ¹	944	852	91.3	90.3
Student questionnaire ^{2,3}	25,206	21,444	85.7	85.1
Student assessment ^{2,3}	25,206	20,781	83.0	82.4
Parent questionnaire ²	25,206	16,995	67.5	67.4
School administrator ²	25,206	23,800	94.5	94.4
School counselor ²	25,206	22,790	90.0	90.4
Teacher questionnaire				
Mathematics teacher ⁴	23,621	17,882	71.9	75.7
Science teacher ⁵	22,597	16,269	70.2	72.0

¹ Uses the school base weight.

² Uses the student base weight.

³ Among questionnaire-capable students (n = 24,658), some 21,444 completed the student questionnaire, and 20,781 completed the mathematics assessment. Thus, 87.0 percent (unweighted) completed the student interview or 87.4 percent weighted. Likewise, 84.3 percent (unweighted) completed a mathematics assessment or 84.7 percent weighted.

⁴ Uses the student base weight. Results reflect students who were enrolled in a mathematics course.

⁵ Uses the student base weight. Results reflect students who were enrolled in a science course.

NOTE: All percentages are based on the row under consideration.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. High School Longitudinal Study of 2009 (HSLs:09) Base Year.

Appendix B: HSL:09 School Sample Size and Participation Yield by Type and Locale

Ingles, S.J., Pratt, D.J., Herbert, D.R., Burns, L.J., Dever, J.A., Ottem, R., Rogers, J.E., Jin, Y., and Leinwand, S. (2011). *High School Longitudinal Study of 2009 (HSL:09). Base-Year Data File Documentation* (NCES 2011-328). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved March 9, 2023 from <http://nces.ed.gov/pubsearch>.

Table 32. HSL:09 school sample size and participation yield by type and locale

	Eligible	Target	Participating schools
Total	1,889	944	944
School type			
Public	1,495	744	767
Total private	394	200	177
Catholic	194	100	102
Other private	200	100	75
Locale			
City	626	308	272
Suburban	693	344	335
Town	198	103	117
Rural	372	189	220
Region			
Northeast	340	161	149
Midwest	474	235	251
South	702	364	380
West	373	184	164
Total for state representation	888	409	454

NOTE: Information concerning the states that have state-representative data is provided in documentation for the restricted-use files.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. High School Longitudinal Study of 2009 (HSL:09) Base Year.