# Getting a Sporting Chance: Title IX and the Intergenerational Transmission of Health

**Abstract:** We know that healthier mothers tend to have healthier infants, but we do not know how much of that relationship reflects the intergenerational transmission of genetic attributes versus environmental influences. From a policy perspective, it is crucial to understand which environmental influences are important, and whether investments in one generation affect outcomes for the next. I use variation in the implementation of Title IX to measure the effects of increased athletic opportunities on the health of infants. Babies born to women with greater athletic opportunities as teenagers have babies that are healthier at birth. They are less likely to be born of low or very low birthweight, and have higher Apgar scores.

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# 1 Introduction

The link between mothers' health and that of their infants is well documented but not well understood. We know that healthier mothers tend to have healthier infants, but the question remains: to what extent does that relationship reflect the intergenerational transmission of genetic attributes versus environmental influences? And if environmental influences matter, which ones are important, and can investments in one generation affect outcomes for the next?

In this paper, I exploit a natural experiment provided by Title IX of the Education Amendments of 1972 to disentangle these forces, focusing on the causal impact of mothers' athletic opportunities on the health of their children. Prior to Title IX's implementation, athletic opportunities for girls were very limited. However, during the 1970's, mandated increases in these opportunities led to a five-fold increase in high school sports participation among girls. This paper builds on related work on Title IX, whose results help frame my findings: Kaestner & Xu (2010) find that cohorts of girls with access to more athletic opportunities have a lower probability of being overweight when evaluated as adolescents, and Kaestner & Xu (2006) find that these same cohorts are healthier as adults.

To what extent did this improvement translate to improvements in the next generation? We do know that health inputs during pregnancy matter.[1] However, this is the first paper to look at the causal effect of long-term maternal fitness and exercise on infant health. The research design uses variation in the implementation of Title IX to examine the effect of increased athletic opportunities on the health of infants born to the cohort of affected women. I employ an instrumental variables approach, which takes advantage of differences, across states, in the required increase in girls' athletic opportunities. I estimate the relationship between athletic opportunities and within state changes in infant health, comparing a cohort of women who completed high school before Title

[1]See, for example, Almond et al. (2011), Hoynes et al. (2011), Almond & Mazumder (2008), Almond (2006) and van Ewijk (2011)

IX (born 1956-1960) and a cohort of women who benefited from the increased opportunities (born 1964-1968).

I find that maternal athletic participation is an important determinant of infant health. The infants born to women who had access to greater athletic opportunities as teenagers are healthier at birth. High school athletic participation rates for girls increased from 5% in 1970 to 24% by the end of the decade, and I find that an increase of this size results in a 5% decrease in low birthweight infants (<2500 grams) and a 7% decrease in the incidence of very low birthweight infants (<1500 grams). I find little evidence that increased education, selection into motherhood or a change in observed behavior during pregnancy is the primary driver, but I do find some evidence that assortative mating may play a role.

## 2 Title IX and Relevant Literature

The Title IX legislation, part of the Education Amendments of 1972, banned discrimination on the basis of gender for any educational program or activity that receives federal aid. While the original law was passed in 1972, it was not until 1975 that provisions specifically prohibiting gender discrimination in athletics were passed (Curtis & Grant). Title IX did not apply only to athletics, but since this was a prominent area with large disparities and official segregation by gender, the legislation has become associated primarily with athletics.[2] Schools were given a three-year window, until the 1978-79 school year, to be in compliance. As shown in Figure 1, girls' participation rates in high school sports increased significantly during the 1970's, from 5% at the beginning of the decade to 24% by the end. At the same time, boys' participation rates remained

[2] It is only very recently that Title IX is being applied in other settings, such as the sciences (http://www.nytimes.com/2008/07/15/science/15tier.html)

relatively stable. [3]

Importantly, this increase in girls' participation rates varied across states, and the size of the increase is correlated with boys' participation rates prior to the passage of Title IX. While the actual rules for being in compliance with the legislation are quite complicated and somewhat vague, [4] Stevenson (2010) points out that attaining equal participation rates for boys and girls is a reasonable way to interpret the rules. In effect, the legislation mandated an increase in athletic opportunities for girls that was proportional to boys' participation in each school. Figure 2 shows the variation in boys' sports participation rates in 1971, prior to Title IX, and Figure 3 shows how this initial level of boys participation rates is related to the increases in girls' participation rates between the passage of Title IX and the deadline for compliance. States with higher pre-Title IX boys' sports participation rates experienced larger increases in opportunities for girls during the 1970s.

Females who graduated high school prior to 1972 had few athletic opportunities, but girls who were born after 1972 reaped the full benefit of the increased opportunities required by Title IX. Although older cohorts (especially those who entered high school after 1978) were able to take advantage of the increase in high school teams, girls who were born after the law was passed knew about the increased opportunities their entire lives. The opportunity to play on a varsity team in

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[3]Note that while there is a drop in 1978-79 for both girls and boys, Kaestner & Xu (2010) investigate this drop in participation and conclude that it stems from changes in reporting, rather than changes in actual participation. In particular, a few states report drops in participation, for both genders, that are implausibly large. If it had been a case of schools dropping boys teams to add girls teams, we would not see a drop for both genders.

[4]Schools must meet any one of the "three prongs": (1) Providing athletic participation opportunities that are substantially proportionate to the student enrollment, (2) Demonstrate a continual expansion of athletic opportunities for the underrepresented sex, (3) Full and effective accommodation of the interest and ability of underrepresented sex.

high school or college may have encouraged them to in invest in their athletic abilities at younger ages. In order to fully capture the effect of Title IX, the analysis would compare the pre-Title IX cohort (girls born prior to 1954) to the post-Title IX cohort (those born after 1972). However, there are data and estimation advantages to looking at cohorts that are closer together. While it will not capture the full effect of the increased opportunities, the main analysis for this paper will compare a pre-Title IX cohort of women who were born in 1956-1960 and graduated high school prior to 1978, to a sample of women who were born in 1964-1968 and entered high school after 1978. Other cohorts that were born further apart and experienced larger differences in athletic opportunities are also examined in Section 7, but the results are qualitatively similar to the main results.

The estimation strategy for this paper takes advantage of the fact that the intensity of treatment varies according to the state where a girl attended high school. This is an artifact of the fact that boys' participation rates varied across states at the time Title IX was passed [5] and that states with high boys' participation rates were required to increase athletic opportunities by a lot, while states with low participation rates required a smaller increase in girls' participation to be in compliance. In the instrumental variables regressions, the size of the required increase in opportunities will be used to instrument for girls' participation rates.

There are a number of potential mechanisms through which we might expect the link between mothers' athletic participation and infant health to operate. First, we know that exercise is beneficial in many ways. Among other benefits, exercise improves body composition, reduces blood pressure and is associated with reduced stress, anxiety and depression. As a result of these benefits, regular exercise is important in the prevention of many chronic diseases and is associated with a

[5] While compliance is measured at the school level, data on participation is available at the state level. While there may be schools in high participation states that do not have high participation rates, on average this will not be the case.

reduced risk of premature death (Warburton et al. 2006).

Within the context of Title IX, Kaestner & Xu (2010) use the legislation as a natural experiment for looking at the link between athletic participation and girls' health. They find that in states that experienced a large increase in athletic opportunities, the probability of being obese declined for adolescent girls. Using a similar empirical design Kaestner & Xu (2006), investigate whether the health benefits associated with Title IX are persistent. Although the magnitudes of the effects are small, they do find that women who were more affected are less likely to be obese, have lower BMIs and are more likely to be physically active.

This is important for my study, because it suggests that the health benefits of athletic opportunities as a teenager persist throughout women's childbearing years. That these healthier women are expected to give birth to healthier infants, is supported by a large body of medical literature which documents a strong correlation between maternal and infant health. However, most medical studies of this relationship are based on non-causal correlations, not on controlled experiments (Pivarnik 1998). In this paper, I provide causal estimates of the role of mothers' athletic participation in determining infant health, while keeping in mind that maternal fitness is not the only potential pathway for this link.

While I am unaware of any papers that examine the causal relationship between long-term athletic participation and infant health, the economics literature has provided causal evidence on the impact of a variety of prenatal health inputs. For example, a number of papers have taken advantage of natural experiments where mothers were exposed to nutritional deprivation during pregnancy, and they find that infant health suffers as a result (e.g., Stein A.D. 1995, Almond & Mazumder 2008). In addition, there are papers that examine the effect of exogenous income transfers during pregnancy, and find causal evidence that these transfers improve infant health (e.g., Almond et al. 2011, Hoynes et al. 2011).

A second potential channel through which Title IX may have affected birth outcomes is through its impact on mothers' educational attainment. Using an estimation strategy similar to the one in this paper, Stevenson (2010) examines the effect of women's athletic participation on educational attainment and labor market outcomes, and she finds that an increase in female athletic participation leads to increased educational attainment for females and an increase in the female labor force participation rate. Furthermore, there is an extensive literature linking parental education with infants' health at birth, though evidence on the causal relationship is mixed. Currie & Moretti (2003) find that higher maternal educational attainment increases birthweight and gestational age, while McCrary & Royer (2011) do not find an improvement in infant health due to higher educational attainment. In this paper, I find little evidence to suggest that the improved infant health is driven by maternal education.

Even if mother's education is not driving the results, it could be that assortative mating plays a role. That is, it could be that when mother's education improves, father's education improves along with it, and this combination is important. On top of that, it could even be that increases in athletic opportunities increase the rate of assortative mating. I find some evidence to support the former, but not the later.

## 3 Data

The sports participation data come from an annual survey published by the National Federation of State High School Associations (NFHS). The publication contains information, by state and gender, on the number of high school participants in each sport. Data exist for all academic years after the 1969-70 school year, except for 1970-71, 1974-75, and 1976-77. After Title IX, all states except for Iowa provided reports of female participation. For years where participation data are unavailable, participation is imputed. For years prior to the collection of data, girls' participation is set equal to what it was in the first available year: 1969-1970. For the three missing years in the 1970's participation is set equal to the average of the year on either side.

These NFHS data give a raw number of total participants,[6] but do not provide participation rates. In order to calculate participation rates, I divide the total number of participants by the population of 14-17 year olds in each state, year and gender.[7] The population data come from the National Cancer Institute's Survey of Epidemiology and End Results (SEER).

The data on infant health outcomes are obtained from the National Center for Health Statistics' Vital Statistics Natality Files (Natality Data). These data are constructed using birth certificate information from each state, and include detailed information about the birth and demographic characteristics of the mothers, as well as information on early infant health outcomes and information about the mothers' behavior during pregnancy. The files contain a 50% sample of birth certificate data from all states prior to 1972, a mix of either a 50% or 100% sample between 1973 and 1985, and a 100% sample for all states after 1985.[8] For estimation, all data are collapsed down to a cell level, where the cell is defined by the mother's state and year of birth, mother's race, and mother's age, year and parity when giving birth.

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[6]When interpreting the participation rates, it is important to note that the total number of participants counts each player on each team. For example, an individual who plays on three teams adds three to the total.

[7]Stevenson (2010) uses state level high school enrollment data from the National Center for Education Statistics to get an estimate of the number of high school students in each state, and the 5% Public Use Micro Sample of the 1990 census to estimate the gender division within the state in order to come up with enrollment, by gender for each state. I have also tried this method, and the results are very similar.

[8]Important for this study, the data include information on the mother's state of birth and her age when giving birth. This information is used to calculate her year of birth, and to match her athletic opportunities to the appropriate year and state. I use the Natality files from 1970-2004. Files prior to 1970 and after 2004 are excluded because they do not include the mother's state of birth.

Table 1 shows summary statistics for both the pre- and post- Title IX cohorts, women born 1956-1960 and 1964-1968, respectively. It is important to note that while there is considerable overlap in the years when the babies of these women are born, on average the post-Title IX cohort babies are born seven years later than those born to mothers in the pre-Title IX cohort. On its own, this is not a problem for my analysis because it includes birth year fixed effects. The only reason that birth year differences would lead to biased estimates of the impact of Title IX would be if state level trends in infant health vary in a way that is correlated with boys' levels of sports participation in 1971. This assumption will be tested in Section 5.

# 4 Estimation Strategy

In order to estimate the effect of an increase in athletic opportunities on infant health, I estimate the following equation, first for the full sample and then separately for white and black mothers:

$$\text{Outcome}_{bsrap} = \alpha + \beta\ \text{SportPart*}_{sb} + \mathbf{X}_{bs} + \phi_b + \phi_s + \phi_r + \phi_a + \phi_p + \epsilon_{bsrap} \qquad (1)$$

$$\text{SportPart*}_{sb} = \alpha + \gamma\ \text{RequiredInc}_{sb} + \mathbf{X}_{bs} + \phi_b + \phi_s + \phi_r + \phi_a + \phi_p + \epsilon_{sb} \qquad (2)$$

where $\text{SportPart}_{sb}$ is the participation rate in state *s* for women who where born in year *b*, measured when they were 14 and entering high school. The estimated $\beta$ indicates the effect of a 10 percentage point increase in participation rates. $\text{Outcome}_{bsrap}$ is the average outcome for women born in year *b* in state *s* and of race *r*,[9] who gave birth at age *a* and at parity *p*.

We might be worried that increases in girls' athletic participation rates are endogenously related to changes in women's health and, by extension, to the health of their children. For that reason

[9]Regressions include only white and black mothers.

I estimate $\beta$ using two stage least squares. The first stage of the two stage least squares analysis is equation 2, where the excluded exogenous regressor, $\text{RequiredInc}_{sb}$, is the size of the increase needed in order to be in compliance with Title IX. For the "pre" cohort, this is equal to zero, as there is no required increase in participation prior to Title IX. For the "post cohort" it equals the boys' participation rate in 1971 for that state.

All regressions include a full set of fixed effects for mother's year of birth $\phi_b$ (yob) , mother's state of birth $\phi_s$ (sb), mother's race $\phi_r$, mother's age at (child's) birth $\phi_a$, and parity $\phi_p$.[10] Regressions which pool white and black mothers also include a set of black$\times$yob and black$\times$state fixed effects.

The state of birth fixed effects are particularly important, as they control for any time invariant differences between states. However, it is still important to control for state-specific variables in case there are changes over time that might be correlated with improvements in infant health.[11] $\mathbf{X}_{bs}$ is vector of economic variables measured at age 18, when the individual was graduating from high school and choosing to either enter the labor market or go to college. It includes the state unemployment rate and state per capita real income.[12] In addition, we might worry that something not captured by the economic variables is changing over time in a way that differs by area. For

[10]The regression does not control separately for the year of the child's birth, since this is uniquely identified by the combination of mother's year of birth and mother's age at child's birth.

[11]As shown in the summary statistics included in the previous section, the post-Title IX group has children, on average, seven years later than the pre-Title IX cohort. For this reason, state-specific time trends are not included, as they would soak up a lot of the variation I am trying to measure.

[12]The state unemployment rate comes from the Bureau of Labor Statistics, and state per capita income comes from the Bureau of Labor Statistics. The state specific unemployment rate begins in 1976, so for years prior to that, unemployment is imputed using variation in the national unemployment rate.

this reason, some specifications include region specific linear time trends.[13] Standard errors are clustered by mother's state of birth and the regressions are weighted by the number of observations making up each cell.

The infant health outcomes examined are birthweight and Apgar score. In addition to looking at average birthweight, I look at the probability of birthweight falling below what is considered a critical threshold. Equation 1 is estimated for low birthweight births per 1000 and very low birthweight births per 1000. Low birthweight is defined as less than 2500 grams, while very low birthweight is defined as less than 1500 grams. The five minute Apgar score comes from a test given five minutes after birth that quickly assesses the infant's health through activity, pulse, grimace (reflex irritability), appearance, and respiration. Each category is scored from 0-2, and the total score ranges from 0-10.

# 5 Instrument Validity

As mentioned in Section 3, it is very important to show that state level trends in infant health do not vary in a way that is correlated with boys' levels of sports participation in 1971. In order to test this assumption, I run a placebo test that splits the pre-Title IX cohort into two groups. This tests whether sports participation rates have any power in explaining differences in the outcomes for infants born to mothers who entered high school in the 1960's. Here, the "pre" cohort consists of women who entered high school in 1960-1964 and the "post" cohort is comprised of women who entered high school in 1965-1969. Since both the "pre" and "post" cohorts enter high school prior to Title-IX, they should not be affected by Title IX, and we would not expect the increases required by the legislation to have any explanatory power for changes in infant health. Girls' participation

[13] Additional regressions that are not included in the final paper, but that are available upon request, include state specific time trends. While these state trends soak up a significant amount of variation, the results are qualitatively the same.

rates from 1970-1979 are assigned to the years 1960-1969,[14]

Ideally, all of the estimated $\beta' s$ (the coefficient for SportPart) would be statistically insignificant. Looking at the full sample, displayed in column (1) of Table 2, this is the case for three of the four main health outcomes of interest. The exception is the coefficient for "very low" birthweight, which is significant at the 10% level. However, splitting the sample by race uncovers a different story. For white mothers, all four $\beta' s$ are insignificant, but for black mothers who entered high school during the 1960s, two of the four $\beta' s$ are statistically different from zero. This raises considerable concern about the validity of the instrument for black mothers. One potential explanation could be that the era chosen for the falsification test, as well as the true Title IX era, coincides with significant changes in terms of access to quality health care due to civil rights. It could be that this introduces some bias. To make things worse, the first stage F-statistic is significantly lower for the sample of black women (5.7) than it is for the sample of white women (19.3), which would inflate any bias.[15] For this reason, the remainder of the paper presents results *only* for white mothers, for whom the instrument is stronger and the falsification test does not raise concerns.[16]

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[14]For example, girls entering high school in 1960 are assigned the participation rate from 1970, and girls entering high school in 1961 are assigned the participation rate from 1971.

[15]This difference in the first stage F-statistic is the result of using different samples of women, but the same participation numbers as they are not race specific. In reality, the predictive power for black women is likely even worse, as the National Longitudinal Survey of Youth indicates that white women were more likely than black women to participate in high school sports during the sample period.

[16]Results for the pooled sample or for black mothers are available upon request.

# 6 Infant Health Results

Table 3 presents the main infant health regression results. Column (1) presents the results from estimating equation (1) with OLS, and column (2) presents the reduced form regression, where OLS is used with the required increase as the independent variable. Columns (3)-(5) display the results from two stage least squares estimation of equation (1). In columns (3)-(5), the first panel shows the first stage results for the coefficient of interest, which gives the estimated relationship between the required increase in girls' participation rates, and the actual increase. In columns (3)-(5) additional control variables (listed at the bottom of the table) are added. In all cases, the coefficient is statistically significant at the 1% level. For the remainder of the paper, I will focus on the preferred specification in column (4), which includes state level economic controls, but does not include region trends.

The rest of Table 3 presents the results from estimating equation 1 for the infant health outcomes of interest. Each panel contains the regression results and summary statistics for the dependent variable listed in bold in the first row. Each cell represents the results from a different regression, with the estimated coefficient on the girls' participation rate listed in the first row and the estimated standard error in parenthesis below.

Comparing the results from OLS estimation in columns (1) to those in the rest of the columns, we see that while the IV results tell the same qualitative story as OLS, the point estimates are larger. This suggests that the local average treatment effect captured by this estimation is higher than the average effect. In other words, those girls who decide to play sports because of the exogenously increasing opportunities gain more than those who would have blazed the trail on their own.

Focusing on the preferred IV specification in column (4), I find evidence of a strong relationship between athletic participation and the probability of having a baby whose birthweight falls below one of the critical thresholds. Panel one shows the estimated relationship between sports participation and the likelihood of having a baby that weighs less than 2500 grams. The coefficient tells us that for white mothers, a 10 percentage point increase in girls' sports participation results in 1.5 fewer babies per 1000 births that fall below this threshold. With a mean of 60, this represents a 2.5% decrease.

The magnitude of this point estimates falls within the range of those estimated in studies examining the effects of other interventions.[17] For example, Almond et al. (2011) find that living in a county that gains access to the Food Stamp Program by the mother's third trimester leads to a 1% decrease in low birthweight births for white women, approximately 1/3 the size of what I find.[18] On the higher end, Currie & Moretti (2003) estimate that a one year increase in a mother's education leads to a 10% decrease in low birthweight births. Similarly, Currie & Walker (2011) find that when electronic toll collection is introduced, which reduces pollution exposure for those who live near a toll plaza, mothers living within 2km of a toll plaza experience a 12% decline in low birthweight births relative to mothers who live further away. These estimates are approximately 3-4 times the size of the effect I find.

Panel two shows how sports participation affects the likelihood of having a baby that weighs less than 1500 grams. A 10 percentage point increase in sports participation translates into 0.34

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[17]While many epidemiological studies examine the effect of exercise during pregnancy on infant health, it is difficult to directly compare the magnitudes from this study with the odds ratios they typically report. It is important to note, however, that most recent studies find either neutral or positive health effects from moderate to intense exercise during pregnancy (Chasan-Taber et al. 2007).

[18]It is important to note that this estimate is for the population average, but that food stamps were only used by approximately 13% of white women in those counties. When the estimate is scaled up to give an estimate of treatment on the treated, the effect is 7-8%. I report 1% in the text because it is more comparable to my estimate of the effect of a 10 percentage point increase in opportunities.

fewer very low birthweight babies per 1000 births, a 3.5% decline. Panel three shows that there is no statistical relationship between athletic opportunities and average birthweight. Panel four suggests that athletic participation leads to gains in Apgar scores. A 10 percentage point increase in athletic participation leads to a 1/3 standard deviation improvement in Apgar scores.

# 7 Robustness Checks

Table 4 presents the results of a number of robustness checks. Column (1) displays the results from the main specification for comparison. In order to test whether the results are robust to different cohort selections, column (2) shows the results from estimating equation 1 using an alternate set of cohorts. The pre-Title IX cohort consists of women who were born between 1946 and 1955 and entered high school between 1960 and 1969, entirely before Title IX was passed. The post-Title IX cohort consist of women who were born between 1966 and 1975 and entered high school between 1980 and 1989, after schools were required to be in compliance. These cohorts were born further apart than the ones used in the main specification.[19] The differences in athletic opportunities are even larger, both in terms of participation rates when entering high school, and the age at which they became aware of the required equality. The results are robust to the alternate cohort design.

The next column experiments with different a construction of the main right hand side variable: sports participation rates. It could be that athletic opportunities when entering high school do not fully capture the change in opportunities on their own. In case the benefit of increased availability is cumulative, girls' participation is constructed as the average of athletic opportunities at age 14 and at age 15. To test this, column (3) shows the results using a two year average of participation rates. Again, the estimated coefficients remain largely unchanged.

Another potential concern is that the results are driven by the southern states, especially because

[19]Here, the cohorts are the same as the ones used in Section 8.1 when looking at selection into motherhood, and are also the ones used in Stevenson (2010).

the cohorts examined came of age during the civil rights era. In addition, of the five "deep south" states – defined here as Alabama, Georgia, Louisiana, Mississippi and South Carolina – all but one fall in the bottom quartile of pre-Title IX boys' participation, and all five are in the bottom half of the distribution. Column (4) shows regression results excluding these five states. There are no major differences.

# 8 Mechanisms

My results strongly suggest that women who had access to more athletic opportunities when entering high school produced healthier infants later in life. Which mechanisms drive this effect? This section examines the available evidence, and shows that the results are not driven by changes in selection into motherhood, education or behavior during pregnancy, but there is some evidence that assortative mating plays a role. While I can not look directly at the link between maternal health and infant health, it remains a likely explanation given the lack of strong supporting evidence for the other potential mechanisms.

## 8.1 Selection into Motherhood

This section examines whether increased athletic opportunities have an effect on selection into motherhood. If athletic opportunities *do* effect selection, we could observe changes in average infant health that are the result of a change in the pool of women who choose to have children rather than a causal relationship between mothers' health and infants' health. The vital statistics natality data are not ideal for this question, since observations in that dataset are conditional on having given birth. Instead, I use of census data from the 5% samples of the 1980 and 2000 censuses.[20] Women classified as pre Title-IX are 25-34 years old when they are surveyed for the

[20]In order to compare treatment and control women at the same ages, I use slightly different cohorts from the main analysis. These are the same cohorts used by Stevenson (2010). Section 7

1980 census, were born between 1946 and 1955, and entered high school between 1960 and 1969. Women classified as post Title-IX are 25-34 years old when they are surveyed for the 2000 census, were born between 1966 and 1975, and entered high school between 1980 and 1989.

It is important to keep in mind that due to the timing of the censuses in relation to the birth years of the cohorts, I am only able to assess selection into motherhood between the ages of 25 and 34. This means I can not distinguish between women's decisions to select out of motherhood altogether versus their decision to delay childbearing past the age of 34. However, as I will show, I do not find any evidence of an effect of athletic participation on the average age at first birth within the natality data.

Table 5 shows the results from the selection analysis.[21] The first panel shows the results of regressions where the dependent variable is an indicator variable equal to 1 if the individual reports that she has a child of her own living in her household and panel two displays results of regressions where the dependent variable is the number of own children living with an individual at the time of survey. Qualitatively, the results suggest that women who experienced the largest increases in athletic opportunities had fewer children by age 34. However, the point estimates are not precise enough to be distinguishable from zero.

The results in Table 6 suggest that treatment and control women experienced no differences in age at first birth. The table displays estimated coefficients from estimating a version of Equation 1 where mother's age is the dependent variable. Only first births are included. If we thought that increased athletic opportunities cause women to delay childbearing, we would expect to see positive and statistically significant coefficient estimates. However, again, the estimated coefficients are negative and not distinguishable from zero.

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includes a robustness check which shows the results of the main analysis using these cohorts. The results are very similar to the main results.

[21] These regressions are estimated at the individual, rather than the cell, level.

## 8.2 Education

Previous literature shows that Title-IX induced athletic participation leads to higher educational attainment, and provides mixed evidence about whether or not more maternal education improves the health of infants. Stevenson (2010) finds that a ten percentage point increase in athletic opportunities leads to 0.039 extra years of education and Currie & Moretti (2003) find that an increase of 0.09 years of education causes a 1% decrease in the incidence of low birthweight babies. Combining these figures, one would expect that a ten percentage point increase in athletic opportunities would cause a 0.4%[22] decrease in the number of low-birthweight babies. This suggests that increased education would explain approximately 1/6 of the 2.5% decrease I find from a 10 percentage point increase in athletic participation.[23] This suggests that there is a lot of room for alternate explanations.

Another way to examine education's potential role in explaining the main results is to estimate the main specification, but split the sample based on educational attainment. Column (1) of Table 7 presents the results from two stage least squares estimation of equation 1 for women without a high school degree at the time they give birth, while column (2) presents the results for women with high school degree or higher. For both subsets of the population, increased athletic opportunities results in healthier infants. If extra educational attainment were a main driver of improved infant health, we might expect to see limited improvement among the children of mothers who did not finish high school. However, the point estimates for these women are even larger than for women with more education. This is more consistent with an explanation like improved maternal health, where infant health is improved across the socioeconomic spectrum, but where the infants of lower

[22] .039/.09*1%=0.43%

[23] At the same time, combining the Stevenson (2010) with McCrary & Royer (2011), which found no effect of education on infant health, would suggest that this mechanism would not be important for explaining any of the estimated improvements in infant health.

socioeconomic mothers have more to gain.

## 8.3 Assortative Mating

While there is little evidence that mother's increased educational attainment explains the improvements in infant health, it could be that assortative mating contributes to the improved health. That is, it could be that mothers increasingly choose partners that are *also* more highly educated and this combination leads to improved infant health. Columns (3) and (4) of Table 7 displays the main health results stratified by marital status. The majority of the improved health occurs for married women, lending support to the idea that assortative mating could be contributing to improved infant health. When available, father's educational attainment was reported in the natality data until 1995, and using those years of data, Table 8 examines whether there are differences in father's education or in the chance that both parents have the same level of education.[24] I find that fathers are slightly more likely to have high school and college degrees in states with larger increases in participation, but that there isn't an increase in the chance that both the father and mother have the *same* level of education.[25]

## 8.4 Behavioral Changes

An alternative explanation is that women exposed to greater athletic opportunities change their health behaviors in ways that also improve their fetus' health. A common explanation for the link between maternal education and infant health is that better educated women are able to afford better

[24]"Same Education" is equal to one if both parents have less than a HS degree, both parents have a HS degree or both parents have a college degree. It is equal to zero in all other combinations.

[25]A similar exercise can be done using census data, which allows an examination of changes in assortative mating without being restricted to women who give birth. The results of looking at educational attainment of husbands yield similar results.

prenatal care and are also more likely to make smart choices about their health related behavior during pregnancy (Currie & Moretti 2003, McCrary & Royer 2011). While I find little evidence that increased education is a main driver, I still look at these potential explanations, as it is possible that women who played sports in high school make smarter choices for reasons other than higher educational attainment.

In order to examine the likelihood of these channels, I examine a number of "behavioral" variables available in the natality data. I estimate the two stage least squares version of equation 1 for indicator variables equal to one if the mother received pre-natal care in the first trimester and if she experienced "low" or "high" weight gain during pregnancy [26] I also examine whether there is any effect on whether she smoked or whether she consumed alcoholic drinks while pregnant. [27]

The results in Table 9 do not suggest that changes in the behavior of women during pregnancy are the main driver of the healthier infants. If increased athletic opportunities, caused women to make healthier decisions during pregnancy, we would expect to see a positive relationship between athletics and the acquisition of prenatal care during the first trimester. At the same time, we would expect to see a negative relationship with smoking, drinking alcohol and low or high weight gain.

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[26]The actual recommended weight gain depends on a mother's pre-pregnancy BMI. Mothers with a lower BMI are encouraged to gain more weight, while mothers with higher a BMI should gain less weight during pregnancy. Mother's BMI is not available in the natality data, so for this study, "low" weight gain is defined as gaining less than 15 pounds during pregnancy, the bottom end of the recommended range for a mother who is "overweight" pre-pregnancy. "High" weight gain is defined as gaining more than 35 pounds, the upper end of the recommended range for a mother who is "normal weight" pre-pregnancy.Committee on Nutritional Status During Pregnancy and Lactation (1990)

[27]With the exception of prenatal care, which is available throughout the entire sample, these behavioral variables are available in the natality data starting in 1989.

However, the coefficients shown in Table 9 are mixed and are not statistically significant.

## 8.5 Subgroup Analysis

Further insights might be provided by splitting the sample in ways that haven't been discussed thus far. Columns (5)-(10) of Table 7 display the main health results stratified by a number of additional variables. First, I examine whether the improvements differ by the gender of the child. Both the magnitudes and statistical significance are very similar for boys and girls.

Next, I examine whether the type of sport played by women within a state matters. For example, it could be that some sports improve fitness and infant health more than others. Unfortunately, this is difficult to look at. While there is some variation across states in the mix of sports, it is difficult to collapse this participation into an indicator that allows a comparison of how beneficial different sports are. One option would be to create a variable that gives the average number of calories burned during an hour of participation and to weight that average by the state specific participation in each sport. However, this is a very rough estimate, and there is surprisingly little variation in this weighted average. This is particularly uninformative because one of the most popular sports is "outdoor track and field" (T&F). Within T&F, there are some events that are very energy intensive and some that are not, but no breakdown is available. This makes the creation of a good measure of calories burned impossible. Another approach is to split states into "basketball" and "T&F" states. In 1974, the first year that participation by gender *and* sport is available, there were 23 states where basketball was the most popular sport, 20 states where T&F was most popular, 7 where it was a different sport and 1 where no breakdown was available. I stratify by most popular sport (basketball or T&F) and find mixed results. In states where the most popular sport was basketball, the improvements were largest for the incidence of low and very low BW, but improvements in Apgar scores were larger in T&F states.

Finally, I split the sample by the incidence of low birthweight births for the Pre-Title IX group. Column (9) displays the results for "Poor BW" states, those with an incidence of low birthweight births that is above the median and column (10) displays the results for "Good BW" states, those that are below the median. While the evidence isn't overwhelming, it does appear that infants born to women living in the Poor BW states benefited most from the increase in athletic opportunities.

## 9 Conclusions

This paper provides evidence that an investment in the athletic opportunities for one generation improves health for the next generation. While the policy variation exploited in this paper only allows me to focus on the benefits of high school sports participation, it is likely that the benefits identified here also extend to improvements in exercise habits more generally. In 2014, the CDC found that only 18% of women met the full 2008 federal physical activity guidelines, and this paper suggests that in addition to the likely health benefits to women, increasing that percentage would have significant health benefits for their children as well.[28]

I find that for the average increase in girls' athletic participation during the 1970's – 20 percentage points – the incidence of low birthweight births to the affected women declined by 5%, the incidence of very low birthweight births declined by 7% and there were small increases in Apgar scores. The decrease in low birthweight births is about half the magnitude of Currie & Moretti's (2003) estimate of the decrease resulting from one additional year of education.[29] I find little evidence to support the theory that the improved infant outcomes are caused by an increase in maternal educational attainment or by changes in behavior during pregnancy, suggesting that improved maternal fitness is a viable explanation.

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[28]Summary Health Statistics: National Health Interview Survey, 2014; http://ftp.cdc.gov/pub/Health_Statistics/NCHS/NHIS/SHS/2014_SHS_Table_A-14.pdf

[29]Currie & Moretti (2003) estimate that a one year increase in education leads to a 0.5 percentage point, or 10% decrease in the incidence of "low" birthweight births.

This sizable benefit in terms of infant health, is particularly important in light of the increasingly tight budgets faced by school administrators. Funding for high school athletics is often an easy target as administrators decide where to cut spending.[30] However, this paper adds to the growing body of literature that points out the less obvious benefits of athletic participation, and shows that these benefits translate into improvements for the next generation.

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## Conflict of Interest

The Author has no conflict of interest.

[30]News stories are all around. See, for example:
http://www.annarbor.com/news/ann-arbor-schools-slashing-freshman-sports-teams-cutting-funding-to-several-other-programs/
http://www.usatoday.com/sports/preps/2009-09-02-budget_sports_cuts_N.htm
http://www.npr.org/2011/03/16/134533821/budget-cuts-put-school-sports-on-chopping-block
http://rivals.yahoo.com/highschool/blog/prep_rally/post/Jacksonville-plans-to-cut-all-school-sports-in-2?urn=highschool-wp26
(All accessed on August 25, 2011)

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## Ethical Statement

This paper raises no ethical issues.

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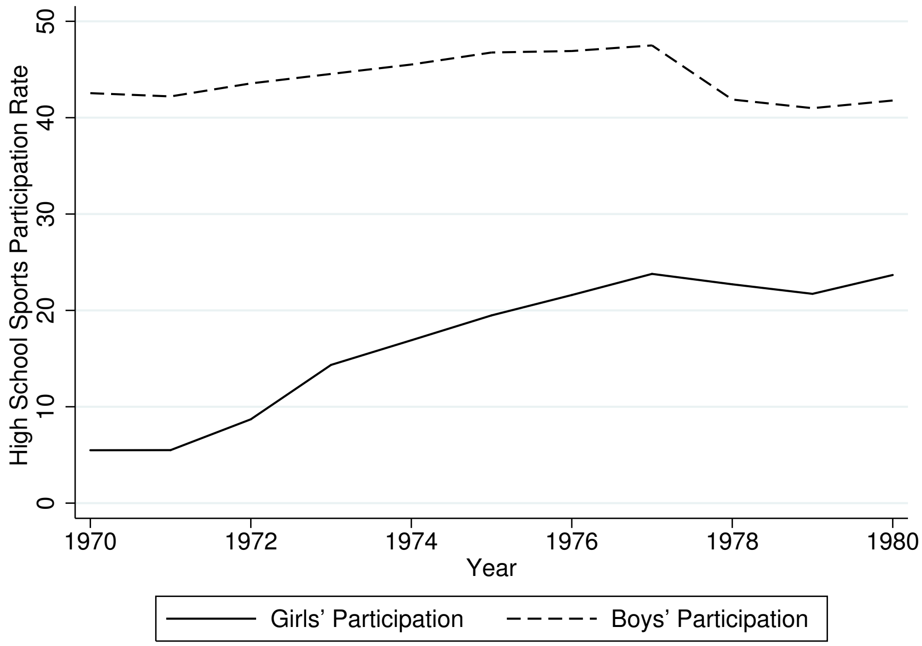
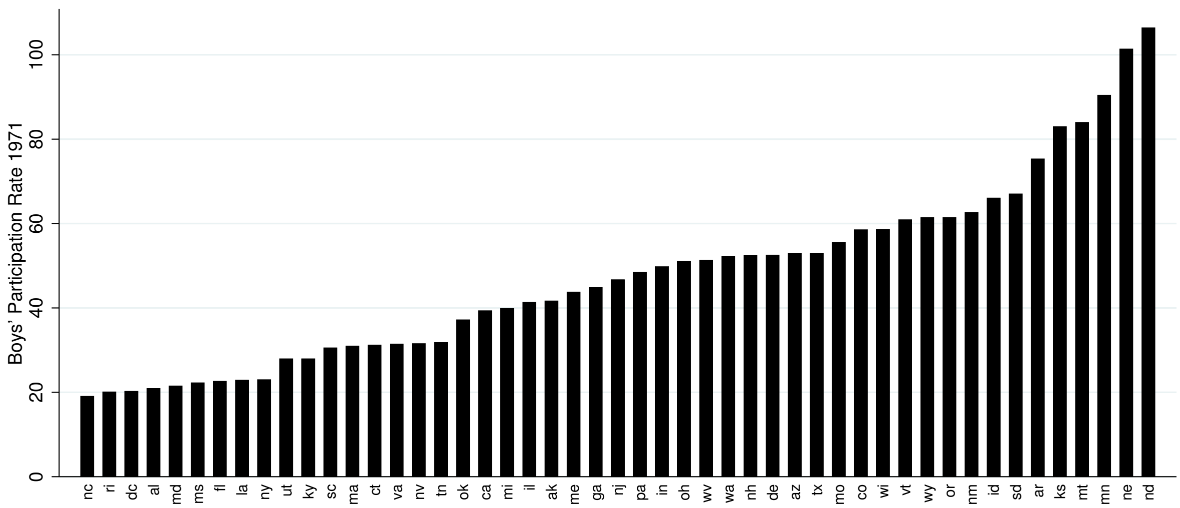
Figure 1: Participation Rates Over Time



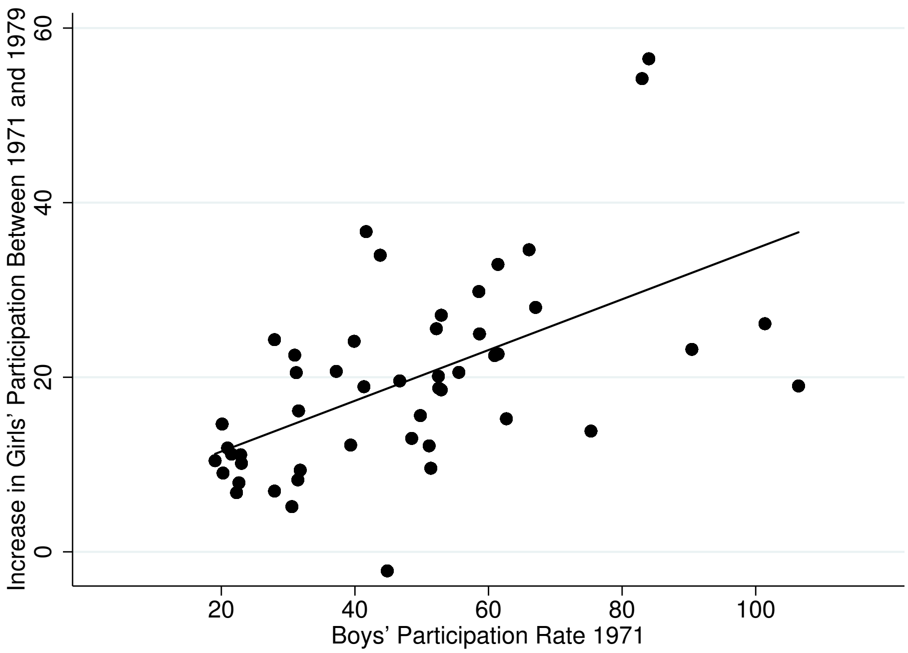

The sports participation data come from an annual survey published by the National Federation of State High School Associations. These NFHS data give a raw number of total participants, which is then divided by the population of 14-17 year olds to create a participation rate.

Figure 2: Boys' Participation Rates 1971-72




The sports participation data come from an annual survey published by the National Federation of State High School Associations. These NFHS data give a raw number of total participants, which is then divided by the population of 14-17 year olds to create a participation rate.

Figure 3: Correlation of Post-Title IX Increases in Girls' Participation and Boys' Pre-Title IX Participation




The sports participation data come from an annual survey published by the National Federation of State High School Associations. These NFHS data give a raw number of total participants, which is then divided by the population of 14-17 year olds to create a participation rate.

Table 1: Summary Statistics

| | Pre-Title IX | | | Post-Title IX | | |
|---|---|---|---|---|---|---|
| | Mean | Min | Max | Mean | Min | Max |
| Mother's Year of Birth | 1958.06 | 1956 | 1960 | 1965.90 | 1964 | 1968 |
| Child's Year of Birth | 1984.68 | 1971 | 2004 | 1991.91 | 1979 | 2004 |
| Girls' Sports Participation Rate | 10.58 | 0.13 | 52.64 | 23.04 | 6.48 | 65.35 |
| Required Increase in Participation | 0.00 | 0.00 | 0.00 | 42.10 | 19.07 | 106.41 |
| Birthweight (grams) | 3345.24 | 227 | 7371 | 3334.37 | 227 | 5660 |
| Low Birthweight (<2500g) | 71.45 | 0 | 1000 | 74.06 | 0 | 1000 |
| Very Low Birthweight (<1500g) | 12.31 | 0 | 1000 | 13.50 | 0 | 1000 |
| Apgar Score | 9.02 | 0 | 10 | 8.95 | 0 | 10 |
| Mother's Age | 26.62 | 15 | 45 | 26.01 | 15 | 40 |
| Mother HS Degree | 0.82 | 0 | 1 | 0.81 | 0 | 1 |
| Mother College Degree | 0.19 | 0 | 1 | 0.21 | 0 | 1 |
| Father HS Degree | 0.85 | 0 | 1 | 0.80 | 0 | 1 |
| Father College Degree | 0.22 | 0 | 1 | 0.13 | 0 | 1 |
| First Trimester Prenatal Care | 0.80 | 0 | 1 | 0.79 | 0 | 1 |
| Any Cigarettes | 0.14 | 0 | 1 | 0.14 | 0 | 1 |
| Any Alcohol | 0.03 | 0 | 1 | 0.02 | 0 | 1 |
| Low Weight Gain (<15 lbs) | 0.09 | 0 | 1 | 0.10 | 0 | 1 |
| High Weight Gain (>35 lbs) | 0.27 | 0 | 1 | 0.30 | 0 | 1 |

*Notes*: The pre-Title IX cohort consists of women born between 1956 and 1960, while the post-Title IX cohort consists of women born between 1964 and 1968. Means are weighted by the number of births per cell

Table 2: Falsification Test: 1960's

| | All | White | Black |
|---|---|---|---|
| **First Stage** | 0.211$^{***}$ | 0.214$^{***}$ | 0.187$^{**}$ |
| | (0.048) | (0.049) | (0.079) |
| F-Stat | 19.01 | 19.27 | 5.66 |
| **Low BW** (<2500g) | -0.737 | -0.427 | -5.320$^{*}$ |
| | (0.496) | (0.476) | (3.109) |
| Mean | 65.82 | 56.13 | 129.19 |
| SD | 41.79 | 25.38 | 65.69 |
| N | 163186 | 96386 | 66800 |
| **Very Low BW** (<1500g) | -0.288$^{*}$ | -0.208 | -1.273 |
| | (0.155) | (0.151) | (0.919) |
| Mean | 10.74 | 8.60 | 24.72 |
| SD | 14.52 | 9.01 | 28.84 |
| N | 163186 | 96386 | 66800 |
| **Birthweight** (grams) | 0.296 | -0.586 | 13.343$^{**}$ |
| | (2.348) | (2.447) | (5.458) |
| Mean | 3365.93 | 3403.54 | 3120.21 |
| SD | 138.33 | 92.97 | 134.41 |
| N | 163186 | 96386 | 66800 |
| **Apgar Score** | 0.001 | 0.002 | -0.005 |
| | (0.004) | (0.004) | (0.018) |
| Mean | 9.07 | 9.09 | 8.93 |
| SD | 0.19 | 0.17 | 0.30 |
| N | 116632 | 71572 | 45060 |

*Notes*: The first panel shows the results from the first stage of the instrumental variables regressions. The coefficient displayed shows the relationship between the required increase in girls' sports participation and actual girls participation rates. Each subsequent panel contains the regression results and summary statistics for the dependent variable listed in bold in the first column. Each column represents the results from a different regression, with the coefficient on the girls' participation rate listed in the first row, and the (se) below. Columns (1) presents the results for the pooled regression, while columns (2)-(3) show the results from regressions stratified by race. All regressions include fixed effects for mother's year of birth (yob), mother's state of birth (sb), mother's age, and parity as well as the state unemployment rate and state per capita real income when the mother was 18 years old. Pooled regressions also include a set of black×yob and black×state fixed effects. Standard errors are clustered by mother's sob and regressions are weighted by the number of observations in each cell.

$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Table 3: Results: Health

| | OLS | RF | IV | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| **First Stage** | | | 0.149*** | 0.173** | 0.135*** |
| | | | (0.033) | (0.033) | (0.049) |
| F-Stat | | | 20.2 | 27.4 | 7.5 |
| **Low BW** (<2500g) | -0.548*** | -0.259** | -1.634** | -1.495** | -2.352*** |
| | (0.161) | (0.113) | (0.753) | (0.614) | (0.773) |
| Mean | 59.89 | 59.89 | 59.89 | 59.89 | 59.89 |
| SD | 22.81 | 22.81 | 22.81 | 22.81 | 22.81 |
| N | 91990 | 93288 | 91357 | 91357 | 91357 |
| **Very Low BW** (<1500g) | -0.067 | -0.059* | -0.378* | -0.343** | -0.593** |
| | (0.055) | (0.030) | (0.205) | (0.165) | (0.279) |
| Mean | 9.75 | 9.75 | 9.75 | 9.75 | 9.75 |
| SD | 7.92 | 7.92 | 7.92 | 7.92 | 7.92 |
| N | 91990 | 93288 | 91357 | 91357 | 91357 |
| **Birthweight** (grams) | 1.100 | -0.116 | -3.268 | -0.670 | 1.330 |
| | (0.713) | (0.383) | (3.473) | (2.199) | (3.367) |
| Mean | 3390.51 | 3390.51 | 3390.51 | 3390.51 | 3390.51 |
| SD | 81.09 | 81.09 | 81.09 | 81.09 | 81.09 |
| N | 91990 | 93288 | 91357 | 91357 | 91357 |
| **Apgar Score** | 0.007** | 0.007*** | 0.055** | 0.040*** | 0.044*** |
| | (0.003) | (0.002) | (0.022) | (0.011) | (0.015) |
| Mean | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 |
| SD | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| N | 86259 | 87389 | 85653 | 85653 | 85653 |
| Econ | Yes | Yes | No | Yes | Yes |
| Region Trend | No | No | No | No | Yes |

*Notes*: The first panel shows the results from the first stage of the instrumental variables regressions. The coefficient displayed shows the relationship between the required increase in girls' sports participation and actual girls participation rates. Each subsequent panel contains the regression results and summary statistics for the dependent variable listed in bold in the first column. Each column represents the results from a different regression, with the coefficient on the girls' participation rate listed in the first row, and the (se) below. Columns (1) presents the results from an OLS regression, while columns (2)-(5) show the results from a regression where girls' participation is instrumented with the size of the required increase. All regressions include fixed effects for mother's year of birth (yob), mother's state of birth (sb), mother's age, and parity as well as the additional control variables listed at the bottom of the column. Columns marked "Yes" for "Econ" include the state unemployment rate and state per capita real income when the mother was 18 years old. Standard errors are clustered by mother's sob and regressions are weighted by the number of observations in each cell.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Robustness Checks

| | (1) Original | (2) Alt. Cohort | (3) Two Year | (4) No South |
|---|---|---|---|---|
| **Low BW** (<2500g) | -1.495$^{**}$ | -1.198$^{**}$ | -2.112$^{**}$ | -1.319$^{*}$ |
| | (0.614) | (0.531) | (0.914) | (0.679) |
| **Very Low BW** (<1500g) | -0.343$^{**}$ | -0.413$^{***}$ | -0.484$^{**}$ | -0.306 |
| | (0.165) | (0.121) | (0.239) | (0.186) |
| **Birthweight** (grams) | -0.670 | -0.325 | -0.947 | -1.569 |
| | (2.199) | (3.109) | (3.110) | (2.749) |
| **Apgar Score** | 0.040$^{***}$ | 0.037$^{***}$ | 0.059$^{***}$ | 0.039$^{***}$ |
| | (0.011) | (0.012) | (0.016) | (0.012) |

*Notes*: This table includes the regression results from all of the robustness checks described in Section 7. Each row contains the regression results and summary statistics for the dependent variable listed in bold in the first column. Each column represents the results from a different regression, with the coefficient on the girls' participation rate listed in the first row, and the (se) below. The first column shows the original IV results, and each subsequent column presents the IV results for the robustness check listed at the top of the table. All regressions include fixed effects for mother's year of birth (yob), mother's state of birth (sb), mother's age, and parity, as well as controls for the state unemployment rate and state per capita real income when the mother was 18 years old.. Standard errors are clustered by mother's sb and regressions are weighted by the number of observations in each cell.
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Table 5: Selection into Motherhood

| | |
|---|---|
| **Have Child** | -0.0067 |
| | (0.0041) |
| Mean | 0.63 |
| SD | 0.48 |
| N | 1336699 |
| **Number Children** (<1500g) | -0.0207 |
| | (0.0128) |
| Mean | 1.24 |
| SD | 1.21 |
| N | 1336699 |

*Notes*: Each column represents the results from a different regression, with the coefficient on the girls' participation rate listed in the first row, and the (se) below. In each regression, girls' participation is instrumented with the size of the required increase and fixed effects for mother's year of birth (yob), mother's state of birth (sb), mother's age, and parity are included, as well as controls for the state unemployment rate and state per capita real income when the mother was 18 years old. Standard errors are clustered by mother's sb and regressions are weighted by the number of observations in each cell.
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Table 6: Mother's Age at First Birth

| | |
|---|---|
| **Age at First Birth** | 0.024 |
| | (0.192) |
| Mean | 24.69 |
| SD | 5.46 |
| N | 13307 |

*Notes*: Only first births are included. Each column represents the results from a different regression, with the coefficient on the girls' participation rate listed in the first row, and the (se) below. In each regression, girls' participation is instrumented with the size of the required increase and fixed effects for mother's year of birth (yob), mother's state of birth (sb), mother's age, and parity are included, as well as controls for the state unemployment rate and state per capita real income when the mother was 18 years old.. Standard errors are clustered by mother's sb and regressions are weighted by the number of observations in each cell.
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Table 7: Health: Stratified Samples

| | HS Deg | | Married | | Gender | | Sport | | BW | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) No | (2) Yes | (3) No | (4) Yes | (5) Female | (6) Male | (7) BBall | (8) T&F | (9) Poor | (10) Good |
| **Low BW** (<2500g) | -3.606*** | -1.435*** | 0.915 | -1.162* | -1.507** | -1.482*** | -2.600** | -0.116 | -2.035*** | -2.279 |
| | (1.267) | (0.519) | (1.842) | (0.684) | (0.765) | (0.574) | (1.036) | (0.602) | (0.653) | (2.095) |
| Mean | 87.75 | 54.93 | 91.60 | 53.88 | 64.39 | 55.63 | 61.48 | 58.92 | 63.23 | 56.89 |
| SD | 48.78 | 21.60 | 51.71 | 21.59 | 28.19 | 26.03 | 22.73 | 23.25 | 23.72 | 21.51 |
| N | 72987 | 80109 | 68849 | 84895 | 84025 | 84434 | 42095 | 35855 | 46545 | 44812 |
| **Very Low BW** (<1500g) | -0.866** | -0.354** | -0.182 | -0.194 | -0.349 | -0.337* | -0.507 | -0.287 | -0.460** | 0.041 |
| | (0.406) | (0.169) | (0.759) | (0.192) | (0.229) | (0.186) | (0.450) | (0.277) | (0.213) | (0.347) |
| Mean | 13.52 | 9.06 | 15.83 | 8.65 | 9.69 | 9.81 | 10.08 | 9.54 | 10.18 | 9.37 |
| SD | 19.87 | 7.76 | 21.56 | 7.64 | 10.16 | 10.09 | 7.95 | 8.02 | 8.40 | 7.45 |
| N | 72987 | 80109 | 68849 | 84895 | 84025 | 84434 | 42095 | 35855 | 46545 | 44812 |
| **Birthweight** (grams) | 5.689 | 0.166 | -1.262 | -1.609 | 0.202 | -1.537 | -8.059 | 2.560 | -2.230 | 3.275 |
| | (3.836) | (2.709) | (7.002) | (2.326) | (2.315) | (2.220) | (7.071) | (2.265) | (3.062) | (6.967) |
| Mean | 3258.16 | 3416.34 | 3256.90 | 3419.09 | 3326.15 | 3451.59 | 3382.12 | 3396.20 | 3373.30 | 3405.99 |
| SD | 108.62 | 73.72 | 110.46 | 75.29 | 83.99 | 91.72 | 79.40 | 84.45 | 80.50 | 78.46 |
| N | 72987 | 80109 | 68849 | 84895 | 84025 | 84434 | 42095 | 35855 | 46545 | 44812 |
| **Apgar Score** | 0.021** | 0.046*** | 0.004 | 0.045*** | 0.043*** | 0.038*** | 0.012 | 0.042*** | 0.047*** | 0.021 |
| | (0.010) | (0.012) | (0.008) | (0.012) | (0.011) | (0.011) | (0.024) | (0.016) | (0.011) | (0.031) |
| Mean | 9.00 | 9.00 | 8.93 | 9.01 | 9.01 | 8.99 | 9.04 | 8.97 | 9.03 | 8.98 |
| SD | 0.20 | 0.12 | 0.18 | 0.12 | 0.13 | 0.13 | 0.13 | 0.10 | 0.13 | 0.11 |
| N | 67145 | 76383 | 66631 | 83128 | 78470 | 78917 | 39328 | 33817 | 43386 | 42267 |

*Notes*: Each panel contains the regression results and summary statistics for the dependent variable listed in bold in the first column. Each column represents the results from a different regression, with the coefficient on the girls' participation rate listed in the first row, and the (se) below. All columns present the results from a regression where girls' participation is instrumented with the size of the required increase. All regressions include fixed effects for mother's year of birth (yob), mother's state of birth (sb), mother's age, and parity, as well as controls for the state unemployment rate and state per capita real income when the mother was 18 years old. Standard errors are clustered by mother's sb and regressions are weighted by the number of observations in each cell.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Assortative Mating

| | |
|---|---|
| **Dad HS Degree** | 0.008$^{*}$ |
| | (0.004) |
| Mean | 0.84 |
| SD | 0.14 |
| N | 51767 |
| **Dad College Degree** | 0.013$^{**}$ |
| | (0.006) |
| Mean | 0.21 |
| SD | 0.17 |
| N | 51767 |
| **Same Education** | 0.002 |
| | (0.003) |
| Mean | 0.70 |
| SD | 0.05 |
| N | 51748 |

*Notes*: Each column represents the results from a different regression, with the coefficient on the girls' participation rate listed in the first row, and the (se) below. In each regression, girls' participation is instrumented with the size of the required increase and fixed effects for mother's year of birth (yob), mother's state of birth (sb), mother's age, and parity are included, as well as controls for the state unemployment rate and state per capita real income when the mother was 18 years old. Standard errors are clustered by mother's sb and regressions are weighted by the number of observations in each cell.
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Table 9: Behavior During Pregnancy

| | (1) |
|---|---|
| **First Trimester** | 0.002 |
| | (0.005) |
| Mean | 0.83 |
| SD | 0.13 |
| N | 86292 |
| **Any Smoking** | 0.003 |
| | (0.005) |
| Mean | 0.14 |
| SD | 0.08 |
| N | 60139 |
| **Any Alcohol** | 0.004 |
| | (0.003) |
| Mean | 0.02 |
| SD | 0.02 |
| N | 60301 |
| **Low Wt. Gain** ($<$15 lbs) | -0.002 |
| | (0.001) |
| Mean | 0.09 |
| SD | 0.04 |
| N | 59925 |
| **High Wt. Gain** ($>$36 lbs) | -0.009 |
| | (0.005) |
| Mean | 0.29 |
| SD | 0.05 |
| N | 59925 |

*Notes*: Each panel contains the regression results and summary statistics for the dependent variable listed in bold in the first column. Each column represents the results from a different regression, with the coefficient on the girls' participation rate listed in the first row, and the (se) below. All columns present the results from a regression where girls' participation is instrumented with the size of the required increase and include fixed effects for mother's year of birth (yob), mother's state of birth (sb), mother's age, and parity, as well as controls for the state unemployment rate and state per capita real income when the mother was 18 years old. Standard errors are clustered by mother's sb and regressions are weighted by the number of observations in each cell.
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$