Maternal Socio-Economic Status and the Well-Being of the Next Generation(s)

Kasey S. Buckles, Ph.D.

University of Notre Dame, NBER, and IZA

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Abstract

A rich literature in economics and the social sciences has shown that improvements in women's socio-economic status (SES) can also improve the well-being of their children. This chapter identifies several channels for this effect, drawing on both theoretical and empirical work in economics. Empirical evidence on the effects of maternal SES on child outcomes like health, education, and labor market success is presented, with a focus on recent work using new data sets and methodological innovations that allow for credible identification. The chapter also discusses emerging evidence that shocks to maternal well-being can affect not only a woman's own children, but future generations as well. Finally, the chapter highlights several fertile areas for future work.

Keywords

Maternal socio-economic status; intergenerational transmission of education; intergenerational transmission of income; child well-being; infant health; child health; child quality production function

I. Introduction

As previous chapters in this volume have documented, women's well-being has objectively improved along many dimensions over the last several decades. For most of the world, women's literacy and educational attainment have increased, labor market opportunities have expanded, political participation is at historic highs, and women have more bargaining power within the home (Stevenson and Wolfers 2009).[1] These changes are likely to have benefits that extend beyond the current generation of women. At the macro level, improvements in women's health or education are thought to be catalysts for long-term economic development (Gill, Pande, and Malhotra 2007; Onarheim, Iversen, and Bloom 2016). Increases in women's political representation have been shown to increase infrastructure investments in child health, leading to decreases in child mortality (Bhalotra and Clots-Figueras 2014), and to increases in children's educational attainment (Kose, Kuka, and Shenhav 2016). Moreover, at the micro level, higher maternal socio-economic status (SES) can lead to better outcomes for a woman's own children through the intergenerational transmission of SES.[2]

The degree to which parents' SES is predictive of their children's outcomes varies across time and place. The intergenerational transmission of education in particular has been widely studied—in part, because education is relatively easy to measure and can be observed early in the life cycle (Black and Devereux 2011). In a study of 42 countries surveyed mostly in the late 1990s and early 2000s, Hertz et al. (2007) find that the simple correlation between parents' and children's education ranges from 0.10 to 0.66. In the United States, there is some evidence that this correlation is increasing over time. In Figure I, I use data from the General Social Survey to show trends in the intergenerational transmission of education in the United States for birth cohorts born between 1915 and 1989 (divided into 5-year cohorts). The figure shows coefficients from regressions of children's' education on their mother's or father's education, where education is measured with an indicator for a high school degree. The predictive power of parental education was highest for the most recent cohorts, born in the late 1970s and 1980s,

[1] However, as Stevenson and Wolfers note, women's subjective well-being has paradoxically fallen over this period.

[2] Throughout this paper, socio-economic status (SES) is defined as a measure that captures class standing, based on an individual or household's education, income, occupation, and wealth.

with mothers' and fathers' education being equally predictive in recent years.[3] The correlation coefficient for mothers' education reached a peak of 0.36 for cohorts born between 1985 and 1989; for cohorts born between 1915 and 1974, the correlation between maternal education and the child's education had been stable at around 0.3. Critically, the consequences of a lack of mobility are likely to grow as household income inequality increases (Corak 2013).

In this chapter, I discuss how women's SES affects the well-being of their children. I begin by identifying several channels for this effect, drawing on both theoretical and empirical work in economics. I then present empirical evidence on the effects of maternal SES on child well-being, including birth outcomes, health, educational attainment, and labor market outcomes, focusing on recent work using new data sets and methodological innovations that allow for credible identification. In Section III, I highlight emerging evidence that shocks to maternal well-being can affect not only her own children, but future generations as well. I close by discussing areas for future work.

II. Maternal SES and Children's Well-Being

A. Potential Channels

Social scientists have long been interested in understanding the process of child development—what makes a child happy, healthy, and successful in childhood and beyond? Within economics, interest in the topic was spurred by Gary Becker's early work suggesting that parents invest resources in children in order to increase their "quality" (1960). Willis (1973) and Becker and Tomes (1976) proposed models of the child quality production function in which goods, parents' time, and the child's endowment were key inputs. More recently, empirical economists have used both structural and reduced-form approaches to quantify the relative

[3] Amin, Lundborg, and Rooth (2015) find that mothers' education is at least as important as fathers' in determining children's educational attainment in Sweden. Akarçay-Gürbüz and Polat (2016) reach a similar conclusion using data from Turkey. Beller (2009) argues that including mothers' characteristics produces a more accurate picture of SES than using fathers' characteristics alone (as is frequently done), and finds that failure to include mothers' characteristics has caused researchers to understate the degree to which intergenerational mobility has declined in the United States in recent years.

importance of different inputs and to estimate the child quality production function at different ages (Todd and Wolpin 2003; Reichman et al. 2009; Cunha, Heckman, and Schennach 2010; Aizer and Cunha 2012; Del Boca, Flinn, and Wiswall 2014).

A straightforward implication of this work is that differences by maternal SES in the quantity or quality of inputs, or in exposure to environmental or social factors that affect inputs, could generate a link between maternal SES and child well-being.[4] I now present both theoretical and empirical work on how these differences in inputs might be related to maternal SES. The aim of this section is to identify potential channels; much of the research described here documents differences in inputs by maternal SES, but does not attempt to establish a causal link between the two. In Section II.B. below, which considers the relationship between maternal SES and child outcomes directly, I discuss potential sources of bias in estimates of the effect of maternal SES and focus more exclusively on research that attempts to identify causal effects.

1. Quantity of Inputs

Perhaps the most straightforward channel by which improved women's well-being might translate to improved outcomes for children is through an increase in resources that are critical to child development. While the work described in the previous section has produced child quality production functions that have different functional forms or vary in the weights on different inputs, there is broad agreement about the importance of two particular inputs: money and time. Beginning with the first of these, Kornrich and Furstenberg (2013) use Consumer Expenditure Survey data to show that per-child spending on goods like education and child care was 8.8 times higher in households in the tenth decile of the U.S. income distribution than in the first. In 2006-2007, families in which the parents had a college education spent about $1,700 more each year per child than families where the parents did not have a high school degree. The positive relationship between maternal education and costly child inputs like health care persist even after controlling for differences in income (Strauss and Thomas 1995).

[4] In their article on the link between maternal SES and infant health at birth, Aizer and Currie (2014) identify poor health behaviors, environmental factors, access to medical care, and underlying maternal health as important channels. In this chapter I consider many measures of child well-being (including but not limited to infant health), so the discussion of potential channels is necessarily more general.

Parents' time has also been shown to be a valuable input into child well-being (Del Boca, Flinn, and Wiswall 2014). Quantity *and* quality of time seem to matter (where time spent on activities that promote child development are considered higher quality), and more-educated mothers have been shown to do more of both. For example, Guryan, Hurst, and Kearney (2008) use data from the American Time Use Survey to show that mothers with at least a college degree spend about 4.5 hours more per week on child care than mothers with a high school degree or less, despite the fact that they work more hours and have a higher opportunity cost of time. The differences are largest for time spent on educational or recreational activities. Sayer, Gauthier, and Furstenberg (2004) find a similar education gradient in mothers' time with children using data from Canada, Italy, Germany, and Norway. Kendig and Bianchi (2008) also use American Time Use Survey data to show that differences in time with children between married and single mothers are largely driven by differences in maternal SES.

As for the relationship between wages or income and time spent with children, economic theory yields ambiguous predictions. When women have higher earnings, they experience an income effect as they can afford more of this type of investment, but also a substitution effect as the opportunity cost of time with children rises. Intra-household time allocation may also be determined by household bargaining, which can, in turn, be responsive to changes in women's earnings. Using data from the United Kingdom, Kalenkoski, Ribar, and Stratton (2009) show that the relationship between women's potential earnings and time spent with children is generally positive, but small and not statistically significant, suggesting that income and substitution effects roughly offset one another. However, as women's household resources increase via an increase in partners' earnings, time spent with children increases.

2. Quality of Inputs

Improved maternal SES might also improve child outcomes if the *quality* of inputs increases. For example, given an additional dollar to spend on their child's health, more-educated parents might make higher-return investments (Cutler and Lleras-Muney 2010). When it comes to time, higher-SES parents may make better use of an additional hour spent with their children. Kalil, Ryan, and Corey (2012) use American Time Use Survey data to show that highly-educated mothers are more likely to spend time on developmentally appropriate activities with children of different ages (more time in basic care with very young children, more time

teaching with preschoolers, and more time in management activities with school-age children). These results are striking, as they reflect a high-SES advantage beyond the differences in time spent on quality activities mentioned above. That is, even for a given hour of "quality time," more-educated parents spend that time more productively.

A related issue is that even holding quantity and quality constant, the return to public investments in child well-being may be greater for more-educated mothers if mothers' education and public investments are complements in the production of child health. This could be the case if increased education improves the efficiency of these investments (see Barrera (1990), Strauss and Thomas (1995), and Cutler and Lleras-Muney (2006) for a discussion of this theory). Using the Brazilian Demographic and Health Survey, Thomas, Strauss, and Henriques (1991) regress child height on maternal education and other demographic and community-level controls. They show that even conditional on household income, there was a positive interaction between maternal education and community health or sanitation services, which they interpret as evidence that education helps women process information more effectively. Similarly, in a meta-analysis of the effectiveness of parent training programs, Leijten et al. (2013) find that disadvantaged families benefit equally in the short term but less in the long term, perhaps due to greater difficulty in maintaining treatment.[5]

3. Environment

Disadvantaged women and their children are more likely to experience poor environments—e.g., households with more stress or violence, or neighborhoods with more crime or environmental toxins. These differences in environment are sometimes present even before children are born. Aizer (2011) studies the effects of domestic violence on infant health outcomes in California. Because unobserved characteristics of the mother or her partner might be correlated with domestic violence behavior, which could cause bias in Ordinary Least Squares

[5] Note that studies that attempt to identify heterogeneous effects of public investments in child well-being often find that the effects are greatest for children of low-SES mothers. However, as Strauss and Thomas (1995) point out, this could be because any effect of complementarities between mothers' SES (in particular, education) and public investments could be dominated by price effects. Furthermore, for some public investments like information campaigns, the program could operate as a substitute for maternal education. Finally, if higher-SES mothers make more investments in their children, public investments could have larger effects for low-SES mothers if there are diminishing returns to investments.

estimates, Aizer uses a control function approach in which selection into violent relationships is influenced by the severity with which perpetrators of domestic violence are punished in one's jurisdiction. She shows that an admission to a hospital for domestic violence during pregnancy leads to a decrease in birth weight of 163 grams on average, and that "higher levels of violence observed among poor women can explain, in part, observed infant gradients in heath" (p. 519). In other work, Aizer, Stroud, and Buka (2016) use rich data that measures participants' levels of the stress hormone cortisol to examine the effect of stress on infant health; they find that disadvantaged women have higher and more variable cortisol levels (this study is discussed in more detail below). Buckles and Hungerman (2013) show that children of less-educated women are even more likely to be born in winter, when they are more likely to be exposed to adverse weather or disease environments.

Currie (2011) highlights differences in exposure to environmental pollution as a source of socio-economic inequality in birth outcomes. A large literature links prenatal exposure to pollution to worse infant health; Currie, Neidell, and Schmieder (2009) conclude that moving from an area with high carbon monoxide levels to one with low levels would have a larger benefit for infant health than going from smoking ten cigarettes per day during pregnancy to zero. Taking the cases of Superfund sites and the Environmental Protection Agency's Toxic Release Inventory, Currie provides evidence that high-SES mothers (and their unborn infants) are not only less likely to be exposed to pollution, but are also more likely to move in response to changes in pollution. This latter result is important for those working for "Environmental Justice" for disadvantaged families—it suggests that differential exposure to pollution is not driven by differences in where pollution sources are placed, but rather by differences in the ability or willingness to respond to new information about pollution hazards.[6]

[6] Currie's results suggest that more-educated mothers are better able to process information about health risks. Though not always directly related to child health, there is evidence supporting this hypothesis throughout the public health literature. For example, Shimshack, Ward, and Beatty (2007) find that consumers reduced canned fish purchases in response to mercury advisories from the Food and Drug Administration, but only among newspaper and magazine readers and parents with a college degree. Price and Simon (2009) found that the rate of vaginal birth after Cesarean (VBAC) dropped after a *New England Journal of Medicine* report highlighting their risks, and that the largest effects were for mothers with a graduate degree. Finally, Lleras-Muney and Lichtenberg (2005) show that more-educated people adopt newly-

4. Marriage

For recent cohorts in the United States and many other developed countries, there is a growing "marriage gap"—highly-educated women are more likely to form marriages or long-term partnerships, and are less likely to divorce (Pan et al. 2016; Bailey, Guldi, and Hershbein 2013; Isen and Stevenson 2010). Using data from the 2006-2010 National Survey of Family Growth, Copen et al. (2012) show that the fraction of women that have ever been married by age 40 increases with education (0.77 for those without a high school diploma, vs. 0.89 for those with a college degree). Furthermore, the fraction of marriages that last at least twenty years is twice as high among women with a college degree as it is among women who did not graduate high school (0.78 vs. 0.39). Racial gaps in marriage rates have also grown—non-Hispanic whites are now 39 percent more likely to have been married by age 40 than non-Hispanic blacks.

If marriage is good for children, these differences provide an additional channel by which high maternal SES can translate into better outcomes for children. (Duncan, Wilkerson, and England 2006; Buckles and Price 2013). There are several ways in which marriage might benefit children. It could introduce economies of scale (e.g. married couples can share housing, durable goods, etc.) or gains from specialization that free up resources that can then be invested in child well-being. Marriage might also come with social expectations and obligations that serve to benefit children (e.g. spending time at home). Children in married families could have access to larger family networks that provide additional resources, or to legal financial protections like child support in the event that the parents' relationship dissolves. Finally, Weiss and Willis (1985) argue that if parents treat children as a collective good, marriage will benefit children as it allows parents to overcome the free-rider problem inherent with collective goods. That is, the fact that both parents benefit from increased investment in children, even if they do not invest themselves, can lead to under-investment. Marriage alleviates this problem by providing opportunities for parents to monitor one another's behavior and enforce agreements.

The empirical evidence consistently shows that married parents do invest more resources in their children. Meyer and Sullivan (2004) use Consumer Expenditure Survey data to show

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approved drugs more quickly, and provide evidence that education reduces the cost of searching for better treatments.

that quarterly consumption was 78% higher in households with a married mother compared to those with a single mother between 1996 and 2000, with higher spending on food, housing, and child care. Kalil, Ryan, and Chor (2014) compared total time spent in caregiving activities with children across several different family structures, and found that total time was highest for children whose biological parents were married, and lowest for children of single mothers living alone. Even after conditioning on maternal characteristics like age, education, and number of children, the children of married parents received 28% more time (or nearly one hour per day) than children of single mothers. Finally, after controlling for maternal age, ethnicity, and education, single or cohabiting mothers are more likely to continue smoking during pregnancy and are less likely to breastfeed their infants than married mothers (Kiernan and Pickett 2006).

B. Empirical Evidence on the Effects of Maternal SES on Child Outcomes

The previous section highlighted the relationship between mothers' SES and factors that determine child well-being. I now discuss empirical work on the effects of mothers' SES on outcomes directly, including birth outcomes, health, educational attainment, and labor market success. Empirical work in this area faces two key methodological challenges. First, work on the relationship between maternal SES and child outcomes requires data sets (sometimes very large) that allow mothers to be linked to their children. This is a particular challenge when the outcome of interest is observed later in the child's life, as with educational attainment, wages, or adult health. Progress has been made on this dimension in recent years, as researchers are increasingly able to link multiple data sources.

Second, maternal SES is almost certainly endogenous to child outcomes. That is, there may be factors—often unobservable to the researcher—that determine child outcomes but are also correlated with a woman's SES.[7] For example, a woman's cognitive ability might positively affect both her own educational attainment, and that of her children through her genes. If the researcher is unable to control for cognitive ability, this will cause estimates of the effect of the mother's education on her children's attainment to suffer from omitted variables bias (in this case, causing her to overstate the effect of mothers' education). Other potential omitted variables include preferences, other dimensions of ability or health, and family background. Furthermore,

[7] See Duncan et al. (1998) for a helpful discussion of omitted variables bias in estimates of the effect of SES during childhood on outcomes.

mothers and their children often share a common economic or social environment (for example, one that values education relatively highly), which could also lead researchers to overstate the strength of the causal relationship between mothers' education and child attainment.

Social scientists have used a variety of tools to address this issue. One strategy is to use fixed-effects models, which compare siblings who experienced different socio-economic environments (usually income or poverty status) at specific points in their lives (Conley and Bennet, 2000; Duncan et al. 1998). This strategy eliminates omitted variables bias due to characteristics that are common within families, but results may still be biased by within-family variation in unobservable characteristics. More recently, economists have turned to "natural experiments" that exploit plausibly exogenous variation in maternal SES or resources, often from public policy or from natural events. In some applications, the policy or event effectively creates an experiment in which the treatment (maternal SES) is randomly assigned. For example, in two of the studies referenced below, the fact that adopted children are randomly assigned to adoptive parents allows the researchers to document the effects of being assigned to a high- vs. low-SES family. In other cases, researchers use an instrumental variables strategy, in which the policy or event (the instrument) is shown to affect treatment status but is assumed to be otherwise unrelated to child outcomes. The researcher then concludes that any observed differences in outcomes are due to the differences in treatment induced by the instrument. Much of the work featured in this section uses a natural experiment approach.

1. Birth outcomes

A large literature in economics and other disciplines has determined that health at birth is a strong predictor of later life outcomes, including educational attainment, success in the labor market, and health over the life-cycle (Almond, Chay, and Lee 2005; Black, Devereux, and Salvanes 2007). One influential explanation for this link is Barker's fetal origins hypothesis, in which Barker posited that many later-life diseases are a result of injuries or nutritional deficiencies experienced *in utero* (Barker, 1990). Economists have expanded this work to examine the effects of *in utero* conditions on education, cognitive ability, and success in the labor market (Almond and Currie, 2011). The causal link between *in utero* conditions and these outcomes has been established using quasi-experimental variation induced by, for example, nutritional intake during Ramadan (Almond and Mazumder, 2011), exposure to influenza

(Almond, 2006), or parental job loss (Lindo, 2011). This work has motivated a second literature, now also well-developed, on estimating the effects of maternal SES on infant health outcomes like birth weight and gestation. This research has been reviewed extensively elsewhere, including Currie (2011) and Aizer and Currie (2014); the general finding is that maternal disadvantage contributes to poor health at birth, though inequality in birth outcomes has not grown as quickly as inequality along other dimensions in recent years.

Which of the channels in the previous section play a role in generating these SES differences in infant health? Certainly the quantity and quality of inputs like nutrition and prenatal care is higher for high SES mothers. For example, Currie and Moretti (2003) use proximity to a college or university as an instrument for college-going (their measure of SES), and show that increased maternal education led to more prenatal visits and less prenatal smoking (a "negative input" into infant health), which in turn led to better infant health. The effects are large; a one year increase in maternal education is predicted to decrease the probability of low birth weight by about 0.01, relative to a mean of about 0.05. In their study using within-mother variation in cortisol levels across pregnancies, Aizer, Stroud, and Buka (2015) conclude that even short-term exposure to stressful shocks can hinder child development, and that "not only are mothers with low levels of human capital characterized by higher and more variable cortisol levels, but that the negative impact of elevated cortisol on their offspring is greater. These results suggest that maternal stress may play a role in the intergenerational persistence of poverty" (p. 523). Finally, Buckles and Price (2013) document a large marriage premium for infant health—the difference in birth weight and gestation between married and unmarried mothers in the United States is as large as the difference between smokers and non-smokers. However, using variation in marital status across matched sibling pairs, they conclude that most of the marriage premium—and perhaps all of it in recent years—is due to positive selection into marriage. That is, marriage does not appear to have an independent effect on infant health beyond its association with other measures of maternal SES.

2. Health in Childhood and Beyond

The health disadvantages that children born to low-SES women experience at birth

extend into childhood.[8] Currie (2009) summarizes the evidence linking maternal SES to child health outcomes including asthma, obesity, injury, mental health, and developmental delays. She cites work from developing countries that exploits exogenous changes to women's income or education to identify causal effects—for example, a policy change that increased pensions for black women in South Africa was shown to increase girls' height (Duflo 2000). More recently, researchers have used exogenous variation in maternal education generated by compulsory schooling reforms to consider the effects of maternal education on child health and typically find modest positive effects (see Rawlings (2015) and Gunes (2015) for results from China and Turkey, respectively).

Given the cumulative nature of health capital, the relationship between maternal SES and health is likely to persist throughout the life cycle. Indeed, there are strong correlations between SES during childhood and adult health and mortality (Cohen et al. 2010; Elo, Martkainen, and Myrskylä 2014). However, parent health is a potentially important omitted variable here, as it is likely correlated with parents' education or income, and may also be a determinant of health in adulthood through genetic channels. To address this, Aizer et al. (2014) study applicants to the Mothers' Pension Program, which was an early form of welfare in the United States that operated from 1911 to 1935. Maximum monthly benefits varied by state and ranged from $10 to $35. The authors compare the children of rejected and accepted applicants to the program, and find that the sons of accepted mothers lived a year longer on average, due to increases in childhood nutrition, educational attainment, and income in adulthood.[9]

Two additional studies have used Swedish data in innovative ways to isolate the causal effects of parents' SES on children's health. The advantage of the Swedish data (and of data from other countries like Norway and Denmark) is that many administrative data sets include a personal identification number that allows the researcher to track an individual through time and across data sets. Lundborg, Nilsson, and Rooth (2014) link military enlistment records to registry data, and exploit variation in parental education generated by schooling reforms in Sweden. They find that mothers' education (and not fathers') increases a child's height and

[8] See Almond, Currie, and Duque (2017) for a conceptual model of the production of health, as a function of inputs during childhood and *in utero*.
[9] Note that the rejected mothers appear to have been slightly better off than the rejected mothers, which would bias the results against finding a protective effect of the program.

overall health in young adulthood. Lindahl et al. (2016) also use Swedish registry data, linking adult health and mortality to information on biological and adoptive parents' SES for a large sample of adoptees. They are therefore able to disentangle the influence of biological and social/environmental influences during childhood. Furthermore, the fact that adoptive parents are effectively randomly assigned in this setting provides a "natural experiment" that allows for the causal estimation of the adoptive parents' SES on health. The authors find that the education of the adoptive mother is the strongest predictor of the adopted child's mortality between the ages of 45 and 73—"an extra year of education for the adopting mother decreases the mortality probability by 2.9-4.6 percent" (p. 25). Higher education for the adoptive mother also decreases hospitalizations at these ages.

3. Education and Cognitive Ability

Children of less-educated or lower-income mothers are also less successful in school and have lower educational attainment. These differences show up before children even enroll in formal schooling. In the United States, "Fewer than half (48 percent) of poor children are ready for school at age five, compared to 75 percent of children from families with moderate and high income" (Isaacs 2012, p. 1), where school readiness is a measure of academic skills, behavior, and health. This readiness gap is due at least in part to the infant and child health discrepancies described above (Currie 2005). Turning to later measures of educational attainment, for the 1979-1982 birth cohorts, children from households with income in the top quartile were 45 percentage points more likely to complete college than those from the lowest quartile—a gap that has grown over time (Bailey and Dynarski 2011). Even when children from disadvantaged households do complete college, the returns to their degree are lower on average when compared to children from higher-income households (Bartik and Hershbein 2016).

Using the same strategy as Lindahl et al. (2016), economists have used data on adopted children to examine the *causal* effects of parental SES on children's education. Bjorklund, Lindahl, and Plug (2006) show that education is transmitted to children through both biological and adoptive parents, and through both mothers and fathers. For example, being adopted by a mother with a university degree increases the likelihood that a child also attains a university degree by 0.145. Moreover, there is a positive and statistically significant interaction between

the biological and adoptive mothers' educational attainment, suggesting that the benefit of an additional year of education from the *biological* mother is greater for children adopted by more-educated women. Sacerdote (2007) uses similar data on Korean American adoptees and finds that "assignment to a small, high education family relative to a lesser educated, large family increases educational attainment by .75 years and raises the probability of graduating from college by 16.1 percentage points. The probability of graduating from a US News Ranked college is increased by 23.1 percentage points relative to a mean of 37.3" (p. 145).

Outside of this work using data on adopted children, researchers have exploited other sources of exogenous variation in mothers' SES to study this question. Akee et al. (2010) show that increases in household income from transfer payments from casino profits led to large increases in educational attainment; an additional $4000 increased education by age 21 by one year for the poorest households. Using variation in household income driven by Earned Income Tax Credit policy, Dahl and Lochner (2017) find that a similar $4000 increase in household income would increase combined math and reading test scores by about 0.16 standard deviations; they also find larger effects for children from more disadvantaged families. Further work on the relationship between maternal SES and educational attainment could shed light on the sources of racial or gender gaps in education. For example, Autor et al. (2016) conclude that boys respond more negatively to family disadvantage (primarily low maternal education and absence of the father), which contributes to gender gaps in behavior problems, academic achievement, and high school completion.

4. Labor Market Outcomes and Poverty

Because health and education are two key determinants of human capital, the preceding sections suggest that maternal SES is likely to affect labor market outcomes as well. In their review article "The Importance of Early Childhood Poverty," Duncan et al. (2012) provide evidence that "compared with children whose families had incomes of at least twice the poverty line during their early childhood, poor children . . . earned less than half as much, worked 451 fewer hours per year, [and] received $826 per year more in food stamps as adults" (p. 93). There is some evidence of a causal link here as well, in part from some of the studies described above. For example, Bjorklund et al. (2006) also look at labor market outcomes in

their study of adopted children in Sweden. The authors are only able to look at the intergenerational transmission of fathers' income, but they find links that are stronger for adoptive fathers than for biological fathers. However, Sacerdote (2007) finds little relationship between adopted children's household income and their adopted parents' SES. Akee et al. (2010) show that increases in household income from casino profits also led to decreases in minor criminality and drug dealing (where criminality is not a labor market outcome per se, but may be a proxy for labor market opportunities given that crime is an alternative to formal labor market participation).

Beyond those studies on the effects of parental income and education, there is recent work showing that women's labor force participation could have important benefits for her children's long-term economic well-being. McGinn, Castro, and Lingo (2015) document that across 24 countries, "adult daughters of employed mothers are more likely to be employed, more likely to hold supervisory responsibility if employed, work more hours, and earn marginally higher wages than women whose mothers stayed home fulltime" (p. 1). Herbst (2017) provides evidence of a causal link in his work on the effects of the Lanham Act, which subsidized child care for women in the 1940s and substantially increased labor force participation among the affected women. He shows that this increase in turn led to long-run increases in employment and earnings and decreases in reliance on public assistance for the women's children. Fernandez, Fogli, and Olivetti (2004) use variation in women's labor force participation driven by World War II to show that when women work, their sons are more likely to marry women who also work—likely leading to higher household incomes and initiating a cycle of increasing female labor force participation.

III. Evidence on Future Generations

Recent work in economics has combined creative identification strategies with rich data that allows for linking families to explore the causal effects of a shock to maternal SES on multiple generations. The evidence in Section II suggests a direct channel for these effects—if improvements in maternal SES (as measured by educational attainment or income) improve the health, educational attainment, and labor market success of her children, then we would also

expect to see benefits for her *children's* children. Gene-environment interactions provide another, less obvious channel—shocks to maternal environment that are either caused by or correlated with her SES can alter her epigenome, which determines which genes are expressed (Currie 2011). This genetic variation can be passed on to future generations.

Most work in this area has examined how shocks to a mother's SES or environment affect not only her child that is *in utero* at the time of the shock, but also her grandchildren. We have already seen that poor maternal SES contributes to adverse birth outcomes like low birth weight; studies linking mothers' and children's birth weights have used family fixed-effects or natural experiment strategies to show that women who are born with low birth weight due to low maternal SES are themselves more likely to have low birth weight children (Almond and Chay 2006; Currie and Moretti 2007; Johnson and Schoeni 2007). Critically, these effects interact with SES—Conley and Bennett (2001) use sibling fixed effects models and conclude that "maternal income has a significant impact on birth weight for those infants who are already at high risk hereditarily (i.e., who have a low birth weight parent)" (p. 450).

A closely related literature is emerging that explores how events that expose women to environmental hazards or stress during pregnancy affect her *in utero* children and her future grandchildren. These include events that expose women to environmental hazards or stress. While these are not shocks to SES *per se*, we have seen that both stress and environment are correlated with SES, and also that the same shock can have worse effects for low-SES women. For example, previous work has shown that *in utero* exposure to the 1918 influenza pandemic had lasting negative effects on educational attainment, wages, and health in many countries (Richter and Robling 2013). Richter and Robling extend this work to the next generation, and show that "potential maternal *in utero* exposure to the Spanish flu lowers educational attainment by 2-2.5 months (1.5-1.8%) of schooling and decreases the probability of college attendance by about 10-12% for female offspring" (p. 1). Similarly, Almond, Currie, and Herrmann (2012) use race-state-year post-neonatal mortality rates as a proxy for disease environment, and find that not only do women who experience a high disease environment in early childhood have worse health and lower SES in adulthood, but their children are more likely to be born with low birth weight. Last, Black et al. (2015) study the long-term effects of radioactive exposure from nuclear weapon testing in Norway in the 1950s and 60s. Men and women who were *in utero* at the time

of exposure had lower educational attainment and earnings, and men had lower IQ scores.[10] Moreover, the *sons* of those men and women also had lower IQ scores.

Finally, a few studies have examined the effects of maternal SES on her children and her children's children through channels other than the *in utero* environment. This work has been limited by the need for data on SES across three generations. Olivetti, Paserman, and Salisbury (2016) solve this problem by linking multiple generations using the United States Census from 1850 to 1940 and by using first names as a proxy for SES. While they are only able to examine the influence of grandfathers (and not grandmothers, which would be more directly relevant for this chapter), they nevertheless provide some of the first evidence of the multi-generational transmission of SES. They find that "grandfathers matter for income transmission, above and beyond their effect on fathers' income" and that "maternal grandfathers are more important for granddaughters than for grandsons, while the opposite is true for paternal grandfathers" (p. 1). In their paper described above, Lindahl et al. (2016) also examine birth outcomes for infants born to adopted children. The health of the adopted child's *biological* parents (as measured by mortality) is highly predictive of health at birth for the adoptee's own children. However, for the adoptive parents, it is greater educational attainment that leads to higher birth weights for their daughter's children.

IV. Avenues for Future Work

Much of the strong empirical work referenced in the previous section is very recent—published within the last five years, or in some cases not yet published at all. There is a reason for this, beyond my interest in describing the current state of the literature. The creation and innovative use of rich data sets has breathed new life into the study of the relationship between maternal SES and child well-being. These data should allow researchers to better understand which of the various channels that transmit SES to the next generation and beyond are most important and how they work together, or to explore heterogeneity in the effects of SES across groups within countries. There may also be heterogeneity in the effects of maternal SES *across*

[10] Cognitive test scores are taken from military enlistment data and so a usable sample can only be constructed for men.

countries that researchers will begin to uncover as the work of linking data sets that has already had great payoffs in countries like Norway and Sweden expands to other parts of the world. Here, I will briefly highlight four additional areas for future work as data and methods improve.

A. Gene-Environment Interactions

In their Swedish adoption study, Bjorklund, Lindahl, and Plug (2006) found that both biological and adoptive parents' SES were important determinants of child outcomes, and that there was a significant interaction between the two. A geneticist might explain this result by saying that a phenotype (expression of a characteristic or trait) is the product of the genotype (the genetic code coming from the biological parents), the environment (from the adoptive parent), and epigenetics (the interaction term, which determines how genes are expressed). Until recently, social scientists have had to rely on adoption or twin studies to try to understand the relative importance of these factors and how they interact to produce economically relevant traits. However, as the costs of collecting DNA have fallen, the number of data sets that provide this information has grown. In the United States, several large data sets like the National Longitudinal Survey of Adolescent Health (AddHealth), the Health and Retirement Study, and Fragile Families now include information on respondents' DNA (Fletcher and Conley 2013). These data might be used to understand how genetic endowments and environment interact to produce the intergenerational transmission of SES. As an early example, Cook and Fletcher (2014) use DNA data available in the Wisconsin Longitudinal Study to show that increases in birth weight have larger effects on children's IQ when the children have a specific gene variant, though the result is attenuated when sibling fixed-effects are included.[11]

B. Changing Family Structure

The past several decades have seen dramatic changes in family structure around the developed world—women are marrying later and having children later, children are more likely to be born to unmarried parents, and family size has fallen (though it has rebounded slightly in recent years) (Stevenson and Wolfers 2007; Luci and Thévenon 2011). How might these changes affect the relationship between maternal SES and child well-being? On the one hand,

[11] The forthcoming book "The Genome Factor" by Dalton Conley and Jason Fletcher (2017) describes the opportunities and challenges as social scientists begin to make use of DNA data.

children in households with limited resources might benefit from smaller families, as those resources are shared by fewer siblings. On the other, the increase in nonmarital childbearing—which is stronger among low-SES groups—might mean fewer resources for children. Because earnings gaps between more- and less-educated women grow throughout the 20s and 30s, the trend toward later childbearing could exacerbate SES differences in infant and child outcomes. In the coming years, social scientists should continue to try to understand the full ramifications of changing family structure, including its effects on the relationship between maternal SES and child well-being.

C. The Role of Public Policy

Much research has been done on how public safety-net programs affect the well-being of women and their children (see Bailey and Danziger (2013) and Nichols and Rothstein (2015) for recent reviews of the effects of U.S. policy). But within this literature, two areas relevant to the question of the intergenerational transmission of SES seem ripe for further study. First, to what extent do public programs like welfare, or the provision of free or subsidized education (from preschool to college), mitigate the relationship between maternal SES and child well-being? For example, economic theory predicts that increased public provision of education should reduce the intergenerational transmission of SES (Ichino, Karabarbounis, and Moretti 2011; Arawatari and Ono 2013), but there is a lack of strong empirical evidence to support this. Second, is program participation itself transmitted from mother to child? Hartley, Lamarche, and Ziliak (2016) use the Panel Study of Income Dynamics to study this latter question. They use variation in mothers' welfare participation (broadly defined) generated by differences across states in the timing of welfare reform, and find that the transmission of program participation is small and largely driven by the transmission of poverty status. More work is needed to know whether this result generalizes to other programs or other settings.

D. Double disadvantage

Finally, a number of the studies referenced above find evidence of a "double disadvantage" for children born with adverse health conditions in low-SES families (see Beach and Saavedra (2015) and Guldi et al. (2016) for additional evidence). That is, the negative effects of poor infant health (which itself is partially caused by low-SES) are greater for children

born to low-SES families. As Aizer and Currie (2014) explain, "the available evidence suggests that the initial health disadvantages associated with being born to a poor mother are likely to be exacerbated over time" (p. 860). This is not only because of the differences in resources or environment that contributed to the initial gap, but also because "the investments they do receive may be less effective" (p. 860). Future work should identify policies or practices that might help these especially vulnerable children.

V. Conclusion

A rich literature in economics and the social sciences has posited that improvements in women's SES might also improve the well-being of their children. In this chapter, I have discussed several potential channels for a causal effect of maternal SES on child outcomes, drawing on theoretical work in economics that has modeled how various inputs work together in the production of child quality, and on empirical work that has established correlations between maternal SES and the quantity or quality of these inputs. I have also highlighted research linking maternal SES to children's environments—both within the home (e.g. family structure or stress) and outside it (e.g. pollution).

Establishing a causal relationship between maternal SES and child outcomes like educational attainment, health, and labor market success is difficult, as there may be factors—often unobservable to researchers—that determine child outcomes but are also correlated with a woman's SES. Recent work, however, has used new data sets and methodological innovations to address this challenge. Taken as a whole, the evidence suggests that higher maternal SES (as measured by education and income in particular) leads to better outcomes for her children. Moreover, there is emerging evidence that shocks to maternal well-being can affect not only a woman's own children, but future generations as well. As a result, efforts to improve women's socio-economic well-being may yield benefits for generations to come.

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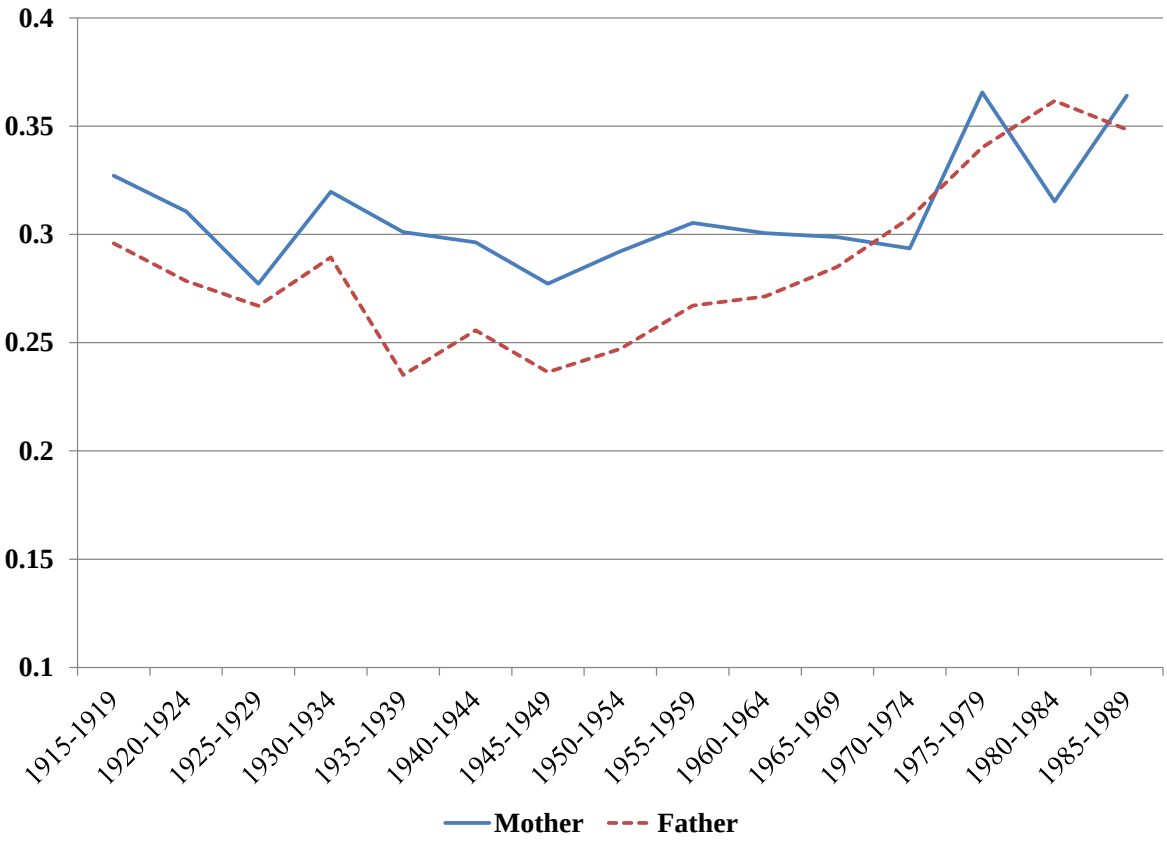
Figure I: Intergenerational Correlations in Educational Attainment in the United States, by Birth Cohort



Notes: Figure shows the correlation coefficient between each parent's educational attainment and the child's, where educational attainment is measured as a dummy variable indicating completion of a high school degree. Data are from the General Social Survey from 1972-2014, collapsed into 5-year birth cohorts by the child's year of birth.