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Teen Birth Across Generations Among Non-Latino Whites and African–American Women: The Effect of Race and Neighborhood Income

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Abstract

Objectives To examine the extent to which lifelong neighborhood income modifies the generational association of teen birth among White and AA women in Cook County, IL.

Methods Stratified and multilevel logistic regression analyses were conducted on the Illinois transgenerational dataset of singleton births (1989–1991) to non-Latina White and AA mothers (born 1956–1976) with appended U.S. census income information. We calculated rates and risks of teen births according to race, maternal age, and lifelong neighborhood economic environment.

Results Teen birth occurred at a rate of 9.5% and 52.9% for White and AA women, respectively. White women whose mothers were teens when they were born had an over five-fold increased risk of becoming teen mothers themselves. For AA women, the risk was smaller, but statistically significant. For both races, women who experienced downward economic mobility had the highest risk of teen birth, while women with upward mobility had the lowest risk, even compared to women in lifelong high income neighborhoods. While White women exposed to lifelong low income had almost threefold increased risk of teen birth compared to those in lifelong high income neighborhoods, AA women in lifelong high and lifelong low income neighborhoods had similar risk of teen birth.

Conclusions for Practice Understanding the racial differences in intergenerational patterns of teen birth is important for effective program planning and policy making, given that interventions targeted at daughters of teen mothers may differ in effectiveness for White and AA teens.

Keywords Teen birth · Racial disparity · Neighborhood economic environment

Introduction

Though the teen birth rate has decreased to record low (Martin et al., 2019) numbers, the U.S. continues to have one of the highest teen birth rates among 15–19 years olds compared to any country in the industrialized world (Sedgh et al., 2015; Singh et al., 2001) with 179,871 births to 15–19 year olds (Martin et al., 2019) in 2018. This is largely attributed to the high prevalence of economic disadvantage coupled with the high teen birth rate among the disadvantaged (Singh et al., 2001).

The U.S. teen birth rate is characterized by a stark racial disparity for African-Americans (26.3 per 1000) compared to whites (12.1 per 1000)(Martin et al., 2019). It has been suggested that reasons for this disparity include differential access to resources, education, and economic opportunities that influence teen birth(Henly, 1993). For example, African-Americans in the U.S. are more likely than whites to grow up in impoverished neighborhoods and less likely to be exposed to individuals in "high status" jobs who may encourage them to delay childbearing (Henly, 1993).

Previous studies have identified several factors contributing to teenage pregnancy among African-American females living in economically disadvantaged communities. These include parental involvement, peer influences, lack of knowledge and information about sex, and substance use including alcohol use (Afable-Munsuz et al., 2006; Secor-Turner et al., 2011; Stueve & O'Donnell, 2005). In addition, health

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reasons may be another motivation toward earlier childbearing for African-Americans, who have a shorter life expectancy (Geronimus et al., 1996) and more optimal birth outcomes at earlier ages (Geronimus, 1992) than their white counterparts. The weathering hypothesis (Geronimus, 1992; Geronimus et al., 2006) has been supported by evidence showing the high incidence of chronic conditions among African-Americans even in their mid to late 20s - which is considered the optimal childbearing age for white women (Schummers et al., 2018, 2019) - leading to poorer birth outcomes than African-Americans in their teens.

For both whites and African-Americans, daughters of teen mothers have a higher propensity to become pregnant or bear children as teens themselves (Card, 1981; Coley & Chase-Lansdale, 1998; Hardy et al., 1998; Hellerstedt et al., 2000; Kiernan, 1997) and have more children by age 30 than daughters of non-teen mothers (Card, 1981). The reason for this intergenerational pattern is not completely understood. It may be due to the direct effect of teen motherhood, or may be the result of background characteristics that led women to bear children early in both generations (Hardy et al., 1998; Liu et al., 2018). Notably, the economic consequences of teen birth seem to be amplified across generations (Furstenberg et al., 1990; Hardy et al., 1998), though it is unclear whether this is the result of transgenerational exposure to poverty, disadvantage and the declining economic conditions over time among the very poor (Henly, 1997), or the direct results of adolescent childbearing.

Intergenerational patterns of teen birth are complex, as is the role of economic status in early childbearing. However, to our knowledge, no study to date has determined the extent to which intergenerational teen birth is affected by race and lifelong neighborhood income. Therefore, we designed a repeated cross-sectional population-based study to understand whether the relationship between having a teen mother and becoming a teen mother herself is modified by a woman's lifelong neighborhood economic environment. These relationships were explored separately for non-Latina whites and non-Latina African-Americans, to acknowledge the different circumstances, antecedents and consequences associated with teen birth across racial groups.

Methods

Illinois Transgenerational Birth File

A detailed description of the Illinois Transgenerational Birth File has been previously published (David et al., 2010). Briefly, records of live births in Illinois from 1989 to 1991 were linked to birth certificates of their mothers born in Illinois from 1956 to 1976. There were approximately 328,000 singleton infants in the 1989–1991 cohort with mothers born in Illinois between 1956 and 1976. Overall, a linkage rate of 78% was achieved in constructing the file, using a deterministic approach with mother's maiden name and exact date of birth. There was successful linkage of 267,303 generation-three (G3) infants' (born 1989–1991) vital records linked to their generation-two (G2) mothers' (born 1956–1976) vital records (Fig. 1).

For the 1989–1991 G3 birth cohort born in the city of Chicago, we appended 1990 U.S. census median family income information to each birth record based on census tract of residence on the birth certificate within the city of Chicago. For the 1956–1961 G2 birth cohort born in Chicago, we appended 1960 U.S. census income to each birth

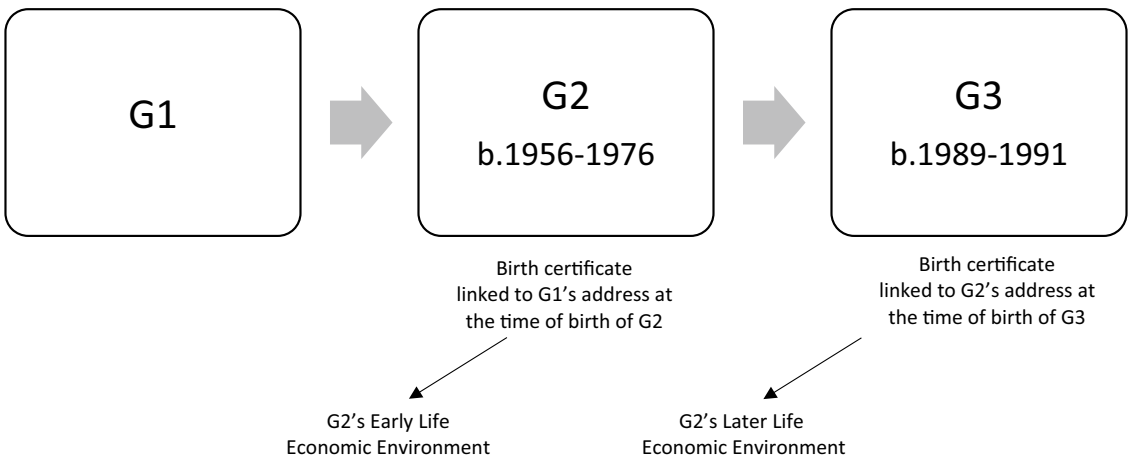

Fig. 1 Relationship between mother's age of Generation 1 and teen birth to Generation 2 by race

record by community area which includes approximately ten census tracts, as census tract information was not coded(David et al., 2010). For the cohort born in Chicago between 1961 and 1976, the 1960 and 1970 median family income of census tract residence was appended to the records. In Chicago, there are 873 census tracts and 77 community areas. For births to women in the collar counties or suburban Cook County, outside the Chicago city limits, we used the smallest available geographic unit (town, township or village) to approximate neighborhood income.

Study Sample

For this study, the sample was restricted to those with linked economic data, which were Chicago-born non-Latina white (n = 10,973) and African-American (n = 11,371) primiparous women (Generation 2, G2), born in Chicago between 1956 and 1976, who lived in Cook County when they gave birth to G3 between 1989 and 1991 (Fig. 1). Of these, 1.5% of whites and 2.8% of African-Americans were excluded due to missing geographic codes and associated census income data, for a total sample size of 10,802 and 11,047 for whites and African-Americans, respectively.

The outcome variable was defined as delivery of a G2 woman's first infant before the age of 20 (vs. ≥ 20) between 1989 and 1991. The primary exposure variable was defined as having a mother (G1) who was a teen when the G2 woman herself was born between 1956 and 1976. Teen motherhood by G2 was divided into categories for maternal ages of < 18, 18–19 and 20+.

Lifelong Neighborhood Economic Environment

Lifelong neighborhood economic environment was conceptualized as a potential effect modifier of the intergenerational association of teen birth. To create this variable, the continuous measure of census tract/community area median family income was divided into quartiles separately for the time of the mother's birth (i.e. "early life") and at the time of her infant's birth (i.e. adulthood, "later life"). Given the very small sample sizes among white women experiencing the lowest income level (quartile 1) in both generations and among African-American women experiencing the highest income level (quartile 4) in both generations, quartiles 1 and 2 (lower 50%) and quartiles 3 and 4 (upper 50%) were collapsed for analysis. Four economic environments over mothers' lifetimes were defined: lifelong high income (upper 50% of neighborhoods at birth and delivery), upward mobility (lower 50% at birth and upper 50% at delivery), downward mobility (upper 50% at birth and lower 50% at delivery), and lifelong poverty (lower 50% at birth and delivery). The income cut-off points (i.e. the medians) were $27,427 for the 1956–76 generation and $35,427 for the 1989–91 births, both expressed in 1989 dollars.

Statistical Analysis

Study population characteristics were compared by race using chi-square tests. The effect of G1's age on subsequent neighborhood economic environment of G2 was examined for those in early life low income and high income neighborhoods using Mantel-Haenszel chi-square tests for trend. Teen birth rates were categorized by maternal age of G2 at the time they gave birth to G3, in addition to categories of lifelong neighborhood economic environment. Chi-square tests (alpha = 0.05) were used to test for the significance of differences in teen birth rates.

To investigate the independent association between G1 women's age at delivery and G2 women's teen birth, we performed multivariate logistic regression analyses. Race-specific multilevel log-linear regression models with random intercepts to account for the clustering of teen births (level 1) within neighborhoods (level 2) were constructed (Snijders, 1999) to estimate the odds ratio for teen birth by G2, comparing ages of < 18 and 18–19 to age ≥ 20. We built two-level hierarchical models to investigate the relationship between teen birth by G2 and their neighborhood economic environment at both levels. Models were fit to assess the association between teen birth, race and teen birth using PROC GLIMMIX in SAS; multilevel logistic regression models incorporated randomly distributed census tract-specific intercepts assuming a binary distribution and a logit link function. After ruling out effect modification ($p > 0.10$ for interaction terms between G1's age and each category of economic environment), economic environment was added as an independent variable to the model in order to estimate its independent effect on teen birth, after controlling for the effect of having a teen mother. Parity was controlled in all models. The adjusted odds ratios (OR) and 95% confidence intervals (CI) were generated from the final models by taking the antilogarithm of the Beta-coefficients for each independent variable and the CI for those coefficients. All analyses were performed using SAS 9.2.

Covariates were limited for this analysis, given the administrative nature of the data and the fact that most of the variables available on the birth certificate measure factors that take place after conception (e.g. prenatal care) or are inextricably linked with age at birth (e.g. education level). Relevant covariates from the G2 woman's birth certificate were limited by missing or incomplete data elements on birth certificates for earlier years due to data storage limitations (David et al., 2010). Therefore, the only covariate available for this analysis was G1's parity (primiparous, 1–2 or 3 + previous livebirths) at the time of the G2 woman's birth.

Table 1 Characteristics of Generation 1 (b. 1956–1976) and Generation 2 (b.1989–1991) non-Latina White and African-American women in Cook County, Illinois

Characteristics	Whites (n = 10,802) %	African-Americans (n = 11,047) %
G1's age at delivery of G2 (years)		
< 18	1.9	15.4
18–19	6.4	15.2
20–24	32.8	32.0
25–35	46.1	30.3
> 35	12.7	7.2
G1's parity at delivery of G2		
Zero	29.0	29.2
Low (1–2 previous)	45.5	37.7
High (3 + previous)	25.5	33.1
G2's Age at delivery of G3		
< 18	3.5	32.8
18–19	6.0	20.1
20–24	21.6	27.6
25–35	68.9	19.6
Lifelong neighborhood economic environment of G2		
Lifelong low income	4.4	57.2
Early high/later low income	13.7	11.0
Early low/later high income	15.4	24.4
Lifelong high income	66.6	7.5

Generation 2(G2) = births from 1956–1976

Generation 3(G3) = births from 1989–1991

Differences in characteristics between Whites and African-Americans are all significant (Chi-square p value <0.05)

A sensitivity analysis was performed for the final model, using < 18 instead of < 20 as the cut-off for teen birth to G3.

All analyses were stratified by race, which was defined by mother's race as listed on the infant's birth certificate (non-Latina white or African-American).

The institutional review board of Children's Memorial Hospital (now called the Ann and Robert H. Lurie Children's Hospital of Chicago) institutional review board approved the study.

Results

Table 1 shows the characteristics and lifelong neighborhood economic environment for white and African-American G2 women who gave birth between 1989 and 1991. While over 30% of G2 African-American women were born to G1 teenage women, only about 8% of G2 white women were born to G1 teenage women. Differences in G1 women's parity were less pronounced, but African-American G2 women were slightly more likely to be born to women of higher parity. Similar to the age distribution for G1 women, less than 10% of G2 white women became teen mothers, while over half (52.9%) of G2 African-American women became teen mothers. The majority of G2 African-American women were exposed to low income neighborhoods throughout their lifetimes, while two-thirds of white women had lifelong exposure to high income neighborhoods.

Proportions of G2 women's lifetime neighborhood economic environment, from the time of their own birth, to the time of their delivery of G3, are shown in Table 2. For white G2 women, their delivery of G3 at teenage years was

Table 2 Proportion of G2 women in early and later life neighborhood economic environments giving birth to G3, by race and age

Early life neighborhood economic environment	Later life neighborhood economic environment			
	Whites		African-Americans	
	Later low income %	Later high income %	Later low income %	Later high income %
Early life low income G2 women Age at delivery of G3	n = 2137		n = 9008	
< 18	29.2*	70.8	71.5	28.5
18–19	25.0	75.0	69.9	30.1
≥ 20	21.8	78.2	69.8	30.2
Early life high income G2 women Age at delivery of G3	n = 8665		n = 2039	
< 18	29.8*	70.2	61.5	38.5
18–19	20.7	79.3	61.6	38.4
≥ 20	16.6	83.4	59.0	41.0

Generation 2 (G2) = births from 1956–1976

Generation 3 (G3) = births from 1989–1991

*p ≤ 0.05 for Mantel-Haenszel chi-square test for trend

associated with increased likelihood of poverty. Early life low income white women who gave birth as teens were less likely to have experienced upward mobility compared to women who gave birth after teenage years: 29.2% of those born into low income neighborhoods who gave birth at < 18 were still in low income neighborhoods, compared to 21.8% of those who gave birth at ≥ 20. Among white women born into high income neighborhoods, younger age at delivery of G3 was associated with an increased probability of experiencing downward mobility (29.8%) compared to their older counterparts (16.6%). For African-American women, no significant associations were seen between age at delivery and economic mobility. Among African-American women born into low income neighborhoods, those delaying childbirth until age 20 or after (69.8%) were just as likely to experience later poverty as those who became teen mothers (71.5%). Among African-American women born into high income neighborhoods, those delaying childbirth (59.0%) had an equal chance of downward mobility as teen mothers (61.5%).

There was a bivariate relationship between the age of G1 women's age at birth to G2, and G2 women's age at birth to G3 (Fig. 2). In both races, there appeared to be a dose-response relationship in teen delivery between G1 and G2, with the prevalence at 42.9%, 22.5% and 8.0% for white G2 women and 72.4%, 61.9%, and 46.6% for African-American G2 women whose own mothers (G1) were < 18, 18–19 and ≥ 20 years old, respectively, when they were born.

Relative risks (RR) and 95% CI for the effect of G2's age and their lifelong neighborhood economic environment on teen birth to G3 are shown in Table 3. White G2 women whose mothers (G1) were < 18 and 18–19 when they were born had an over five- and two-times increased risk, respectively, of becoming teen mothers themselves. For African-American G2 women, RRs were of smaller magnitude, but statistically significant. In both races, women who experienced downward mobility (i.e. early high/later low income) had the highest risk of teen birth, while women with upward mobility (i.e. early low/later high income) had the lowest risk of teen birth, even compared to women in lifelong high income neighborhoods. While white women exposed to lifelong low income had an almost three-fold increased risk of teen birth compared to those in lifelong high income neighborhoods, African-American women in the lifelong high income and lifelong low income neighborhoods had a similar risk of teen birth.

Since lifelong neighborhood economic environment was not a significant effect modifier of the relationship between G1's age and G2's teen birth, it was modeled as an independent variable in the final multivariable multilevel model (Table 4) After controlling for G1's parity and G2's lifelong neighborhood economic context, G2 women whose G1 mothers were < 18 and 18–19 years old when they were born had significantly increased odds of becoming teen mothers themselves. The magnitude of the association was approximately doubled for whites compared to African-Americans. The adjusted ORs for lifelong neighborhood economic environment were similar to the unadjusted measures in Table 3, indicating that G1's age and G2's lifelong neighborhood economic environment are independent risk factors for teen birth.

A sensitivity analysis was performed, using < 18 as the definition of G2's teen birth to G3. Results were very

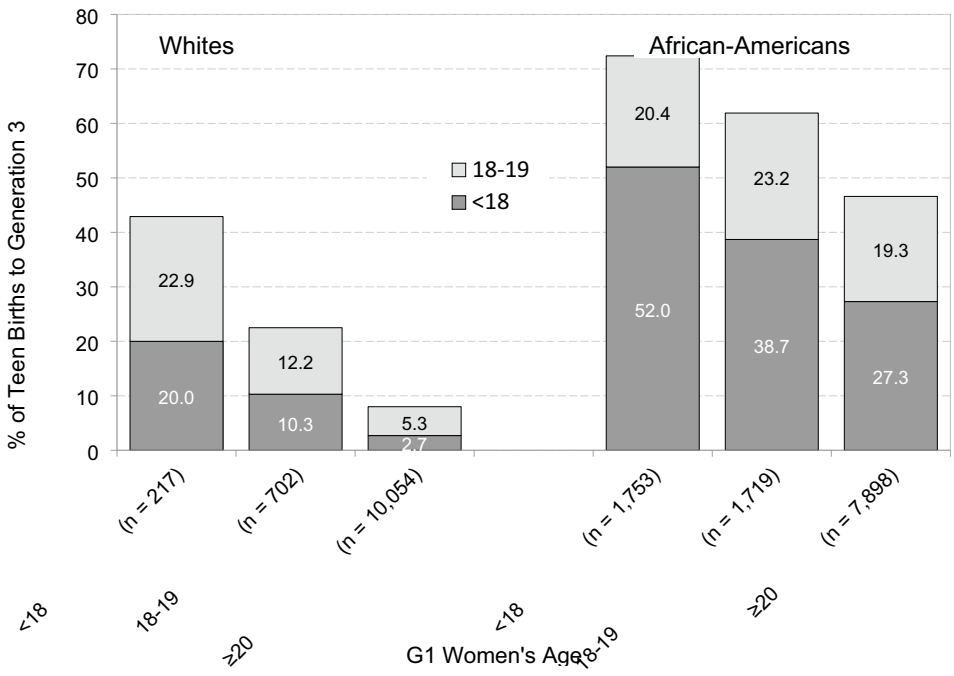

Fig. 2 Relationship between G1 women's age and G2 women's teen birth to G3, by race

Table 3 Incidence and Relative Risk (RR) with 95% confidence intervals (95% CI) of teen birth to Generation 3 by age of Generation 2 and lifelong neighborhood economic environment

	Whites (n = 10,802)		African-Americans (n = 11,047)	
	% Teen birth	RR (95% CI)	% Teen birth	RR (95% CI)
G2's age at delivery of G3				
< 18	42.9	5.4 (4.6, 6.4)	72.4	1.6 (1.5, 1.6)
18–19	22.5	2.8 (2.4, 3.3)	61.9	1.3 (1.3, 1.4)
≥ 20	7.9	Ref.	46.6	Ref.
Lifelong neighborhood economic environment				
Lifelong low income	18.2	2.8 (2.2, 3.4)	51.2	1.0 (0.9, 1.1)
Early high/later low income	27.3	4.2 (3.7, 4.7)	69.6	1.4 (1.3, 1.5)
Early low/later high income	1.4	0.2 (0.1, 0.3)	25.7	0.5 (0.4, 0.6)
Lifelong high income	6.6	Reference	51.4	Reference

Generation 2 (G2) = births from 1956–1976

Generation 3 (G3) = births from 1989–1991

Table 4 Associations between teen birth and neighborhood economic environment

	Whites (n = 10,802)		African-Americans (n = 11,047)	
	Crude OR (95% CI)	aOR* (95% CI)	Crude OR (95% CI)	aOR* (95% CI)
G2's age at delivery of G3				
< 18	6.8 (4.8, 9.5)	8.2 (5.7, 11.8)	2.9 (2.6, 3.3)	3.5 (3.0, 4.0)
18–19	3.0 (2.4, 3.8)	3.4 (2.7, 4.2)	1.8 (1.6, 2.1)	2.0 (1.7, 2.2)
≥ 20	Reference	Reference	Reference	Reference
Lifelong neighborhood economic environment				
Lifelong low income	–	2.4 (1.7, 3.2)	–	1.0 (0.8, 1.2)
Early high/later low income	–	5.4 (4.4, 6.7)	–	2.8 (2.2, 3.4)
Early low/later high income	–	0.2 (0.1, 0.3)	–	0.3 (0.2, 0.4)
Lifelong high income	–	Reference	–	Reference

Generation 2 (G2) = births from 1956–1976

Generation 3 (G3) = births from 1989–1991

*ORs adjusted for G1's parity

similar (data not shown), so only the results for teen births < 20 were presented.

Discussion

This study showed that women were significantly more likely to become teen mothers themselves if they were born to a teen mother, and the magnitude of this association was doubled for whites compared to African-Americans. Lifelong neighborhood economic environment was independently associated with teen birth. For both races, those experiencing downward economic mobility were more likely to become teen mothers than those experiencing lifelong high income neighborhoods, and those experiencing upward mobility were more likely to delay birth until after their teen years, even compared to women living in high incomes throughout their lives.

Our results are consistent with studies that showed increased risk of teen childbearing for children of teen mothers (Card, 1981; Hardy et al., 1998; Kiernan, 1997). However, early childbearing is not absolutely predetermined for daughters of teen mothers. In a longitudinal study of African-American teen mothers, less than half of their daughters and one-third of their sons became teen parents themselves (Furstenberg et al., 1990). In our study, over 70% of white and 30% of African-American women whose mothers were teenagers delayed childbearing until age 20 or older, suggesting that there are opportunities for prevention, as the mechanism is likely not completely biological, since the

timing of puberty is not always associated with teen childbearing (Kahn & Anderson, 1992).

The intergenerational association of teen birth was stronger among whites than African-Americans in our study. This is due in part to the fact that African-Americans whose mothers were not teens at the time of their births were still almost six times more likely whites to become a teen mother. It is possible that other risk factors experienced by African-Americans, unmeasured in our study, such as social disadvantage, racism, lack of educational and career opportunities, are stronger predictors of teen birth than having a teen mother (East & Felice, 1992; Meade et al., 2008).

Surprisingly, lifelong neighborhood economic environment did not affect the relationship between G1 women's teen birth and G2 women's teen birth. Subsequently, we added it to the model as an independent predictor of teen birth and found that it contributed significantly to teen birth across generations, independent of G1's age at delivery. Among whites, the small group exposed to lifelong low income had an over 2-fold increased risk of becoming teen mothers as those who were never exposed to low income. This is consistent with studies showing that sustained exposure to poverty leads to increased risk of teen birth, independent of having a teenage mother (Kiernan, 1997). It is possible that factors associated with poverty - such as lack of educational and career opportunities, earlier ages at first sex, and lack of access to effective contraceptives - may explain the increased risk of teen birth in both generations.

Another surprising finding was that teen birth was just as prevalent among African-Americans living in low income neighborhoods throughout life as it was for African-Americans in high income neighborhoods throughout life. Again, this may be due to unmeasured structural factors that affect even those in high income neighborhoods, such as racism, lack of family wealth and access to family planning services (Geronimus, 2003; Henly, 1993). In contrast, discordant economic mobility experiences (low-to-high and high-to-low income neighborhoods) were significantly related to teen birth.

Similarly, among whites, downward economic mobility was a significant risk factor for teen birth, consistent with studies that have shown a relationship between socioeconomic disadvantage (Kiernan, 1997; Singh et al., 2001), neighborhood deprivation (McCulloch, 2001) and teen childbearing. Speculated reasons for this association include lack of access to resources, educational and economic opportunities, as well as personal disadvantage (McCulloch, 2001), although we could not disentangle the effects of individual household income from neighborhood income. Also possible is the lack of role models in "high status" jobs in poor communities, who show that education can lead to economic stability as a viable alternative to adolescent childbearing (Henly, 1993; McCulloch, 2001).

Overall, the prevalence of teen birth was almost six times higher for African-Americans compared to whites (52.9% vs. 9.5%, respectively). It should be noted that the benefits of becoming a teenage mother often outweigh the costs for impoverished African-Americans, who have limited or no access to advanced education and career possibilities (Geronimus, 2003). In addition, birth outcomes are generally better for teen compared to older African-American mothers (Geronimus & Bound, 1990). For this reason, and because the intergenerational relationship of teen birth is weaker for African-Americans, interventions focused on behavioral change alone may not be effective to reduce teen birth in the African-American community. Rather, the social context needs to change in order for African-American teens to view delaying childbirth as a worthwhile endeavor (Breheny & Stephens, 2008; Geronimus, 2003). Instead, diverging views about root causes contributing to the high incidence of teen pregnancy, combined with clashing social, religious and ideological positions on interventions, have resulted in reluctance to acknowledge that different subgroups of the teenage population require different policy responses, rather than a one-size-fits-all approach (Brindis, 2006).

It should be noted that the births in our data occurred immediately prior to the 1996 Personal Responsibility and Work Opportunity Act, which created profound change in policies, programs, and cultural understanding of teen pregnancy. The law instituted the Temporary Assistance for Needy Families (TANF) program, intended to replace the Aid to Families with Dependent Children (AFDC) as the main welfare provider for low-income families. The policy changes included restrictions on benefits to unmarried teen parents, incentives to states that decreased nonmarital births, and a federally funded abstinence-only education program. Although teen births fell steadily throughout the 1990s and early twenty-first century, and welfare caseloads declined after enactment of the law, the effects of the specific provisions of the welfare reform and teen births have yielded mixed results, with only some studies showing an association(Wertheimer, 2000), and others found that it did not significantly reduce the number of teenage pregnancies and subsequent births (Kelly, 2007). It has been suggested that the lack of direct association between the legislation and decreasing teen births may reflect that the era was also marked by a strong economy and an emphasis on child-support enforcement, as well as the availability of long-acting contraceptive methods and increased public education about HIV/AIDS (Brindis, 2006; Manlove et al., 2003; Wertheimer, 2000). How the 1996 welfare reform affected the reproductive outcomes, including teen births, of the women born 1989–1991 in our cohort (G3) remains to be investigated.

The application of multilevel modeling does have limitations. While widely used in research of neighborhood effects

on individual outcomes, it does not fully take into account potential independent observations in one neighborhood (i.e. census tract) from another, which may lead to overestimation of the statistical significance of neighborhood effects. In contrast, spatial models make estimations and predictions across areas by modeling the spatial correlations in different locations. Studies comparing the standard multilevel modeling and spatial modeling have shown that they produce similar estimates of fixed effects as well as predicting new observations within existing neighborhoods (Xu, 2014). We recognize the call for reflection on the assumption of between-neighborhood independence and the role of space in understanding contextual effects, and plan to incorporate these advancing spatial methods in our future work in studying neighborhood effects.

The study has other limitations. First, we could not fully establish the temporal relationship between lifelong economic environment and teen birth, as the data represent cross sectional data sources, rather than a true longitudinal data set. This is less of a problem for downward mobility, since it is more likely that downward mobility led to adolescent childbearing, and less likely that teens moved to more disadvantaged neighborhoods as a result of the pregnancy. For the upwardly mobile, we are less confident about the direction of the relationship, because we only have a measure of neighborhood economic environment at the time of the G3 birth, which, for teen mothers was during adolescence, but for older mothers was later. It is possible that upward mobility occurred after adolescence for non-teen mothers as a result of delayed childbearing, rather than an incentive to delay birth. Second, we could not separate the effects of neighborhood economic environment from the effects of personal income, as vital statistics data do not provide a measure of individual income. Since individual and neighborhood income are correlated, but not always concordant, we have likely not fully captured the effect of personal income across generations, and therefore our results are subject to residual confounding.

In addition, we did not have information about risk factors that might mediate the association between teen birth across generations, such as family instability (Quinlivan, 2004), attitudes toward pregnancy, contraceptive behaviors, sexual activity, and contraceptive use. Importantly, our data and subsequent interpretation of results, are considerably limited by the inability to track those families who migrated far out of Cook County in this period, one of substantial movement to suburbs and the so-called "white flight." Finally, we were not able to capture teen *pregnancy* in either generation, but only the proportion of teen *births*. Without data on pregnancies that ended in induced or spontaneous abortion, we were not able to estimate the intergenerational relationship in teen pregnancy, which may tell a different story, especially if they differ between races.

Despite these limitations, this study used a unique data source of linked mother and infant birth records with linked census level socioeconomic data to examine the complex relationships between having a teen mother, exposure to different neighborhood economic environments across generations, and race.

In conclusion, we have shown that daughters of teen mothers are significantly more likely to experience teen birth themselves among both whites and African-Americans. Upward mobility was a protective factor, and downward mobility was a risk factor strongly associated with teen birth. Mechanisms for this association must be clarified to appropriately plan prevention efforts beyond behavioral interventions alone. Understanding the racial differences in intergenerational patterns of teen birth is important for effective program planning and policy making, given that interventions targeted at daughters of teen mothers may differ in effectiveness for white compared to African-American teens.

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