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‘Out-of-Sequence’ Schooling and Mothers’ Health and Health Behaviors

Jennifer March Augustine, PhD
Department of Sociology, University of South Carolina

Abstract:

Although the links between education and heath are robust and growing in significance, what remains unclear is whether such links are observed when education is obtained “out-of-sequence.” I investigate this policy and theoretically important issue by examining the health returns to education for mothers’ who reentered the education after the birth of a child. This particular focus is timely, given recent trends in many mothers’ return to higher education, the growing education gap in women’s health, and the connections between maternal health and children’s health and development. Data come from the Fragile Families and Child Wellbeing Study. The analysis involves fixed effects modeling techniques and a diverse set of maternal health measures associated with child health that reflect mother’s physical health, mental health, and health behaviors. The results speak to policy debates on how to narrow health disparities across generations and life course theories linking education to health.

Background and Study Overview

The connections between one's education and one's health is one of the most widely studied—and empirically robust—in the field of population health (Alder et al. 2994; Conti, Heckman, and Urzua 2010). Education has been linked with numerous morbidities, mortality risk, later-life disability, obesity, general health, mental health, and an array of health-related behaviors that have implications for various health outcomes (Adams 2002; Arendt 2005; Cowell 2006; Cutler and Glaeser 2005; Culter and Lleras-Muney 2010; Goesling 2007; Lleras-Muney 2005). What remains unclear is whether these links persist for individuals who pursued their schooling in a way that deviates from the "normative sequence" of life course events (Furstenberg 2005). One pattern of deviation that has grown increasingly common in the U.S. is women's pursuit and completion of higher education *after* the transition to motherhood (Augustine 2016; MacMillon 2005). Indeed, among today's college students, over one-quarter have dependent children, with the vast majority of these student parents (76%) being women (Gault et al 2014). This trend—and the related of issue of whether these mother's pursuit of higher education leads to improvements in their health—also raises several issues that have implications for public policy and a seminal theory to population research, life course theory (Elder 1994).

As a matter of public policy, scholars from across disciplines have argued that one of the most powerful policy levers for reducing population health disparities is promoting higher education among less advantaged segments of society, particularly given evidence of the rising significance of education for health (Goesling 2007; Hout 2012). This argument has been especially directed toward lower educated women, who have experienced an increase in health risks over the past several decades more so than less educated men (Montez and Zajacova 2013), and women with children in particular, whose education levels have been found to have profound implications for the health and development of their children and the reproduction of health disparities more broadly (Prickett and Augustine 2016). The theoretical importance of this issue speaks to a fundamental tenet of life course theory; that "out of sequence" transitions create "demands and conditions that…interfere with the achievement and enactment of other roles and statuses" (2005:212). The theory thus raises the question of whether mothers who pursue greater schooling derive the types of returns from their education that are argued to drive the link between education and health (Mirowsky and Ross 1998; Ross and Wu 1995; Scheiman 2001)—such as greater labor market opportunities, wider social networks, and increased cognitive skills such problem solving skills, self-efficacy, and sense of control—resulting in an improvement in their health and health behaviors.

At present, the existing research provides an unclear answer to this question, although there is some preliminary evidence to suggest that, consistent with the theory, out-of-sequence education may not confer to same health-related returns for mothers as had they followed a "normative" life course trajectory. For example, one recent study found that adults who married before completing college had a 50% higher probability of becoming obese compared to individuals who married after completing college (Miech et al. 2015). Two others exploring a range of life course trajectories found that non-normative trajectories were associated with lower self-reported health and higher rates of smoking and drinking (Barban 2013) and worse mental health (Jackson 2004). Finally, in research that goes beyond the health arena, one study found that increases in mothers' education did not result in increases in children's academic or behavioral outcomes (Augustine and Negraia 2018). This study underscores how the returns to maternal education that

form the link to children's positive academic and behavioral development—which are many of the same human capital and social psychological mechanisms that link education to health (see Augustine and Negraia 2018 for a summary)—may not accrue to mothers who pursued their education after the transition to motherhood.

In order to better clarify these important and timely empirical and theoretical matters, this study examines a national sample of lower educated mothers (i.e., without college degrees at the baseline data collection) participating in the Fragile Families and Child Wellbeing study (FFCW) who returned to the higher education system after having a child, and whether they experienced a change in their health behaviors and outcomes as a result of changes in their education. To do so, I draw on fixed effects techniques, which employ estimates of within person residualized change to help address problems of mothers' unequal and unobserved selection into higher education, which might confound the results. I will also attend to issues of heterogeneity linked to the type of schooling that mothers' pursued (e.g., vocational, a two-year college, a four-year college) and whether or not mothers earned a degree; and I will explore a range of physical health, mental health, and health behavior indicators and have been linked to children's health and development (Garbarski 2014; Hofhuis et al., 2003; Turney 2011).

Data and sample

FFCW is a racially and ethnically diverse, national birth cohort survey originally designed to understand the family life and development of children in lower income families. The study began in 2000, when a random sample of 3,712 unmarried and 1,186 married mothers who met the sampling criteria were selected from hospitals in 20 U.S. cities soon after giving birth. With appropriate weighting, this sample is representative of all births in U.S. cities with populations greater than 200,000 at the turn of the century. Data collection for FFCW includes a baseline interview in which mothers were asked about their highest level of education, and follow-up interviews at child age 1-, 3-, 5-, and 9 in which mothers were asked about whether they had reenrolled in school, where, whether they had earned a new degree or certificate since the last interview, and what type. Mothers were also asked during these interviews about their mental health (depressive symptoms, parenting stress), physical health (self-rated general health), and health behaviors (smoking, drinking, and drug use). The availability of these measures along with the representativeness of the sample make the FFCW well suited to the aims of this study, as does the fact that the panel design is amenable to a fixed effects approach. The sample also represents the population of women most likely to return to school, and the richness of the study provides for a range of time-varying (e.g., mother's union status, availability of different forms of social support, work schedule) and background (mother's parents education, maternal health behaviors during pregnancy) covariates. The analytic sample for this study is based on the 4,368 mothers who did not have a 4-year college degree at the time of the study child's birth.

Key Measures

Education. The baseline measure of mother's **highest level of education** is coded into three categories: less than a high school degree; a high school degree or GED; and some college (which includes some college, an Associate's degree, and a vocational degree because the baseline interview did not provide separate categories for them). Based on mother's reports at each wave for whether she had **reenrolled** in a school since the last interview and where, I

created a series time-varying binary variables which reflected enrollment in a vocational school; two-year school; or four-year school. Based on mother's reports at each wave for whether she had **completed schooling** since the last interview and from where, I also created a series of time-varying binary variables to reflect completion of degree/certificate from a vocational school; a two-year degree; and a four-year degree. In order to incorporate these measures into a fixed effects framework, for both sets of time-varying variables, mothers who reported reenrollment or additional degree attainment are assigned a value of 1 for all subsequent waves.

Maternal health. To capture mothers' **mental health**, I drew on two measures assessed during the 1, 3, 5, and 9 year telephone interviews. The first is a binary indicator for whether mothers' reports of depressive symptoms reached a specific cut-off. The FFCW provides two measures: one that reflects a "conservative" cutoff, and one that reflects a "liberal" cutoff. I also included a composite measure of parenting stress which reflected the average of mothers' responses (on a scale of 1-4 reflecting different levels of agreement) to four questions (e.g., I often feel tired, worn out, or exhausted from raising a family). To capture physical health, I drew on mother reports assessed at each wave of overall health (range: 1-5; 1= excellent and 5= poor). To assess **maternal health behaviors,** I include measures for smoking (*1 = yes, 0 = no*, in response to the question of whether the mother smoked in the last month); excessive drinking (*1 = yes, 0 = no*, in response to the question of whether the mother had more than 4 drinks in an outing during the last month); and drug use (*1 = yes, 0 = no*, in response a series of question about whether mother used various illicit drugs in the past month). All three measures of maternal health behaviors were assessed at the 1, 3, 5, and 9-year interviews.

Covariates. To account for potential **sources of confounding**, I account for a variety of time-invariant background factors (to be used for descriptive purposes) assessed at the baseline (e.g., child gender, race, city, maternal age at birth, smoking during pregnancy, marital status) and first wave (e.g., child temperament) and time-varying factors (e.g., number of children; subsequent births; whether the mother lives with a grandparent; whether the mother received financial support from family or friends; whether the mother works a non-standard schedule or multiple jobs; family structure; availability of emergency child care), assessed at each wave.

Analysis Plan

In order to examine whether there is a significant association between mothers' post-natal higher education and mother's health, I will draw on fixed effects. This technique estimates within person residualized change, thereby adjusting for unmeasured stable sources of variability, such as a genetic trait, that can positively bias associations (Allison 2009). Short of an instrumental variables approach (which for various reasons is untenable in the FFCW) or random assignment experiment, fixed effects is regarded as the optimal strategy for dealing with unmeasured confounds. The technique also provides a framework for dealing with multiple panels of data, as well as challenges of using panel data, such as repeated measurement error.

In the first set of fixed effects models, I will estimate the associations between reenrollment in various institutions (e.g., vocational school, 2-year school, 4-year school) and changes in the measures of maternal health. Maternal parenting stress and self-rated health will be estimated using linear regression. All other measures will be estimated using logistic regression. Estimates from logistic regression models will be presented in the form of predicted probabilities. I will

begin by estimating the specific measures of reenrollment separately (e.g., one model that only includes the time-varying measure of vocational enrollment). As a second step, I will combine all measures of reenrollment together and add interactions between them to assess whether there is an additional charge in mothers' associated with enrollment in more than one institution, with a focus on cases where mothers' initially enroll in a lower tier institution (e.g., vocational school) and subsequently enroll in a higher tier institution (e.g., 4-year college). I will then repeat these same steps using the time-varying measures of degree completion. As a final step, I will explore whether the observed patterns are consistent across groups of women who had different levels of education at the baseline or different demographic profiles defined by their race and ethnic background, marital status, and age. For all models, multiple imputation techniques and appropriate weighting will be used to maintain the representativeness of the sample across study waves, and any significant associations will be substantively interpreted in terms of their effect size.

Results

At this time, results from the fixed effects models are unavailable, although I expect to be able to produce them in the fall of 2018, with sufficient time prior to the 2019 meeting to make any adjustments and conduct any necessary robustness checks. Below, however, is a descriptive table to convey how a sufficiently large number of mothers participating in the FFCW enrolled in school and increased their level of education. There is also sufficient variability (results not shown) across time in terms of mothers' depression, parenting stress, smoking, and excessive drinking, although rates of drug use and thus within mother variability (as expected) were quite low for the proposed analysis.

On the basis of prior research, I expect that the associations between additional maternal education and mother's health and health behavior's will be weak or non-significant. Such findings stand to help refine our understanding of the link between education and health by elucidating the importance of sequencing in this link, and help inform policy debates by focusing on a population that has been the focus of debates around public health.

Frequencies of Mother's School Enrollment and Additional Educational Attainment at Each Study Wave

	Study Wave			
	Wave 1	Wave 2	Wave 3	Wave 4
Completed Schooling				
Attained vocational degree	185	141	213	350
Attained Associates' degree	41	60	84	137
Attained Bachelor's degree	31	48	46	75
Enrollment in School				
Attended 2-year college	154	173	187	145
Attended 4-year university	134	181	183	123
Attended vocational school	243	310	291	328

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