The Social Origins of Infant Health: Moving Beyond Low Birthweight

Extended Abstract

Michael J. McFarland

Princeton University

Nancy E. Reichman

Robert Wood Johnson Medical School

Sara McLanahan

Princeton University

Bridget Goosby

University of Nebraska at Lincoln

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This work is supported by the Center for Research on Child Wellbeing and the Center for Health and Wellbeing at Princeton University. Direct correspondence to Michael McFarland, Center for Research on Child Wellbeing, Princeton University, Princeton, NJ 08542 mjm11@princeton.edu.

BACKGROUND

Social demographers have a long-standing interest in studying how social factors influence birth outcomes, particularly low birthweight. This interest has been driven in large part by the close association between adverse birth outcomes and infant mortality. More recently, the emergence of the fetal origins hypothesis (FOH) has prompted new interest in birth outcomes as markers of the fetal environment. This reorientation pushes demographers to look at birth outcomes in different and more nuanced ways and prompts the need for a deeper understanding of how social factors may have differing effects on *different* dimensions of infant health.

The FOH posits that deleterious conditions experienced in utero during biologically critical periods decrease the rate of cell division, and therefore growth, with long-lasting effects on future health. Because the timing of critical periods during gestation are tissue-specific, noxious in utero conditions can produce not only reduced growth but also disproportionate growth, which can occur because of biological "trade-offs" (Barker 1995). For example, brain growth (which is often operationalized as head circumference) may be sustained under harmful conditions at the expense of the rest of the body. In order to understand how social processes impact later health and mortality, researchers must first understand how the social context influences the fetal environment. Indeed, variation in the fetal environment is likely reflective of a variety of interactive social and biological etiologies. Understanding these patterns and processes is essential for ascertaining the pathways by which social disparities in health and mortality arise**.** While we cannot measure the fetal environment directly, examining infant birth outcomes will provide clues as to the social and behavior factors that contribute to the fetal environment.

While the FOH has caught the attention of demographers because of its potential to account for social disparities in health and mortality, to date demographic research has relied almost exclusively on low birthweight as a marker of fetal adversity, despite the fact that other birth outcomes representing different biological processes are equally or more important than birthweight (Barker 1995). In this paper we use data from a special supplement to the Fragile Families and Child Wellbeing Study that contains a rich array of social and medical information in addition to a racially and economically diverse sample. The aims of this study are fourfold and concern three social factors linked to socioeconomic disadvantage. First, we seek to document racial/ethnic, educational, and marital status differences in multiple and less commonly studied birth outcomes. Second, we seek to document racial/ethnic, education, and marital status differences in maternal health conditions prior to and during pregnancy. Third, we seek to determine the extent to which social support, mental wellbeing, pre-existing health conditions, pregnancy-related health conditions, and health behaviors explain observed racial, educational and marital status differences. Finally, we seek to determine to what extent these racial, educational, and marital status differences and the factors explaining these differences vary by the marker of infant health.

DATA

The Fragile Families and Child Wellbeing (FFCWB) study is an ongoing longitudinal birth cohort study. Between the spring of 1998 and the fall of 2000, parents were interviewed in 75 hospitals in 20 U.S. cities shortly after their children were born. Cities were selected from all 77 cities in the U.S. with over 200,000 people, using a stratified random sample. In 20 of the cities, all hospitals within the city boundaries that had maternity wards were included. In the other two (the largest) cities, hospitals were randomly sampled. Within each hospital, births were randomly sampled from birth logs. Non-marital births were oversampled. A total of 4,898 mothers (3,712 unmarried; 1,186 married) were interviewed after they gave birth. As part of a ''supplemental'' study to the core survey, additional information was collected from medical records (from the birth) for the mother and child in all 20 of the cities in which interviews were conducted. Data were abstracted from the medical records using a detailed standardized instrument. The availability of medical record data depended on administrative processes of hospitals rather than decisions on the part of survey respondents to make their medical records available.

PRELIMINARY RESULTS

We are currently in the initial stage of data analysis and hence will present some very preliminary models examining differences by race/ethnicity, education, and marital status in small for gestational age (SGA) and head circumference to weight ratio (HCWR). We also show estimates for low birthweight (LBW), the most commonly studied measure of infant health, primarily for comparison purposes. Despite the fact that both theoretical and empirical work have shown the importance of considering head circumference in relation to body size, the health disparities literature has largely overlooked this important dimension of infant health (Lindley, Becker, Gray, Herman 2000; Barker 1995). Table 1 shows associations between social and biological factors and three indicators of birth outcomes. At least five points can be gleaned from Table 1. First, the relative importance of both social and biological factors varies across the three outcomes. For example, being married is protective and hypertension is harmful in regards to LBW and HCWR, but these patterns do not hold for SGA. Second, non-Hispanic blacks are disadvantaged for all birth outcomes, while Mexicans are advantaged in SGA and LBW but not HCWR. Third, education and marital status explain the black-white disparity in LBW in this relatively disadvantaged FFCWB sample. These social factors do not, however, explain the protective effect witnessed by Mexicans. Fourth, neither education nor marital status is protective in terms of SGA. Fifth the influence of biological factors differs across dimension of infant health. For instance, hypertension is harmful in regards to HCBW and LBW but not SGA. Moreover, the Mexican advantage is explained by biological factors. Overall, these results provide preliminary evidence that social disparities and their associated pathways to infant health vary by dimension of infant health, highlighting the complexity in understanding the social origins of the fetal environment.

CONCLUSIONS

This project is in its initial stages but the preliminary results show that disparities by race, education, and marital status vary across outcomes suggesting that multiple social-biological pathways are influencing the fetal environment. This project is unique in identifying these differing pathways and documenting their associates with race, education, and marital status. Future steps for this project include: (1) investigating the functional form between social factors and birth outcomes with a specific focus on acquiring a conceptual understanding of the underlying distributions; (2) examining a broader array of birth outcomes; (3) examining a broader array of social factors to test specific pathways; (4) investigating subpopulation differences; and (5) integrating these results into a broader framework to understand the complex ways in which social factors influence the fetal environment. In order to more fully understand the origination of health and mortality disparities throughout the population, researchers must first understand the labyrinth of complex patterns and processes that reflect an intricate fetal environment. This project aims to take this initial step.

REFERENCES

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Lindley A., Becker S., Gray R., Herman A. (2000). Effect of Continuing or Stopping Smoking during Pregnancy on Infant Birth Weight, Crown-Heel Length, Head Circumference, Ponderal Index, and Brain: Body Weight Ratio. *American Journal of Epidemiology* 152:219-225.

Table 1: The Effect of Social and Biological Factors on Three Indicators of the Fetal Environment

	Small for Gestational Age (N=2017)[a]					Head Circumference/Birth Weight (N=1956)[b]					Low Birth Weight (N=2018)[a]				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 4	Model 15
Race/Ethnicity															
U.S.-born Mexican (white=ref.)	0.445*	0.424*	0.482+	0.599	0.645	0.007	0.003	0.006	0.015	0.019	0.374*	0.332*	0.372*	0.394+	0.435
Foreign-born Mexican	0.363+	0.332*	0.397+	0.552	0.576	-0.020	-0.032+	-0.024	-0.010	-0.006	0.464	0.377+	0.500	0.561	0.622
Non-Hispanic black	1.585*	1.424+	1.550*	1.764**	1.856**	0.033***	0.024*	0.026**	0.029**	0.031**	1.551*	1.199	1.293	1.282	1.345
Other race	0.591	0.599	0.570	0.642	0.638	0.011	0.012	0.008	0.009	0.013	0.373	0.376	0.367	0.382	0.358
Other Hispanic	1.008	0.924	1.006	1.218	1.193	0.009	0.002	0.006	0.013	0.012	1.230	0.991	1.132	1.223	1.214
Education and marital status															
High school (< high school=ref.)		1.167	1.204	1.232	1.395+		-0.005	-0.003	-0.002	0.004		1.143	1.198	1.151	1.337
>High school		0.795	0.848	1.008	1.083		-0.022*	-0.019+	-0.009	-0.004		0.637+	0.716	0.821	0.891
Married to father (not married=ref.)		0.816	0.885	1.033	1.083		-0.016+	-0.015+	-0.005	-0.004		0.517**	0.567*	0.643+	0.665
Pre-existing health conditions															
Mental health problem			1.752**	1.411	1.508+			0.010	-0.008	-0.006			1.534+	1.263	1.341
Cardiovascular			1.113	1.063	1.072			0.013	0.008	0.007			1.660	1.448	1.480
Diabetes			0.390	0.341	0.310			0.010	0.003	-0.006			2.106	2.137	1.995
Hypertension			1.325	1.325	1.084			0.086***	0.089***	0.072***			3.210***	3.457***	2.925**
High bmi			0.858	0.930	0.893			-0.025**	-0.018*	-0.022*			0.686+	0.723	0.684+
Low bmi			2.159**	2.023**	2.035*			0.033+	0.023	0.020			2.095*	1.900*	1.865+
In utero exposures															
High weight gain				0.719	0.638*				-0.034***	-0.039***				0.775	0.672
Low weight gain				1.328	1.342				0.038***	0.040***				2.457***	2.609***
Smoked				2.350***	2.538***				0.048***	0.050***				1.641*	1.762**
Alcohol use				1.316	1.302				0.047**	0.049**				1.754*	1.758+
Drug use				0.853	0.784				-0.008	-0.012				0.780	0.716
Preeclemsia/toxemia					3.361***					0.118***					4.304***
Gestational diabetes					0.524					-0.021					0.678
Gestational hypertension					2.419***					0.044**					2.597***

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10.

[a] Odds ratios are presented.

[b] Regression coefficients are presented. This measure was calculated as ln ((head circumference (cm)/birth weight (kgs)) X 1000).