

Biodemography: Consilience in Action An Introduction to a Special Issue of *Social Biology*



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Many evolutionary theorists have made a statement to an audience something like the following:

"Your ancestors differed in many ways. Some were smart, and some were dumb. Some were pretty, and some were not. Some could sing, some could define indelimitic integrals. Some could run fast, and some could grow turnips. But one thing they all did—the one thing they definitely shared in common was that every single one of your direct ancestors, without exception, successfully made babies."

This basic evolutionary concept may be reformulated into the following principles: 1) All of your direct ancestors, dating back to the origin of anatomically modern humans and earlier, reproduced successfully; 2) All of the babies born to your direct ancestors grew to sexual maturity, and all of them, without fail, reproduced successfully; 3) Although every one of your direct ancestors has already died or eventually will, not even one of them died before reaching sexual maturity and reproducing. Given these principles suggesting that every single person currently alive comes from a successful and extraordinarily long lineage of survivors and reproducers, is it safe to say then that all people currently alive are guaranteed survival to sexual maturity and reproductive success? Of course not—nor in our current generation, and cer-

tainly not in the long-term across future generations. Indeed, every generation has produced a subset of the population that has died before reaching sexual maturity, and among those that lived into their reproductive years, some were either unable to produce offspring or chose not to do so—thereby permanently ending an extraordinarily long line of success in survival and reproduction. Given the uncertainty just noted, who among the many born in each generation should we expect to survive to sexual maturity and ultimately pass their genes onto the next generation? What information would we like to have to improve our chances of living long enough to reproduce?

This special issue of *Social Biology* emerges from the types of thinking defined by these principles of survival and reproduction. Within what disciplinary perspective is such thinking embedded? Traditionally, the answer would be biology—more specifically, those who study evolutionary theory within biology. A more contemporary perspective broadens this answer, however, because some interesting interdisciplinarity has already begun to emerge (very much in the spirit of Wilson's 1998 book, *Consilience*). In fact, the importance of an interdisciplinary approach to questions of biology has emerged recently in the form of a new

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The Effect of the Nurturant Bonding System on Child Security of Attachment and Dependency

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ABSTRACT: This paper uses a biopsychosocial theory of human bonding to explore the intergenerational transmission of bonding traits. More specifically, it examines how the nurturant bonding system of the mother affects the succorant bonding system of the young child. In the first section of the paper, we take the bonding framework proposed by Miller and Rodgers (2001) and elaborate its implications for mother-child dyads. Next, we describe the collection of data from 78 mothers prior to their pregnancy with an index child and again when that child is between the ages of two and four and a half. These data allow the creation of a number of mother and child variables that are derived from the bonding framework. Using these variables, we construct a temporally organized, structural equation model of maternal effects on the child, with the two main outcome variables being child security of attachment and child dependency. We then test the model using LISREL. Although the results are tentative and require further confirmatory research, they lend support to three broad hypotheses derived from the bonding framework. In particular, the results support the construct of a motivational substrate that affects both maternal childbearing and her child-rearing behaviors. They also indicate the importance of child temperament in the formation of the succorant bond. Finally, they demonstrate that the precocious variables, child security of attachment and dependency. Two submodels based on predictors of these two outcomes reveal a number of pathways along which these effects take place. We conclude with a brief discussion of the lessons learned that might strengthen future studies of mother-child bonding and, more generally, the intergenerational transmission of bonding traits.

INTRODUCTION

In this paper we use data collected during a longitudinal study of childbearing in married couples to conduct an exploratory test of the theoretical framework proposed by Miller and Rodgers (2001) for understanding the biopsychosocial systems involved in human bonding. We focus on two of the four systems discussed by these authors, namely the nurturant system of the mother and

the succorant system of the child. We measure features of the maternal bonding system before an index child's conception and then again when that child is between the ages of two and four and a half, at which time we also measure features of the index child's bonding system. Using models derived from Miller and Rodgers's framework, we then explore how the maternal bonding system affects the filial bonding system. An important goal of this exploratory work, which should be viewed as both hypothesis testing and hypothesis generating, is contributing to a theory of intergenerational bonding transmission.

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book devoted to describing the stories behind newly formed successful interdisciplinary collaborations (Kessel, Rosenfield, and Anderson, 2003).

This special issue is devoted to this emerging theoretical orientation, one that combines two active research arenas that have seldom spoken to one another—until recently. The first is evolutionary biology. The second of those arenas is traditional demography. Classic demography—which involves scientific studies of “size, distribution, structure, and change of populations” (Shryock and Siegel, 1976, p. 1)—can be divided into fertility, mortality, and migration (e.g., Weller and Bouvier, 1981). It has seldom been noticed that two of those three sub-areas are ones that motivate interest in the second arena, evolutionary theory. The theory of human fitness—the ability of humans to pass on their genotype to future generations—depends explicitly and completely on fertility and mortality. Those who live long enough, reproduce, and then ensure the reproductive fitness of their offspring, have figuratively and literally “won” the human fitness contest.

This natural rapprochement has recently begun to be formalized. A few years ago the Population Association of America held its first session titled “Evolutionary Demography.” There was such enthusiasm for the topic, that a closely-titled session (or, sometimes, more than one) has occurred at all PAA meetings since. Recent publishing attention has been given to the role of heredity in both longevity and fertility. This attention can perhaps be framed most effectively with reference to two recent edited volumes produced by the National Academy of Science:

end of the life cycle. They study the relation of parental age to the expected survival of their children. They show that age has a higher relation to child survival than a number of other competitor predictors related to past fertility behavior.

Smith, Mineau, and Bean blend both fertility and longevity within their framework. They study the influence on longevity after age 60 of reproductive behavior earlier in life. They find similar results across gender, magnified for wives. Their results support both evolutionary and social interpretations as causal mechanisms.

Yashin, Ukrainseva, Boiko, and Arbeeve present a methodological piece showing that inspection of aggregate age trajectory curves can mislead scientists interested in individual patterns of aging. They use three models of aging to demonstrate the weakness in this link. Beyond age trajectory curves, individual-level longevity is facilitated by lack of frailty and eliminating stressful (parentally fatal) behaviors.

Finally, Kohler, Rodgers, and Christensen use biometrical models to partition data from a longitudinal twin registry into that associated with genetic versus environmental variance. Their patterns are interpretable in relation to social and historical events—in particular, to periods of fertility transition that signal increasing choice and flexibility in female childbearing behavior.

The articles in this special issue signal future directions. First, the interdisciplinarily reflected in these articles will certainly continue to expand within and across disciplines, leading to a further broadening and support for a biodemographic perspective. The paper by Kohler, Rodgers, and Christensen reflects a collaborative effort by an economist, a

psychologist, and a geneticist. Authors within this special issue from other disciplines include a mathematician, a biologist, a statistician, an M.D., policy researchers, and several demographers. Second, the methodological approaches reflected in these papers are not only highly interdisciplinary, but also highly sophisticated. Third, the paper by Smith, Mineau, and Bean demonstrates that research on the biodemography of fertility and longevity are not necessarily mutually exclusive.

Finally, we conclude the introduction to this special section with reference to the prescience reflected in Wilson's meta-idea of “consilience” (Wilson, 1998). Consilience is a meta-idea because it is an idea about ideas. Specifically, consilience refers to a “dream of united learning” (Wilson, 1998, p. 3), to the “jumping together” of knowledge by the linking of facts and fact-based theories across disciplines to create a common groundwork of explanation” (Wilson, 1998, p. 8). Wilson spent a whole chapter (Chapter 9, pp. 197–228) promoting and developing the importance of a consilience process between the social sciences and the natural sciences. *Social Biology* is a journal that has always had broad interdisciplinary underlying its conceptual themes. Just as Wilson champions the importance of consilience, *Social Biology* has long reflected the same values and goals. This special issue is, we hope, a successful and interesting “jumping together” of some old ideas into new ideas, of old theories into new theories. Especially, this special issue is one piece of an ongoing and growing effort by newly christened biodemographers to achieve a consilience of perspectives in the study of longevity and fertility.