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Evolutionary Approach to Below Replacement Fertility

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ABSTRACT The large human brain, the long period of juvenile dependence, long life span, and male support of reproduction are the co-evolutionary result of the human niche based on skill-intensive techniques of resource accrual. The regulation of fertility under traditional conditions is based upon a co-evolved psychology and physiology where adjustments of investment in offspring depend upon the returns to skill and mortality hazards. When all wealth is somatic, the hormonal system controlling ovulation and implantation translates income into genetic descendants. In modern society the existence of extra-somatic wealth is a critical condition to which our evolved proximate physiological mechanisms do not respond. However, psychological mechanisms regulating parental investment in offspring quality may lead to greater and greater investment in own and offspring education, a smaller desired family size, a delay in the onset of reproduction, and a reduction in the total numbers of offspring produced. This delay in reproduction can cause many individuals to produce fewer children than desired because fecundity falls during the reproductive part of the life course. As more individuals in a society follow this pattern, more will fail to reach their desired family size. At the same time the effective use of birth control decreases the numbers of families producing more children than desired. Below replacement fertility can result. Predictions from this model were tested using data from the National Survey of Families and Households and the Albuquerque Men study. Am. J. Hum. Biol. 14:233–256, 2002.

Over the past 120 years, there have been dramatic changes in fertility rates throughout the world. In most of Europe, North America, New Zealand, and Australia, a detectable change in fertility rates (10% reduction in I_f) occurred between 1880 and 1920, with the exception of France where the fertility transition occurred at the beginning of the 19th Century (Caldwell and Caldwell, 1998; Coale and Treadway, 1986; Knodel and van de Walle, 1979). A second major transition has occurred over the last 30 years. In most countries in Asia, Latin America, and the Middle East, as well as parts of sub-Saharan Africa, marked reductions in fertility occurred between 1965 and 1985 (Bongaarts and Watkins, 1996; Caldwell and Caldwell, 1998). During the same period, many countries in developed nations underwent yet another decline in fertility, leading to "below-replacement" fertility levels (i.e., total fertility rates below 2.2 (Davis et al., 1986; Lesthaeghe and Williems, 1999; Morgan, 1996).

This article provides a theoretical framework, *the embodied capital theory of life history evolution,* for explaining the pattern of those fertility transitions, and presents a series of specific hypotheses about the reduction to below-replacement levels, with a focus on the United States. It is proposed that these fertility transitions result from the interaction of evolved psychological and physiological mechanisms governing human fertility with specific changes in the economy and public health.

Our thesis is that natural selection acted on human physiology and psychology to

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