Natural and sexual selection in a monogamous historical human population

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Whether and how human populations exposed to the agricultural revolution are still affected by Darwinian selection remains controversial among social scientists, biologists, and the general public. Although methods of studying selection in natural populations are well established, our understanding of selection in humans has been limited by the availability of suitable datasets. Here, we present a study comparing the maximum strengths of natural and sexual selection in humans that includes the effects of sex and wealth on different episodes of selection. Our dataset was compiled from church records of preindustrial Finnish populations characterized by socially imposed monogamy, and it contains a complete distribution of survival, mating, and reproductive success for 5,923 individuals born 1760–1849. Individual differences in early survival and fertility (natural selection) were responsible for most variation in fitness, even among wealthier individuals. Variance in mating success explained most of the higher variance in

variation in fitness, which determines the overall opportunity for total selection at the level of the organism (7–10). Because the methods of studying selection in natural populations are relatively well established, our understanding of selection in human populations is now limited mainly by the lack of suitable datasets (5, 11).

Recently, the establishment of large genomic and epidemiological datasets has enabled precise measurements of selection acting on specific loci and phenotypic traits in humans (5, 6). These studies demonstrate that selection has not stopped with the advent of agriculture and can act on certain traits even within contemporary modern populations. For example, Byars et al. (12) found some traits of medical significance in the United States to be currently influenced by selection (see also ref. 13). By using summary statistics for birth and death rates in a population, it is also possible to estimate opportunity for total selection (i.e., variance in relative fitness) and its two