Electronic Supplementary Material for:
Bruckner TA, Helle S, Bolund E, Lummaa V. Culled males, infant mortality and reproductive success in a pre-industrial Finnish population. *Proceedings of the Royal Society: Biological Sciences*

Human Life History Database

Careful documentation of the Church registries allows for linkage of data between mothers and their children. The Finnish Human Life History dataset includes information on birth characteristics (including date of birth), social class, exact age at death, age at marriage, number of live (and stillborn) offspring and age of death of offspring. A detailed description of the quality and provenance of the historical data appears elsewhere (http://www.huli.group.shef.ac.uk/study-pop.html). We excluded twins based on their different life histories from that of singletons [Lummaa et al., 2001].

Lummaa, V., Jokela, J., Haukioja, E. 2001 Gender difference in benefits of twinning in pre-industrial humans: boys did not pay. J Anim Ecol 70, 739–746.

Structural Equation Model

We further used marital status (1=married; 0= never married) to predict the zero-inflation component of number of born and survived offspring (1= had children; 0 = no children) to predict the zero-inflation component of LRS. Inclusion of these variables in the SEM assists with predicting the likelihood of having zero children that survive to age 15 years, given that most men yielded offspring only if they first married.

Sensitivity Analyses

We performed two sensitivity analyses to assess the robustness of our findings. First, for the two results that suggest rejection of the null (i.e., infant mortality and LRS), we repeated the analyses but included twins. For male infant mortality, the sex ratio coefficient became slightly stronger than the initial test (odds ratio for a 1 SD increase = 1.09; 95% CI = 1.03—1.16, $p<.01$). For total offspring surviving to age 15 years, the sex ratio coefficient remained negative but became attenuated in magnitude and statistical significance (coef. = -.038, SE = .023, $p =.105$). Second, we included cohort size in the infant mortality analysis to control for the possibility that sampling variation (due to small cohort sizes) drove the sex ratio result. Inference remained essentially unchanged (OR=1.09; 95% CI = 1.02—1.16, $p=.01$).

Figure S1. Annual Sex Ratio at Birth (M/F) for Five Finnish Parishes, 1790 to 1870.

Table S2. Birth, fertility, and mortality characteristics of pre-Industrial Finns, 1790 to 1870.

	n	%	Mean (SD)
Annual sex ratio			1.06 (0.07)
Annual number of births			921.6 (218.4)
Males			
Lifespan in years			29.1 (28.5)
Region of Birth			
Archipelago (Kustavi, Hiittinen)	3,018	35.6	
Mainland Region (Ikaalinen, Tyrvaa)	4,478	52.8	
Northern Region (Pulkkila)	981	11.6	
Social Class at birth			
Poor	1,023	12.1	
Middle Class	3,566	42.1	
Wealthy	3,671	43.3	
Died before 1 year	1,463	17.3	
Died before 15 years	3,012	35.5	
Died before 50 years	4,242	50.4	
Ever Married	1,872	44.5	
Married and ≥1 live birth	1,460	41.0	
Married and ≥ 1 birth survived to 15 yrs	1,255	35.2	

Note: column percents may not sum to 100% due to rounding and non-exhaustive nature of categories.