

Original Article

## Explaining Below-Replacement Fertility and Increasing Childlessness in Wealthy Countries: Legacy Drive and the “Transmission Competition” Hypothesis

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**Abstract:** We propose a novel evolutionary perspective for explaining why, in most wealthy countries, female fertility has recently dropped below replacement level, with an increasing incidence of childlessness. Our hypothesis is based on the proposition that throughout human evolution, behaviors that promoted gene transmission (offspring production), and hence fitness, have involved not just those associated with a strong “sex drive,” but also those associated with a strong “legacy drive” – the desire to “leave something of oneself” for the future. Because of this intrinsic legacy drive, we argue, humans (and males, in particular) have been inherently vulnerable for “side-tracking” into other activities that promote “meme transmission” — i.e., activities perceived as providing a lasting legacy of “self” through investment in career development, accumulation of wealth and status, and several other activities that have potential to impact on the thoughts and actions of others in both current and future generations. Humans engage in meme transmission, therefore, at the potential expense of time, energy, and resources for investing in gene transmission. Based on evolutionary arguments, we discuss why realized competition between gene transmission and meme transmission has emerged significantly only in recent human history, why meme transmission is presently winning out in wealthy countries – thus accounting for below-replacement fertility and increasing childlessness – and why natural selection can be expected in the near future to generate a significant shift in the fertility-promoting behaviors of humans.

**Keywords:** adoption, childlessness, GDP, female empowerment, fitness, gene transmission, lifetime fertility, meme transmission, parenting-drive.

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### Introduction

One of the most puzzling contemporary trends in human reproduction is the dramatic decline in average lifetime fertility per female across countries with increasing wealth (Fig. 1). For countries in the top 10% of national wealth, fertility is now so low, it has dipped below replacement level in virtually every case. The resulting “population implosion” is one of the most pressing societal problems now facing these countries (Caldwell, Caldwell and McDonald, 2002; Douglass, 2005; Frejka and Sardon, 2004). At

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the same time, the opposite problem – inordinately high fertility and overpopulation – continues to plague the poorest countries. What are the causes of this striking pattern of human demography? A range of hypotheses based on socio-economic, socio-cultural, and evolutionary factors have been proposed (see Kohler, Behrman, and Skytthe, 2002; Pritchett, 1994; Schultz, 1997; Wachter and Bulatao 2003 for recent overviews). Here, we discuss some relatively simple explanations based on straightforward consequences of Darwinian evolution – explanations that appear to have been largely overlooked in the literature on this topic.

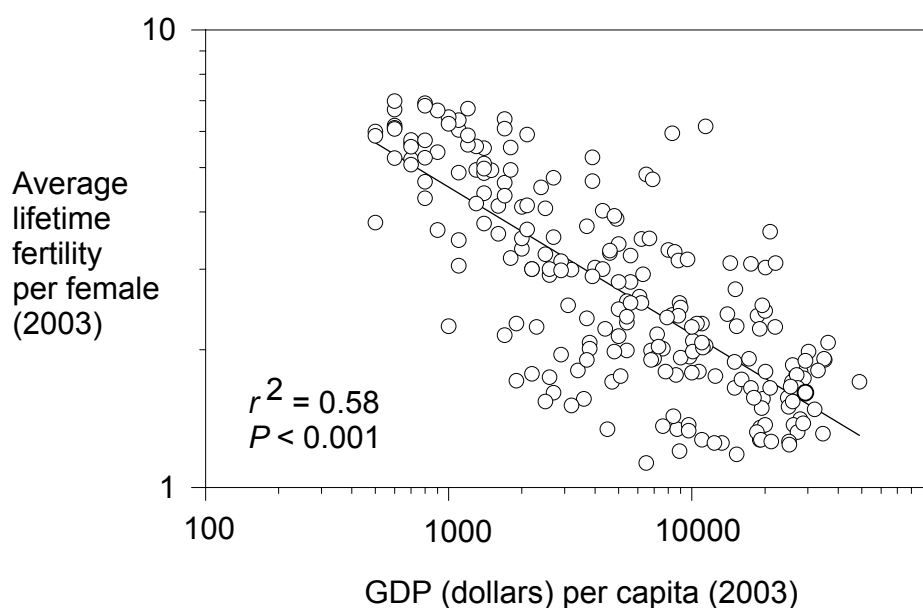
The relationship in Figure 1 exists, we suggest, because of two distinctly different evolutionary processes that drive human fertility toward opposite extremes. Inordinately high fertility is easily explained by the strong “fertility-selection” that operates in virtually all species where mortality rate is high, including when populations are severely crowded and hence, the resource needs of offspring are strongly contested. In this instance, fitness is maximized primarily by maximizing fertility. [Note that in referring to the number of offspring produced, we use the term fertility here, as is conventional in human studies, whereas “fecundity” is the term normally used in studies of wild species]. As in wild species, this “fertility-selection” is likely to have operated intensely throughout most of the evolutionary history of humans (Aarssen, 2005). Hence, we should expect to see the highest fertility in societies where competition for the resource needs of offspring is most intense, and infant mortality rate is high, which is indeed the case – in the most impoverished countries (Fig. 1). Typically, there are severe constraints here on individual offspring endowment, imposed by severe poverty and instability of personal wealth – often a consequence of recurring effects of political corruption, war, and anarchy. These circumstances describe the human condition at various times in one place or another around the globe throughout human history. As products of evolution under these circumstances, behaviors that promote high fertility, especially in males, are conspicuous in these impoverished societies. This includes, particularly, polygyny and the subjugation of females, whose mating and fertility are largely controlled by dominant males with a preference for high coital rates, and a preference for producing many offspring that include especially sons, who in turn repeat these high fertility-promoting male behaviors in the next generation (Aarssen, 2005; Low, 2005). Because it is physiologically possible for males to father many more children than what any female can bear in her lifetime, it seems likely that throughout much of human evolution, our predecessors left more descendants when a larger proportion of them were male at reproductive maturity. Accordingly, it is not surprising perhaps, as a product of natural selection, that behaviors promoting multiple sexual partners (especially in males), and preference for male offspring have been common throughout human history (Rubin, 2002).

Inordinately low (below-replacement) fertility, however, is less obviously explained in evolutionary terms. Aarssen (2005) has proposed an explanation based on “relaxed fertility-selection.” In modern wealthy countries that have social services and where personal wealth is relatively secure under the protection of law and political stability, mortality rate is lower, plus offspring have access to resources that are largely uncontested by the offspring of other parents – a societal structure that is analogous to the effects of “niche differentiation” in wild species. Unlike in wild species, however, the niche differentiation here is between families (rather than between species), thus virtually eliminating the effect of offspring competition between families. Under these

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circumstances, fertility-selection within the population is relaxed, thus allowing behaviors promoting low fertility to increase in relative frequency by random genetic drift. According to this hypothesis, the main promoting factor here is the greater empowerment of women in wealthier countries, and particularly their control over their own fertility. One indicator of female empowerment is represented by the percentage of the female population that is literate, which, across countries, is highly correlated with the GDP per capita data in Figure 1 (Spearman-rank correlation,  $r_s = 0.676$ ,  $p < .001$ ). Moreover, when GDP per capita (wealth) and percentage of female literacy (empowerment) are combined in a multiple regression analysis, 70% ( $r^2 = 0.70$ ) of the variation in lifetime fertility is explained – compared with only 58% predicted by variation in GDP alone (Fig. 1) (data from *The World Fact Book* (CIA); [www.cia.gov/cia/publications/factbook](http://www.cia.gov/cia/publications/factbook)).

**Fig. 1.** The relationship between gross domestic product (GDP) per capita and average lifetime fertility (births per woman) in 2003 for 223 countries. The line and associated  $r^2$  and  $p$ -values are from linear regression analysis. Note Log scales. Data are from *The World Fact Book* (CIA) available at [www.cia.gov/cia/publications/factbook](http://www.cia.gov/cia/publications/factbook).



The education, financial independence and legal rights of equality for women in wealthy countries means that they can now choose, if they wish, to have only one child, or no children at all – and indeed, given the mean lifetime fertility of less than 1.5 offspring in many of these countries (Fig. 1), a large percentage of the female population clearly exercises this choice. The resulting population implosion thus reduces the effective population size of breeders in each successive generation. This, combined with other large scale causes of population loss (e.g. from world wars, where mostly males are lost), and combined also with the absence of strong “fertility-selection,” results in conditions promoting random genetic drift in affecting the distribution of fertility promoting behaviors (Aarssen, 2005). Moreover, with females now in control over their own fertility in wealthy

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countries, males with high-fertility-promoting behaviors here are unable to enjoy any fitness advantage. Owing to their greater intrinsic cost of parenthood – i.e., the time and energy commitments associated with pregnancy, childbirth, and breastfeeding – females have inherently lower fertility preferences (Blaffer Hrdy, 1999), compared with the high-fertility-promoting male behaviors favored historically by strong fertility selection. Hence, males that happen to have low to moderate fertility-promoting behaviors may be more likely to be chosen as husbands by empowered females, and so may actually enjoy a fitness advantage (compared with males that have high-fertility-promoting behaviors), thus further contributing to the spread of genes effecting low-fertility-promoting behaviors in wealthy countries (Aarssen, 2005).

It is important to note, however, that an average lifetime fertility that is below replacement results not so much because females attain low fertility, but more specifically because a sizable percentage of females within the population have *no* fertility at all. The incidence of childless women is growing rampantly in wealthy countries (Cain, 2001; Cannold, 2005). Relaxed fertility-selection and random genetic drift cannot fully account for this. Understanding the causes of below-replacement fertility, therefore, requires an understanding of why women are more likely to remain childless when they have greater power (which is generally promoted by greater wealth). Explanations for voluntary childlessness (zero lifetime fertility) have been previously explored largely in terms of just proximate socio-cultural/economic factors (e.g. McAllister and Clarke, 1998; Park, 2005). Here, we propose a novel evolution-based hypothesis involving the effects of competition between gene transmission and meme transmission that is a product, we argue, of the recent empowerment of women.

### **The transmission competition hypothesis**

Below-replacement fertility is common in wealthy societies because there is obviously something inherently appealing about a lifestyle that is often associated with childlessness (or with at most only one child). The puzzling question is – why is this appeal so widespread given its obvious maladaptive consequences in evolutionary terms? The explanation, we propose, is that behaviors promoting low fertility and childlessness are, ironically, indirect by-products of natural selection itself, but the large-scale effects (e.g. Fig. 1) have been realized only recently because of the recent large-scale elevation in the empowerment of women in wealthy countries. Evolutionary fitness is measured in terms of gene transmission, where genetic descendants result as a product of investment in fertility and parental care. Natural selection here obviously favors genes that effect behaviors promoting desire for sex and mating, but also, we argue, it favors genes that promote behaviors associated with a desire for immortality and/or a desire to “leave something of oneself” for the future. One way to live “forever,” or into the future, is through one’s offspring/descendants. Accordingly, our predecessors that left the most descendants were not only those with strong sex drives, but also those with a strong desire to “leave something of oneself” for the future.

Here is the crucial point: when women have both empowerment and wealth, the practice of “leaving something of oneself” for the future need not involve investment in fertility and parental care. This evolved desire can be expressed instead through other domains that may be associated with what Dawkins (1976) referred to as “meme”

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transmission, involving investment in activities that are perceived to provide some measure of personal legacy, i.e. “memetic descendants.” These may include activities such as the promotion of status for an individual or for a family name (e.g., through generation of income, financial investment, or a reputation of integrity, or fame that might be expressed through a trophy, championship, commemorative plaque or memorial monument); philanthropy and the assistance of others in need (e.g., through social work, the health-care profession, volunteering, charitable aid, donation, contribution to endowments); the persuasion of others (e.g., through positions of power and leadership in business or government, or through impact as an educator, or through fashions, trend-setting, child adoption, involvement in clubs, associations, politics, or through popularity with a wide circle of friends); the generation, inspiration and promotion of ideas and new discoveries (e.g., through academic research, scholarship, literature, film, art, music, journalism, or attracting media attention); the creation and promotion of products or services (through invention, technology, commerce); or the pursuit of “everlasting life” (through religion and the recruitment of new believers to religion).

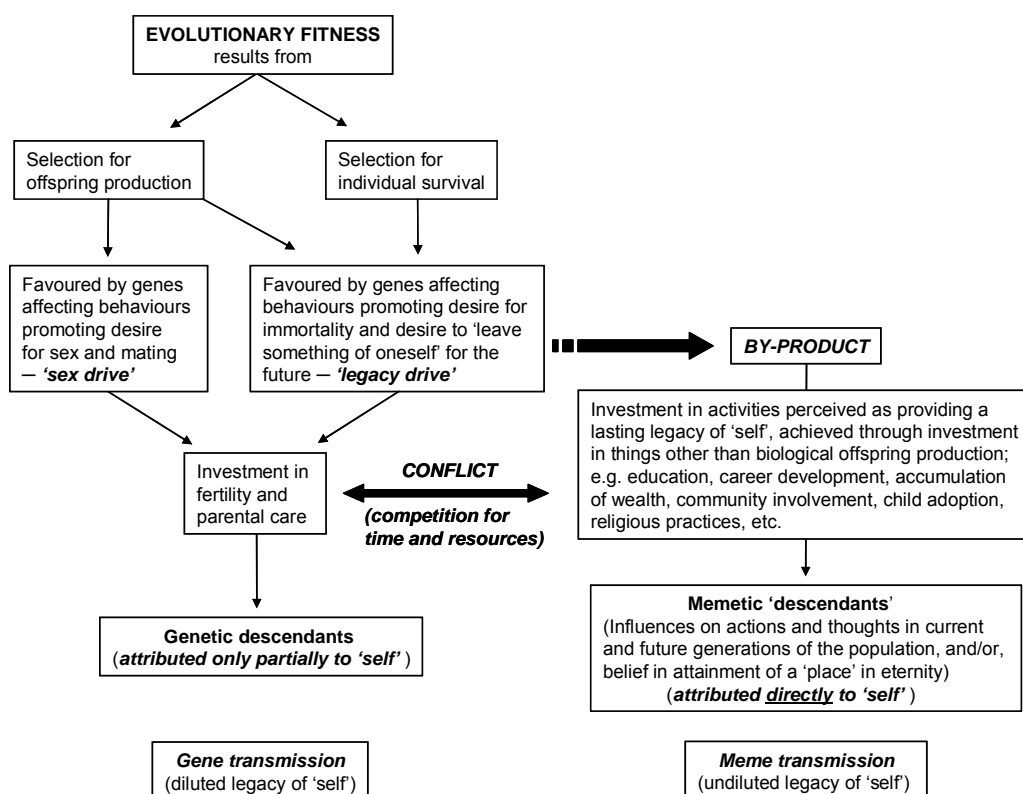
Opportunities for most of these activities increase dramatically across countries with increasing wealth, and most people in wealthy countries place a high priority on being engaged in one or more of these domains of meme transmission. This is accomplished by time, energy, and resources devoted to personal education, career development, accumulation of wealth, community involvement, religious practices, etc. – all of which compete with the time, energy, and resources required to bear and raise children, and so competes with gene transmission (Fig. 2). Meme transmission competes so effectively against gene transmission, we suggest, because the latter provides only a diluted legacy of “self;” i.e., because one’s genes are diluted in each successive generation, genetic descendants are attributed only partially to “self.” “Memetic descendants,” on the other hand, have greater potential to represent a largely undiluted (or at least less-diluted) legacy of “self.” As well, there is no reason to assume that motivation for meme transmission, or a legacy drive, requires any perceived guarantee that one will actually be successful in leaving a legacy of some kind – any more than motivation for gene transmission, or a sex drive, requires that one’s children actually survive and successfully produce their own children. Activities promoting meme transmission have wide appeal perhaps because humans are generally cognizant of their potential to exert an influence of “self” on the actions and thoughts of both current and future generations of the population (regardless of any genetic relationship with these generations), and/or, their potential, through religious faith, to attain a “place” for themselves in eternity. More probably, we suggest, the motivation is intrinsic; i.e. evolution by natural selection has produced in humans not just a strong instinctive “sex drive,” but also a strong instinctive “legacy drive” because throughout history, both drives have served in promoting the accumulation of genetic descendants (Fig. 2).

The competitive power of meme transmission is illustrated particularly well, we suggest, by the voluntary celibacy routinely associated with highly dedicated religious worshippers – e.g., priests and nuns of Catholic and Orthodox Christianity. Historically, celibacy and prolonged virginity has also been associated with the ancient Greeks, pagan Rome, native North Americans, several sects of eastern religions, cults (e.g., Shakers), and with various socio-cultural practices of abstinence (resisting sex drive) in order to enhance opportunity for personal achievement of one form or another (Abbott, 2000). A more

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subtle example may be associated with a modern perception (in wealthy countries) that success in meme transmission will be generally greater when a parent invests in fewer, and hence better-endowed (as opposed to many, poorly-endowed) offspring. This may stem from a perception that, by having fewer better-endowed offspring, there is a greater likelihood of promoting personal legacy for the parent through greater accumulation of descendants who – although not particularly numerous – will have wealth, fame, status, etc., and thus greater potential to impact on the thoughts and actions of others in future generations. This personal legacy for the parent is particularly facilitated when descendants bear the parent’s family name – a widespread cultural tradition associated almost exclusively with male parenthood. As discussed below, almost everything to do with meme transmission has, until recently, been the exclusive domain of males.

**Fig. 2.** Illustration of the proposed competition between gene transmission and meme transmission in humans. Behaviors promoting meme transmission are proposed as by-products of selection for behaviors promoting gene transmission; i.e. behaviors associated with a desire to “leave something of oneself” for the future – i.e., “legacy drive.” See text.



## **Discussion**

Behaviors that promote engagement in meme transmission, we argue, are inevitable by-products of natural selection for behaviors that also promote gene transmission – i.e. the desire to “leave something of oneself” for the future. Historically, we suggest, humans have been aware that “leaving something of oneself” for the future can be achieved by having children – which of course promotes evolutionary fitness, and thus accounts for why this desire to “leave something” is now common in humans. Just as common, however, is an awareness in humans that “leaving something of oneself” for the future can also be achieved through other domains that have potential to leave a personal legacy, without having children – or at least without having very many children. Hence, as an indirect consequence of selection for gene transmission, this intrinsic (evolved) legacy drive has left humans inherently vulnerable for “side-tracking” into activities promoting meme transmission (Fig. 2). When given the opportunity, therefore, it is not surprising that humans are commonly preoccupied with the pursuit of curiosity-based learning, rewarding careers, creative expression, political power, material wealth, prestige, and social status – all at the expense of childbearing and childrearing effort. This intrinsic legacy drive, we suggest, also provides an evolutionary explanation for the paradox of foster parenting and especially child adoption (Eisenberg, 2001), which contributes nothing to one’s gene transmission, but may provide, for many, an important opportunity to “leave something of oneself” for the future. This kind of interplay between gene transmission and meme transmission, mediated through effects of natural selection (Fig. 2), we suggest represents a potentially important conceptual framework for understanding cultural evolution (Ehrlich and Levin, 2005).

We are particularly interested here in the socio-cultural issue that men and women have had very different historical opportunities to accumulate “memetic descendants.” In males, the pursuit of wealth and status has contributed not only to meme transmission, but has served also to attract and acquire mates and so has had fairly obvious value for evolutionary fitness. Emperors, kings, and other men of power down through history typically had many wives and hence, many offspring (Betzig, 2005). Historically, men have also been able to invest freely and abundantly in all of the other domains of meme transmission above, without incurring any penalty on evolutionary fitness, owing to their historical success in subjugating women.

For the same reason, the historical participation of women in meme transmission has been negligible by comparison. According to the recent review by Murray (2003), of the 4000 most “accomplished” people that lived over the 1150 years between 800 BC and 1950, only about 2% were women. Over this time period, and still today in severely impoverished countries that lack female empowerment, the desire to “leave something of oneself” for the future could/can be expressed in females primarily through just offspring production and religious practices. We suggest that this accounts, not only for the higher female fertility in more impoverished countries (Fig.1), but also for the greater importance placed on religious practice there compared with wealthier western societies (Pew Global Attitudes Project, 2002). This may also help to account for the greater role of women (compared with men) in professions that, like childrearing, involve nurturing (such as nursing and teaching in primary school), and also the greater involvement of women generally in religious worship in most societies (Francis, 1997) (even though, ironically,

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the positions of power within most religions have always been, and still are, held largely by men). Interestingly, there is also some evidence that people who are less sexually active tend to be more religious (Laumann, Gagnon, Michael and Michaels, 1994), and Bogaert (2004) reports that asexual individuals (defined as those having no sexual attraction for either sex), in particular, tend to be more religious than sexual individuals. This leads to the interesting speculation that when desire for sex is minimal or lacking in some individuals, an innate desire to leave something of oneself for the future – a legacy drive – may, nevertheless, persist strongly, and may be manifested by a heightened religiosity, as a compensation for the absence of sexuality.

There are two critical questions here: If activities that promote meme transmission place constraints on gene transmission (Fig. 2), then why has natural selection not long ago forged behavioral domains in humans that minimize this effect? The most important reason, we suggest, is that the long history of male domination over females (Lerner, 1986), and especially their control over female fertility, has prevented any significant competition between meme transmission and gene transmission, both within families and within whole populations. In other words, throughout much of human evolution, females have expended most of the effort involved in gene transmission, whereas males have expended most of the effort involved in meme transmission. It is largely just males that have reaped the benefits of both, but the recent empowerment of women has now changed this. With independence and wealth combined, women in many contemporary societies are allowed now, along with men, to engage freely in meme transmission. At the same time, this has now forced men to invest more equally in efforts associated with gene transmission (e.g. parental care), thus resulting in widespread competition between gene transmission and meme transmission, like never before, in both women *and* men.

The second question is even more fundamental: Why have humans, and males in particular, been so historically vulnerable for “side-tracking” into activities that promote meme transmission? There is of course the value of male status in attracting, and competing for mates, but equally important, we suggest, is that males (unlike females), throughout most of human evolution, could never be completely certain about their own paternity, and hence, their own success in gene transmission. [Daly, Wilson and Weghorst (1982) invoke this argument as an explanation for male sexual jealousy]. Side-tracking into activities promoting meme transmission thus compensated in helping to satisfy the evolved desire to “leave something of oneself” for the future. Much of this male activity throughout human history involved the pursuit of power and dynasties through warmongering, conquering and ruling over other people and other societies. This, combined with behaviors promoting the subjugation of women – to help maximize the chances of male success also in gene transmission – was loathsome (by contemporary social standards), yet inevitable as an evolutionary consequence of this uniquely male predicament. An interesting example of this link between prolificacy and power in males is evident from a recent study of Y-chromosome phylogeography in Gaelic Ireland (Moore, McEvoy, Cape, Simms and Bradley, 2006).

Low (2000) argues that the fitness benefit of striving for status was historically less significant for women compared with men. This is because – unlike men – women that had the highest wealth and status were unable, for physiological reasons, to have orders of magnitude more children than women with the lowest wealth/status. We suggest, however, that our female predecessors that had the highest fitness probably included those that

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inherited high status-seeking behaviors (i.e., a strong legacy drive) from their fathers, because although these women were limited in how they could express it, they could nevertheless pass on this strong legacy drive to their sons. Hence, status-seeking behaviors may have been historically less conspicuous in women not because (or not just because) women may generally have a weaker intrinsic legacy drive, but to a large extent simply because of the historical subjugation of women by men. Throughout most of human history, post-hunter/gatherers, most women lacked control over not just their own fertility, but also their own participation in mating – a consequence of both traditional cultural imperatives (e.g. “arranged” marriages, usually by fathers), plus the limited historical opportunities for employment or ownership of property by women (Low, 2005). Even in societies where women could choose their own husbands, most – unless they chose prostitution, life in a convent, or poverty in a gruelling low-paying job – had no choice but to marry and bear children in order to secure basic provisions for themselves, and for their children.

With no power or financial independence, many of our female predecessors were probably better off as the third or fourth wife of a wealthy, powerful husband than as the only wife of a poor husband with no status. Ironically, therefore, those women with considerable success in leaving descendants probably included those who were actually attracted to powerful males with dominating personalities (Kokko, 2005; Sadalla, Kenrick, and Vershure, 1987). However, they probably also included those women who had strong legacy drives of their own combined with mere tolerance of dominating males because this was a necessary sacrifice for a women in order to leave her legacy through offspring production. Moreover, because males had ultimate control, the women of the past who left many descendants are also just as likely to have been those with the physical qualities that are most attractive to males, regardless of whether these females had any innate attraction to dominant, coercive male behaviors.

Hence, now that many women are empowered, and have their own independent wealth in wealthy societies, many are rejecting long-term relationships because of a shortage of “desirable” males – not dominant coercive males, but rather, those males that display mating behaviors and fertility preferences that are compatible with those of most females, including behaviors that signal fidelity, sensitivity to gender equality, and reliability for assistance with parental care (Aarssen, 2005). These are attractive male qualities to a women presumably because they promote female opportunities for engagement in meme transmission – thus helping to satisfy a woman’s intrinsic legacy drive (Fig. 2) – while at the same time retaining opportunity for participation in gene transmission (with her “desirable” male) at whatever level of investment she chooses. Many childless women, therefore, may not really prefer childlessness per se; rather, they may forgo motherhood because they reject long-term mating. In a recent poll published by the Japanese Yomiuri newspaper (BBC News, 25 February, 2005), a staggering 70% of single Japanese women reported that they would prefer to remain unwed. In many Asian countries, the desirability of marriage from a woman’s point of view is diminished by cultural expectations that women will continue to do most of the housework and childrearing, even if they work full time, and also by cultural traditions that openly sanction the visiting of sex workers by married men (Jones, 2005; Low, 2005).

It is important to note in the above considerations that behaviors promoting zero lifetime fertility, although categorically maladaptive, have virtually never had opportunity,

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at least in recent evolutionary history, to be strongly selected against in women. This is because historically, most women with these behaviors – regardless of the reasons for them – were largely coerced by men to bear offspring (Aarssen, 2005). This effect might also be a contributing factor in accounting for the generally lower or less-conspicuous interest in sex for women compared with men (Peplau, 2003). The traditional view is that women are generally less anxious for sex (i.e. heterosexual sex) because this has evolved as an adaptive strategy for allowing greater accuracy in choosing high quality mates, and/or, for limiting pregnancies to prevent a mother from having more children than she can adequately care for (Blaffer Hrdy, 1999). However, women might also be less anxious for sex because, unlike in men, low interest in heterosexual sex has virtually never had opportunity to be selected against in women – because historically, most women, regardless of their libido or their sexual orientation, were largely coerced by males to engage in sex and at least some offspring production.

Regardless of the reason – whether it be low interest in heterosexual sex, rejection of mating because of a shortage of desirable males, or low priority for motherhood because of engagement in meme transmission – as many as half of all women in wealthy contemporary societies remain childless, or with at most one offspring, simply because now they *can*, at frequencies that are unprecedented in recorded human history. In order to ensure opportunity for their own meme transmission, empowered women in wealthy countries can be expected to continue to successfully reject long-term relationships with males whose behaviors promote high fertility and/or that signal infidelity, insensitivity to gender equality, or disinterest in parental care – thus further promoting the spread of genes effecting low-fertility-promoting male behaviors in wealthy countries, and also in poor countries as they become wealthier, and as women there become more empowered. Even males, when they can no longer get away with subjugating females (as is now largely the case in wealthier countries), may also prefer low fertility including childlessness because they too, under these circumstances, incur competition between gene transmission and meme transmission. Interestingly, however, Kohler, Behrman and Skytthe (2005) report, from a recent survey, that additional children beyond the first child have a negative effect on subjective well-being for females, but no effect for males.

Who will be the parents of the future? Because of the current widespread availability of cheap and effective contraception, strong sex drives will not rescue us from population implosion. Natural selection operating currently, however, can be expected soon to exert noticeable effects on the distributions of fertility-promoting behaviors of both males and females. In societies with below-replacement fertility and empowered women, this selection can be expected eventually to cause a return to at least replacement level fertility as genes effecting behaviors that promote childlessness in women – including disinterest in heterosexual sex – are now allowed, for probably the first significant time in post-hunter/gatherer human evolution, to be widely disfavored by natural selection. The parents of the future will be the products of this selection, and will inevitably be characterized by a strong “parenting drive” inherited from ancestors also with strong parenting drives, some of whom are raising children today. It is easy to imagine a strong parenting drive associated with either a refined legacy drive – where desire to “leave something of oneself” for the future is preferentially expressed through offspring/descendant production, without being compromised or “out-competed” by other domains of legacy drive – or resulting simply from a separate and explicit desire for

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children, involving strong maternal/nurturing behaviors (e.g. Foster 2000), and having no particular connection with desire to “leave something of oneself” for the future. Future research will be required to understand the nature and consequences of interactions (if any) between human behaviors that promote “legacy drive” versus “parenting drive” versus “sex drive” – both heterosexual and homosexual.

Societies, however, will inevitably prefer to promote fast-track correctives to below-replacement fertility through institutional changes – such as available and affordable childcare – that make it easier for women to combine work and family (Kohler, Billari and Ortega, 2002; Morgan and Berkowitz King, 2001). Even more drastic measures may be required. In Spain, where almost 50% of men admit to doing no housework at all, a recent law has been enacted requiring couples to sign a marriage contract whereby they are obliged to share domestic responsibilities. Failure to do so will affect the terms of a divorce settlement (BBC news, 17 June, 2005). In searching for solutions, we stress the importance of recognizing that the motivation for meme transmission in humans – “legacy drive” – is unlikely to go away quickly, if ever, because it represents an intrinsic evolutionary product of a long history of natural selection (Fig. 2). In order to be successful, it is essential that correctives to very low fertility through institutional changes have the effect of returning again to a state where competition between gene transmission and meme transmission is alleviated in human populations. Thankfully, the subjugation of women by men, although not fully extinguished, is at least no longer a socially or morally acceptable means to achieve this in most developed countries. Unfortunately, however, this is not the case in much of the less-developed world, where the opposite problem of high fertility remains, perhaps, as an even greater challenge.

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