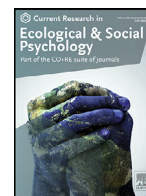




Contents lists available at ScienceDirect

Current Research in Ecological and Social Psychology

journal homepage: www.elsevier.com/locate/cresp

Desire for social status affects marital and reproductive attitudes: A life history mismatch perspective

Amy J. Lim^{a,*}, Norman P. Li^b, Zoi Manesi^b, Steven L. Neuberg^c, Mark van Vugt^d,
Andrea L. Meltzer^e, Kenneth Tan^b^a Discipline of Psychology, Murdoch University, Singapore^b School of Social Sciences, Singapore Management University, Singapore^c Department of Psychology, Arizona State University, Tempe, Arizona^d Department of Experimental and Applied Psychology, Vrije Universiteit Amsterdam, Amsterdam, the Netherlands^e Department of Psychology, Florida State University, Tallahassee, FL, USA

ARTICLE INFO

Keywords:

Evolutionary psychology
Life history theory
Evolutionary mismatch
Social status
Low fertility

ABSTRACT

Modern low fertility is an unresolved paradox. Despite the tremendous financial growth and stability in modern societies, birth rates are steadily dropping. Almost half of the world's population lives in countries with below-replacement fertility and is projected for a continued decline. Drawing on life history theory and an evolutionary mismatch perspective, we propose that desire for social status (which is increasingly experienced by individuals in industrialized, modern societies) is a key factor affecting critical reproductive preferences. Across two experimental studies (total $N = 719$), we show that activating a desire for status can lead people to prefer reproductive tradeoffs that favor having fewer children, thereby predicting preferences for delaying both marriage and having a first child. These data support an evolutionary life history mismatch perspective and suggest a complementary explanation for declining fertility rates in contemporary societies, especially developed and economically advanced ones.

Fertility rates around the world have on average declined. Indeed, more than half the world's population currently lives in countries where total fertility rates are not only low but have dropped below replacement level (i.e., 2.1 children per woman; see Gerland et al., 2014; Wilson and Pison, 2004; Frejka, 2017). Among these countries are developed nations and economically affluent countries such as those in Europe (1.80), the United States (1.87), and East Asian countries such as Korea (0.78) and Singapore (1.10) (The World Bank, n.d.). These trends pose a paradox: If there is an abundance of resources that can potentially be spent on raising offspring, why have fertility rates in modern, resource-rich societies been steadily dropping? This question is timely and important, as the issue of modern low fertility has major implications for global population aging (Lutz et al., 2008) and related societal transformations with regard to economic growth, the labor market, health care, and the pension system (e.g., Bloom et al., 2010; Harper, 2014; Kohler et al., 2006; Lloyd-Sherlock, 2000; Lutz et al., 2008).

Scholars have focused on economic (e.g., Becker, 1992; Willis, 1973), cultural transmission (e.g., Bongaarts and Watkins, 1996; Cleland and Wilson, 1987), and mortality (e.g., Kirk, 1996) processes, among others, to explain the preference of having fewer children. For example, such models highlight the role of (a) reduced child mortality (Pepper and Nettle, 2013; Reher, 2004; Sanderson and Dubrow, 2000), (b) increased

status ascribed to small family size (i.e., prestige bias; Richerson and Boyd, 1984), and (c) economic savings and benefits associated with investing in the self over children (Kramer, 2005; Shenk et al., 2013). Although these models shed insights to the changes in attitudes toward children, they do not offer a compelling explanation for why people in affluent modern societies would adopt a preference for fewer children that has the effect of severely compromising their reproductive fitness. That is, we question how people's reproductive fitness levels plummet to the maladaptive point in many modern societies where fertility rates are increasingly well below replacement levels and people are forgoing reproduction entirely. Proponents of birth control and investments in embodied or human capital argue that these factors can explain the reduced offspring number; and indeed, the increased investment in embodied or human capital is inextricably related to the reduced offspring number (Hugh-Jones and Abdellaoui, 2022). Yet, the question remains - why has the tradeoff tilted as far toward investment and away from reproduction as it has?

Reasons for low fertility and the variability in reproductive timing is complex; to complement the existing explanations for declining fertility in contemporary societies, we offer a novel perspective to this issue. Specifically, we suggest that there are various modern-day, evolutionarily novel ecologies that chronically induce people (their reproductive

* Corresponding author at: Discipline of Psychology, Murdoch University Singapore, #03-01 King's Center, 390 Havelock Road, Singapore.

E-mail address: amy.lim@murdoch.edu.au (A.J. Lim).

timing mechanisms) to perceive that do not have enough to successfully reproduce despite the capital and resources they may already possess. To this end, we propose a novel Life History Mismatch perspective (Li et al., 2018), arguing that modern conditions chronically trigger a subjective lack of social status. This is because evolved psychological mechanisms designed to detect status competition are ill-equipped to effectively process the exaggerated number of high-status competitors conveyed by modern forms of exposure and communication. This is crucial given that a desire to compete for social status is tightly tied to both mate preferences and fertility (e.g., Fletcher et al., 2000). Importantly, this mismatch highlights an intriguing paradox—that the need to achieve a *high or sufficient* level of social status/resources to support and attract potential mates in affluent modern societies likely contributes to preferences for later marriage and timing of first child, with the implication of inadvertently contributing to declining fertility rates.

Evolutionary underpinnings and life history mismatch

Life history theory, a framework based in evolutionary biology (Charnov, 1993; Roff, 1992; Stearns, 1992), has been employed in recent empirical studies and theoretical reviews to examine nuances in human mating and reproductive strategies (e.g., Del Giudice et al., 2016; French et al., 2020; Kaplan et al., 2000; Kenrick and Griskevicius, 2015; Sng et al., 2017; Tan et al., 2022). A basic assumption of life history theory is that, because resources are limited, organisms face important tradeoffs in energy allocation between *somatic effort*, which involves investing in one's ability to reproduce in the future [i.e., developing and maintaining the body and mind, which, for humans, includes acquiring human capital (e.g., knowledge, skills) and social capital (e.g., status, alliances)], and *reproductive effort* (Borgerhoff Mulder, 1992), which involves direct investment in acquiring and maintaining mates, reproducing, and caring for offspring. The relative proportions of energy invested in somatic versus reproductive effort over the lifespan constitutes people's life history strategies. These life history strategies can be conceptualized as existing on a fast-slow continuum. Whereas a faster life history strategy is characterized by the tendency to favor early reproduction, a high reproductive rate, and reduced offspring investment at the expense of somatic effort, a slower life history strategy is characterized by preferences for greater somatic effort but relatively late reproduction, a low reproductive rate, and heightened parental investment (Lessels, 1991; Shenk, 2011).

Research on life history strategies typically show differences between species (see Del Giudice, 2020; Sear 2020) and as such, questions have been raised about the applicability of life history theory in understanding within-species variation (see Zietsch and Sidari, 2020). Importantly however, much research has documented extensive reproductive variability within species (e.g., Tinbergen and Both, 1999), including humans (e.g., Ellis et al., 2009; Griskevicius et al., 2013; Mittal and Griskevicius, 2014). Given that there exist various environmental contexts that have different implications for reproduction, evolution would have selected for individual flexibility in terms of strategies used to allocate resources toward reproductive or somatic effort (Stearns, 1989). Consistent with this idea, prior research has shown that women who live in regions characterized by shorter (versus longer) life expectancies are younger when they birth their first child (Wilson and Daly, 1997). Providing further evidence that life history strategies co-evolve with other ecological features, other research has shown that energy stress (greater energy expenditure and high energy variability) is associated with reduced fecundity (Ellison et al., 2002; Ellison, 2003).

Notably, specific social and ecological conditions should influence life history strategies beyond general harshness or unpredictability. A resource-competition perspective of life history theory posits that environments with low resource competition select for fast life history strategies to facilitate quicker exploitation of the available resources, whereas those with fierce competition select for slow life history strategies to allow more time for accumulating competitive ability (i.e., ac-

quiring more social status), which would allow for more immediate and effective competition (MacArthur and Wilson, 1967). Indeed, as the socioeconomic status of women has increased and thus competition for resources as increased, life expectancies and income have become higher, and the age at which women have their first child has become correspondingly delayed (Nettle, 2011). Furthermore, people in regions with greater population density, and thus greater competition for resources, experience lower fertility rates (Rotella et al., 2021) and demonstrate preferences for a slower life history strategy, greater future orientation, delayed marital timing, and greater parental investment in fewer children (Sng et al., 2017). Likewise, Yong et al. (2019) demonstrated that resource competition is associated with reduced social status affordance, which is associated with less favorable attitudes towards marriage and a preference for fewer children. Together, this work underscores the extent to which life history theory can explain how environmental conditions might influence reproductive timing mechanisms to adaptively induce reproduction in either direction. However, life history theory does not, by itself, explain how people have delayed their reproduction to the arguably maladaptive point where fertility is well below replacement level.

To understand this puzzling phenomenon more fully, we incorporate an evolutionary mismatch perspective, which highlights that psychological mechanisms now function in environments very different from those in which these mechanisms evolved (Li et al., 2018; 2020). Evolved psychological mechanisms, including those for reproductive timing, can be thought of as conditional (if – then) decision rules that function to process specific environmental cues to produce adaptive output in the form of thoughts, feelings, and/or behavior (Kenrick et al., 2003; Tooby and Cosmides, 1992). These adaptations have evolved in response to selection pressures faced by ancient humans, who lived as hunter-gatherers in small villages of no more than 150 people, mostly relatives, in savannahs (Dunbar, 1992). As such, our adaptations tend to be suited to conditions familiar to savannahs. Yet, modern environments have become substantially different from those ancestral habitats. Technological changes that create modern environments occur much faster than the rate at which evolutionary change occurs. The consequence is that our evolved psychological mechanisms have not fully adapt to modern conditions—they lag behind and are mismatched to the evolutionarily novel environments in which they now must operate—and hence may no longer produce adaptive outputs (Crawford, 1998; Kanazawa, 2004; Li et al., 2018; Tooby and Cosmides, 1990). For instance, the scarcity of vital calorie- and nutrient-rich fruits in ancestral environments selected for humans who preferred sweet tastes, such that those with (versus without) this heritable preference were more likely to acquire and consume those fruits when available; over thousands of generations, strong preferences for sweets became a species-typical trait exceedingly well-adapted for common ecologies of caloric scarcity. This evolved preference, however, is not adaptive in modern environments abundant with manufactured sugar in foods and drinks because this abundance now leads people to overconsume sugar, resulting in maladaptive outcomes¹ (e.g., diabetes; Gluckman and Hanson, 2006).

As can be gleaned from the literature, many modern problems, beyond that of food intake, owe to evolutionary mismatches (see

¹ The preference for sweet things is an adaptation; that is, the adaptive behaviour is the consumption of sweet things as they provide good calories. In this sense, we are not consciously trying to eat more sugar, but will likely gravitate towards sweet tasting things (which happens to contain sugar). In today's environment where artificially sweetened food is plenty, this preference for sweet things (i.e., a well-functioning adaptation) may result in a maladaptive outcome, for instance, obesity as people continue to gravitate to and continue consuming sweet things. Hence, it is not that the preference for sweet things is a maladaptation, nor is it a maladaptive illness, but it is that this adaptive preference in the current mismatched environment, can produce maladaptive outcomes (i.e., fitness compromising as obesity poses health risks and limits mating opportunities).

Li et al., 2018; 2020; van Vugt et al., 2020). People encounter many attractive and formidable individuals on social and mass media. Because people's psychological mechanisms that assess mate value and mating opportunities are not adept at differentiating virtual individuals from real people (Kanazawa, 2022), people engage copious amounts of social comparisons with the seemingly unlimited number of virtual individuals they encounter online. This consequently contributes to the destabilization of long-term relationships and to various types of self-dissatisfaction among viewers (Yong et al., 2017). Apart from mating and relationships, evidence for evolutionary mismatches is also observed in the context of diseases and mental and emotional disorders (see Kavanagh et al., 2018; Nesse and Williams, 1996; Nesse, 1998). Characteristics of modern environments (e.g., the lack of social and family support, intense competition, media overexposure) chronically induce psychological stress, which leads to immune dysfunction and chronic disease (Brenner et al., 2015). Following this line of reasoning, we propose an evolutionary life history mismatch model in which a mismatch between mechanisms governing life history strategy and the current environment is a major factor underlying modern reproductive delays and thus declining fertility (Li and Manesi, 2017). Specifically, we argue that modern cues hijack psychological mechanisms (Li et al., 2018) governing life history strategies, causing people to maladaptively delay reproduction. The current studies focus on one key modern-day environmental input variable that we hypothesize contributes to modern low fertility: the desire for social status.

Desire for social status and reproductive mismatch

Humans compete with one another for resources and mates to achieve reproductive success, and the attainment of social status is vital to this goal. Similar to other social animals (e.g., Cowlshaw and Dunbar, 1991), humans live within status hierarchies that regulate social behaviors, and having social status within these hierarchies is essential for the access to resources and social allies (van Vugt and Tybur, 2015; von Rueden et al., 2011). People with higher status are more formidable, influential, and conferred more respect and deterrence, which are useful for warding off competitors and getting what they want (Buss and Schmitt, 1993; van Vugt and Tybur, 2015; Henrich and Gil-White, 2001). On top of the benefits social status bring for the survival in groups, social status also facilitates the acquisition of mates. Social status is a desired trait in mates (Li et al., 2002; Townsend, 1993; Nettle and Pollet, 2008). Men with higher status are not only able to provide more resources, but they are also more able to provide the protection that women desire (Buss and Schmitt, 1993). Women with higher status can also facilitate the reproductive success of men – children of higher status parents experience lower rates of mortality, healthier psychosocial functioning, and better social competitiveness later in life (von Rueden and Jaeggi, 2016; Henz, 2019; Kaplan et al., 1998). As such, having sufficient status meant having access to resources and reproductive success, whereas insufficient status meant access to fewer resources and fewer or no reproductive opportunities (e.g., Buss, 1989; Cheng et al., 2013; Li et al., 2002; Von Rueden et al., 2011).

With the fitness costs (benefits) of having low (high) social status, adaptations to monitor and manage social status would thus be selected for. This includes the attention towards cues of dominance and prestige (Gutierrez et al., 1999; Li et al., 2020) and self-evaluations of one's position in the status hierarchy (van Vugt and Tybur, 2015). A host of work on economic position indicates that people have a tendency to attend to positional over absolute values of limited resources, which implies that psychological mechanisms assessing status likely evolved to evaluate sufficiency in relative rather than absolute terms (Hill and Buss, 2006; 2010). And indeed, people are motivated to maintain a decent standing relative to others (von Rueden et al., 2019). Because having status gives one preferred access to mating and resources, it is necessary to ensure that one's status is sufficient. For these reasons, evolved social status sensitivities include attending closely to cues of one's sta-

tus within one's competition pools, and engaging efforts to increase or maintain status when cues suggested that status was lacking or waning compared to others. If assessed status is deemed insufficient, it often makes sense not to pursue mating opportunities, because those pursuits are likely to be unsuccessful; it instead makes sense to first pursue additional status. In this way, insufficient status can delay the pursuit of mating goals and reproduction.

Problematically, modern environments lead us to believe we have insufficient status to pursue mating (or to accept someone else as an adequate mate)—even when we objectively have sufficient resources to pursue mating and have children. In densely populated, technologically advanced modern environments, there are ubiquitous cues to high status individuals. For instance, people more frequently encounter high status individuals in the usual course of a day via contemporary media, which exposes us to socially successful individuals outside our actual social circles and with whom we actually do not compete (Suvorov, 2021; Yong et al., 2017). Additionally, social media enables people to readily exaggerate their actual levels of attractiveness and success (Siibak, 2009; Gonzales and Hancock, 2011; Blease, 2015; Vogel and Rose, 2016). Because encountering high-status individuals outside one's own social circle is unlikely in the evolutionary past, our psychological mechanisms may not have evolved to discount the relevance of high-status individuals outside our competitive circles, or to effectively discern and discount artificially generated cues of high status and success via social media—only relatively recently have we had such experiences with such mediated experiences—such cues hijack our status-seeking systems to suggest to even those who may already possess high status that they have yet to out-compete a sufficient number of others to move from somatic to reproductive effort. This process reinforces slower life history strategies, resulting in especially delayed reproductive outcomes. As such, modern cues may be inducing people to invest extraordinary effort into attaining more status at the cost of reproduction.

Additionally, consistent with the bias towards relative over absolute social standing, there is growing evidence that modern competitive environments induce people to assess their own social standing as worse than what they actually are (Kaplan and Lancaster, 2000; Kaplan et al., 2002; Morita, 2018; Sear et al., 2016; Shenk et al., 2016). People living in modern environments are constantly insecure about their social standing and feel like they are not doing enough despite their best efforts to keep up (Frank, 1999). Other research reveals that, in modern environments, people's perceptions of competition have substantially increased, resulting in elevated status signaling, perfectionism, and materialism as means of life improvement (e.g., Curran and Hill, 2019; Kasser et al., 2004), all of which predict negative attitudes toward marriage and reproduction (e.g., Li et al., 2015; 2011).

Collectively, there are reasons to believe that our adapted mechanisms are mismatched to modern circumstances and are being fooled into delaying reproduction. Modern contexts interfere with the assessment of social status that leads to the constant belief that we have insufficient status to pursue mating and that more status should be sought. As such, in modern competitive environments, people are especially motivated to prioritize attaining social status and delaying reproduction.

The current research

While existing findings provide support for the relation between status-striving – in the form of educational attainment – and number of offspring, these findings are correlational (e.g., Hugh-Jones and Abdellaoui, 2022). In this paper, drawing on an evolutionary life history mismatch perspective, we experimentally examined whether desire for status can affect life history strategies and reproduction. Specifically, we tested in two experiments whether activating the desire for social status leads to preferences for delaying marriage and reproduction, and whether such preferences may be linked to shifts toward slower life history strategies.

Study 1

This study used a priming method to examine the causal link between desire for social status and attitudes regarding marital and reproduction timing. Study 1 also tested the mediating effect of reproductive strategy, operationalized by the tradeoff between quantity in offspring vs. the quality of offspring (see Sng et al., 2017). We hypothesized that, in response to desire for social status, people are likely to shift their reproductive strategy, which consequently influences their marital and reproduction decisions.

Methods

Power analysis

We conducted an *a priori* power analysis based on work testing the effects of desire for social status for preferences for pro-environmental products (Griskevicius et al., 2010), which had an effect size of $d = 0.47$. Assuming a somewhat more conservative effect size ($d = 0.35$), we used G*Power's (version 3.1.9.7) T-tests means difference between two groups with the following parameters to determine that we needed a minimum of $n = 130$ per condition with 0.80 power and an α of 0.05.

Participants

The focus of this study is on marital and reproductive timing. Because female fertility declines rapidly after age 40 (e.g., Eijkemans et al., 2014), we recruited participants up to 40 years of age who were single and had no children. These criteria are in line with previous studies focusing on reproductive strategies (Sng et al., 2017). We recruited 300 participants using Amazon's Mechanical Turk and Turk Prime. Despite the preselection, 32 participants indicated that they were actually married and/or had children and/or were above 40 years old, leaving a final sample size of $N = 268$ (154 men; $M_{\text{age}} = 28.99$ years, $SD_{\text{age}} = 5.36$ years).

Design and procedure

After providing informed consent, participants provided socio-demographic information (e.g., socioeconomic status, age, etc.). They were then randomly assigned to read one of two primes (see below) designed to activate either elevated desired social status (social status condition) or general arousal (control condition). Participants were asked to read the story carefully as they would later be asked to recall information about it. Next, participants answered items assessing marital timing, reproductive timing, and reproductive strategies. Finally, they completed passage-comprehension and suspicion-probe items. No participants in this study expressed suspicion about the experiment's manipulation or purpose.

Manipulation: social status versus control

Participants in the social status condition ($n = 134$) read a hypothetical scenario in which they imagined that a major purpose in their life was to move up the social ladder. According to the passage, reaching high-ranking positions and achieving success is important for oneself and everyone in one's social network, and that success results in a good life, respect from others, and other invaluable social rewards. The passage ends by emphasizing that achieving high social standing will be a difficult and uncertain endeavor and that the individual will face a series of challenging situations in their pursuit of status. Participants in the control condition ($n = 134$) read instead a modified version of a previously designed control passage (Griskevicius et al., 2009) similar in length and style to the social status passage and designed to elicit similar levels of general arousal. Specifically, participants imagined they had lost their keys and, although they spent several hours searching, it was

very difficult to find them. To maintain consistency with the experimental condition, we modified the control passage to indicate that searching for the keys was very challenging and the outcome was uncertain.

To ensure the social status story elicited the intended feelings, we piloted it using an independent sample of participants ($N = 42$; 26 men; $M_{\text{age}} = 31.62$ years, $SD_{\text{age}} = 10.62$ years) randomly assigned to read either the social status passage or the control passage and who then indicated the extent to which they: (a) "desire to have higher social status" and (b) "are motivated to have higher prestige" (1 = *not at all*, 9 = *very much*). Because the two items were highly correlated ($r = 0.90$), we averaged them to form a composite score of desire for social status. These pilot participants also indicated how they felt at that very moment (overall affect; 1 = *very bad*, 9 = *very good*), as well as the extent to which they felt: (a) sad and (b) worried (negative affect; 1 = *not at all*, 9 = *very much*). The social status group indeed indicated greater desire to acquire social status ($M = 7.17$, $SD = 2.18$) than did the control group ($M = 5.21$, $SD = 2.22$), $t(40) = 2.88$, $p = .006$, 95% CI [0.58, 3.32]; $d = 0.89$. Helping to rule out the possibility that effects of the manipulation could be due simply to affective differences, the two conditions elicited similar levels of overall affect ($p = .14$) and negative affect (worry: $p = .14$; sadness: $p = .73$).

Marital and reproductive timing

To assess marital and reproductive timing, we used a modified version of the items developed by Griskevicius et al. (2011). For marital timing, two items assessed *when people want to get married*. The first item was open-ended: "Assume that you will get married. At what age would you like to marry?" The average desired age at marriage was 33.72 years ($SD = 5.87$ years). We transformed participants' responses by subtracting their current age from their ideal marital age; these transformed values indicated the number of years from now that participants ideally wanted to marry. The second item stated: "Assume that you will get married. In how many years from now do you want to get married?" Participants completed this item using an 11-point scale, ranging from 1 (*in 1 year*) to 11 (*in 11+ years*). Not surprisingly, these two items were highly correlated ($r = 0.91$), and thus we averaged them to form an index of marital timing ($M = 4.65$, $SD = 3.20$).

Likewise, for reproductive timing, two items assessed *when people want to have their first child*. Again, the first item was open-ended: "Assume that you will have children. At what age would you like to have your first child?" The average desired age at reproduction was 35.53 years ($SD = 6.11$ years). We transformed participants' responses by subtracting their current age from their ideal first reproductive age; these transformed values indicated the number of years from now that participants ideally wanted to have their first child. The second item stated: "Assume that you will have children. In how many years from now do you want to have your first child?" Participants completed this item using an 11-point scale, ranging from 1 (*in 1 year*) to 11 (*in 11+ years*). These two items were highly correlated ($r = 0.84$), and thus we averaged them to form a reproductive timing index ($M = 6.28$, $SD = 3.75$).

Life history strategy

To assess the tradeoff between slow and fast life history strategies in reproduction (Sng et al., 2017), we presented participants with two offspring quality-versus-quantity options and asked them to indicate their preference using a 1 (*definitely option A*) to 9 (*definitely option B*) scale: "Which of these two options would you prefer? Have one child and invest all your time and resources into that one child (option A) OR have multiple children and split your time and resources across all of them (option B)?" After reverse scoring, higher scores indicated a slower life history reproductive strategy where greater investment in fewer offspring is favored over less investment in more offspring ($M = 5.53$, $SD = 2.83$).

Table 1
Study 1: Mediation analysis on marital timing.

Variable	B	SE	t	df	p	LLCL	ULCI
DV = Reproductive strategy ($R^2 = 0.03$)							
Constant	4.18	.54	7.73	266	< 0.01	3.11	5.24
Condition	0.90	.34	2.64	266	.01	0.23	1.58
DV = Marital Timing ($R^2 = 0.06$)							
Constant	2.16	.66	3.25	265	< 0.01	0.85	3.47
Condition	0.92	.38	2.40	265	.02	0.17	1.68
Reproductive Strategy	0.20	.07	2.93	265	< 0.01	0.07	0.33

Table 2
Study 1: Mediation analysis on reproductive timing.

Variable	B	SE	t	df	p	LLCL	ULCI
DV = Reproductive strategy ($R^2 = 0.03$)							
Constant	4.18	.54	7.73	266	< 0.01	3.11	5.24
Condition	0.90	.34	2.64	266	.01	0.23	1.58
DV = Reproductive Timing ($R^2 = 0.07$)							
Constant	3.30	.78	4.26	265	< 0.01	1.77	4.83
Condition	0.87	.45	1.94	265	.05	-0.01	1.76
Reproductive Strategy	0.30	.08	3.80	265	< 0.01	0.15	0.46

Results and discussion

Marital timing, reproductive timing, offspring quality-versus-quantity tradeoff

Independent *t*-tests were conducted for marital timing, reproductive timing, and offspring quality-versus-quantity tradeoff. As predicted, participants in the social status group preferred to delay marriage ($M = 5.21$, $SD = 3.32$) compared to those in the control group ($M = 4.10$, $SD = 2.98$), $t(266) = 2.87$, $p < .01$, 95% CI [0.35, 1.86], $d = 0.35$. Participants in the status group also preferred to delay the timing of their first child ($M = 6.85$, $SD = 3.95$) versus those in the control group ($M = 5.71$, $SD = 3.47$), $t(266) = 2.52$, $p = .01$, 95% CI [0.25, 2.04], $d = 0.31$. Finally, participants in the status group were inclined to have fewer children and to invest more in each ($M = 5.99$, $SD = 2.77$) versus those in the control group ($M = 5.08$, $SD = 2.83$), $t(266) = 2.64$, $p < .01$, 95% CI [0.23, 1.58], $d = 0.32$.

To reduce the likelihood of Type I error, we conducted a MANOVA to examine the effect of social status desire on marital and reproductive decisions. Results revealed a significant effect of status desire on the combined dependent variables: marital timing, reproductive timing, and offspring quality-versus-quantity tradeoff, $F(3, 264) = 4.35$, $p = .005$; $\eta^2 p = 0.047$. The analysis also revealed significant effects for each the dependent variables separately.

Mediation analyses

To examine the mediating role of reproductive life history strategy, we conducted a mediation analysis using Hayes' PROCESS model 4 (Hayes, 2017), in which desire for status was the independent variable, marital timing was the dependent variable, and reproductive strategy was the mediator. Results are presented in Table 1. As can be seen, desire for status was positively associated with reproductive strategy, and reproductive strategy was positively associated with marital timing. The direct effect of status desire on marital timing remained significant, $B = 0.92$, $p = .02$. Desire for status was indirectly and positively associated with marital timing via reproductive strategy, $B = 0.18$, 95% CI = [0.02, 0.42].

We re-estimated this mediation analysis but replaced marital timing with reproductive timing as the dependent variable. Results are presented in Table 2. Mirroring the first analysis, as can be seen desire for status was positively associated with reproductive strategy, reproductive strategy was positively associated with reproductive timing, and desire

for status was indirectly, positively associated with reproductive timing via reproductive strategy, $B = 0.27$, 95% CI = [0.05, 0.57]. The direct effect of status desire on reproductive timing became non-significant, $B = 0.87$, $p = .05$, when reproductive strategy was included as a mediator.²

Overall, Study 1 suggests that activating a desire for social status led people to want to delay marriage and reproduction and favor high investment in a smaller number of children (versus low investment in a larger number of children) via a slower reproductive strategy.

Study 2

To ensure that the effects found in Study 1 were not due to artifacts of non-status related differences between the two priming conditions (e.g., other emotions that may arise from reading the control passage), we added a no-prime control condition in Study 2.

Methods

Methods were identical to those of Study 1 except where noted below.

Participants

Given the effect sizes observed in Study 1, we again used a conservative effect size ($d = 0.15$) to conduct an a priori power analysis in G*Power using *F*-tests ANOVA with 3 groups to determine that we needed a minimum total sample size of 432 with 0.80 power and an α of 0.05. We thus aimed to recruit 500 participants through Amazon's Mechanical Turk and Turk Prime. We excluded 49 participants who violated our eligibility criteria (i.e., indicated they were actually married, had children, and/or were above 40 years old); thus, the final sample consisted of 451 participants (234 men; $M_{\text{age}} = 28.88$ years, $SD_{\text{age}} = 5.29$ years).

Design and procedure

In this study, we included a no-prime control condition where participants were not required to read any passage. Participants were randomly assigned to one of three conditions in a between-participants design where they read either the social status passage, the control passage, or no passage ($N_{\text{status}} = 150$; $N_{\text{passage control}} = 150$; $N_{\text{no-passage control}} = 151$).

Manipulation: social status versus control versus no-prime control

We first conducted a pilot test to determine whether the social status passage could elicit greater desire for social status than each of the other two control conditions. We randomly assigned an independent sample of participants ($N = 56$; 36 men; $M_{\text{age}} = 31.98$ years, $SD_{\text{age}} = 8.07$ years) to read either the social status passage, the control passage, or no passage. As in Study 1, they completed the two manipulation-check items and three items measuring overall and negative affect. The social status manipulation was effective, $F(2, 53) = 7.63$, $p = .001$, $\eta^2 p = 0.22$: the desire to acquire social status was significantly greater for the social status group ($M = 7.47$, $SD = 1.42$; 95% CI [6.57, 8.38]) than the passage control group ($M = 5.11$, $SD = 2.40$, $p = .001$; 95% CI [4.23, 5.99]) and the no-passage control group ($M = 5.68$, $SD = 1.77$, $p = .017$; 95% CI

² Given the effect socioeconomic status has on reproductive decisions (Tan et al., 2022), we reran the analyses described above controlling for current socioeconomic status. As age may have an effect on marital and reproductive decisions, we also reran the analyses controlling for age. Results of these additional analyses showed similar patterns of findings – all effects remained significant. Additional analyses with a two-way interaction with age were conducted; there were no significant interaction between the condition participants were assigned to and age.

Table 3
Study 2, Pilot: Descriptive statistics for social status desire and affect.

Variables	Status		Control text		No text	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Status desire	7.47	1.42	5.11	2.40	5.68	1.77
Overall affect	6.00	2.00	5.05	1.75	6.16	1.61
Worry	5.11	2.52	5.63	2.45	3.63	2.85
Sadness	3.44	2.31	4.21	2.32	3.11	2.33

Table 4
Study 2: Descriptive statistics for marital timing, reproductive timing, and reproductive strategy.

Variables	Status		Control text		No text	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Marital Timing	4.29	2.79	3.39	2.59	3.28	2.40
Reproductive Timing	5.49	3.23	4.46	2.84	4.44	2.86
Reproductive strategy	6.05	2.70	5.25	2.70	5.13	2.66

[4.80, 6.57]); the two control groups did not differ from one another, $p = .62$. Regarding arousal, results showed that, compared to each of the two control conditions, the social status condition elicited similar levels of overall affect ($ps > 0.11$) and negative affect (sadness: $ps > 0.32$; worry: $ps > 0.09$). Descriptive statistics of social status desire and affect items are presented in Table 3.

Marital and reproductive timing

We assessed marital and reproductive timing using the same instrument from Study 1. The average desired age at marriage was 32.54 years ($SD = 5.22$ years). The two items relating to marital timing were highly correlated ($r = 0.97$) and were combined into a marital timing index ($M = 3.65$, $SD = 2.63$). The average desired age at reproduction was 33.76 years ($SD = 4.74$ years). The two items relating to reproductive timing were highly correlated ($r = 0.93$) and were combined into a reproductive timing index ($M = 4.79$, $SD = 3.01$).

Offspring quality-versus-quantity tradeoff

As in Study 1, the measure of reproductive strategy focused on the tradeoff between offspring quantity and offspring quality ($M = 5.47$, $SD = 2.71$).

Results and discussion

Marital timing, reproductive timing, and offspring quality-versus-quantity tradeoff

One-way ANOVAs were separately conducted for marital timing, reproductive timing, and offspring quality-versus-quantity tradeoff. Descriptive statistics of these variables are provided in Table 4. Analyses revealed significant effects for each of the dependent variables: Participants in the social status group preferred to delay marriage compared to those in the passage control group ($p = .003$) and the no-passage control group ($p = .001$), $F(2, 448) = 6.78$, $p = .001$, $\eta^2p = 0.029$; the two control conditions did not differ from one another, $p = .726$. Likewise, participants in the social status group preferred to delay the birth of their first child versus those in the passage control group ($p = .003$) and the no-passage control group ($p = .002$), $F(2, 448) = 6.11$, $p = .002$, $\eta^2p = 0.027$; the two control conditions did not differ from one another, $p = .962$. Finally, participants in the social status group expressed stronger preference for fewer children (with higher investment in each child) versus the passage control group ($p = .010$) and the no-passage control group ($p = .003$), $F(2, 448) = 5.22$, $p = .006$, $\eta^2p = 0.023$; the

two control conditions did not differ from one another, $p = 0.696$.³ We conducted a MANOVA to examine the effect of social status desire on marital and reproductive decisions. Results showed a significant overall effect of status desire, $F(6, 892) = 3.56$, $p = .002$; $\eta^2p = 0.023$.

Mediation analyses

Similar to Study 1, mediation analyses were conducted to test the mediation of marital and reproductive timing via reproductive strategy with Hayes' PROCESS model 4 (Hayes, 2017). We first included the desire for status as the independent variable (dummy coded with the no prime control condition as the reference category), marital timing as the dependent variable, and reproductive strategy as the mediator in the model. Results are presented in Table 5. As can be seen, the desire for status was positively associated with reproductive strategy, and reproductive strategy was positively associated with marital timing. The direct effect of status desire on marital timing remained significant after including reproductive strategy as the mediator, $B = 0.82$, $p < .01$. Finally, desire for status was indirectly associated with marital timing through reproductive life history strategy, $B = 0.19$, 95% CI = [0.06, 0.34].

We re-estimated this mediation analysis but replaced marital timing with reproductive timing as the dependent variable. Results are presented in Table 6. Similar to the prior analysis, desire for status was positively associated with reproductive strategy, reproductive strategy was positively associated with reproductive timing, and desire for status was indirectly, positively associated with reproductive timing via reproductive strategy, $B = 0.13$, 95% CI = [0.03, 0.28]. The direct effect of status desire on reproductive timing remained significant, $B = 0.92$, $p < .01$.⁴

Overall, Study 2 extended the results of Study 1; the inclusion of the no-passage control condition accords further confidence to the findings in Study 1, demonstrating that the effects were not due to artifacts of non-status related differences between the text that primed social status and the control text. Study 2 also replicated the statistically mediating role of reproductive life history strategy on the relation between status desire and marital timing and on the relation between status desire and reproductive timing.

General discussion

Across two experimental studies, we showed that a heightened desire for social status affects preferences for marital and reproductive timing. Specifically, both studies showed that activating (versus not activating) the desire to acquire higher social status led to preferences for delayed marriage and reproduction, and for investing heavily in fewer children rather than spreading one's resources across multiple children (i.e., offspring quality over quantity). Also, the quality/quantity tradeoff, reflecting a slower reproductive life history strategy, statistically mediated the effects of desire for social status on delayed marriage and reproduction (fully, for marital timing, in Study 1 and partially in Study 2).

Supporting and extending life history mismatch

Together, the findings are consistent with the theoretical framework of life history mismatch (Li et al., 2018; see also Gluckman and Hanson, 2006; Kavanagh and Kahl, 2018; Sng et al., 2017; Yong et al., 2019,

³ Follow-up analyses were conducted using LSD corrections to control for multiple comparisons. The findings remained the same when with Bonferroni corrections.

⁴ Given that we compared the effects of the status prime against the control text in Study 1, we also ran the mediation analyses with the control text condition as the reference category. The results are presented in Table 7 and 8 for marital timing and reproductive timing respectively.

Table 5
Study 2: Mediation analysis on marital timing.

Variable	B	SE	t	df	p	LLCL	ULCI
DV = Reproductive strategy ($R^2 = 0.03$)							
Constant	5.13	.22	23.45	448	< 0.01	4.70	5.56
Condition X1	0.12	.31	0.39	448	.70	-0.49	0.73
Condition X2	0.92	0.31	2.97	448	< 0.01	0.31	1.53
DV = Marital Timing ($R^2 = 0.07$)							
Constant	2.25	.31	7.27	447	< 0.01	1.64	2.86
Condition X1	0.08	.29	0.28	447	.78	-0.50	0.66
Condition X2	0.82	.30	2.77	447	.01	0.24	1.40
Reproductive Strategy	0.20	.05	4.50		< 0.01	0.11	0.29

Note. Condition X1 is coded such that no text, control, and status prime are 0, 1, and 0, respectively; Condition X2 is coded such that no text, control, and status prime are 0, 0, and 1, respectively.

Table 6
Study 2: Mediation analysis on reproductive timing.

Variable	B	SE	t	df	p	LLCL	ULCI
DV = Reproductive strategy ($R^2 = 0.03$)							
Constant	5.13	.22	4.70	448	< 0.01	4.70	5.56
Condition X1	0.12	.31	-0.49	448	.70	-0.49	0.73
Condition X2	0.92	0.31	0.31	448	< 0.01	0.31	1.53
DV = Reproductive Timing ($R^2 = 0.04$)							
Constant	3.70	.36	10.29	447	< 0.01	2.99	4.40
Condition X1	-0.001	.34	-0.004	447	.98	-0.67	0.67
Condition X2	0.92	.34	2.66	447	.01	0.24	1.59
Reproductive Strategy	0.15	.05	2.79	447	.01	0.04	0.25

Note. Condition X1 is coded such that no text, control, and status prime are 0, 1, and 0, respectively; Condition X2 is coded such that no text, control, and status prime are 0, 0, and 1, respectively.

Table 7
Study 2 Mediation analysis on marital timing with control text as reference category.

Variable	B	SE	t	df	p	LLCL	ULCI
DV = Reproductive strategy ($R^2 = 0.02$)							
Constant	5.25	.22	23.93	448	< 0.01	4.82	5.68
Condition X1	- 0.12	.31	-0.39	448	.70	-0.73	0.49
Condition X2	0.80	.31	2.58	448	.01	0.19	1.41
DV = Marital Timing ($R^2 = 0.07$)							
Constant	2.33	.31	7.43	447	< 0.01	1.64	2.86
Condition X1	-0.08	.29	-0.28	447	.78	-0.50	0.66
Condition X2	0.74	.30	2.49	447	.01	0.24	1.40
Reproductive Strategy	0.20	.05	4.49	447	< 0.01	0.11	0.29

Note. Condition X1 is coded such that control, no text, and status prime are 0, 1, and 0, respectively; Condition X2 is coded such that control, no text, and status prime are 0, 0, and 1, respectively.

Table 8
Study 2: Mediation analysis on Reproductive Timing with control text as reference category.

Variable	B	SE	t	df	p	LLCL	ULCI
DV = Reproductive strategy ($R^2 = 0.02$)							
Constant	5.25	.22	23.93	448	< 0.01	4.82	5.68
Condition X1	- 0.12	.31	-0.39	448	.70	-0.73	0.49
Condition X2	0.80	.31	2.58	448	.01	0.19	1.41
DV = Reproductive Timing ($R^2 = 0.04$)							
Constant	3.69	.36	10.14	447	< 0.01	2.98	4.41
Condition X1	0.001	.34	0.004	447	.99	-0.67	0.67
Condition X2	0.92	.34	2.67	447	.01	0.24	1.59
Reproductive Strategy	0.15	.05	2.79	447	.01	0.04	0.25

Note. Condition X1 is coded such that control, no text, and status prime are 0, 1, and 0, respectively; Condition X2 is coded such that control, no text, and status prime are 0, 0, and 1, respectively.

2023). That is, they support the idea that, in modern environments, some inputs may be especially intense in magnitude or no longer have the same fitness consequences as in the evolutionary past, which, in turn, can lead ancestrally adaptive psychological mechanisms to produce output that is maladaptive in current times. The discrepancy in intensity (and quantity) of status competition cues between current and ancestral environments arises from modern humans' exposure to

population densities that exceed ancestral ones by up to 10,000 times (Rotella et al., 2021) and to countless numbers of real and virtual competitors (Yong et al., 2017). Yet, psychological mechanisms underlying reproductive behavior have not evolved to comprehend modern contexts, and thus result in perceptions that one's own status and resources are grossly insufficient to support a family. In other words, they have been "fooled" by the environment into engaging in extremely delayed

and decreased reproduction, which may be considered maladaptive in current times. Supporting the life history mismatch model, the current work provides the first empirical evidence for a causal link between modern-day desire for status and (a significantly delayed) reproductive timing.

Furthermore, the current work highlights a basic tradeoff between status attainment and reproduction and extends conceptual and empirical work from life history theory (Del Giudice et al., 2016; Ellis et al., 2009; Griskevicius et al., 2011; Sng et al., 2017). In line with life history theory, perceived status competition was found to promote a slower life history strategy, as expressed by the inclination to invest more into fewer children than have resources spread across several children. Importantly, and extending prior work on life history theory, the present research suggests that modern societal issues, such as delayed marriage and reproduction, may be maladaptive outputs of otherwise efficient psychological mechanisms. Although it was likely adaptive for psychological mechanisms to produce slower life history strategies upon intense competition in the ancestral environment, perceptions of endless competition within the modern environment may be leading to extreme levels of slow life history strategies that may ultimately leave highly competent individuals with no descendants.

The current empirical evidence also supports and extends prior work from evolutionary anthropology and ecology that has proposed links between (a) social status concerns and desires and (b) low fertility (Boone and Kessler, 1999; Borgerhoff Mulder, 1998; Hill and Reeve, 2004; Rogers, 1990; Shenk et al., 2016). In the modern world, the cost required to reach the highest-ranking positions, and the expenses for raising competitive offspring and transmitting status to them, are particularly high (see also, Galor, 2012; Hill and Reeve, 2004), making the tradeoff between status seeking and reproduction especially pronounced. Moreover, because of the prestige bias where people imitate others who are perceived as successful, the preference of investing more in fewer offspring becomes increasingly widespread (Richerson and Boyd, 1984). Studies on materialism, an obsession with proxies of social status via the possession of desirable material goods, also evidence the negative association between status desires and reduced fertility as well as more negative attitudes toward marriage and reproduction (Luttbegg et al., 2000; Li et al., 2011; 2015). In societies where materialistic attitudes are more pronounced and the desire for social status is high (such as developed East Asian countries), people put off mating efforts – some to the extent of forgoing mating entirely and remaining single and childless – as they reportedly are too busy to socialize or be interested in dating (Cheng, 2020; Ghaznavi et al., 2020; Wang and Jiang, 2016; Yong et al., 2019). The present research contributes to these lines of research, which mainly consists of theoretical models (e.g., Rogers, 1995) and correlational data (e.g., Luttbegg et al., 2000; Hugh-Jones and Abdellaoui, 2022), by providing empirical evidence for a causal effect of desire for status on delayed reproduction. The current paper also provides direct evidence for the evolutionary mismatch account proposed to explain the prioritization of social status at the expense of fertility in modern contexts (Yong et al., 2023).

Limitations, implications, and future directions

We opened this article by considering a paradox: Why do people in modern and resourceful societies opt for delayed fertility often below replacement levels? The present findings provide initial evidence that having an elevated desire for status, which often characterizes individuals living and working in modern, competitive, urban centers, may be a factor behind modern low fertility. However, our work is far from conclusive and poses questions for future work.

First, although the causal link from social status desires to reproductive desires is a crucial life history tradeoff and a key part of our argument about why modern people are reproducing less, there are parts of the framework that remain to be directly examined. For instance, although our studies demonstrated that status desire led to a preference

for slow history strategy, thereby contributing to delayed marital and reproductive timings, our studies cannot conclusively identify the mechanism underlying the effect of status desire on changes in preference for a slower life history strategy. While we have demonstrated that the primes we used in our studies induced the desire for social status in our pilot tests, we did not directly test this in our main analyses. Also, given the nature of our status desire manipulation, possible mediators could include perceived competition for resources and status inadequacy. More research is required to identify the specific mechanism through which this change in preference occurs.

Alongside relentlessly fostering desires for status, modern environments combine various evolutionarily novel ecological and social factors that can shape reproductive strategies, such as low harshness (i.e., morbidity and mortality), low unpredictability (i.e., variation of harshness from one period to another), high costs and benefits related to status competition (see also Ellis et al., 2009; Shenk et al., 2016), and physiological stress (for an overview, see Negro-Vilar, 1993)—which we attempted to simulate in our experimental scenarios. Future research might productively tease apart the effect of desire for social status from the potential effects of related variables that may also characterize contemporary societies. Moreover, given that selected life history strategies depends on exact notions of harshness (i.e., food, events) and unpredictability (i.e., resources, events, interruption risk), rather than high (versus low) harshness and unpredictability (see Fenneman and Frankenhuis, 2020), it is also imperative for future work to define clearer notions of competition and identify how they select for life history strategies.

Ecological conditions can only partially explain the selection of strategies and that genes play an important role to the selection of life history strategies (Ellis et al., 2009; Baldini, 2015). With correlational studies (e.g., Ellis, 2004; Nettle et al., 2010), it is difficult to tease apart the effects of ecological environments on life history strategies from that of genes (i.e., genetically inclined to have “fast” life histories in the first place) (Baldini, 2015). The experimental nature of this paper can address part of this concern but more studies – ideally involving monozygotic twins – is required.

Our findings do not suggest that *having* high status leads to low fertility. Rather, they suggest that *being concerned about obtaining* higher status can lead people to endorse a slower life history strategy. That is, even individuals who have reached stable high-status positions might have many (rather than few) children and reproduce earlier (rather than later) in life, but only if they are not concerned with obtaining a higher status; high-status individuals who are motivated to obtain additional status—perhaps due to constant exposure in the modern environment suggesting relatively higher status is necessary, may delay reproduction, expend more effort boosting their career, and invest more in fewer children. Future research may benefit from directly testing this possibility.

We note that all participants in the studies came from WEIRD populations (see Henrich et al., 2010). Although primarily focused on status, our experimental manipulation simulates conditions of modern environments; therefore, the results should generalize to contemporary societies that are characterized by status competition as well as predictability. This is in line with the aims of this research and is particularly valuable if one is to understand the significance of status desire for modern fertility decline.

We assessed marital and reproductive preferences rather than observing actual marital and reproductive behaviors. Given the experimental nature of our study, it would not be ethical to manipulate factors that might affect people’s actual marriage and reproductive behaviors and hence, measuring marital and reproductive preferences is likely to work best in this context. That said, for our studies, participants were properly debriefed after the study to prevent our manipulations from altering behaviors through changed intentions. Despite the intention-behavior gap, meta-analysis demonstrate that intentions do strongly predict behavior (Sheeren and Webb, 2016). As such, there is reason to believe that marital and reproductive preferences translate to actual behaviors.

On a related note, we are not suggesting that people's reproductive behaviors evolved to be guided by their reproductive intentions per se, rather, we posit that relevant ecological conditions likely influence people's psychology in various ways (e.g., increased status anxiety or insecurity, decreased mating interest), in turn manifesting in greater investment and decreased reproduction. In this process, people's thoughts, feelings, and intentions related to reproduction may be accessible to them when asked. For example, men exposed to women who were near ovulation, and were accordingly more fertile, exhibited increased implicit accessibility to sexual concepts (Miller and Maner, 2011), exemplifying the operation of psychological mechanisms in achieving their adaptive goals without human consciousness. Moreover, given that our ancestors never had the technology to control their reproduction as people in the modern day do, it is unlikely that people evolved to intentionally control their reproduction. As such, research is necessary to test these assumptions and ascertain the extent to which people pursued fitness maximization in intentional ways. Along a similar vein, it can be critiqued that the status prime employed in our studies caused participants to rationally cut back on other areas including having and raising children. While consistent findings from a host of existing studies suggest that this is not the case (e.g., Sng et al., 2017; Griskevicius et al., 2011), it is necessary for future work to test for discriminant validity and tease apart the role rationality play in reproductive behaviors. In other words, future studies must include measures assessing other activities that people spend their time on upon being primed with status concerns, and activities that people spend their time on (including having and raising children) upon being primed with any major goal or concern.

More practically, the present research helps explain why subfertility is such a rising problem in the modern world by drawing attention to an important and underexplored explanation. The current findings can inform policy makers in their efforts to increase reproduction rates, especially in affluent countries with ultra-low fertility (e.g., countries in East Asia and Europe). The extremely low fertility rates in these countries poses significant concerns at the societal level—when a population is not replaced, sustaining an existing population can extremely challenging sociopolitically and socioeconomically (e.g., financial needs of aging individuals, expensive healthcare, labor shortage). Furthermore, these insights can inform counselors who are developing interventions for couples and individuals who are contemplating their reproductive timing and tradeoffs. To this end, we are not suggesting that our study should be taken as encouragement to increase population size since population reduction is adaptive in certain contexts.

Last, we note the current debate on the application of life history theory to human psychology and behavior (e.g., Sear, 2020; Zietsch and Sidari, 2020). Critiques argue that such application deviate significantly from the theory's biological foundations and that psychology researchers are overly liberal in their predictions of psychological outcomes from the theory. Yet, with the empirical support received from psychosocial applications of life history theory (e.g., French et al., 2020; Griskevicius et al., 2013; Sng et al., 2017; Rotella et al., 2021; Tan et al., 2022; Williams et al., 2016; Yong et al., 2019), some scholars suggest that the theory is in a validation phase where further research will likely clarify rather than eliminate it as a psychological framework (see, for example, the "LHT-P" model proposed by Nettle and Frankenhuys, 2020). As such, life history theory still has the potential to offer insights for the current paper's discussion on social status and fertility, and future work through this perspective promises to contribute to this important validation effort.

Conclusion

Fertility decline in modern and prosperous societies has been an intriguing paradox, leading to explanations from multiple disciplines. Despite that increased, multidisciplinary attention, we still know little about the deep causes of and psychological mechanisms underlying

modern low fertility. Drawing on the novel evolutionary life history mismatch perspective, we provide the first empirical evidence for a mismatch between the modern competitive environment and the psychological mechanisms evolved to assess one's social standing and reproductive strategies. Across two experimental studies, we find evidence that thirst for higher status can lead to slow life history strategies related to reproduction. Taken together, these results reinforce the conclusion that competition for status can be a powerful explanation of modern low fertility.

Ethics & informed consent statement

This research has been conducted in a manner consistent with the current APA Ethical Principles of Psychologists and Code of Conduct. This research has been approved by an ethics committee. Participants of this research has provided informed consent. No personal details of participants are included in the paper.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Norman Li reports financial support was provided by Singapore Ministry of Education.

Data availability

Data will be made available on request.

Funding

Preparation of this manuscript was supported in part by an Academic Research Fund (AcRF) Tier 1 grant from the Singapore Ministry of Education (MOE).

References

- Baldini, R., 2015. Harsh environments and "fast" human life histories: what does the theory say? *Biorxiv*, 014647.
- Becker, G.S., 1992. Human capital and the economy. *Proc. Am. Philos. Soc.* 136 (1), 85–92.
- Bleese, C.R., 2015. Too many 'friends,' too few 'likes'? Evolutionary psychology and 'Facebook depression. *Rev. Gen. Psychol.* 19 (1), 1–13. doi:10.1037/gpr0000030.
- Bloom, D.E., Canning, D., Fink, G., 2010. Implications of population ageing for economic growth. *Oxford Rev. Econ. Policy* 26 (4), 583–612.
- Bongaarts, J., Watkins, S.C., 1996. Social interactions and contemporary fertility transitions. *Popul. Dev. Rev.* 22 (4), 639–682. doi:10.2307/2137804.
- Boone, J.L., Kessler, K.L., 1999. More status or more children? Social status, fertility reduction, and long-term fitness. *Evol. Hum. Behav.* 20 (4), 257–277.
- Borgerhoff Mulder, M., 1992. Reproductive decisions. In: Smith, E.A., Winterhalder, B. (Eds.), *Evolutionary Ecology and Human Behaviour*. Aldine de Gruyter, pp. 339–374.
- Borgerhoff Mulder, M., 1998. The demographic transition: are we any closer to an evolutionary explanation? *Trends Ecol. Evol. (Amst.)* 13 (7), 266–270. doi:10.1016/s0169-5347(98)01357-3.
- Brenner, S.L., Jones, J.P., Rutanen-Whaley, R.H., Parker, W., Flinn, M.V., Muehlenbein, M.P., 2015. Evolutionary mismatch and chronic psychological stress. *J. Evol. Med.* 3 (1), 1–11.
- Buss, D.M., 1989. Sex differences in human mate preferences: evolutionary hypotheses tested in 37 cultures. *Behav. Brain Sci.* 12 (1), 1–14. doi:10.1017/S0140525X00023992.
- Buss, D.M., Schmitt, D.P., 1993. Sexual strategies theory: an evolutionary perspective on human mating. *Psychol. Rev.* 100 (2), 204–232. doi:10.1037/0033-295X.100.2.204.
- Charnov, E.L., 1993. *Life History invariants: Some Explorations of Symmetry in Evolutionary Ecology*, 6. Oxford University Press, USA.
- Cheng, Y.-H.A., 2020. Ultra-low fertility in East Asia: confucianism and its discontents. *Vienna Yearbook Population Res.* 18, 83–120. <https://econpapers.repec.org/RePEc:vid:yearbk:v:18:y:2020:i:1:oid:0x003bd199>.
- Cheng, J.T., Tracy, J.L., Foulsham, T., Kingstone, A., Henrich, J., 2013. Two ways to the top: evidence that dominance and prestige are distinct yet viable avenues to social rank and influence. *J. Pers. Soc. Psychol.* 104 (1), 103–125. doi:10.1037/a0030398.
- Cleland, J., Wilson, C., 1987. Demand theories of the fertility transition: an iconoclastic view. *Popul. Stud. (Camb.)* 41 (1), 5–30. doi:10.1080/0032472031000142516.
- Cowlshaw, G., Dunbar, R.I.M., 1991. Dominance rank and mating success in male primates. *Anim. Behav.* 41 (6), 1045–1056. doi:10.1016/S0003-3472(05)80642-6.
- Crawford, C., 1998. Environments and adaptations: then and now. In: Crawford, C., Krebs, D.L. (Eds.), *Handbook of Evolutionary psychology: Ideas, issues, and Applications*. Erlbaum, pp. 275–302.

- Curran, T., Hill, A.P., 2019. Perfectionism is increasing over time: a meta-analysis of birth cohort differences from 1989 to 2016. *Psychol. Bull.* 145 (4), 410–429. doi:10.1037/bul0000138.
- Del Giudice, M., Gangestad, S.W., Kaplan, H.S., 2016. Life history theory and evolutionary psychology. In: Buss, D.M. (Ed.), *The Handbook of Evolutionary Psychology: Foundations*. John Wiley & Sons Inc, pp. 88–114.
- Del Giudice, M., 2020. Rethinking the fast-slow continuum of individual differences. *Evol. Hum. Behav.* 41 (6), 536–549. doi:10.1016/j.evolhumbehav.2020.05.004.
- Dunbar, R.I.M., 1992. Neocortex size as a constraint on group size in primates. *J. Hum. Evol.* 22 (6), 469–493. doi:10.1016/0047-2484(92)90081-J.
- Eijkemans, M.J.C., van Poppel, F., Habbema, D.F., Smith, K.R., Leridon, H., te Velde, E.R., 2014. Too old to have children? Lessons from natural fertility populations. *Hum. Reprod.* 29 (6), 1304–1312. doi:10.1093/humrep/deu056.
- Ellis, B.J., Figueredo, A.J., Brumbach, B.H., Schlomer, G.L., 2009. Fundamental dimensions of environmental risk: the impact of harsh versus unpredictable environments on the evolution and development of life history strategies. *Human Nature* 20 (2), 204–268. doi:10.1007/s12110-009-9063-7.
- Ellison, P.T., Bribiescas, R.G., Bentley, G.R., Campbell, B.C., Lipson, S.F., Panter-Brick, C., Hill, K., 2002. Population variation in age-related decline in male salivary testosterone. *Hum. Reprod.* 17 (12), 3251–3253. doi:10.1093/humrep/17.12.3251.
- Ellison, P.T., 2003. Energetics and reproductive effort. *Am. J. Hum. Biol.* 15 (3), 342–351. doi:10.1002/ajhb.10152.
- Fenneman, J., Frankenhuus, W.E., 2020. Is impulsive behavior adaptive in harsh and unpredictable environments? A formal model. *Evol. Hum. Behav.* 41 (4), 261–273.
- Fletcher, G.J.O., Simpson, J.A., Thomas, G., 2000. Ideals, perceptions, and evaluations in early relationship development. *J. Pers. Soc. Psychol.* 79 (6), 933–940. doi:10.1037/0022-3514.79.6.933.
- Frank, R.H., 1999. *Luxury fever: Why Money Fails to Satisfy in an Era of Excess*. Free Press, New York.
- Frejka, T., 2017. Half the world's population reaching below replacement fertility. N-IUSSP. <https://www.niussp.org/fertility-and-reproduction/half-the-worlds-population-reaching-below-replacement-fertility/>.
- French, J.E., Whitley, K.A., Altgelt, E.E., Meltzer, A.L., 2020. Attachment anxiety in young adulthood is associated with childhood unpredictability and predicts intentions to engage in unprotected sex. *Pers. Individ. Dif.* 159, 109858. doi:10.1016/j.paid.2020.109858.
- Galor, O., 2012. The demographic transition: causes and consequences. *Clometrica (Berl)* 6 (1), 1–28. doi:10.3386/w17057.
- Gerland, P., Raftery, A.E., Ševčíková, H., Li, N., Gu, D., Spoorenberg, T., Alkema, L., Fosdick, B.K., Chunn, J., Lalic, N., Bay, G., Buettner, T., Heilig, G.K., Wilmoth, J., 2014. World population stabilization unlikely this century. *Science* 346 (6206), 234–237. doi:10.1126/science.1257469.
- Ghaznavi, C., Sakamoto, H., Nomura, S., Kubota, A., Yoneoka, D., Shibuya, K., Ueda, P., 2020. The herbivore's dilemma: trends in and factors associated with heterosexual relationship status and interest in romantic relationships among young adults in Japan: analysis of national surveys, 1987–2015. *PLoS One* 15 (11), e0241571. doi:10.1371/journal.pone.0241571.
- Gluckman, P., Hanson, M., 2006. *Mismatch: Why our World No Longer Fits Our Bodies*. Oxford University Press.
- Gonzales, A.L., Hancock, J.T., 2011. Mirror, mirror on my Facebook wall: effects of exposure to Facebook on self-esteem. *Cyberpsychol. Behav. Soc. Netw.* 14 (1–2), 79–83. doi:10.1089/cyber.2009.0411.
- Griskevicius, V., Ackerman, J.M., Cantú, S.M., Delton, A.W., Robertson, T.E., Simpson, J.A., ..., Tybur, J.M., 2013. When the economy falters, do people spend or save? Responses to resource scarcity depend on childhood environments. *Psychol. Sci.* 24 (2), 197–205. doi:10.1177/09567976124514.
- Griskevicius, V., Delton, A.W., Robertson, T.E., Tybur, J.M., 2011. Environmental contingency in life history strategies: the influence of mortality and socioeconomic status on reproductive timing. *J. Pers. Soc. Psychol.* 100 (2), 241–254. doi:10.1037/a0021082.
- Griskevicius, V., Tybur, J.M., Gangestad, S.W., Perea, E.F., Shapiro, J.R., Kenrick, D.T., 2009. Aggress to impress: hostility as an evolved context-dependent strategy. *J. Pers. Soc. Psychol.* 96 (5), 980–994. doi:10.1037/a0013907.
- Griskevicius, V., Tybur, J.M., Van den Bergh, B., 2010. Going green to be seen: status, reputation, and conspicuous conservation. *J. Pers. Soc. Psychol.* 98 (3), 392–404. doi:10.1037/a0017346.
- Harper, S., 2014. Economic and social implications of aging societies. *Science* 346 (6209), 587–591. doi:10.1126/science.1254405.
- Hayes, A.F., 2017. *Introduction to mediation, moderation, and Conditional Process analysis: A regression-Based Approach*. Guilford Publications.
- Henrich, J., Gil-White, F.J., 2001. The evolution of prestige: freely conferred deference as a mechanism for enhancing the benefits of cultural transmission. *Evol. Hum. Behav.* 22 (3), 165–196. doi:10.1016/S1090-5138(00)00071-4.
- Henrich, J., Heine, S.J., Norenzayan, A., 2010. Most people are not WEIRD. *Nature* 466 (7302). doi:10.1038/466029a, 29–29.
- Henz, U., 2019. Fathers' involvement with their children in the United Kingdom: recent trends and class differences. *Demogr. Res.* 40, 865–896. <https://www.jstor.org/stable/26727019>.
- Hill, S.E., Buss, D.M., 2006. Envy and positional bias in the evolutionary psychology of management. *Manag. Decis. Econ.* 27 (2–3), 131–143. doi:10.1002/mde.1288.
- Hill, S.E., Buss, D.M., 2010. Risk and relative social rank: positional concerns and risky shifts in probabilistic decision-making. *Evol. Hum. Behav.* 31 (3), 219–226. doi:10.1016/j.evolhumbehav.2010.01.002.
- Hill, S.E., Reeve, H.K., 2004. Low fertility in humans as the evolutionary outcome of snowballing resource games. *Behav. Ecol.* 16 (2), 398–402. doi:10.1093/beheco/ari001.
- Hugh-Jones, D., Abdellaoui, A., 2022. Human capital mediates natural selection in contemporary humans. *Behav. Genet.* 52 (4), 205–234.
- Kanazawa, S., 2004. General intelligence as a domain-specific adaptation. *Psychol. Rev.* 111 (2), 512–523. doi:10.1037/0033-295X.111.2.512.
- Kaplan, H., Lancaster, J.B., 2000. The evolutionary economics and psychology of the demographic transition to low fertility. In: Cronk, L., Chagnon, N., Irons, W. (Eds.), *Adaptation and Human Behavior: An Anthropological Perspective*. Aldine de Gruyter, pp. 283–322.
- Kaplan, H., Lancaster, J.B., Anderson, K.G., 1998. Human parental investment and fertility: the life histories of men in Albuquerque. In: Booth, A., Crouter, N. (Eds.), *Men in families: When do They Get involved? What difference Does It make?* Lawrence Erlbaum, New York, pp. 55–111.
- Kaplan, H., Hill, K., Lancaster, J., Hurtado, A.M., 2000. A theory of human life history evolution: diet, intelligence, and longevity. *Evolutionary Anthropol.: Issues News Rev.: Issues News Rev.* 9 (4), 156–185. doi:10.1002/1520-6505(2000)9:4<3C156::AID-EVAN5/3E3.0.CO;2-7.
- Kaplan, H., Lancaster, J.B., Tucker, W.T., Anderson, K.G., 2002. Evolutionary approach to below replacement fertility. *Am. J. Hum. Biol.* 14 (2), 233–256. doi:10.1002/ajhb.10041.
- Kasser, T., Ryan, R.M., Couchman, C.E., Sheldon, K.M., 2004. Materialistic values: their causes and consequences. In: Kasser, T., Kanner, A.D. (Eds.), *Psychology and Consumer Culture: The Struggle For a Good Life in a Materialistic World*. American Psychological Association, pp. 11–28. doi:10.1037/10658-002.
- Kavanagh, P.S., Kahl, B.L., 2018. Are Expectations the missing link between life history strategies and psychopathology? *Front. Psychol.* 9, 1–7. doi:10.3389/fpsyg.2018.00089.
- Kenrick, D.T., Griskevicius, V., 2015. Life history, fundamental motives, and sexual competition. *Curr. Opin. Psychol.* 1, 40–44. doi:10.1016/j.copsy.2014.12.002.
- Kenrick, D.T., Li, N.P., Butner, J., 2003. Dynamical evolutionary psychology: individual decision rules and emergent social norms. *Psychol. Rev.* 110 (1), 3–28. doi:10.1037/0033-295X.110.1.3.
- Kirk, D., 1996. Demographic transition theory. *Popul. Stud. (Camb.)* 50 (3), 361–387. doi:10.1080/0032472031000149536.
- Kohler, H.P., Billari, F.C., Ortega, J.A., 2006. Low fertility in Europe: causes, implications and policy options. In: Harries, F. (Ed.), *The Baby bust: Who will Do the Work*. Rowman & Littlefield Publishers, pp. 48–109.
- Kramer, K.L., 2005. Children's help and the pace of reproduction: cooperative breeding in humans. *Evolutionary Anthropol. Issues News Rev.: Issues News Rev.* 14 (6), 224–237. doi:10.1002/evan.20082.
- Lessels, C.M., 1991. The evolution of life-histories. In: Krebs, J., Davies, N. (Eds.), *Behavioural ecology: an Evolutionary Approach*. Blackwell, Oxford, UK, pp. 32–68.
- Li, N.P., Bailey, J.M., Kenrick, D.T., Linsenmeier, J.A.W., 2002. The necessities and luxuries of mate preferences: testing the tradeoffs. *J. Pers. Soc. Psychol.* 82, 947–955.
- Li, N.P., Lim, A.J.Y., Tsai, M.H., O, J., 2015. Too materialistic to get married and have children? *PLoS One* 10 (5), e0126543. doi:10.1371/journal.pone.0126543.
- Li, N.P., Manesi, Z., 2017. Life history mismatch: insights into why people are delaying marriage and not having children. Invited talk presented at the Attraction and Relationships preconference of the 53rd annual meeting of the Society for Experimental Social Psychology.
- Li, N.P., Patel, L., Balliet, D., Tov, W., Scollon, C.N., 2011. The incompatibility of materialism and the desire for children: psychological insights into the fertility discrepancy among modern countries. *Soc. Indic. Res.* 101 (3), 391–404. doi:10.1007/s11205-010-9665-9.
- Li, N.P., van Vugt, M., Colarelli, S.M., 2018. The evolutionary mismatch hypothesis: implications for psychological science. *Curr. Dir. Psychol. Sci.* 27 (1), 38–44. doi:10.1177/0963721417731378.
- Li, N.P., Yong, J.C., van Vugt, M., 2020. Evolutionary psychology's next challenge: solving modern problems using a mismatch perspective. *Evolutionary Behav. Sci.* 14 (4), 362–367. doi:10.1037/ebso000207.
- Lloyd-Sherlock, P., 2000. Population ageing in developed and developing regions: implications for health policy. *Soc. Sci. Med.* 51 (6), 887–895. doi:10.1016/S0277-9536(00)00068-X.
- Luttbeg, B., Bergerhoff Mulder, B., Mangel, M.S., 2000. To marry again or not? A dynamic model of marriage behavior and demographic transition. In: Cronk, L., Chagnon, N., Irons, W. (Eds.), *Adaptation and Human Behavior: An Anthropological Perspective*. Aldine de Gruyter, pp. 345–368.
- Lutz, W., Sanderson, W., Scherbov, S., 2008. The coming acceleration of global population ageing. *Nature* 451 (7179), 716–719. doi:10.1038/nature06516.
- MacArthur, R.H., Wilson, E.O., 1967. *The Theory of Island Biogeography*. Princeton University Press, Princeton, NJ.
- Miller, S.L., Maner, J.K., 2011. Ovulation as a male mating prime: subtle signs of women's fertility influence men's mating cognition and behavior. *J. Pers. Soc. Psychol.* 100 (2), 295–308. doi:10.1037/a0020930.
- Mittal, C., Griskevicius, V., 2014. Sense of control under uncertainty depends on people's childhood environment: a life history theory approach. *J. Pers. Soc. Psychol.* 107 (4), 621–637. doi:10.1037/a0037398.
- Morita, M., 2018. Demographic studies enhance the understanding of evolutionarily (mal)adaptive behaviors and phenomena in humans: a review on fertility decline and an integrated model. *Popul. Ecol.* 60 (1–2), 143–154. doi:10.1007/s10144-017-0597-y.
- Negro-Vilar, A., 1993. Stress and other environmental factors affecting fertility in men and women: overview. *Environ. Health Perspect.* 101 (2), 59–64. doi:10.1289/ehp.93101s259.
- Nesse, R., 1998. Emotional disorders in evolutionary perspective. *Br. J. Med. Psychol.* 71 (4), 397–415.
- Nesse, R.M., Williams, G.C., 1996. *Why We Get sick: The new Science of Darwinian medicine*. Vintage.

- Nettle, D., 2011. Flexibility in reproductive timing in human females: integrating ultimate and proximate explanations. *Philosoph. Trans. R. Soc. B: Biol. Sci.* 366 (1563), 357–365. doi:10.1098/rstb.2010.0073.
- Nettle, D., Frankenhuys, W.E., 2020. Life-history theory in psychology and evolutionary biology: one research programme or two? *Philosoph. Trans. R. Soc. B* 375 (1803), 20190490.
- Nettle, D., Pollet, T.V., 2008. Natural selection on male wealth in humans. *Am. Nat.* 172 (5), 658–666. doi:10.1086/591690.
- Pepper, G.V., Nettle, D., 2013. Death and the time of your life: experiences of close bereavement are associated with steeper financial future discounting and earlier reproduction. *Evol. Hum. Behav.* 34 (6), 433–439. doi:10.1016/j.evolhumbehav.2013.08.004.
- Reher, D.S., 2004. The demographic transition revisited as a global process. *Popul. Space Place* 10 (1), 19–41. doi:10.1002/psp.313.
- Richerson, P.J., Boyd, R., 1984. Natural selection and culture. *Bioscience* 34 (7), 430–434. doi:10.2307/1309632.
- Roff, D.A., 1992. *The Evolution of Life Histories: Theory and Analysis*. Chapman & Hall.
- Rogers, A.R., 1990. Evolutionary economics of human reproduction. *Ethol. Sociobiol.* 11 (6), 479–495. doi:10.1016/0162-3095(90)90022-X.
- Rogers, A.R., 1995. For love or money: the evolution of reproductive and material motivations. In: Dunbar, R.I.M. (Ed.), *Human Reproductive Decisions*. St. Martin's Press, pp. 76–95. doi:10.1007/978-1-349-23947-4_5.
- Rotella, A., Varnum, M.E.W., Sng, O., Grossmann, I., 2021. Increasing population densities predict decreasing fertility rates over time: a 174-nation investigation. *Am. Psychol.* 76 (6), 933–946. doi:10.1037/amp0000862.
- Sanderson, S.K., Dubrow, J., 2000. Fertility decline in the modern world and in the original demographic transition: testing three theories with cross-national data. *Popul. Environ.* 21 (6), 511–537. doi:10.1007/BF02436770.
- Sear, R., 2020. Do human 'life history strategies' exist? *Evol. Hum. Behav.* 41 (6), 513–526.
- Sear, R., Lawson, D.W., Kaplan, H., Shenk, M.K., 2016. Understanding variation in human fertility: what can we learn from evolutionary demography? *Philosoph. Trans. R. Soc. B: Biol. Sci.* 371 (1692), 20150144. doi:10.1098/rstb.2015.0144.
- Sheeran, P., Webb, T.L., 2016. The intention–behavior gap. *Soc. Personal Psychol. Compass* 10 (9), 503–518.
- Shenk, M.K., Towner, M.C., Kress, H.C., Alam, N., 2013. A model comparison approach shows stronger support for economic models of fertility decline. *Proc. Natl. Acad. Sci.* 110 (20), 8045–8050. doi:10.1073/pnas.1217029110.
- Shenk, Mary K., 2011. Our Children: parental Decisions — How Much to Invest in Your Offspring. In: Frey, U.J., Störmer, C., Willführ, K.P. (Eds.), *Essential Building Blocks of Human Nature*. Springer, Berlin Heidelberg, pp. 17–38. doi:10.1007/978-3-642-13968-0_2.
- Shenk, Mary K., Kaplan, H.S., Hooper, P.L., 2016. Status competition, inequality, and fertility: implications for the demographic transition. *Philosoph. Trans. R. Soc. B: Biol. Sci.* 371 (1692), 20150150. doi:10.1098/rstb.2015.0150.
- Siibak, A., 2009. Constructing the self through the photo selection-visual impression management on social networking websites. *Cyberpsychol.: J. Psychosoc. Res. Cyberspace* 3 (1), 1.
- Sng, O., Neuberg, S.L., Varnum, M.E.W., Kenrick, D.T., 2017. The crowded life is a slow life: population density and life history strategy. *J. Pers. Soc. Psychol.* 112 (5), 736–754. doi:10.1037/pspi0000086.
- Stearns, S.C., 1989. Trade-offs in life-history evolution. *Funct. Ecol.* 3 (3), 259–268. doi:10.2307/2389364.
- Stearns, S.C., 1992. *The Evolution of Life Histories*. Oxford University Press.
- Suvorov, A., 2021. Population numbers and reproductive health. *Endocrinology* 162 (11). doi:10.1210/endo/bqab154, bqab154.
- Tan, K., Li, N.P., Meltzer, A.L., Chin, J.L., Tan, L.K., Lim, A.J., ..., van Vugt, M., 2022. Effects of economic uncertainty and socioeconomic status on reproductive timing: a life history approach. *Curr. Res. Ecol. Soc. Psychol.* 3, 100040.
- Tinbergen, J.M., Both, C., 1999. Is clutch size individually optimized? *Behav. Ecol.* 10 (5), 504–509. doi:10.1093/beheco/10.5.504.
- The World Bank. (n.d.). *Total Fertility Rate (births per Woman)*. The World Bank Group. https://data.worldbank.org/indicator/SP.DYN.TFRT.IN?most_recent_value_desc=false
- Tooby, J., Cosmides, L., 1992. The psychological foundations of culture. In: Barkow, J.H., Cosmides, L., Tooby, J. (Eds.), *The Adapted mind: Evolutionary psychology and the Generation of Culture*. Oxford University Press, pp. 19–136.
- Tooby, J., Cosmides, L., 1990. The past explains the present. *Ethol. Sociobiol.* 11 (4–5), 375–424. doi:10.1016/0162-3095(90)90017-Z.
- Townsend, J.M., 1993. Sexuality and partner selection: sex differences among college students. *Ethol. Sociobiol.* 14 (5), 305–329. doi:10.1016/0162-3095(93)90002-Y.
- Van Vugt, M., De Vries, L.P., Li, N.P., Forgas, J.P., Crano, W.D., Fiedler, K. (Eds.), 2020. Nudging evolutionary mismatched behaviors: implications for social psychology and public policy. Applications of Social Psychology: How social Psychology Can Contribute to the Solution of Real World Problems 40–57. doi:10.4324/9780367816407.
- Van Vugt, M., Tybur, J.M., 2015. The evolutionary foundations of hierarchy: status, dominance, prestige, and leadership. In: Buss, D. (Ed.), *Handbook of Evolutionary Psychology*, pp. 788–809.
- Vogel, E.A., Rose, J.P., 2016. Self-reflection and interpersonal connection: making the most of self-presentation on social media. *Trans. Issues Psychol. Sci.* 2 (3), 294–302. doi:10.1037/tps0000076.
- von Rueden, C., Gurven, M., Kaplan, H., 2011. Why do men seek status? Fitness payoffs to dominance and prestige. *Proc. R. Soc. B Biol. Sci.* 278 (1715), 2223–2232. doi:10.1098/rspb.2010.2145.
- von Rueden, C.R., Jaeggi, A.V., 2016. Men's status and reproductive success in 33 nonindustrial societies: effects of subsistence, marriage system, and reproductive strategy. *Proc. Natl. Acad. Sci. USA* 113 (39), 10824–10829. doi:10.1073/pnas.1606800113.
- von Rueden, C.R., Redhead, D., O'Gorman, R., Kaplan, H., Gurven, M., 2019. The dynamics of men's cooperation and social status in a small-scale society. *Proc. R. Soc. B* 286 (1908), 20191367.
- Wang, M., Jiang, Z., 2016. Greater work-related stress among Chinese media workers in the context of media transformation: specific stressors and coping strategies. *Int. J. Commun.* 10, 6103–6125. <https://ijoc.org/index.php/ijoc/article/view/5045>.
- Williams, K.E.G., Sng, O., Neuberg, S.L., 2016. Ecology-driven stereotypes override race stereotypes. *Proc. Natl. Acad. Sci.* 113, 310–315.
- Willis, R.J., 1973. A new approach to the economic theory of fertility behavior. *J. Polit. Econ.* 81 (2), S14–S64. doi:10.1086/260152, Part 2.
- Wilson, M., Daly, M., 1997. Life expectancy, economic inequality, homicide, and reproductive timing in Chicago neighbourhoods. *BMJ* 314 (7089), 1271. doi:10.1136/bmj.314.7089.1271.
- Wilson, C., Pison, G., 2004. More than half of the global population lives where fertility is below replacement level. *Population Soc.* 405, 1–4.
- Yong, J.C., Lim, A.J., Li, N.P., 2023. When social status gets in the way of mating: the incompatibility between social status and reproductive goals in modern contexts. *Culture Evolution*.
- Yong, J.C., Li, N.P., Jonason, P.K., Tan, Y.W., 2019. East Asian low marriage and birth rates: the role of life history strategy, culture, and social status affordance. *Pers. Individ. Dif.* 141, 127–132. doi:10.1016/j.paid.2019.01.009.
- Yong, J.C., Li, N.P., Valentine, K.A., Smith, A.R., 2017. Female virtual intrasexual competition and its consequences: an evolutionary mismatch perspective. In: Fisher, M.L. (Ed.), *The Oxford handbook of Women and Competition*. Oxford University Press, New York, pp. 657–680. doi:10.1093/oxfordhb/9780199376377.013.38.
- Zietsch, B.P., Sidari, M.J., 2020. A critique of life history approaches to human trait covariation. *Evol. Hum. Behav.* 41 (6), 527–535. doi:10.1016/j.evolhumbehav.2019.05.007.