Evolutionary Psychological Science (2020) 6:188–194
https://doi.org/10.1007/s40806-019-00214-z

RESEARCH ARTICLE

# Induced Mate Abundance Increases Women's Expectations for Engagement Ring Size and Cost

Ashley Locke[1] · Jessica Desrochers[1] · Steven Arnocky[1]

Published online: 4 December 2019


**Abstract**
Research on some non-human species suggests that an abundance of reproductively viable males relative to females can increase female choosiness and preferences for longer-term mating and resource investment by males. Yet little research has explored the potential influence of mate availability upon women's preferences for signals of men's commitment and resource provisioning. Using an experimental mate availability priming paradigm, the present study examined whether women ($N = 205$) primed with either mate scarcity or abundance would differ in their expectations for engagement ring size and cost. Results demonstrated that women who were primed with the belief that good-quality mates are abundant in the population reported expecting a statistically-significantly larger and more expensive engagement ring relative to women primed with mate scarcity. Results suggest that women flexibly attune their expectations for signals of men's investment based, in part, upon their perception of the availability of viable mates.

**Keywords** Priming · Sex ratio · Engagement rings · Social psychology · Evolutionary psychology · Mating behavior

## Introduction

An engagement ring is one of the most common, conspicuous, and costly signals of a man's commitment to a woman. The practice is believed to have begun in 1477, when Mary of Burgundy received a diamond engagement ring from Archduke Maximilian of Austria (American Gem Society n.d.). Today, the overwhelming majority of Western engagements involve the purchase of a diamond ring (Diamond Council of America 2010), costing Canadian men an average of $4957.25 (RateSupermarket.ca Team 2019). From an evolutionary perspective, engagement ring purchasing is situated within the broader context of gift giving, which Saad and Gill (2003) found to be most often directed toward romantic partners. Moreover, they found that men were more likely than women to report tactical motives for giving gifts to their romantic partners (Saad and Gill 2003). From an evolutionary perspective, gift giving could have evolved primarily as a male courtship strategy to attract and retain mates for both short- and long-term purposes (Saad and Gill 2003). Indeed, previous research has demonstrated that men more frequently compete intrasexually by using tactics of resource possession and display to attract mates (Buss 1989). Variability in engagement ring size and cost signals men's resources (Miller 2000), with men's income being the strongest predictor of their engagement ring expenditures (Cronk and Dunham 2007). Beyond resource and status signaling, the engagement ring is also emblematic of a man's intent to marry the recipient; thus, this expenditure also overtly signals a man's commitment to, and willingness to share resources with, that woman. This is important given that women, more than men, adopt a mating strategy characterized by a preference for longer-term, less pluralistic pair-bonding (see Arnocky and Vaillancourt 2017 for review). Women face the adaptive problem of obtaining the resources necessary for offspring survival (Hrdy 1999) and are thus sensitive to cues from men that signal their ability and willingness to invest those resources (Buss 1989; Waynforth and Dunbar 1995). Indeed, women, more than men, prioritize resources in a prospective mate (Buss 1989) and will trade-off other characteristics to satisfy this necessity (Li et al. 2002).

Although women are particularly sensitive to cues of male commitment, resources, and provisioning, women can also vary from one another in their sensitivity toward such cues.

✉ Steven Arnocky
stevena@nipissingu.ca

[1] Nipissing University, North Bay, Ontario, Canada

For example, Hughes and Aung (2017) found that younger and higher mate value women placed more importance on long-term mates who provide emotional support, romantic gifts, and show signs of wealth potential, compared to older and lower mate value women. Women's mating strategies and preferences may also be influenced by external environmental cues. Recent studies have shown that evolutionarily relevant cues, such as danger, wealth, and infant presence (Thomas and Stewart-Williams 2018), as well as disgust (Al-Shawaf et al. 2018), can influence human mating strategies including preferences for relational commitment. For example, in one study, the participants (men and women) exposed to sexual disgust stimuli and pathogen disgust stimuli exhibited a reduction in short-term mating desire (Al-Shawaf et al. 2018). In a series of studies by Thomas and Stewart-Williams (2018), participants were shown a variety of stimuli and were asked to indicate their preferred relationship type for fifty opposite-sex individuals. Participants primed with videos about parental care showed greater long-term relationship interest, and this result held only among women when the sexes were examined separately (Thomas and Stewart-Williams 2018). Furthermore, priming resource abundance increased short-term relationship interest in both men and women (Thomas and Stewart-Williams 2018). Finally, this series of studies demonstrated that women primed with danger cues selected more relationships in general—both short-term and long-term—than those who watched the neutral slideshow (Thomas and Stewart-Williams 2018). This provides evidence that mating strategies and preferences can change rapidly in response to external stimuli, such as cues to parental care and resource abundance (Thomas and Stewart-Williams 2018). One other environmental context which might affect women's preference for cues to resource investment, such as engagement rings, is the ratio of reproductively viable males to females in the mating population.

Today, over one-third of women are directly involved in selecting their own engagement ring (Ross 2017), and some viral social media coverage has highlighted cases of women rejecting proposals based on dissatisfaction with ring size (e.g., Dubuis 2015). Yet to date, little research has explored factors that might influence women's expectations surrounding engagement ring size and cost. One recent study (Cloud and Taylor 2019) identified women's physical attractiveness as one individual difference variable that is correlated with such expectations. Specifically, the authors found that men who imagined themselves mated to a woman who was relatively more desirable than themselves reported that they would purchase larger, more expensive engagement rings. Women who imagined themselves mated to a less attractive man expected a larger and more expensive engagement ring than if the man were higher in attractiveness. Similarly, Cronk and Dunham (2007) found that men's engagement ring expenditure increased when they were proposing to a younger woman, whose youth serves as an indicator of reproductive potential (Campbell 2004) and contributes to their desirability as a mate (Buss 1989). Together, these findings suggest women's preferences for engagement ring quality increases alongside their relative mate value.

Women's mate value is not merely dictated by individual difference factors, such as youth and attractiveness. Rather, it is also susceptible to demographic characteristics including the ratio of reproductively viable males to females in the environment, typically defined by the population's Operational Sex Ratio (OSR, Emlen and Oring 1977). For example, if there are many reproductively viable males relative to females in the environment, then female mate value increases. Females can afford to be more selective of the males they mate with, and males must compete more vigorously to attract the relatively scarce females. Indeed, in some non-human species, research has shown that a male-biased OSR (more males relative to females) can lead to shifts in female mate preferences, whereby females become more selective with respect to desired male traits. For example, female killifish (*Austrolebias reicherti*) typically prefer larger males. Yet as the proportion of males decreases in the mating environment, females become less choosy regarding male size (Passos et al. 2014). Similarly, in the bushcricket (*Steropleurus stali*), females become more selective (again, for larger males) when males are made to be more abundant, relative to females, in the population (Bateman 1997). Jirotkul (1999) found that female guppies (*Poecilia reticulate*) increased their preference for males with orange coloration (a mate value characteristic) when the sex ratio was male biased.

Sex ratios have been shown to influence human behavior as well. Researchers have identified differences in mating psychology and behavior across both naturalistic sex ratios and laboratory-based priming experiments that induce perceptions of high and low levels of mate availability. However, to date, most of this research has focused on the effects of mate availability upon intrasexual competition, with relatively little focus on mate preferences. For example, previous research has demonstrated that experimentally manipulated perceptions of mate availability can influence sociosexual orientation, intrasexual competition, and willingness to engage in aggressive mate guarding (Arnocky et al. 2014, 2016). Research by Stone et al. (2007) demonstrated that cross-culturally, both men's and women's mate preferences were sensitive to sex ratios. Specifically, when men were more numerous, they held lower standards presumably to facilitate partner acquisition. Alternatively, when men were scarce and women more numerous, women exhibited higher standards presumably to avoid deception by men seeking short-term relationships (Stone et al. 2007). Operational sex ratios also play a role in marital age whereby women tend to marry earlier in populations where there are more men than women (Marlowe and Berbesque 2012). Additionally, Marlowe and Berbesque

(2012) suggest that menopause increases the OSR because it removes many adult women from the reproductive pool. It is still unclear, however, whether women might increase their expectation of engagement ring size, as a signal of men's investment and resources, when they believe that viable mates are abundant versus scarce, with only one study having explored this topic to date (Griskevicius et al. 2012). Griskevicius et al. (2012) had participants read one of two short articles generated for their study. One article highlighted that the sex ratios on campuses were becoming female biased, and the other indicated that the sex ratios were becoming male biased (Griskevicius et al. 2012). Results demonstrated that in the condition where women were scarce, both men and women expected men to spend more money on an engagement ring (Griskevicius et al. 2012). However, these data are potentially limited in that the study did not include a manipulation check to determine the effectiveness of the priming task. As such, it is unclear whether the differences in women's engagement ring preferences were actually due to changes in perceived mate availability resulting from the priming stimuli, or rather to some other factor. Although some researchers have recently argued against the utility of manipulation checks (Hauser et al. 2018; Fayant et al. 2017), others have highlighted their utility (Foschi 2014), and manipulation checks are widely viewed as "necessary in a well-designed [social psychology lab] experiment" (Fayant et al. 2017, p. 126). Furthermore, it is unclear whether the relationship held when the researchers looked specifically at women's preferences rather than pooled data with men included. Ostensibly, the motives underlying engagement ring purchasing and expectations differ between the sexes, and it is unclear whether the observed effect may have been driven instead by men's orientation toward competition to demonstrate their resource provisioning ability. Therefore, it remains unclear whether women who are primed to perceive that mates are abundant actually increase their preferences for engagement ring size and cost relative to women primed with mate scarcity.

## The Present Study

Further research is required to gain a better understanding of the ecological factors that affect women's expectations surrounding cues to men's resource investment in mateship. The present study aims to address the aforementioned issues and extend the work of Griskevicius et al. (2012) by examining women's preferences for engagement ring size and cost in relation to experimentally manipulated perceptions of either mate abundance or mate scarcity, including a manipulation check to ensure that the task was actually effective at inducing these mindsets. We hypothesized that women primed with mate abundance would expect a larger and costlier ring than women primed with mate scarcity.

# Method

## Participants

*A priori* power analysis using G*Power 3.1 indicated a minimum sample size of 200 participants in order to obtain statistical power at the .80 level, with Cronbach's alpha set at 0.05 and a small effect size, $d = 0.2$. The sample consisted of 205 unmarried undergraduate women between the ages of 17 and 39 ($M_{age} = 20$, $SD = 2.87$). The majority of participants were heterosexual (84.9%), 2% reported a homosexual sexual orientation, 9.8% bisexual, and 2.9% other. Furthermore, 48.3% of our sample reported being single and 51.7% were pair-bonded. The Nipissing University Research Ethics Board approved this research, and participants provided written informed consent. Participants were recruited through a university-wide online research participation system, and by word of mouth. Remuneration consisted of partial course credit or a chance to win $100.

## Procedure

Participants completed self-report questionnaires and a perceived mate availability priming task on a computer in a private testing room. The procedure took approximately 25 minutes to complete. Participants first completed a questionnaire consisting of a demographics section (age, ethnicity, relationship status). Participants then completed the priming task, followed by the engagement ring preference measure.

## Materials

**Priming Mate Abundance Versus Mate Scarcity** Previous studies have shown that perceptions of mate scarcity versus abundance can be manipulated in humans utilizing a bogus magazine article memory task (Arnocky et al. 2014, 2016). Participants were randomly assigned to one of two conditions, which primed either mate scarcity or abundance. They read one of two fictitious magazine articles developed by Spielmann et al. (2009). In the mate scarcity condition, the magazine article communicated that good-quality mates are often already in relationships, and that after a break-up, most people remain single for longer than they expect or desire. Conversely, in the mate abundance condition, the article communicated that good-quality mates are easy to come by, and that after a break-up, most people can easily find a new and better romantic partner. This priming task has shown to be a reliable manipulation of perceived mate availability, evidenced by subsequent self-reports following exposure to the articles (Spielmann et al. 2009). The task has also shown good construct validity, such that scarcity priming increases intrasexually competitive attitudes and mate-guarding intentions in men and women (Arnocky et al. 2014) and restricts men's sociosexual orientation (Arnocky et al. 2016), relative to

abundance priming. To ensure that the participants read the article thoroughly, they were asked to indicate the title of the magazine, and any main conclusions of the article that they could remember. Following the reading of the article, each participant was prompted to consider people they personally know, who are single and available, with whom they could hypothetically imagine developing a meaningful romantic relationship if the participant were ever to be single. Those assigned to the mate scarcity condition were asked to list the initials of ten people (difficult), whereas those in the abundance condition were prompted to list one or two people's initials (easier), in the space provided to them.

**Manipulation Check** To assess concerns about being single and worry about not being able to find a mate, we used relevant items from the 6-item Fear of Being Single Scale developed by Spielmann et al. (2013). On a 5-point Likert scale participants rated how true the statements applied to them from 1 = *not at all true* to 5 = *very true*. The scale included the following items: "It scares me to think that there might not be anyone out there for me," "I feel it is close to being too late for me to find the love of my life," "I feel anxious when I think about being single forever," "I need to find a partner before I'm too old to have and raise children," "If I end up alone in life, I will probably feel like there is something wrong with me," and "As I get older, it will get harder and harder to find someone." The measure showed good internal consistency as a composite measure ($\alpha = 0.86$). We also examined the items individually as they related to the priming tasks.

**Engagement Ring Preference** Participants subsequently responded to an expected resource investment paradigm, asking them to identify the size and expense of an engagement ring given to them by a preferred long-term mate. This was used to examine the possible effect of mate scarcity priming on engagement ring choice in women. Following Cloud and Taylor (2019) participants were asked, "If your partner were to propose to you after an extended period of dating, what is the smallest size of the engagement ring with which you would be satisfied in receiving?" Participants were shown five identical engagement rings that differed only by carat weight and cost, ranging from 0.50 carats ($500) to 1.50 carats ($9000), and chose one of the options. The five engagement rings are coded from 1 to 5, where 1 equals the smallest and least expensive engagement ring.

## Results

### Manipulation Check

We examined whether participants varied in their random assignment along the dimension of current relationship status. Participants did not differ across conditions in terms of whether they were currently single (coded as 0) or pair-bonded (coded as 1), ($\chi^2$ (1) = .005, $p = .94$, two-tailed). We next conducted a manipulation check to determine whether the priming task was effective in altering perceptions of mate availability. Independent samples *t* tests were conducted to analyze the manipulation check (the average manipulation check and each item separately) in relation to the two priming conditions (mate scarcity and mate abundance). The priming condition did not differ significantly between the two conditions when considering the average of all six items together ($t(203) = 0.77$, $p = .22$, one-tailed), although it did trend in the expected direction, mate scarcity ($M = 2.82$, $SD = 1.12$; mate abundance $M = 2.71$, $SD = 0.98$). The priming conditions did, however, differ in terms of two specific manipulation check items in the anticipated direction: "It scares me to think that there might not be anyone out there for me" ($t(203) = 2.03$, $p = .02$, one-tailed) and "I feel it is close to being too late for me to find the love of my life" ($t(203) = 1.88$, $p = .03$, one-tailed), whereby those in the scarcity condition scored higher than those in the abundance condition, suggesting the manipulation was effective at influencing participants' concern about finding a romantic partner and perception that it is too late to find a desirable partner.

### Engagement Ring Preference

Next, we examined whether priming condition influenced engagement ring preferences. Given the directional prediction inherent to the model, we utilized an ANCOVA with a one-way test of statistical significance. Results showed that women primed with mate abundance reported expecting a statistically-significantly larger and more expensive engagement ring ($M_{scarcity} = 1.76$, $SD = 0.09$, $M_{abundance} = 1.98$, $SD = 0.09$, $F(203) = 3.57$, $p = .03$) relative to women primed with mate scarcity (Fig. 1). When controlling for the two manipulation check items that varied by condition, the results did not meaningfully change ($M_{scarcity} = 1.76$, $SD = 0.81$, $M_{abundance} = 1.99$, $SD = 0.95$, $F(201) = 3.77$, $p = .03$). When controlling for both age and current romantic relationship status, results for priming condition also did not meaningfully change, $F(1, 201) = 3.08$, $p = .04$, one-tailed. When examining the interaction effect of condition and relationship status, there was no significant interaction. Conversely, neither age, $F(1, 203) = 0.40$, $p = .27$, relationship status, $F(1, 203) = 0.82$, $p = .19$, nor either of the manipulation check items ($F(201) = 0.00$, $p = 0.99$ and $F(1, 201) = .23$, $p = .63$ respectively) predicted engagement ring preference. Additionally, when examining the interaction effect of condition and relationship status, there was no significant interaction, $F(1, 201) = 1.74$, $p = .19$.

## Discussion

This study provides a better understanding of whether self-perceived mate availability influences women's expectations

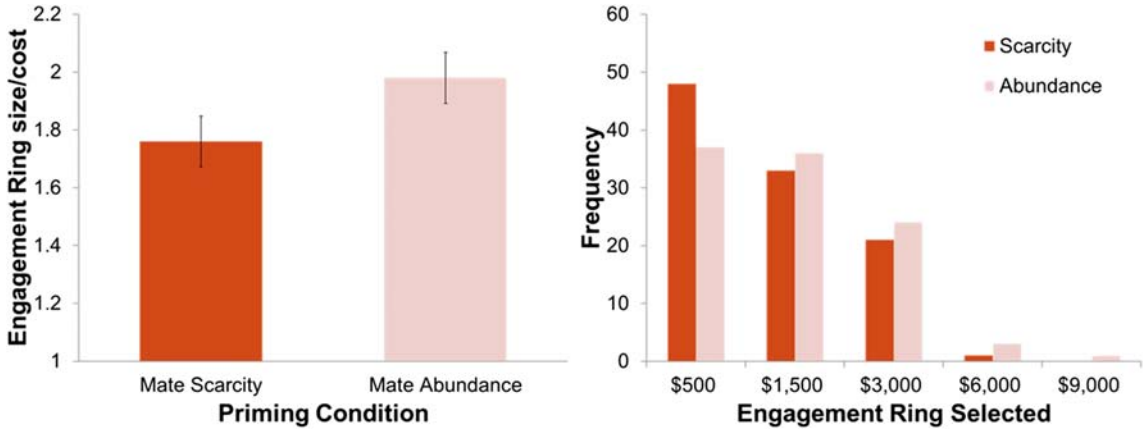


**Fig. 1** Left panel shows group differences in ring size/cost by mate availability condition. Right panel demonstrates the frequency with which each ring was selected across mate availability groups

surrounding engagement ring purchases as a putative cue to men's resource investment in long-term mateships. Using a novel engagement ring expectation measure (Cloud and Taylor 2019), results suggested that when women perceive mates to be abundant, they increase their expectations of cues to long-term investment by men, relative to when mates are scarcer. In other words, when the environment allows for increased mate choice and expression of mate preferences among women, they will increase their expectations for men's resource investment relative to environments in which mates are scarce.

The present research improved upon previous work on this topic in a few notable ways. Specifically, our study aimed to replicate and extend the work of Griskevicius et al. (2012) who identified that men and women (pooled together) anticipated a more expensive ring purchase when primed with a male-biased sex ratio. The present research specifically examined women's (instead of women and men pooled together) preferences for engagement ring size and cost to isolate the effect of perceived mate availability on women's mate preferences. The present research also ensured that the mate availability priming manipulation that was employed was indeed effective at inducing group differences in participants' perceptions of mate availability (i.e., use of a manipulation check). Findings from the present study help to form a more cohesive body of literature on engagement ring preferences that incorporates methods used in previous studies. The engagement ring scenario used in the present research provides a visual cue to participants of engagement ring size preferences, as opposed to the 12-point scale of varying costs from "$500 or less" to "over $3000" in $250 increments as in Griskevicius et al. (2012). This aforementioned scale is problematic because in Canada, the average amount spent on an engagement ring is over $4900 (RateSupermarket.ca Team 2019). Thus, even the most expensive option on the scale (adjusted from American to Canadian dollars) would still be much less than the average cost of an engagement ring. In the present research, the additional visual cues gave participants the opportunity to understand each ring's value and cost without needing to assess prior engagement ring knowledge or familiarity. We also provided participants with more flexible options to choose from, with options ranging from $500 to $9000.

Another area of research that this study builds upon is the role of perceived mate availability and its influence upon human mating psychology and behavior. The current research indicated that perceived mate availability affects mating decisions in the form of expected economic expenditures regarding men's costly investments in engagement rings. Previous research has also shown that monetary decisions and consumer spending are related to mating effort in men, whereby inducing mating goals in men increased their willingness to spend on conspicuous luxuries (e.g., new car, new watch, new cell phone) but not basic necessities such as basic toiletries or household cleaning products (Griskevicius et al. 2012). However, the researchers did not specifically look at how perceptions of mate availability might influence these decisions. Perhaps mate availability also influences other areas of consumer behavior and financial decisions that are related to mate attraction or retention aside from engagement ring purchases, which would be an interesting area of study. Further, it would be valuable to investigate actual expenditures rather than reported willingness to make such purchases as was the case in Griskevicius et al. (2012) and in the present study.

There were some notable limitations to the present study. First, our sample was restricted in age to women between 17 and 39, with a mean age of 20. Perhaps engagement ring expectations might change with age, and this would be an interesting area for future study. Nevertheless, for our purposes, the sample of undergraduate students was a good starting point since women at this age (~ 20) might be thinking about engagement ring costs. According to Statistics Canada, women marry for the first time at 29.6 years of age (Milan

2011). But, according to a recent study, the average length of an engagement is about 14.5 months, placing the average age of engagement around 27 years old (Zaleski 2015).

One other important limitation of the present study may have been our choice of manipulation check measure, which was adopted because of its previous use with this priming task by other researchers (Spielmann et al. 2009). Ostensibly, the priming task ought to induce group differences in a measurable psychological mindset or attitude surrounding, in this case, the availability of mates. Some researchers have suggested that these measured changes in mindset should then mediate links between the priming task and the outcome variable (see Lench et al. 2014; c.f. Hauser et al. 2018). Although we found some support for the efficacy of the manipulation when examining items individually, none of these items, in turn, correlated with ring preferences. It is possible that the manipulation check items are not adequate for capturing perceived mate scarcity. For example, none of the items directly ask about participants' perceptions of how many adequate mates are available in the population, but rather items are vaguer in referring to difficulty in attracting mates. Such challenges could lie in other factors, such as one's own perceived mate value or perhaps even the total population (small city versus large city) which might affect available mating options. It is also possible that the priming task might be influencing ring preferences for a reason other than mate scarcity perception. Future work should seek to optimize mate availability priming stimuli and the items used to ensure that differences in perceived mate availability have been induced.

Another important area of further research lies in the examination of men's willingness to provide resources to women. Griskevicius et al. (2012) found that when primed with mate scarcity, men but not women chose sooner but smaller monetary gains, were less interested in saving money, and were willing to increase their credit card debt, suggesting that perceived mate scarcity does not merely trigger a sex-general change in mating psychology across men and women. Interestingly, Griskevicius et al. (2012) found a combined effect of mate scarcity upon expected ring expenditures for men and women. This indicates that mate scarcity might independently influence men's willingness to provide signals of resource provisioning to women. Future research should examine men's anticipated spending on engagement rings under varying conditions of perceived mate availability.

Future research might also investigate within-participant changes in mating strategy in response to mate availability priming stimuli. Although most work in the area of mate availability has relied on between-group comparisons, recent evidence using a within-participant design has shown that mating strategies can change rapidly in response to external stimuli, such as cues to parental care and resource abundance (Thomas and Stewart-Williams 2018). Implementation of such a design might help to determine whether differences in engagement ring expectations are indeed the result of the priming stimuli.

Investigating engagement ring size and cost expectations is a relatively new but valuable index of resource and commitment provisioning. Engagement proposals are constructed in a particular way because it seemingly sends a message about the strength of a couple's relationship. Previous research has indicated that after reading about the engagement of a hypothetical couple, participants perceived the relationship to be stronger when a diamond ring was presented during the proposal rather than another kind of ring or no ring at all (Schweingruber et al. 2008). Furthermore, a traditional proposal with the use of a diamond engagement ring could possibly be a couple's attempt to send signals that will create support for their relationship among their friends and family (Schweingruber et al. 2008). Thus, this research is important in helping to understand deeply ingrained cultural values around proposals and engagement rings and sheds light on the fact that perceived mate availability might be contributing to this widely accepted phenomenon.

One of the diamond industry's best-known messages is the "two-month salary" rule, which states that a proposer should buy an engagement ring worth 2 months of their salary (Schweingruber et al. 2008). Although such cultural expectations surrounding the cost of engagement rings are widely known, little research to date has explored individual differences in these expectations from an evolutionary perspective. The investment in an engagement ring is a very costly one, and it is important to understand the conditions that may predict women's expectations for men's spending in this domain. The current experimental research showed that women expect increased investment by men in environments where women perceive prospective mating options as abundant rather than scarce. The relative number of same-sex rivals and available mates serves as a powerful environmental cue to human behavior, one of these being economic spending on engagement rings, a putative cue to long-term investment.

**Funding Information** Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Development Grant (file # DDG-2017-00013) awarded to S. Arnocky.

## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that there is no conflict of interest.

## References

Al-Shawaf, L., Lewis, D. M. G., Ghossainy, M. E., & Buss, D. M. (2018). Experimentally inducing disgust reduces desire for short-term mating. *Evolutionary Psychological Science, 5*, 267–275. https://doi.org/10.1007/s40806-018-0179-z.

American Gem Society. (n.d.). *The history of the diamond as an engagement ring*. Retrieved on April 2 2019 from: https://www.americangemsociety.org/page/diamondasengagement.

Arnocky, S., & Vaillancourt, T. (2017). Sexual competition among women: a review of the theory and supporting evidence. In M. L. Fisher (Ed.), *The Oxford handbook of women and competition* (pp. 25–39). New York: Oxford University Press. ISBN: 978–1–63463-131-0. https://doi.org/10.1093/oxfordhb/9780199376377.013.3.

Arnocky, S., Ribout, A., Mirza, R. S., & Knack, J. M. (2014). Perceived mate availability influences intrasexual competition, jealousy and mate-guarding behavior. *Journal of Evolutionary Psychology, 12*(1), 45–64. https://doi.org/10.1556/JEP.12.2014.1.3.

Arnocky, S., Woodruff, N. W., & Schmitt, D. P. (2016). Men's sociosexuality is sensitive to changes in mate-availability. *Personal Relationships, 23*(1), 172–181. https://doi.org/10.1111/pere.12118.

Bateman, P. W. (1997). Operational sex ratio, female competition and mate choice in the Ephippigerine Bushcricket Steropleurus stali Bolivar. *Journal of Orthoptera Research*, (6), 101–104. https://doi.org/10.2307/3503541.

Buss, D. M. (1989). Sex differences in human mate preferences: evolutionary hypotheses tested in 37 cultures. *Behavioral & Brain Sciences, 12*, 1–49.

Campbell, A. (2004). Female competition: causes, constraints, content, and context. *Journal of Sex Research, 41*(1), 16–26. https://doi.org/10.1080/00224490409552210.

Cloud, J. M., & Taylor, M. H. (2019). The effect of mate value discrepancy on hypothetical engagement ring purchases. *Evolutionary Psychological Science, 5*(1), 22–28. https://doi.org/10.1007/s40806-018-0156-6.

Cronk, L., & Dunham, B. (2007). Amounts spent on engagement rings reflect aspects of male and female mate quality. *Human Nature, 18*(4), 329–333. https://doi.org/10.1007/s12110-007-9018-9.

Diamond Council of America. (2010). Bridal jewelry: advanced jewelry sales 6. Retrieved on June 3 2019 from: https://www.diamondcouncil.org/Documents/CourseMaterials/AJS/Lesson6.pdf.

Dubuis, A. (2015). Marriage proposal flops after man's girlfriend says diamond is TOO SMALL. *Daily Mirror*. Retrieved on April 11 2019 from: https://www.mirror.co.uk/news/weird-news/marriage-proposal-flops-after-mans-7053841.

Emlen, S., & Oring, L. W. (1977). Ecology, sexual selection, and the evolution of mating systems. *Science, 197*(4300), 215–223. https://doi.org/10.1126/science.327542.

Fayant, M. P., Sigall, H., Lemonnier, A., Retsin, E., & Alexopoulos, T. (2017). On the limitations of manipulation checks: an obstacle toward cumulative science. *International Review of Social Psychology, 30*(1), 125–130. https://doi.org/10.5334/irsp.102.

Foschi, M. (2014). Hypotheses, operationalizations, and manipulation checks. In M. J. Webster & J. Sell (Eds.), *Laboratory experiments in the social sciences* (2nd ed., pp. 247–268). San Diego: Elsevier Academic Press. https://doi.org/10.1016/B978-0-12-404681-8.00011-X.

Griskevicius, V., Tybur, J. M., Ackerman, J. M., Delton, A. W., Robertson, T. E., & White, A. E. (2012). The financial consequences of too many men: sex ratio effects on saving, borrowing, and spending. *Journal of Personality and Social Psychology, 102*(1), 69–80. https://doi.org/10.1037/a0024761.

Hauser, D. J., Ellsworth, P. C., & Gonzalez, R. (2018). Are manipulation checks necessary? *Frontiers in Psychology, 9*, 998. https://doi.org/10.3389/fpsyg.2018.00998.

Hrdy, S. B. (1999). *Mother nature: maternal instincts and how they shape the human species*. New York: Ballantine Books.

Hughes, S. M., & Aung, T. (2017). Modern-day female preferences for resources and provisioning by long-term mates. *Evolutionary Behavioral Sciences, 11*(3), 242–261. https://doi.org/10.1037/ebs0000084.

Jirotkul, M. (1999). Operational sex ratio influences female preference and male–male competition in guppies. *Animal Behavior, 58*(2), 287–294. https://doi.org/10.1006/anbe.1999.1149.

Lench, H. C., Taylor, A. B., & Bench, S. W. (2014). An alternative approach to analysis of mental states in experimental social cognition research. *Behavior Research Methods, 46*(1), 215–228. https://doi.org/10.3758/s13428-013-0351-0.

Li, N. P., Bailey, J. M., Kenrick, D. T., & Linsenmeier, J. A. (2002). The necessities and luxuries of mate preferences: testing the tradeoffs. *Journal of Personality and Social Psychology, 82*(6), 947–955. https://doi.org/10.1037//0022-3514.82.6.947.

Marlowe, F. W., & Berbesque, J. C. (2012). The human operational sex ratio: effects of marriage, concealed ovulation, and menopause on mate competition. *Journal of Human Evolution, 63*(6), 1–9. https://doi.org/10.1016/j.jhevol.2012.09.004.

Milan, A. (2011). Marital status: overview 2011. *Components of statistics Canada, report on the demographic situation in Canada.* Retrieved on March 18 2019 from: https://www150.statcan.gc.ca/n1/pub/91-209-x/2013001/article/11788-eng.htm.

Miller, G. (2000). *The mating mind*. New York: Doubleday.

Passos, C., Tassino, B., Reyes, F., & Rosenthal, G. G. (2014). Seasonal variation in female mate choice and operational sex ratio in wild populations of an annual fish, *Austrolebias reicherti*. *PLoS One, 9*, e101649. https://doi.org/10.1371/journal.pone.0101649.

RateSupermarket.ca Team. (2019). The cost of love in Canada study 2018. Retrieved on July 2 2019 from: https://www.ratesupermarket.ca/blog/the-cost-of-love-in-canada-2018/.

Ross, J. (2017).This is the average engagement ring spend in 2017. *The Knot*. Retrieved on March 27 2019 from: https://www.theknot.com/content/the-knot-2017-jewelry-and-engagement-study.

Saad, G., & Gill, T. (2003). An evolutionary psychology perspective on gift giving among young adults. *Psychology & Marketing, 20*(9), 765–784. https://doi.org/10.1002/mar.10096.

Schweingruber, D., Cast, A. D., & Anahita, S. (2008). "A story and a ring": audience judgments about engagement proposals. *Sex Roles, 58*(3–4), 165–178. https://doi.org/10.1007/s11199-007-9330-1.

Spielmann, S., MacDonald, G., & Wilson, A. (2009). On the rebound: focusing on someone new helps anxiously attached individuals let go of ex-partners. *Personality and Social Psychology Bulletin, 35*(10), 1382–1394. https://doi.org/10.1177/0146167209341580.

Spielmann, S. S., MacDonald, G., Maxwell, J. A., Joel, S., Peragine, D., Muise, A., & Impett, E. A. (2013). Settling for less out of fear of being single. *Journal of Personality and Social Psychology, 105*(6), 1049–1073. https://doi.org/10.1037/a0034628.

Stone, E. A., Shakelford, T. K., & Buss, D. M. (2007). Sex ratio and mate preferences: a cross-cultural investigation. *European Journal of Social Psychology, 37*, 288–296. https://doi.org/10.1002/ejsp.357.37.

Thomas, A. G., & Stewart-Williams, S. (2018). Mating strategy flexibility in the laboratory: preferences for long- and short-term mating change in response to evolutionarily relevant variables. *Evolution and Human Behavior, 39*(1), 82–93. https://doi.org/10.1016/j.evolhumbehav.2017.10.004.

Waynforth, D., & Dunbar, R. I. M. (1995). Conditional mate choice strategies in humans: evidence from "lonely hearts" advertisements. *Behaviour, 132*(9), 755–779.

Zaleski, J. (2015). How long is too long to be engaged? *The Knot*. Retrieved on May 15 2019 from: https://www.theknot.com/content/too-long-to-be-engaged.