



Missed Connections and Embarrassing Confessions: Using Big Data to Examine Sex Differences in Sexual Omission and Commission Regret

AQ: au
AQ: 1

Gregory D. Webster
University of Florida

C. Veronica Smith
University of Mississippi

AQ: 2

Tatiana Orozco
U.S. Department of Veterans Affairs,
Gainesville, Florida

Peter K. Jonason
University of Padova and University of Kardinal
Stefan Wyszyński

Amanda N. Gesselman
Indiana University Bloomington

Rachel Leigh Greenspan
University of Pennsylvania

Error management theory (EMT; [Haselton & Buss, 2000](#)) draws on parental investment theory ([Trivers, 1972](#)) and signal detection to make novel predictions about human cognitive biases and their adaptive implications. EMT predicts that heterosexual men overperceive sexual interest from women, whereas women underperceive honest signals of relationship commitment from men. In turn, sexual strategies theory ([Buss & Schmitt, 1993](#)) predicts that men may experience more regret over romantic or sexual omission (missed opportunities), whereas women may experience more regret over romantic or sexual commission (regretting past decisions). We tested these predictions using craigslist's missed connections (personal ads posted by people on craigslist.org seeking to contact someone they saw briefly in public) and [FMyLife.com's](#) (FML) love and intimacy sections (embarrassing incidents that people experience and choose to share online anonymously). We recorded missed connections for men seeking women and women seeking men in all 50 U.S. states at 3 time points ($N > 61,000$). We also recorded FMLs posted by men and women over a 3-year span ($N > 3,500$). Consistent with EMT, parental investment theory, and sexual strategies theory, men were more likely to post missed connections (sexual or romantic omission regret), whereas women were more likely to post in FML's love and intimacy sections (sexual or romantic commission regret). We discuss EMT's broad theoretical implications for psychology.

Gregory D. Webster, Department of Psychology, University of Florida; C. Veronica Smith, Department of Psychology, University of Mississippi; Tatiana Orozco, Research Service, U.S. Department of Veterans Affairs, Gainesville, Florida; Peter K. Jonason, School of Psychology, University of Padova, and Institute of Psychology, University of Kardinal Stefan Wyszyński; Amanda N. Gesselman, Kinsey Institute, Indiana University Bloomington; Rachel Leigh Greenspan, Carey Law School, University of Pennsylvania.

AQ: 3

AQ: 4

Talks, posters, and data blitzes based on this research were respectively presented at (a) the Society of South-

eastern Social Psychologists in Gainesville, FL (October 2012); (b) the Society for the Scientific Study of Sexuality in Tampa, FL (November 2012); and (c) the Close Relationships preconference at the Society for Personality and Social Psychology in New Orleans, LA (January 2013).

Peter K. Jonason was partially funded by the Polish National Agency for Academic Exchange (Grant PPN/ULM/2019/1/00019/U/00001).

Correspondence concerning this article should be addressed to Gregory D. Webster, Department of Psychology, University of Florida, P.O. Box 112250, Gainesville, FL 32611-2250. E-mail: gdwebs@ufl.edu

Public Significance Statement

This research used online archival data to examine sex differences in sexual or romantic regret. Data showed that men were more likely to express sexual or romantic omission regret, whereas women were more likely to express sexual or romantic commission regret. Sex differences in sexual regret should be considered when implementing prevention or reduction interventions.

Keywords: error management theory, sexual regret, sex differences, cognitive bias, sexual intent

Imagine a man and a woman reading at a small café. Both are single, heterosexual, physically attractive strangers. They exchange furtive glances and find each other appealing but leave without interacting. Who would be more upset by this missed opportunity and more motivated to connect with the other person? Because both men and women value relationships, one might assume they would be equally upset. Both parental investment theory and error management theory, however, suggest otherwise.

Parental Investment and Sexual Strategies Theories

Parental investment theory (Trivers, 1972) suggests that in sexually reproducing species, the sex that carries the greater cost of minimal reproductive investment (females) is nearly always the choosier sex when it comes to mating. Building off of parental investment theory, sexual strategies theory (Buss & Schmitt, 1993) suggests that women (vs. men) are more likely to pursue comparatively fewer mates of higher phenotypic quality because of reproductive cost asymmetries in minimal parental investment. Conversely, males are more likely to pursue as many mates as possible of acceptable-but-not-always-high phenotypic quality for the same reproductive cost reasons. For example, in most mammals, males can contribute solely sperm, whereas females must devote months or years of somatic energy to gestation and lactation. Consequently, male and female mammals often adopt different sexual strategies to maximize their reproductive output or to minimize their reproductive costs. This reproductive calculus often manifests behaviorally as males pursuing quantity mating strategies and females pursuing quality ones.

Support for both parental investment theory (Trivers, 1972) and sexual strategies theory (Buss & Schmitt, 1993) can be found in field studies of human behavior. Studies of newspaper personal ads (e.g., Baize & Schroeder, 1995; Davis, 1990) found men advertise—and women seek—cues to resources (height, status, money), whereas women advertise—and men seek—cues to fertility (youth, health, beauty). Sex differences in advertised desires can also translate into actual behaviors. Most men who were approached by an attractive female stranger on a university campus indicated their willingness to sleep with her that evening; no women were willing to do the same when approached by an attractive male stranger (Clark & Hatfield, 1989).

Error Management Theory

Error management theory (Buss, 2001; Haselton & Buss, 2000; Haselton, Buss, & DeKay, 1998; Haselton, Nettle, & Andrews, 2005; see also Al-Shawaf, 2016) combines aspects of parental investment theory (Trivers, 1972) and signal detection theory (Green & Swets, 1966) to produce powerful predictions about human cognitive biases and their adaptive implications. In the context of heterosexual relationships, error management theory makes at least two key predictions. First, error management theory predicts that men (vs. women) should be more likely to overperceive sexual interest from women (Abbey, 1982; Farris, Treat, Viken, & McFall, 2008; Henningsen, Henningsen, & Valde, 2006; Maner et al., 2005). Consequently, both parental investment theory and sexual strategies theory would predict that men experience more sexual or romantic omission regret (i.e., missed opportunities). Second, error management theory predicts that women (vs. men)

should be more likely to underperceive honest signals of relationship commitment from the opposite sex (Buss, 2003). It follows that both parental investment theory and sexual strategies theory would predict that women experience more sexual or romantic commission regret (i.e., regret over past or ongoing sexual or romantic decisions). Because minimal reproductive costs are trivial for men but substantial for women, the cost of missing a sexual opportunity to reproduce is greater for men than women, whereas the potential cost of having sex with an unsupportive partner is greater for women than men (Haselton, 2003).

This cost asymmetry can be shown using signal detection theory. If the man in the café believes that the woman is interested in him when she actually is not, then he has committed a Type I error (a false positive or “false alarm”). The cost to him is small; he will feel disappointed until another woman catches his eye. If, however, the man believes the woman is uninterested in him when she actually is, then he has committed a Type II error (a false negative or miss). The cost to him can be biologically significant; he has missed a potential reproductive opportunity. As such, evolutionary pressures may have shaped male cognition not necessarily to be accurate in reading women’s sexual intent but perhaps to be biased by overperceiving sexual interest toward their own fitness interests. Men who exploited the sexual opportunities afforded them would have likely outreproduced other men who missed such opportunities, thus favoring an adaptive cognitive bias over accuracy.

Sex Differences in Sexual Intent and Regret

A substantial literature supports the theoretically derived prediction that men generally overperceive women’s sexual interest in them. For example, in a laboratory-based study of nearly 200 people that used an opposite sex speed-dating paradigm, Perilloux, Easton, and Buss (2012) assessed the sexual interest of both the target (“I am sexually interested in him/her”) and perceiver (“He/she is sexually interested in me”). Results showed that (a) men significantly overperceived women’s sexual interest (Cohen’s $d = 0.57$), (b) women significantly underperceived men’s sexual interest ($d = 0.61$), and (c) this sex difference was

substantial ($d = 1.19$). Men’s misperceptions correlated positively with their scores on a measure of sociosexuality (i.e., Penke & Asendorpf, 2008), and it was specifically the attitude (vs. behavior or desire) items that largely drove this association. In contrast, women’s misperceptions were unrelated to their sociosexuality scores. Thus, men seeking greater sexual variety—especially those holding positive attitudes about casual sex—were more likely to overperceive women’s sexual interest. In addition, men’s sexual misperceptions of women correlated positively with men’s ratings of their own attractiveness and women’s tendencies to be sexually misperceived correlated positively with men’s ratings of women’s attractiveness. Thus, the more attractive that men viewed themselves or a woman, the more likely they were to believe she was more interested in them than she truly was.

Because people’s true sexual intentions are difficult to assess directly, it is possible that what is ostensibly men’s overperception of women’s sexual intent could instead be women underreporting their own true sexual intent (Perilloux & Kurzban, 2015). For example, women might not be fully aware of their own sexual intentions (i.e., an implicit self-bias). In a series of studies that used incentives, women thought that other women would report sexual intentions more in line with men’s expectations, suggesting some level of self-bias (Perilloux & Kurzban, 2015). In other words, women may underreport their own sexual intentions, perhaps consistent with cultural expectations regarding the sexual double standard (i.e., promiscuity is punished in women but rewarded in men). When women were further incentivized to report their true intentions, they were even more in line with men’s expectations. Thus, perhaps men’s ostensible sexual overperception bias is more a consequence of women underreporting their true sexual intentions.

Extending this research across cultures, sex differences in perceptions of sexual intent may be limited to U.S. student samples. Specifically, samples from France, Spain, and Chile showed some limited evidence of men’s overperceptions of women’s sexual intent, but this bias was driven largely by one item in a multi-item scale of behaviors (Perilloux, Muñoz-Reyes, Turiegano, Kurzban, & Pita, 2015), suggesting that sex differences in reading sexual intent not only

varies across cultures but also differs between specific behaviors across cultures (see also Goh, Stoeckli, & Schoebi, 2018).

But in Perilloux and Kurzban's (2015) crucial Study 3, women were first asked about what other women would say regarding sexual intent and then about what other women would want regarding the same. A preregistered replication and extension of this work found that question order was pivotal (Murray, Murphy, von Hippel, Trivers, & Haselton, 2017). That is, going from say to want, women upwardly adjusted their ratings of sexual intent, but when going from want to say, women downwardly adjusted their ratings of sexual intent (a significant interaction effect). In other words, some of Perilloux and Kurzban's (2015) findings may be at least partly due to this order confound. In sum, Murray et al.'s (2017) findings suggest that men's overperception of women's sexual intent is more likely than women underreporting their true intent.

In a series of laboratory experiments involving U.S. undergraduates, men regretted inaction (omission regret) more than action for both romantic and sexual relationships, whereas women regretted action (commission regret) more than inaction only for sexual relationships, albeit marginally so (Roese et al., 2006). Thus, the overall sex difference for omission versus commission regret was larger for sexual than nonsexual romantic relationships. But not all studies have shown robust sex differences in sexual regret. For example, a sample of nearly 250 U.S. undergraduates showed no strong differences in overall sexual regrets, but women (vs. men) reported more regret about being pressured to have sex (Oswalt, Cameron, & Koob, 2005).

Sexual and romantic mistakes are among the things people report regretting the most. A meta-analysis of the things that people regret the most in life across a dozen domains featured (in descending order) education, career, romance, parenting, self-improvement, leisure, finance, and family (Roese & Summerville, 2005). In an independent study of U.S. university students showed romance to be their primary regret of the 12 regret domains (Roese & Summerville, 2005; see also Morrison & Roese, 2011).

Because of sex differences in opportunities for casual sex (women often receive more offers

than men), men may be more likely to regret missed opportunities simply because there are fewer of them compared with women. One way around this regret-baseline-frequency issue is to examine regret intensity (Galperin et al., 2013). To this end, participants rated their regret intensity after reading experimentally manipulated vignettes describing either commission (casual sex vs. romantic action) or omission (casual sex vs. romantic inaction) regret scenarios. The typical sex differences were found for sexual regret intensity but not romantic regret intensity (Galperin et al., 2013). Subsequent studies using large-sample online surveys again found that men reported more sexual inaction (omission) regrets than women, and women reported more sexual action (commission) regrets than men (Galperin et al., 2013).

Comparatively less research has examined the extent to which women show commitment-skepticism bias toward men in mating and dating contexts. Commitment skepticism describes women's general tendency to be adaptively mistrustful of men's romantic and sexual overtures, especially considering the biological cost asymmetries resulting from conceiving and raising offspring following a one-night stand (Trivers, 1972). As mentioned above, these sex differences in the social perception of intention and commitment likely influence emotional responses regarding regret. Specifically, drawing on prior research (Galperin et al., 2013), men are more likely to experience sexual or romantic omission regret (e.g., ruminating on a missed potential hook-up or "the one that got away"), whereas women are more likely to experience sexual or romantic commission regret (e.g., wishing they had not slept with a man who turned out to be a cheater or loser).

The Present Research

The current studies tested two regret-related predictions derived from the theories above. First, we predicted that men (vs. women) would post more online missed connections, which are personal ads posted by people on craigslist.org who seek to connect with someone they saw briefly in public, often with little if any social interaction. Content analysis of craigslist's missed connections posts show that they frequently contain verbal (e.g., compliments) and nonverbal (e.g., eye contact) physical attractive-

ness expressions (Bevan, Galvan, Villasenor, & Henkin, 2016). Because missed connections represent missed opportunities for potential relationships (romantic, sexual, or both), they can provide a direct and behaviorally valid test of sexual omission regret. More specifically, we predict that men will be more likely than women to seek out a connection with a person whom they perceived as possibly having a sexual or romantic interest in them by posting more missed connections. Simply put, we predict that men will post significantly more men-seeking-women missed connections on craigslist than women will post women-seeking-men ones (Study 1).

Second, we predicted that women (vs. men) would post more online Fuck My Life (FML) stories, which are brief, embarrassing confessionals posted anonymously by people on [FMyLife.com](https://www.fmylife.com), which often describe commission regrets. Specifically, we predicted that women (vs. men) would post more FML stories self-tagged or self-categorized as love (i.e., romantic behavior) or intimacy (i.e., sexual behavior) because the theories outlined above would predict that women would likely experience greater romantic and sexual commission regret (Study 2).

Study 1: Sexual and Romantic Omission Regret

Method

We sampled missed connections data from one craigslist community (typically the largest) in all 50 U.S. states and the District of Columbia (DC) across three time points, yielding three independent samples. All heterosexual missed connection posts (which appear online for a month) were counted for each craigslist community ($N = 51$) on June 4, July 5, and August 16, 2009, yielding 61,412 posts (Samples 1, 2, and 3, respectively). Below is a typical man-seeking-woman post:

You had a great smile and beautiful eyes in a white top and blue jeans. [. . .] I was tall in a dark jacket and couldn't stop looking, glancing, hoping to catch your eye. I cannot stop thinking about you and regret not talking to you.

For each state, we calculated (a) the percentage of missed connections posted by each sex and (b) the male-to-female ratio (i.e., the men-seeking-women-to-women-seeking-men ratio).

Results

The overall sample had 42,911 (70%) men-seeking-women posts but only 18,501 (30%) women-seeking-men posts—a significant departure from 50%, $\chi^2(1, N = 61,412) = 9,702.5, p < .05, d = 0.87$ (see Table 1).

Sample 1. Across all 50 states and DC, men posted more missed connections than women. For the average craigslist community, 71.8% of missed connections were listed by men; only 28.2% were listed by women ($SDs = 5.7%$). The average sex difference was 43.6% ($SD = 11.5%$, 95% confidence interval [CI; 40.4%, 46.8%]) and differed from zero, $t(50) = 27.15, p < .001, d = 3.80$. We also examined the male-to-female ratios of people posting missed connections in each community. The average ratio was 2.73 ($SD = 1.00$, 95% CI [2.45, 3.01]) and differed from a 1:1 ratio, $t(50) = 12.42, p < .001, d = 1.74$.

Sample 2. Replicating Sample 1, 71.7% of missed connections were posted by men; only 28.3% by women ($SDs = 5.4%$). The average sex difference was 43.5% ($SD = 10.9%$, 95% CI [40.4%, 46.5%]) and differed from zero, $t(50) = 28.54, p < .002, d = 4.00$. The average male-to-female ratio was 2.73 ($SD = 1.13$, 95% CI [2.41, 3.05]) and differed from a 1:1 ratio, $t(50) = 10.98, p < .001, d = 1.54$.

Sample 3. Replicating Samples 1 and 2, 72.6% of missed connections were posted by men; only 27.4% by women ($SDs = 5.0%$). The average sex difference was 45.1% ($SD = 10.0%$, 95% CI [42.3%, 47.9%]) and differed from zero, $t(50) = 32.35, p < .001, d = 4.53$. The average male-to-female ratio was 2.76 ($SD = 0.68$, 95% CI [2.57, 2.95]) and differed from a 1:1 ratio, $t(50) = 18.49, p < .001, d = 2.59$.

Discussion

The data supported our prediction: Men posted more missed connections on craigslist than women, not only overall but also in every single state (and DC) and at all three time points for a total of nonindependent 153 replications. Although these samples were nonoverlapping regarding time windows and geographic regions, they were technically neither temporally nor spatially independent because adjacent samples in time and adjacent states are more likely

TI

Table 1
Percentages of Missed Connections Posts by Sex in the Largest Craigslist Communities in 50 U.S. States and the District of Columbia

State, district, or commonwealth	Sample 1				Sample 2				Sample 3			
	M→W	W→M	Diff.	Ratio	M→W	W→M	Diff.	Ratio	M→W	W→M	Diff.	Ratio
Alabama	72	28	44	2.6	83	17	66	4.8	80	20	61	4.1
Alaska	66	34	32	1.9	71	29	42	2.5	68	32	36	2.1
Arizona	72	28	44	2.6	71	29	43	2.5	76	24	52	3.2
Arkansas	81	19	61	4.1	64	36	28	1.8	77	23	54	3.3
California	66	34	31	1.9	67	33	35	2.1	69	31	38	2.2
Colorado	67	33	33	2.0	66	34	33	2.0	69	31	38	2.2
Connecticut	76	24	52	3.1	78	22	56	3.5	72	28	43	2.5
Delaware	80	20	61	4.1	81	19	62	4.2	79	21	58	3.7
District of Columbia	69	31	38	2.2	73	27	46	2.7	73	27	46	2.7
Florida	77	23	54	3.3	79	21	58	3.7	78	22	56	3.6
Georgia	68	32	37	2.2	69	31	38	2.2	70	30	40	2.3
Hawaii	72	28	45	2.6	72	28	43	2.5	64	36	29	1.8
Idaho	68	32	36	2.1	77	23	53	3.3	76	24	52	3.1
Illinois	65	35	31	1.9	65	35	31	1.9	66	34	32	2.0
Indiana	74	26	48	2.9	69	31	39	2.3	74	26	48	2.9
Iowa	69	31	38	2.2	80	20	60	4.0	74	26	48	2.9
Kansas	81	19	62	4.3	65	35	31	1.9	76	24	53	3.2
Kentucky	73	27	46	2.7	72	28	44	2.5	72	28	44	2.6
Louisiana	67	33	34	2.0	70	30	41	2.4	62	38	24	1.6
Maine	71	29	43	2.5	74	26	48	2.8	75	25	50	3.0
Maryland	69	31	38	2.2	69	31	38	2.2	69	31	37	2.2
Massachusetts	71	29	41	2.4	67	33	33	2.0	63	37	26	1.7
Michigan	68	32	36	2.1	74	26	48	2.8	70	30	40	2.3
Minnesota	70	30	40	2.4	71	29	42	2.4	74	26	48	2.8
Mississippi	82	18	65	4.7	71	29	42	2.4	71	29	43	2.5
Missouri	69	31	38	2.2	67	33	33	2.0	71	29	41	2.4
Montana	68	32	35	2.1	76	24	52	3.2	75	25	50	3.0
Nebraska	83	17	66	4.8	78	22	56	3.6	68	32	37	2.2
Nevada	73	27	46	2.7	74	26	49	2.9	77	23	53	3.3
New Hampshire	64	36	29	1.8	73	27	45	2.7	73	27	46	2.7
New Jersey	78	22	56	3.6	79	21	57	3.7	79	21	58	3.8
New Mexico	69	31	37	2.2	71	29	42	2.4	76	24	52	3.1
New York	69	31	39	2.3	69	31	38	2.3	67	33	35	2.1
North Carolina	75	25	49	3.0	74	26	49	2.9	75	25	49	3.0
North Dakota	76	24	53	3.3	66	34	31	1.9	81	19	63	4.3
Ohio	70	30	40	2.4	73	27	47	2.7	77	23	54	3.4
Oklahoma	73	27	46	2.7	72	28	44	2.6	76	24	52	3.2
Oregon	68	32	36	2.1	65	35	29	1.8	67	33	34	2.1
Pennsylvania	59	41	18	1.4	65	35	30	1.9	67	33	34	2.0
Rhode Island	68	32	36	2.1	67	33	33	2.0	67	33	34	2.0
South Carolina	74	26	48	2.9	73	27	47	2.8	82	18	63	4.4
South Dakota	88	12	76	7.2	76	24	52	3.1	75	25	50	3.0
Tennessee	75	25	51	3.1	76	24	51	3.1	74	26	47	2.8
Texas	69	31	38	2.2	73	27	46	2.7	74	26	47	2.8
Utah	72	28	44	2.6	72	28	44	2.6	73	27	47	2.8
Vermont	77	23	54	3.3	68	32	35	2.1	76	24	51	3.1
Virginia	62	38	23	1.6	63	37	26	1.7	62	38	23	1.6
Washington	64	36	29	1.8	66	34	33	2.0	65	35	29	1.8
West Virginia	78	22	56	3.5	90	10	80	9.0	78	22	56	3.5
Wisconsin	70	30	39	2.3	70	30	40	2.3	72	28	44	2.6
Wyoming	76	24	53	3.3	67	33	33	2.0	77	23	54	3.3
Mean	71.8	28.2	43.6	2.73	71.7	28.3	43.5	2.73	72.6	27.4	45.1	2.76

Diff. = difference; M = men; → = seeking; W = women. Discrepancies due to rounding. All nonratio numbers are percentages. Boldface = mean values.

This document is copyrighted by the American Psychological Association or one of its allied publishers. This article is intended solely for the personal use of the individual user and is not to be disseminated broadly.

to be more similar to one another above chance levels (Ward & Gleditsch, 2008). But then again, if nonindependence were a major problem, then greater heterogeneity across samples would have emerged. It did not. In fact, in none of the 153 samples did women post more missed connections than men. We believe that this robust pattern suggests that men (vs. women) are experiencing more regret over the possibility of a missed romantic or sexual opportunity and that this regret influences their decision to post a missed connection. On a theoretical level, this finding directly supports parental investment and sexual strategies theories (and is consistent with error management theory), suggesting that men tend to overperceive women's sexual intent, which can manifest as sexual omission regret in the form of posting a missed connection. In Study 2, we test women's propensity to experience more sexual commission regret than men.

Study 2: Sexual and Romantic Commission Regret

Method

We tested our second prediction using *FMyLife.com*'s (FML) love and intimacy sections. On *FMyLife.com*, people anonymously post embarrassing incidents that they choose to share with others online. Below is a typical FML intimacy posting:

I was having sex with my new boyfriend, and I realized that he enjoys making airplane sound effects while inserting himself inside of me. Moment ruined. FML.

We recorded more than 3,500 FMLs posted by men and women over a 3-year time span.

Results

Love sample. Among people posting FML stories that they categorized as love ($N = 1,611$), men posted 592 (36.7%) and women posted 1,019 (63.3%), which was a significant difference, $\chi^2(1, N = 1,611) = 132.9, p < .001, d = 0.54$.

Intimacy sample. Among people posting FML stories that they categorized as intimacy ($N = 1,965$), men posted 727 (37.0%) and women posted 1,238 (63.0%), which was a significant difference, $\chi^2(1, N = 1,965) = 113.2, p < .001, d = 0.55$.

Discussion

Consistent with theory and our expectations, women (vs. men) were more likely to experience—or at least publicly express experiencing—commission regret related to sexual or romantic events. These findings for women's sexual commission regret complement Study 1's findings for men's sexual omission regret. Furthermore, Study 2's findings corroborate predictions derived directly from parental investment and sexual strategies theories—and derived indirectly from error management theory—that women are more likely to express romantic and sexual commission regret than men.

General Discussion

Findings from both studies were consistent with the abovementioned theoretical approaches to sex differences in sexual omission and commission regret. Specifically, we found support for both men's sexual and romantic omission regret and for women's sexual and romantic commission regret. One alternative explanation is that men have been socialized to pursue women, whereas women have been socialized to be pursued by men. If these results were dictated solely by socially learned or culturally reinforced norms, then one would expect substantial variation across the United States in regions in which gender-stereotypic behavior regarding dating and sexuality are either more traditional or progressive; however, the direction of the sex difference was the same in all 153 cases (50 states and DC across three time points). Thus, men posted more missed connections than women by roughly the same margin in every state.

Another alternative explanation is that men do not so much misperceive women's sexual intent as women simply underreport their true sexual intent (Perilloux & Kurzban, 2015; but see Murray et al., 2017); however, without an unbiased assessment of women's true sexual intent, we cannot rule out this possibility. This possibility also reveals a methodological limitation of the present research because a pure test of error management theory—and signal detection theory more generally—requires an objective truth or baseline or other criterion against which perceptions of reality are judged. For example, given the limitations of our data, we

cannot know for certain whether the target of a missed connection was or was not attracted to the person who chose to post it. Lacking this objective truth, we cannot show perceptual or cognitive bias in an empirical sense; we can only imply the presence of bias in some form. Thus, although our findings can lend direct support to parental investment and sexual strategies theories, they can only lend indirect support to—or are at least consistent with—error management theory. To provide direct support for error management theory would likely require a controlled laboratory experiment with random assignment. Such an experimental approach would have augmented internal validity but diminished external and ecological validity because we would have likely needed to rely solely on university students for our sample and used a contrived situation in an artificial setting. In contrast, our big data approach likely diminished internal validity (no controlled experiments) but also augmented both external and ecological validity because our online sample was far more diverse and inclusive (Henrich, Heine, & Norenzayan, 2010) while assessing actual behavior in the real world (Baumeister, Vohs, & Funder, 2007) gleaned from the Internet (Gosling & Mason, 2015).

Yet another potential limitation of Study 1 is that we did not attempt to assess posters' intended time horizons for their missed-connection targets: Were they looking for short-term hook-ups, long-term committed relationships, or something in between (e.g., ongoing booty-calls [Jonason, Li, & Richardson, 2011], friends with benefits [Lehmiller, VanderDrift, & Kelly, 2011])? If missed connections are primarily used to bring about short-term relationships, then one might expect men (vs. women) to experience greater or more frequent sexual omission regret and hence generate the pattern we observed (i.e., men posting far more missed connections than women). If, however, missed connections are primarily used to bring about long-term relationships, then one might expect little if any sex difference in posting rates because both men and women might equally regret the missed opportunities to have a committed, long-term partner. But then again, deriving one's intended or expected relationship duration from a sample of ambiguous missed connection posts may be a fool's errand—theoretically worthwhile to be sure but practically impossi-

ble. Future research should consider experimentally manipulating expected or intended relationship time horizons to examine their possible moderating role on sex differences in sexual omission/commission regret.

Together these studies suggest that three evolutionary theories may play key roles in explaining sex differences in sexual omission versus commission regret and that these sex differences are reflected not just in surveys but also in real interpersonal behavior. From a broader theoretical perspective, these findings indirectly suggest that regret, as a social emotion, functions differently in the sexes in ways consistent with biologically adaptive cost asymmetries. Our archival, big data studies also highlight the Internet as a powerful tool to observe real behavior (Baumeister et al., 2007; Gosling & Mason, 2015)—one that circumvents potential problems associated with self-reports (Paulhus & Vazire, 2007).

From an even broader theoretical perspective, the present findings hint at the possibility that error management theory may relate at least indirectly to a novel and important effect—sex differences in the experience of sexual regret. Indeed, error management theory has been instrumental in inspiring derivative theories such as evolved navigation theory (Jackson, 2009; Jackson & Cormack, 2008). Evolved navigation theory posits that people perceive and move through the physical world in ways that are more perceptually adaptive than accurate. For example, people often overestimate vertical but not horizontal distances because underestimating the former often carries a greater survival cost (e.g., death, severe injury) than the latter (Jackson & Cormack, 2008). Our ancestors who overestimated vertical distances chose to climb or walk or leap with caution to avoid falling to their deaths; these ancestors went on to survive and outreproduce those who underestimated the same vertical distances and fell to their deaths after behaving less cautiously. Thus, our results hint at error management theory's expansion into new territories; it may apply to both survival- and reproduction-relevant adaptive cognitive and perceptual biases, including sex differences in experiencing sexual regret. Future research should consider using an experimental manipulation that involves a true criterion against which cognitive or perceptual bias can be assessed or established. In the meantime, the

present findings on sex differences in sexual regret can at least corroborate both parental investment and sexual strategies theories.

References

- Abbey, A. (1982). Sex differences in attributions for friendly behavior: Do males misperceive females' friendliness? *Journal of Personality and Social Psychology, 42*, 830–838. <http://dx.doi.org/10.1037/0022-3514.42.5.830>
- Al-Shawaf, L. (2016). Could there be a male commitment skepticism bias and a female sexual overperception bias? Novel hypotheses based on error management theory. *Evolutionary Psychological Science, 2*, 237–240. <http://dx.doi.org/10.1007/s40806-016-0052-x>
- Baize, H. R., & Schroeder, J. E. (1995). Personality and mate selection in personal ads: Evolutionary preferences in a public mate selection process. *Journal of Social Behavior and Personality, 10*, 517–536.
- Baumeister, R. F., Vohs, K. D., & Funder, D. C. (2007). Psychology as the science of self-reports and finger movements: What ever happened to actual behavior? *Perspectives on Psychological Science, 2*, 396–403. <http://dx.doi.org/10.1111/j.1745-6916.2007.00051.x>
- Bevan, J. L., Galvan, J., Villasenor, J., & Henkin, J. (2016). "You've been on my mind ever since": A content analysis of expressions of interpersonal attraction in Craigslist.org's missed connections posts. *Computers in Human Behavior, 54*, 18–24. <http://dx.doi.org/10.1016/j.chb.2015.07.050>
- Buss, D. M. (2001). Cognitive biases and emotional wisdom in the evolution of conflict between the sexes. *Current Directions in Psychological Science, 10*, 219–223. <http://dx.doi.org/10.1111/1467-8721.00153>
- Buss, D. M. (2003, September). *Sexual treachery: The co-evolution of conflict in human mating strategies*. Paper presented at the Department of Psychology, Carnegie-Mellon University, Pittsburgh, PA.
- Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review, 100*, 204–232. <http://dx.doi.org/10.1037/0033-295X.100.2.204>
- Clark, R. D., & Hatfield, E. (1989). Gender differences in receptivity to sexual offers. *Journal of Psychology & Human Sexuality, 2*, 39–55. http://dx.doi.org/10.1300/J056v02n01_04
- Davis, S. (1990). Men as success objects and women as sex objects: A study of personal advertisements. *Sex Roles, 23*, 43–50. <http://dx.doi.org/10.1007/BF00289878>
- Farris, C., Treat, T. A., Viken, R. J., & McFall, R. M. (2008). Sexual coercion and the misperception of sexual intent. *Clinical Psychology Review, 28*, 48–66. <http://dx.doi.org/10.1016/j.cpr.2007.03.002>
- Galperin, A., Haselton, M. G., Frederick, D. A., Poore, J., von Hippel, W., Buss, D. M., & Gonzaga, G. C. (2013). Sexual regret: Evidence for evolved sex differences. *Archives of Sexual Behavior, 42*, 1145–1161. <http://dx.doi.org/10.1007/s10508-012-0019-3>
- Goh, P. H., Stoeckli, P. L., & Schoebi, D. (2018). Mood and the perception of sexual interest in different cultural contexts: A comparison between a Malaysian and a Swiss sample. *Journal of Cross-Cultural Psychology, 49*, 1144–1161. <http://dx.doi.org/10.1177/0022022118770797>
- Gosling, S. D., & Mason, W. (2015). Internet research in psychology. *Annual Review of Psychology, 66*, 877–902. <http://dx.doi.org/10.1146/annurev-psych-010814-015321>
- Green, D. M., & Swets, J. A. (1966). *Signal detection theory and psychophysics*. New York, NY: Wiley.
- Haselton, M. G. (2003). The sexual overperception bias: Evidence of a systematic bias in men from a survey of naturally occurring event. *Journal of Research in Personality, 37*, 34–47. [http://dx.doi.org/10.1016/S0092-6566\(02\)00529-9](http://dx.doi.org/10.1016/S0092-6566(02)00529-9)
- Haselton, M. G., & Buss, D. M. (2000). Error management theory: A new perspective on biases in cross-sex mind reading. *Journal of Personality and Social Psychology, 78*, 81–91. <http://dx.doi.org/10.1037/0022-3514.78.1.81>
- Haselton, M. G., Buss, D. M., & DeKay, W. T. (1998, July). *A theory of errors in cross-sex mindreading*. Paper presented at the Human Behavior and Evolution Society Meeting, Davis, CA.
- Haselton, M. G., Nettle, D., & Andrews, P. W. (2005). The evolution of cognitive bias. In D. M. Buss (Ed.), *The handbook of evolutionary psychology* (pp. 724–746). Hoboken, NJ: Wiley.
- Henningsen, D. D., Henningsen, M. L. M., & Valde, K. S. (2006). Gender differences in perceptions of women's sexual interest during cross-sex interactions: An application and extension of cognitive valence theory. *Sex Roles, 54*, 821–829. <http://dx.doi.org/10.1007/s11199-006-9050-y>
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences, 33*, 61–83. <http://dx.doi.org/10.1017/S0140525X0999152X>
- Jackson, R. E. (2009). Individual differences in distance perception. *Proceedings Biological Sciences, 276*, 1665–1669. <http://dx.doi.org/10.1098/rspb.2009.0004>
- Jackson, R. E., & Cormack, L. K. (2008). Evolved navigation theory and the environmental vertical illusion. *Evolution and Human Behavior, 29*, 299–

304. <http://dx.doi.org/10.1016/j.evolhumbehav.2008.03.001>
- Jonason, P. K., Li, N. P., & Richardson, J. (2011). Positioning the booty-call relationship on the spectrum of relationships: Sexual but more emotional than one-night stands. *Journal of Sex Research, 48*, 486–495. <http://dx.doi.org/10.1080/00224499.2010.497984>
- Lehmiller, J. J., VanderDrift, L. E., & Kelly, J. R. (2011). Sex differences in approaching friends with benefits relationships. *Journal of Sex Research, 48*, 275–284. <http://dx.doi.org/10.1080/00224491003721694>
- Maner, J. K., Kenrick, D. T., Becker, D. V., Robertson, T. E., Hofer, B., Neuberg, S. L., . . . Schaller, M. (2005). Functional projection: How fundamental social motives can bias interpersonal perception. *Journal of Personality and Social Psychology, 88*, 63–78. <http://dx.doi.org/10.1037/0022-3514.88.1.63>
- Morrison, M., & Roese, N. J. (2011). Regrets of the typical American: Findings from a nationally representative sample. *Social Psychological & Personality Science, 2*, 576–583. <http://dx.doi.org/10.1177/1948550611401756>
- Murray, D. R., Murphy, S. C., von Hippel, W., Trivers, R., & Haselton, M. G. (2017). A preregistered study of competing predictions suggests that men do overestimate women's sexual intent. *Psychological Science, 28*, 253–255. <http://dx.doi.org/10.1177/0956797616675474>
- Oswalt, S. B., Cameron, K. A., & Koob, J. J. (2005). Sexual regret in college students. *Archives of Sexual Behavior, 34*, 663–669. <http://dx.doi.org/10.1007/s10508-005-7920-y>
- Paulhus, D. L., & Vazire, S. (2007). The self-report method. In R. W. Robins, R. C. Fraley, & R. F. Krueger (Eds.), *Handbook of research methods in personality psychology* (pp. 224–239). New York, NY: Guilford Press.
- Penke, L., & Asendorpf, J. B. (2008). Beyond global sociosexual orientations: A more differentiated look at sociosexuality and its effects on courtship and romantic relationships. *Journal of Personality and Social Psychology, 95*, 1113–1135. <http://dx.doi.org/10.1037/0022-3514.95.5.1113>
- Perilloux, C., Easton, J. A., & Buss, D. M. (2012). The misperception of sexual interest. *Psychological Science, 23*, 146–151. <http://dx.doi.org/10.1177/0956797611424162>
- Perilloux, C., & Kurzban, R. (2015). Do men overperceive women's sexual interest? *Psychological Science, 26*, 70–77. <http://dx.doi.org/10.1177/0956797614555727>
- Perilloux, C., Muñoz-Reyes, J. A., Turiegano, E., Kurzban, R., & Pita, M. (2015). Do (non-American) men overestimate women's sexual intentions? *Evolutionary Psychological Science, 1*, 150–154. <http://dx.doi.org/10.1007/s40806-015-0017-5>
- Roese, N. J., Pennington, G. L., Coleman, J., Janicki, M., Li, N. P., & Kenrick, D. T. (2006). Sex differences in regret: All for love or some for lust? *Personality and Social Psychology Bulletin, 32*, 770–780. <http://dx.doi.org/10.1177/0146167206286709>
- Roese, N. J., & Summerville, A. (2005). What we regret most . . . and why. *Personality and Social Psychology Bulletin, 31*, 1273–1285. <http://dx.doi.org/10.1177/0146167205274693>
- Trivers, R. L. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual selection and the descent of man, 1871–1971* (pp. 136–179). Chicago, IL: Aldine.
- Ward, M. D., & Gleditsch, K. S. (2008). *Spatial regression models*. Los Angeles, CA: Sage. <http://dx.doi.org/10.4135/9781412985888>

Received January 12, 2020

Revision received February 13, 2020

Accepted February 20, 2020 ■

AUTHOR QUERIES

AUTHOR PLEASE ANSWER ALL QUERIES

1

AQau—Please confirm the given-names and surnames are identified properly by the colors.

■ = Given-Name, ■ = Surname

The colors are for proofing purposes only. The colors will not appear online or in print.

AQ1—Author: Please be sure to provide the name of the department(s) with which you and your coauthors are affiliated at your respective institutes if you have not already done so. If you are affiliated with a governmental department, business, hospital, clinic, VA center, or other nonuniversity-based institute, please provide the city and U.S. state (or the city, province, and country) in which the institute is based. Departments should be listed in the author footnote only, not the byline. If you or your coauthors have changed affiliations since the article was written, please include a separate note indicating the new department/affiliation: [author's name] is now at [affiliation].

AQ2—Author: Please reduce affiliations to two per journal style.

AQ3—Author: Please reduce affiliations to two per journal style.

AQ4—Author: Please provide departmental affiliations for all authors.
