

2015

# The Breakup Project: Using Evolutionary Theory to Predict and Interpret Responses to Romantic Relationship Dissolution

Craig E. Morris

Follow this and additional works at: [https://orb.binghamton.edu/dissertation\\_and\\_theses](https://orb.binghamton.edu/dissertation_and_theses)



Part of the [Anthropology Commons](#)

---

## Recommended Citation

Morris, Craig E., "The Breakup Project: Using Evolutionary Theory to Predict and Interpret Responses to Romantic Relationship Dissolution" (2015). *Graduate Dissertations and Theses*. 2.  
[https://orb.binghamton.edu/dissertation\\_and\\_theses/2](https://orb.binghamton.edu/dissertation_and_theses/2)

This Dissertation is brought to you for free and open access by the Dissertations, Theses and Capstones at The Open Repository @ Binghamton (The ORB). It has been accepted for inclusion in Graduate Dissertations and Theses by an authorized administrator of The Open Repository @ Binghamton (The ORB). For more information, please contact [ORB@binghamton.edu](mailto:ORB@binghamton.edu).

The Breakup Project: Using Evolutionary Theory to Predict and Interpret  
Responses to Romantic Relationship Dissolution

BY

CRAIG ERIC MORRIS

BA, Pennsylvania State University, 1992  
BA, Indiana University of Pennsylvania, 2007  
MA, Binghamton University, 2010

DISSERTATION

Submitted in partial fulfillment of the requirements for  
the degree of Doctor of Philosophy in Anthropology  
in the Graduate School of  
Binghamton University  
State University of New York  
2015

UMI Number: 3713604

All rights reserved

INFORMATION TO ALL USERS

The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if material had to be removed, a note will indicate the deletion.



UMI 3713604

Published by ProQuest LLC (2015). Copyright in the Dissertation held by the Author.

Microform Edition © ProQuest LLC.

All rights reserved. This work is protected against unauthorized copying under Title 17, United States Code



ProQuest LLC.  
789 East Eisenhower Parkway  
P.O. Box 1346  
Ann Arbor, MI 48106 - 1346

© Copyright by Craig Eric Morris 2015

All Rights Reserved

Accepted in partial fulfillment of the requirements for  
the degree of Doctor of Philosophy in Anthropology  
in the Graduate School of Binghamton University  
State University of New York  
2015

April 30 2015

Dr. Chris Reiber, Chair  
Department of Anthropology, Binghamton University

Dr. Ann M. Merriwether, Member  
Departments of Psychology and Human Development, Binghamton University

Dr. David Sloan Wilson, Member  
Departments of Biological Sciences and Anthropology, Binghamton University

Dr. Susan M. Seibold-Simpson, Outside Examiner  
Decker School of Nursing, Binghamton University

## **ABSTRACT**

The formation and maintenance of romantic pair bonds is a well-represented topic in human evolutionary sciences. This extensive body of work, drawn mostly from the field of evolutionary psychology, has proposed mechanisms for attracting a mate (e.g., resource display, physical cues), attaining a mate (e.g., intrasexual competition), and keeping a mate (e.g., competitor derogation, emotional manipulation). However, this evolutionary model of human pair bonding has not fully addressed relationship termination. If we accept that we have an evolved suite of behaviors that encourage and facilitate pair bonding, then we must also look to breakups and ask whether evolution has played a role in shaping “heartbreak”—the post-relationship grief (PRG) which many individuals endure.

The evolutionary model of human mating predicts divergent mating “agendas” for men and women. The first step in our research program was to conduct a modest pilot study to address how and when PRG differs between men and women. This pilot study is included as Chapter One for convenience. Having concluded that many of the existing suppositions about breakups were not supported by our initial inquiry, we set out to expand and revise the current model so that it can be used to make accurate predications regarding a more complex suite of variables (e.g., life history, sexuality). Chapter Two explains the logic and implications of this expansion via the example of a specific breakup scenario: the loss of a woman’s partner to a romantic rival.

After presenting the possible evolutionary cause and adaptive benefits of PRG, we next tested both new and existing hypotheses as they relate to biological sex differences (Chapter Three) and life history variation (Chapter Four) in PRG. This quantitative foundation for

ongoing qualitative study concludes with an overview of PRG in a population that is sorely underrepresented in evolutionary literature—individuals whose sexual orientation is not exclusively heterosexual.

**DEDICATION**

For *S.*



## ACKNOWLEDGMENTS

A dissertation can be a lonely struggle between an individual's passion for the subject material and the seemingly insurmountable task of seeing their efforts through to fruition. While it is up to the individual to maintain their dedication to the task, this is simply not possible without the assistance, support, and guidance of countless individuals whose names may not appear as co-authors, but whose role in the project is necessary and tangible.

I would first like to thank my family, who somehow stood beside me and my decision to attend college for 28 semesters (and one summer session). Second, to my friends from PSU, IUP, and BU, I hope I have in some way kept your spirits afloat as you have mine. To Drs. Francis Allard of the Indiana University of Pennsylvania and Miriam Chaiken of New Mexico State University, I owe an enormous debt. In 2006 I said (something to the effect of) "There's something missing here and I think it's something *important*." Their response was not to chastise me but to say: immerse yourself in the literature, identify the "omission," and devise a way to contribute to its elimination.

To Dr. Amanda Morris of Kutztown University, my closest friend and indefatigable confidant, I say simply, "Thank you for everything." Thank you for believing in me, believing in my work, and demonstrating through your excellence in teaching, administrating, and mentoring just how much positive change can come from investing in the academic task at hand, no matter how mundane, for the greater good of producing students who understand the power of their own voice.

My dissertation committee members, Drs. Ann Merriwether and David Sloan Wilson of Binghamton University (SUNY) have enthusiastically supported this project since I first

presented my colloquium; providing valuable input on additional sources and also methods to make the project more manageable in its present form. Special thanks also to Dr. Susan M. Seibold-Simpson of the Decker School of Nursing, Binghamton University for graciously agreeing to act as outside examiner.

To Dr. Chris Reiber of Binghamton University (SUNY), since my first day on campus you have been my advisor, my mentor, my strongest advocate, and my friend. There is little I can say here that reflects the magnitude of your contribution to this project. Without your guidance and support, I have little doubt that this stage of the research program simply would not have come to fruition. During my years here at Binghamton, I have had the privilege of teaching and mentoring many students. When those who come to me with problems above and beyond simple academic issues, I always take pause and then proceed after first asking myself, “How would Chris help this student make their situation better?”

Lastly, my heartfelt thanks to the thousands of participants around the world who took 20, 30, or 60 minutes out of their busy days to share deeply personal (and often painful) stories of love and loss with me—a faceless stranger. An aggregate statistical snapshot of their experiences appear in the following pages but it is my pledge to them that this research program is ongoing; I will do my best to make their voices heard.

## TABLE OF CONTENTS

List of Tables	x
List of Figures	xi
Chapter 1: Frequency, Intensity, and Expression of Post-Relationship Grief	1
Chapter 2: Intrasexual Mate Competition and Breakups: Who Really Wins?	18
Chapter 3: Quantitative Sex Differences in Response to the Dissolution of a Romantic Relationship	53
Chapter 4: Quantitative Life History Variation in Post-Relationship Grief	76
Chapter 5: Sexuality and Post-Relationship Grief	101
Appendices	120
A: Survey distribution	120
B: Survey instruments	125
Works Cited	145

## LIST OF TABLES

Table 1.1	Mean emotional and physical trauma levels	p. 13
Table 1.2	Themes from additional comments regarding breakup experience	16
Table 3.1	Demographic information for participants who experienced a breakup	68
Table 4.1	Demographic information for participants	90
Table 5.1	Internet distribution of invitation to participate in a romantic relationship survey	116
Table 5.2	Distribution of male and female self-reported sexual orientation	117
Table 5.3	Mean demographic information for participants	117
Table 5.4	Independent samples t-test results comparing Mate Value	118
Table 5.5	Breakup prevalence, frequency, and relationship length by sex and sexuality	119
Table 5.6	Independent samples t-test results comparing Breakup Frequency	120
Table 5.7	Independent samples t-test results comparing Relationship Length	121

## LIST OF FIGURES

Figure 3.1	Distribution of emotional and physical response levels to a breakup by sex	p. 69
Figure 3.2	Components of emotional and physical responses to a breakup by sex	70
Figure 3.3	Initiator of breakup by sex	71
Figure 3.4	Mean emotional, physical, and total response levels by initiator of breakup and sex	72
Figure 3.5	Distribution of cause of breakup as reported by sex	73
Figure 3.6	Mean emotional, physical, and total response levels by cause of breakup and sex	74-75
Figure 4.1	Multiple breakup distribution	90
Figure 4.2	Mate value	91
Figure 4.3	Age distribution by sex	92
Figure 4.4	Selected Breakup	93
Figure 4.5	Distribution of emotional and physical response levels by gender	94
Figure 4.6	Distribution of emotional and physical response levels by age	95
Figure 4.7	Length of selected relationship	96
Figure 4.8	Distribution of time since relationship termination	97
Figure 4.9	Linear regression scatterplot of total response and time since breakup	98

Figure 4.10	Mean total response for men and women by age category	100
Figure 5.1	Distribution of Breakup Cause by sex and sexuality	122

## **CHAPTER 1**

### **Frequency, Intensity, and Expression of Post-Relationship Grief**

Morris, C.E., and Chris Reiber. Frequency, intensity and expression of post-relationship grief. *EvoS Journal: The Journal of the Evolutionary Studies Consortium* 3, no. 1 (2011): 1-11.

## **Abstract**

Following the break-up of a romantic relationship, individuals experience varying degrees and constellations of emotional and physical responses. Colloquially referred to as “heartbreak,” we term this experience post-relationship grief (PRG). A strict adherence to sexual strategies theory suggests that males and females may experience PRG differently since males have evolved to favor promiscuity and females to favor mate stability. This suggests that PRG may be more pronounced in females than males. Another plausible argument could be made that since males must compete for mates in this model, a breakup signals a costly resumption of mate competition tactics for males. To evaluate these predictions, we analyzed quantitative and qualitative data collected through a self-report questionnaire that was administered to 1735 university students. Three times as many females as males responded, and nearly four times as many females offered free-response comments when prompted. Of the 98% of respondents who reported experiencing a breakup, 96% reported emotional trauma (such as anger, depression and anxiety) and 93% physical trauma (such as nausea, sleep loss and weight loss). The intensity of PRG was virtually indistinguishable between males and females. However, the expression of PRG varied between genders across a series of recurring themes; females focused on broad self-esteem and trust issues, while males reflected more narrowly on the actual intensity and duration of PRG. PRG levels were lower in individuals initiating the breakups than in those who did not.



## Introduction

Much contemporary anthropological, biological and psychological research suggests that the stereotypical Western literary concept of “romance” is not necessarily a human universal, yet some form of romantic love itself is found in virtually all cultures (Bartels and Zeki, 2004; Buss and Schmitt, 1993; Jankowiak and Fisher, 1992; Lampert, 1997). In one noted example, Buss’ survey of over 10,000 subjects in 37 cultures found that both men and women rated love as the single most important criterion in their eventual selection of a mating partner (1989). It seems reasonable to assume that if romantic love is a human universal, then romantic relationships, both successes and failures, would be an equally universal part of the human experience. Fisher’s work has further suggested that relationship failures (breakups) create physical and emotional response patterns that are just as universal as romantic love itself (2004).

The complex web of emotional anguish and physical distress associated with the termination of a romantic relationship is referred to by the authors hereafter as post-relationship grief—PRG.<sup>1</sup> Fisher’s studies have shown that PRG sufferers may have trouble remembering things, difficulty focusing, and can have a feeling of lost purpose or missing direction in their lives (2004). Furthermore, PRG is often accompanied by fear, anger, panic, worry, sadness, and emotional numbness. Anxiety attacks are common, as are loss of appetite, reduced immune system function, and an inability to perform work or academic duties (Dürschlag, Hirzel and Sachser, 1998). Najib and Lorberbaum (2004) found that women whose breakups were particularly distressing showed greater decreases in brain activity in the neural

---

<sup>1</sup> Existing research has deemed this experience as “heartbreak,” a “broken heart,” and other colloquial terms that we feel do not fully capture the broad physical and emotional suffering involved. Furthermore, the linkage of “love” to the human heart is not a culturally universal linguistic convention.

regions linked to feeling, motivation, and concentration when thinking about their former mate than when they thought of another acquaintance they had known for a comparable period. Bartels and Zeki (2004) reported that the areas of the brain associated with romantic love are also associated with the euphoria produced by recreational drugs, like cocaine. Thus, they argue that romantic love operates along the same neural pathways as addiction.

While extensive research has been done on grief related to the death of a loved one, less work has focused on the depression and sense of loss triggered specifically by the termination of a romantic relationship. This is intriguing considering the work of Archer (1999), which suggests that the most common triggers of grief are both death of a loved one and termination of a romantic relationship. A study of anxiety in twins (Krendle, 1998) compared the severity of the breakup response to other episodes of depression experienced by the participants in the previous year and found that the risk of depression and anxiety was significantly higher during months involving a romantic breakup. Several of Randy Nesse's writings on the possible adaptive benefits of grief and depression suggest that PRG may be a cross-cultural defensive response to a situation where personal loss is inevitable. For example, Nesse has argued that in situations where extended effort in pursuing a goal could result in personal loss or wasted effort, a depressed or unmotivated response would be predicted evolutionarily as it would provide a fitness advantage by deterring: 1. futile challenges to dominants, 2. actions lacking planning or resource allocation, and 3. disrupting a currently unsatisfactory major life enterprise when the alternative is likely to be even worse (Nesse, 2000). In addition, Nesse has argued that incidents of social loss (breakup, death of a loved one) would be expected to produce a particularly traumatic emotional response (Keller and Nesse, 2005). Relatedly, in her work linking grief and depression, Fisher (2002) found that administering serotonin could help hasten recovery from a breakup.

Questions regarding human universals that are related to reproductive fitness are often initially scrutinized via Buss' sexual strategies model, and PRG is no exception. Buss has suggested (2003) that in the environment of evolutionary adaptedness (EEA), those individuals who possessed any suite of behaviors that would allow them to overcome PRG quickly and return to the mating "game" effectively would be evolutionarily favored, while those individuals whose behaviors exacerbated PRG to the detriment of future pairings would, obviously, be selected against. Already, a range of inquiry presents itself: Is PRG itself adaptive in a Bussian fashion or is it adaptive as part of Nesse's broader suite of grief response? Is it both? Perhaps, neither?

Importantly, sexual strategies theory also suggests that men and women have disparate agendas concerning romantic relationships (Buss, 1989, 2003; Buss and Schmitt, 1993). For example, it is claimed that men, in virtually all instances, are hard-wired for increased promiscuity relative to females. This behavior reflects the clear reproductive fitness benefits of multiple sexual partners. One oft-cited study (Clark and Hatfield, 1989) found that while 75% of males would agree to have sex with a virtual stranger when offered, not a single female participant would do so. Buss (2000) has concluded that most women demand a degree of emotional involvement concomitant with sex, while men have far less difficulty participating in "no strings" sex. As long-term male investment in any offspring is optional, it has been logical to conclude that maximum reproductive attempts would facilitate maximum reproductive success in males.

Copious research demonstrates that females are much choosier in mate selection (for an overview, see Buss, 2003). Women invest substantial biological resources in their offspring and for a longer time than do men, and thus favor mates who exhibit traits complementary to that behavior. The female agenda is to secure a mate with the best possible combination of compatible genes and abundant resources (Harris, 2004). As predicted by this agenda, women

valued a mate's economic resource level twice as highly as did men (Buss and Dedden, 1990). The propensity for men to select young, physically attractive mates, and women to choose older, financially secure mates also appears in cross-cultural studies to varying but notable degrees (Buss, 1989; Sprecher, Sullivan and Hatfield, 1994). For men, this behavior is designed, theoretically, to exploit the optimal reproductive years in a mate. Therefore, an effective lifetime mating strategy for men—as suggested by sexual strategies theory—is to invest only as much in a mate and her offspring as is necessary to keep them healthy, while keeping as many additional resources available for securing reproductive access with other, younger, mates.

If one has confidence in this (simplified) but generally accepted paradigm and the gender differences it ascribes, then we should expect that the physical and emotional traumas evoked by the termination of a romantic relationship would be disparate as well. In particular, we would expect women to experience demonstrably higher levels of PRG as the termination of a productive relationship for a female would leave her and her (potential) offspring without the expected resources and protection of the male. In a standard Bussian model, men should express lower overall levels of PRG because a breakup is, in many ways, merely a transition period to the next, inevitable, mate. However, sexual strategies theory also allows for the opposite expectation; as males are assumed to compete for mating opportunities while females are afforded the luxury of choosiness from the near-constant availability of mating options, one could argue that for a majority of males, the termination of a relationship would foreshadow the need for a renewed, and costly, competition for a mate.

The purpose of this pilot study is to establish possible gender differences in PRG and then evaluate the two different potential explanations for their existence. Quantitative data were collected to measure and evaluate the potential difference in frequency and intensity of PRG between genders. Qualitative data were collected to allow examination of narrative text

that might elucidate themes and patterns of PRG expression that are not easily reducible to numeric scales, but which might differ by gender in important ways.

## Methods

**Participants.** An email invitation to participate in a confidential “heartbreak” survey was sent to the entire student population of a Northeastern state university (~14500) and 4265 students visited the secure survey website donated by StudentVoice.com<sup>®</sup> over a ten-day period. To be included in the analysis, respondents had to report their age as 18 years or older and report having experienced a breakup of a past romantic relationship; thus,  $N=1735$ . The 1735 respondents (1295 women and 440 men) ranged in age from 18 to 52 years ( $M=20$  years,  $SD\pm 4.86$ ). The methods used in this study were approved by the university’s Institutional Review Board and all research conformed to the guidelines for the ethical treatment of human subjects. No tangible material or monetary compensation was offered to participants, though gratitude was expressed for participation.

**Procedure.** The survey was brief and initially screened respondents for age and incidence of breakup of a romantic relationship in the past. If respondents had experienced more than one breakup, they were asked to focus on the most recent. Respondents were asked if they had experienced emotional and/or physical trauma related to the breakup and if so, to rate the trauma on a ten point scale, from one (“minimal”) to ten (“unbearable”). Respondents were also asked which, if either, party initiated the breakup. Lastly, respondents were asked if they would like to submit any additional, confidential comments about their breakup experience. Because this is a pilot study geared at distinguishing, on a large scale, between the response patterns predicted by alternative hypotheses, we did not specifically investigate length of relationship, whether a marriage or offspring was involved, sexual identities, or same-sex relationships.

**Analyses.** Data were grouped by gender and basic descriptive statistics were computed using Excel 2010<sup>®</sup>. Emotional Trauma Level (ETL) is the mean emotional response and Physical Trauma Level (PTL) is the mean physical response. Data were imported into Atlas.ti 6.0 for qualitative analyses. A set of codes was generated by the experimenters to include categorical states-of-mind and commonly occurring issues and themes. For example, “anger” was frequently conveyed, sometimes directly and sometimes indirectly but clearly through the use of synonyms or descriptive phrases pointing to that emotional state. Other codes included: ongoing trauma, depression, appetite issues, personal improvement, insomnia, identification of breakup as worst life experience to date, weight loss, vulgarity, length of recovery exceeding one year, nausea, reliance on social network, substance abuse and loss of self-esteem. Every free-response statement was evaluated with respect to each of the codes. The codes were related specifically to key words and phrases that appeared most frequently; such as “worst,” “couldn’t sleep,” “depressed,” and any use of profanity. The keywords were tagged *sui generis* by the software and not shoe-horned into categories by the researchers. Summaries were then generated to reflect how many times each code appeared by gender and by relationship-ending status (breaker, breakee, mutual). Qualitative analyses were objectively interpreted via the Atlas.ti 6.0 knowledge workbench that creates visual grammatical and mathematical correlations between variables independent of any theoretical model/hypothesis under investigation.

## Results

When asked to ascribe responsibility for the breakup, 436 (25%) felt the breakup was mutual (“Mutuals”), 556 (32%) felt that they themselves had initiated the breakup (“Breakers”), and 721 (42%) felt they were “broken up with” by the other party (“Breakees”). Twenty-two participants had no response. Participants were asked to rate the severity of emotional trauma caused by the breakup on a scale from one to ten. Table 1.1 presents these results. Overall, respondents reported an average Emotional Trauma Level (ETL) of 7.22 (SD±1.68, N=1670). There was no statistically significant difference in ETL between men and women overall; women  $X=7.3$ ,  $SD\pm 1.9$ ,  $n=1254$ ; men  $X=6.98$ ,  $SD \pm 2.18$ ,  $n=416$ ;  $t(1668) = .0076$ ,  $p=.994$ . Breakees reported the highest average ETL (7.65,  $SD\pm 1.74$ ,  $n=697$ ); Mutuals were slightly lower (7.11,  $SD \pm 1.94$ ,  $n=423$ ); and Breakers were the lowest (6.78,  $SD\pm 2.16$ ,  $n=550$ ).

When asked if they had experienced any physical trauma (such as anxiety, appetite loss or insomnia) as part of the breakup experience, 1276 participants reported that they had, while 378 had not, and 81 had no response. Participants were asked to rate the severity of physical trauma caused by the breakup on a scale from one to ten. Respondents reported an average Physical Trauma Level (PTL) of 6.08 (SD±1.94, N=1276). There was also no statistically significant difference in PTL between men and women; women  $X=6.08$ ,  $SD\pm 1.92$ ,  $n=988$ ; men  $X=6.11$ ,  $SD\pm 1.99$ ,  $n=352$ ;  $t(1338) = .0078$ ,  $p=.433$ . Again, Breakees reported the highest average trauma level (mean PTL = 6.3,  $SD=1.9$ ,  $n=578$ ); Mutuals were slightly lower (6.11,  $SD\pm 1.89$ ,  $n=311$ ); and breakers were the lowest 5.74 ( $SD\pm 1.99$ ,  $n=378$ ). Within genders, ANOVA tests revealed no statistically significant differences in emotional or physical trauma levels based upon perceived responsibility for terminating the relationship. In addition, no visible age-



related trends were evident in this sample except for a slight but consistent tendency of overall PRG level to increase with age.

Table 1.1 Mean *emotional and physical trauma levels*

	Emotional Trauma Level			Physical Trauma Level		
	<i>M</i>	SD	N	<i>M</i>	SD	N
A. Men	6.98	2.18	416	6.11	1.99	352
Breakees	7.49	1.84	177	6.36	1.90	135
Mutuals	6.95	2.14	116	6.35	1.95	102
Breakers	6.28	2.32	123	5.42	1.89	115
B. Women	7.30	1.90	1254	6.08	1.92	988
Breakees	7.59	1.57	528	6.28	1.89	442
Mutuals	7.17	1.18	305	6.04	1.82	240
Breakers	6.90	2.09	421	5.81	2.01	306

**Qualitative Results.** Nearly 45% of survey participants—610 (125 men and 485 women) — submitted comments in an open text field when asked if they wished to share any additional thoughts or feelings regarding their breakup experience. While most of the text responses were brief statements (30-40 words), many were at least a paragraph or two long. Some can be considered short essays, approaching 500 words in length. Thirty-seven percent of women and 28% of men submitted comments. One hundred twenty seven comments were submitted by Mutuals, 191 by Breakers, and 210 by Breakees; 82 comments were submitted by participants who had no opinion on responsibility. After excluding valueless vocabulary words such as “and,” “the,” “he,” “she,” and “me”, the most frequent meaningful terms appearing in the

additional comments were *relationship(s)* [143 occurrences], *hard* [110], *still* [109], *over* [86], and *after* [86]. While cause of the breakup was not directly queried, many of the qualitative responses expounded on the cause(s) of the dissolution. The most commonly reported were: 1. infidelity, 2. distance, 3. lack of communication and 4. the actions/opinions of others.

While frequency and intensity levels between genders of PRG were very similar, notable variation was found in the expression of PRG as evidenced by the trends in the additional comments (see Table 1.2). Anger was a topic of discussion for an equivalent proportion of men and women, and was most often related to infidelity—which itself was also referenced by an equivalent proportion of men and women. Name-calling or general use of profanity was twice as common in men. Sleep loss, nausea and actual appetite loss were twice as likely to be reported by women. Unwanted weight loss, ranging from 10 to 40 pounds, was also about twice as common in women as in men. None of the respondents presented their weight loss in a positive manner, and several went on to discuss major eating disorders spurred by PRG. Several reported that they are still dealing with the eating disorders at present. Only one respondent reported any weight gain.

Women addressed a severe, and often lasting, loss of self-esteem about twice as often as men, and in many cases noted that it hindered their ability to form future romantic relationships. Many women respondents questioned their body shape, weight, and even choice of clothing following the breakup. Also common was self-doubt related to judgment and personality flaws that women perceived themselves to have following the breakup. Often, respondents posed reflexive questions addressing attributes and judgments. Of note, the respondents who explicitly mentioned trust or trust-specific issues were all women. Women were also twice as likely to mention the standard symptoms of depression as were men. At the same time, most comments identifying a “silver lining,” of increased personal awareness and perceived shrewdness in future relationships were submitted by women.

Men were three times as likely as women to report abusing alcohol (most commonly) or recreational drugs in an attempt to ameliorate PRG effects. Men were as likely as women to describe the experience as the “worst” or “most trying” of their lives and, notably, nearly twice as many men reported that their PRG was still present at the time of the survey. Men were also more likely than women to express that their recovery from PRG took a full year or longer.

Table 1.2 Themes *from additional comments regarding breakup experience*

Code	Theme	Total Mentions	Mentions by Women	Mentions by Men	F/M Ratio*
Ongoing	Breakup is still a physical/emotional hardship	50	35	15	7:12
Depression	Depression, devastation, misery	43	38	5	2:1
Appetite	Appetite loss and eating disorders	40	36	4	8:3
Better person	PRG led to increase in savvy/ emotional strength	31	26	5	3:2
Insomnia	Mild to complete sleep loss	31	27	4	2:1
Weight loss	Unwanted weight loss	28	25	3	5:2
Worst	"Worst," "hardest," "most painful," experience of respondent's life	23	18	5	1:1
Self	Lasting loss of self-confidence and/or self-esteem	20	19	1	5:1
Anger	Anger and/or physical violence	19	15	4	1:1
Language	Response includes profanity and/or name calling	18	11	7	1:3
Year	PRG took 12 months or more to recover from	17	13	4	2:3
Nausea	"Sick feeling" unrelated to appetite	14	12	2	2:1
Network	Family/ friends/ church aided in recovery	11	10	1	3:1
Substance	Abuse of drugs and/or alcohol to mediate PRG	9	5	4	1:3

\*Corrected for variance in response rate;  $485F/125M=3.88$ . EX: "Ongoing" =  $35: (15 \times 3.88) = 7:12$

## **Discussion**

These results suggest that breakups are common, and that in virtually every instance, PRG accompanies the breakup. Ninety-eight percent of respondents reported experiencing at least one breakup; over 96% of these reported experiencing some degree of emotional trauma (ETL) while 93% experienced physical trauma (PTL) because of their breakup.

Intensity was generally high. Considering that a trauma level of 10 was identified as “unbearable”, the overall ETL 7.22 and PTL 6.08 are noteworthy. It is also of interest that in all but a handful of instances, emotional trauma was experienced at a greater intensity than physical trauma. Intensity of PRG appears to be roughly equivalent between men and women, with women having slightly higher emotional trauma and men slightly higher physical trauma. Trauma levels and frequency of PRG are virtually identical between genders. Indeed, the only notable difference in PRG frequency and intensity along any variable appears to be that those who initiate a breakup appear to be slightly less traumatized than those who feel they were broken up with. Perhaps as expected, the trauma levels of those who feel the breakup was a mutual decision fell between these values. Because responses were not weighted by perceived responsibility in any way, it seems fair to conclude that either “breakees” are more likely to wish to discuss their breakup experience or that individuals more often view themselves as the victim of a breakup rather than an instigator. These numbers may be inflated, however, as one could argue that since the email invitation referenced a “heartbreak survey,” those predisposed towards an opinion on the subject were more likely to respond. Conversely, those most likely to have a particularly strong response to a past PRG experience may have eschewed the survey altogether after noting the subject material.

As nearly three quarters of respondents were between the ages of 18 and 21, further research will be needed among older survey populations to determine if PRG intensity and expression varies by age. Specifically, additional research could help to establish if the breakup itself causes higher trauma at an older age, memory of a past breakup is more or less intense, or perception of a recent breakup varies directly by age. Since cause of the breakup was not a specific survey criterion, further study will also be needed to examine why both men and women equally report a partner's infidelity as contributing to a breakup, if males are assumed to cheat at a substantially higher rate (Buss, 2000).

The results of this study suggest that the coarse interpretation of sexual strategies theory is not an adequate predictor of PRG along gender lines. Where frequency and intensity would be assumed to be lower in males, it is equivalent or higher.<sup>2</sup> When expression of PRG is described, it is often described as more harrowing and lasting for a longer period of time in males. Perhaps the freedom with which men expressed that breakups may indeed be more severe for them, or at least longer lasting overall, is the most intriguing result of this preliminary investigation. This may indicate that the finer grained use of sexual strategies theory will be a more accurate predictor in future research—relationship termination is more traumatic for males as most must compete for mates.

The claims made by this pilot study are modest due to its narrow focus. We recognize the importance of several factors that were not included in this particular piece of research including, but not limited to: length of relationship, whether a marriage or offspring were involved, sexual identities and same-sex relationships. In addition, the meaning of a “long-term” romantic relationship was left to the discretion of the respondent and was intended mainly to screen out “hook up” behavior (see Reiber and Garcia, 2009, 2010). True “short-term” relationships as suggested by the pluralistic approach (Schmitt 2003) will also be a critical

---

<sup>2</sup> It is interesting to note that while intensity of PRG varied by the respondents' role in the breakup, expression tended to only vary by gender.

qualifier and research is ongoing to investigate each of these additional factors. Moreover, sex differences in self-esteem loss are potentially related to a general sex difference in global self-esteem for the age range of the test population (Kling, Hyde, Showers, and Buswell, 1999). Expanded examination of the topic between the genders, across wider age groups and with added focus on cause/responsibility should lead to a more complete evolutionary explanation of why breaking-up is so, quantifiably, hard to do.



## References

- Archer, J. (1999) *The nature of grief*. NY: Routledge
- Bartels, A., and Zeki, S. (2004) The neural correlates of maternal and romantic love. *NeuroImage*, 21, 1155–1166
- Buss, D. (1989) Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences*, 12, 1-49
- Buss, D. (2000) *The dangerous passion: Why jealousy is as necessary as love and sex*. New York, NY: The Free Press
- Buss, D. (2003) *The Evolution of desire (revised edition)*. New York: Basic Books
- Buss, D., and Dedden, L. (1990) Derogation of competitors. *Journal of Social and Personal Relationships*. 7, 395-422
- Buss, D., and Schmitt, D. (1993) Sexual strategies theory: an evolutionary perspective on human mating. *Psychology Review*, 100, 204-232
- Clark, R. and Hatfield, E. (1989) Gender differences in receptivity to sexual offers. *Journal of Psychology and Human Sexuality* 2, 39-55
- Dürschlag, M., Hirzel, D. and Sachser, N. (1998) Social relationships and the management of stress. *Psychoneuroendocrinology*, 8, 891-904.
- Fisher, H. (2002) Defining the brain systems of lust, romantic attraction, and attachment. *Archives of Sexual Behavior* 31, 413-420
- Fisher, H. (2004) *Why we love: The nature and chemistry of romantic love*. NY: Henry Holt
- Garcia, J.R. and Reiber, C. (2009) Hook-up behavior: A biopsychosocial perspective, 2009. *Journal of Social, Evolutionary & Cultural Psychology* Vol. 208.
- Harris, C.R. (2004) The evolution of jealousy: Did men and women, facing different selective pressures, evolve different “brands” of jealousy? *Sigma Xi, The Scientific Research Society*.
- Jankowiak, W. and Fisher, H. (1992). A cross-cultural perspective on romantic love. *Ethnology*, 31, 73-85
- Keller, M. and Nesse, R. M. (2005) Is low mood an adaptation? Evidence for subtypes with symptoms that match precipitants. *Journal of Affective Disorders* 86, 27-35

- Kling, K. C., Hyde, J. S., Showers, C. J., & Buswell, B. N. (1999). Gender differences in self-esteem: A meta-analysis. *Psychological Bulletin*, *125*(4), 470-500.
- Krendle, C. (1998) Neuroendocrine perspectives on social attachment. *Psychoneuroendocrinology* *23*, 779-818
- Lampert, A. (1997). *The evolution of love*. Westport, CT: Praeger Publishers
- Najib, A. and Lorberbaum, J. (2004) Regional brain activity in women grieving a romantic relationship breakup. *American Journal of Psychiatry*, *161*, 2245-56
- Nesse, R. M. (2000) Is depression an adaptation? *Archives of General Psychiatry* *57*, 14-20
- Reiber, C. and Garcia, J.R. (2010) Hooking Up: Gender Differences, Evolution, and Pluralistic Ignorance. *Evolutionary Psychology* *8*(3).
- Schmitt, D. P. and 118 Members of the International Sexuality Description Project (2003). Universal sex differences in the desire for sexual variety: Tests from 52 Nations, 6 Continents, and 13 Islands. *Journal of Personality and Social Psychology*, *85*(1), 85-104.
- Sprecher, S., Sullivan, Q., and Hatfield, E. (1994) Mate selection preferences: Gender differences examined in a national sample. *Personality Processes and Individual Differences*, *66*, 1074-1080

## **CHAPTER 2**

### **Intrasexual Mate Competition and Breakups: Who Really Wins?**

Morris, C.E., Beuassart, M.L., Reiber, C., & Krajewski, L.S. (in press). Intrasexual Mate Competition and Breakups: Who Really Wins? *Oxford Handbooks Online*.

## **Abstract**

Female competition for male attention is multifaceted. Typically psychological and relational in nature, this competition may be no less damaging than physical violence more commonly used between males. Research on female-female mate competition has examined short-term effects, yet how women cope with long-term effects of romantic relationship dissolution has been little explored. If negative emotions exist because they provide an evolutionary advantage (attuning physiological processes, thoughts, and behaviors to deal with situations that have frequently incurred high fitness costs) then emotions arising from the loss of a mate to a sexual rival may potentially motivate actions that could make one avoid this scenario in the future. This chapter argues that there are consequences of female intrasexual mate competition which may be both evolutionarily adaptive and also beneficial in terms of personal growth, and that may expand beyond mating and into other realms of personal development.

## **Introduction**

Imagine that you are a woman and your best friend calls you in the middle of the night to say that she has discovered that her man has left her for another woman. She is distraught and crying. What do you say? What do you do? You may offer her emotional support, “I’m here for you, girl!” You could make self-esteem enhancing affirmations, “You were too good for him anyway!” You might even give her advice, “Divorce him and take everything!” You may make some colorful and slanderous comments about the other woman. And, if you are a good friend, you may become the arbiter of some, perhaps ill-advised, social justice: “Let’s go out, get drunk, and then burn all his clothes!” The above are, of course, only some of the many ways a woman may react when faced with this situation; and although a bit tongue in cheek, it exemplifies the immediate and dramatic effect that an infidelity-fueled breakup can have on a woman.

There is as much variability in how one might respond to a friend’s late night call as there is variability in how a woman would be affected by the loss of a significant romantic relationship (Frazier & Cook, 1993; Frazier, Port, & Hoff, 1996). Although there are several key factors (e.g., social support, emotionality, personality, cognitive manifestations) that determine the outcome, good or bad, for a woman who has endured a breakup (Frazier & Cook, 1993), research on the effects of mate-loss has focused on a breakup’s short-term consequences, such as emotional distress. However, it has been argued that humans have evolved emotions and behaviors that deal with fitness-reducing environmental challenges. Therefore, it is possible that, in addition to the immediate negative results of female intrasexual mate competition, there may be long-term effects to mate loss that have not been previously explored. This chapter examines several key aspects of the long-term consequences of mate loss precipitated by intrasexual competition. After the initial emotional and physical traumas have dissipated, how

do personal and social factors in the latter stages of relationship dissolution—such as the affective response after a breakup, cognitive changes, and even social mechanisms—function to increase the future fitness of a woman who has just lost her mate to another woman?

## **Sexual Strategies Theory and Mate Loss**

Men and women have divergent reproductive challenges which, during the course of evolutionary history, have led to sex differences in mating strategies. In 1989, David Buss and his research associates published “Sex Differences in Human Mate Preferences: Evolutionary Hypotheses Tested in 37 Cultures,” a study which is still considered a benchmark for cross-cultural sex surveys. Since its publication, Buss has expanded his theoretical model (Buss, 2003) to include a myriad of behaviors that explore the full range of human mating interactions from an evolutionary perspective. This model, Sexual Strategies Theory (Buss, 1989), has framed much of the investigation into the biological foundations of human sexual behavior for the last 20 years.

Buss parses the term “strategy” carefully; he uses the example of sweating as a “strategy” to avoid overheating. In many ways, it is equivalent to “adaptation.” In no instance, in these readings, has “strategy” been used in the conventional sense—as a consciously preplanned series of actions designed to elicit some sort of reproductive benefit. Therefore, sexual strategies are, in their original iteration, simply adaptive solutions to mating problems, as those who failed to reproduce, failed to become our ancestors. Each strategy is tailored to a specific adaptive problem—such as attracting a mate or besting a competitor. Underlying each strategy are evolved emotional mechanisms like jealousy, lust, and love. These mechanisms are sensitive to environmental cues like physical attractiveness or displays of fidelity. They are also self-reflexive and are sensitive to individual mating attributes like perceived attractiveness or the amount of resources an individual controls.

Again, sexual strategies do not require conscious thought; “Just as a piano player’s sudden awareness of her hands may impede performance; most human sexual strategies are

best carried out without the awareness of the actor” (Buss, 2003, p. 3). Critically, different strategies are available and employed, often resulting in emotional conflict, by males and females. Sexual strategies theory emphasizes that both men and women have evolved tactics for obtaining long-term mates and investing in children, but short-term mating will occur when reproductive benefits outweigh costs. Other theories such as Social Role/Biosocial Theory contend that sex differences in sexual behavior are also shaped by the formation of gender roles, expectancy confirmation, and self-regulation (Eagly & Wood, 1999).

Regardless, humans today are all descendants of many generations of ancestors who reproduced successfully. The genotypes of those whose phenotype caused them to reproduce sparingly, or not at all, were statistically overwhelmed by the genotypes of those who reproduced prolifically. As an example, there is a (likely apocryphal) tale of an old rancher being laboriously questioned about his livestock by a potential buyer. Exasperated, the rancher finally says, “Son, my family has owned this ranch for generations; all I can assure you with certainty is that these animals all come from good breeding stock.” Evolutionarily, the same logic applies to humans. We are all descendants of ancestors, going back hundreds of generations, who reproduced successfully. Behaviors like romantic relationship formation and biparental care of children are argued to be evolutionarily adaptive—leading to increased reproductive success. Therefore, those ancestors who possessed some suite of behaviors that allowed them to continue successful mating behavior after the termination of one or more relationships are the ones whose biological predispositions we possess today.

Of course, breaking up with a romantic partner can be one of the most traumatic experiences in a woman’s life (Morris & Reiber, 2011). From a biological perspective, women bear the larger minimum parental investment—nine months of gestation as well as the metabolic costs of lactation—and therefore are more “selective” in their mate choice (Trivers, 1972). That is to say that women are argued to have higher standards for a potential long-term mate (wealth, status, good looks) than men do. The dissolution of an active romantic



relationship (as opposed to being widowed) is an experience that upwards of 85% of all women will face during their lifetimes (Morris & Reiber, 2011). The adaptive problems such as loss of protection, status, and resources a woman, and her children, face if her partner leaves or is expelled from the relationship are considerable due to the aforementioned biological cost a woman inherently invests versus the man. In addition to these resource and fitness benefits of long-term mate retention for a woman, there are benefits to intimate relationships (e.g., support, companionship, love, and sexual activity) which are often all met only by a long-term romantic partner (Laumann, 1994). Thus, relationship breakup often comes at great emotional and physical cost to a woman.

We realize that the word “breakup” is a colloquialism; however, it is used for clarity to indicate the termination of a romantic relationship via social or legal dissolution as opposed to the physical loss (death) of a mate. It is important to reiterate this point because, as seen throughout this chapter, the wide variety of relationship styles, particularly among young women, precludes a rigid definition of a breakup. However, most women have little difficulty identifying the end of a relationship, even if the relationship itself was very different from one she, or her cohort, had participated in previously (Morris & Reiber, 2011).

A man who is already in a committed romantic relationship is often viewed as more desirable to women than an unattached man (Dugatkin, 2000; Uller & Johansson, 2002). This may be because he has been pre-screened by another woman for resources and a willingness to commit to a romantic relationship or because of some other heuristic (Gigerenzer & Goldstein, 1996).”One study (Parker & Burkley, 2009) found that a man’s relationship status directly affected his attractiveness to women; when women thought a man was single, 59% found him attractive, but when they thought he was in a committed relationship, 90% found him attractive. “Hence, one form of competition between women is to attract the highest quality mate, even if it means “poaching” him from a monogamous relationship. In one study (Schmitt, et al., 2004), 53% of women confessed to having attempted to lure someone else’s mate into a long-term

relationship, 80% of men reported that someone had attempted to lure them out of a romantic relationship, and roughly 30% of women said they lost a partner to a mate poacher (Schmitt, et al., 2004).

Since women have faced recurrent fitness costs associated with romantic breakups, it follows that natural selection would favor adaptations to cope with these costs—adaptations expected to differ from men’s (i.e., sex-specific strategies formulated to help offset the costs of mate loss). Indeed, there is some indication that, as a result of a potential mate loss from a partner’s affair, men and women are predisposed to respond to counteract the sex-specific costs. For example, men may have to address lost mating opportunities or a decrease in social status, whereas women may face a more tangible loss (e.g., protection, resources) (Miller & Maner, 2008). As a result, men report more feelings of anger and engage in more violent and self-destructive behaviors than women (e.g., substance abuse) (Morris & Reiber, 2011). Women, in comparison, frequently feel more depressed and participate in more social, affiliative behaviors than men do (Miller & Maner, 2008). Women’s behaviors could be argued to be more constructive strategies as a result of their tendency to preserve the relationship, whereas men choose destructive strategies for maintaining their own self-esteem (Bryson, 1991).

## **Reactions to Mate Loss**

Breakups can be tremendously distressing. Research has shown that romantic relationship dissolution is recognized as a significant lifetime event (Kendler, Hettema, Butera, Gardner, & Prescott, 2003). Moreover, relationship dissolution can result in major psychological difficulties (Amato, 2000) which can manifest as a perseveration or fixation with the lost mate, hyperbolic effort to resume the relationship, as well as physical and emotional distress. Though the most intense symptoms of distress often appear immediately after the breakup and diminish over time (Knox, Zusman, Kaluzny, & Cooper, 2000; Moller, Fouladi, McCarthy, & Hatch, 2003), breaking up with a loved one can have profound long-lasting effects (Chung et al., 2003). It should be noted that ongoing research by the authors suggests that explicit or perceived infidelity tends to produce the most extreme negative short term effects, emotional and physical, for most women.

Research on mate loss has concentrated on the psychological responses and emotional discomfort of the experience (Fine & Sacher, 1997; Sbarra & Ferrer, 2006). The loss of a mate can have several adverse results; for instance, it can trigger the onset of a major mental health condition (Kendler, et al., 2003; Mearns, 1991). Research has shown that serious mental health problems such as anxiety, anger, and feeling hopelessness often follow a breakup (Davis, Shaver, & Vernon, 2003; Monroe, Rohde, Seeley, & Lewinsohn, 1999). Some studies have addressed the emotional costs of a breakup, but without any explicit theoretical framework (Jankowiak, & Fischer, 1992; Jankowiak & Paladino, 2008). One such study found that those who had pre-existing issues with depression and anxiety expressed stronger emotional problems following a breakup. Additionally, self-blame and “catastrophic” misperception were the most robustly correlated cognitive variables associated with mate loss (Boelen & Reijntjes, 2009). A similar

longitudinal study on relationship-specific forecasting errors (e.g., how severe and long-lasting individuals assumed that their breakup experience would be initially as compared to how they evaluated the experience after time) found that those who were more in love with their partners, who thought it was unlikely they would soon enter a new relationship, and who did not initiate the breakup made especially inaccurate predictions about the specifics of the breakup (Eastwick, et al., 2008).

Aversive mental health symptoms do not seem to be correlated with the “formality” of a romantic relationship. Married couples, cohabitating couples, couples who had plans to marry, and those simply, “in a relationship” all experience the same spectrum of emotional distress following a breakup (Rhoades, Kamp Dush, Atkins, Stanley, & Markman, 2011). Regardless of which partner initiated the breakup and regardless of whether the desire to break up was one-sided or mutual, it is clear that the dissolution of romantic relationships is often intensely stressful, and stressful interpersonal contexts are amongst the most reliable precipitants of depressed states (Kendler, et al., 2003; Monroe, et al., 1999). The degree of a woman’s physical and emotional response to a breakup can be predicted by numerous variables, including the length of the relationship (Tashiro & Frazier, 2003), the time since the loss (Sprecher, Felmlee, Metts, Fehr, & Vanni, 1998), or who initiated the breakup (Perilloux & Buss, 2008). Interestingly, psychological distress and lowered life satisfaction are expressed even by those individuals who wanted the relationship to end (Rhoades, et al., 2011).

**Grief.** Bowlby (1980) posited a multiple-stage theory of grief that applies to coping with the loss of an important relationship, such as a romantic relationship. It structures the stages of coping following a breakup. The first phase involves protest against the breakup. The next phase is despair, in which the reality of the loss becomes more immediate and the emotional and psychological responses shift to sorrow, depression, withdrawal, and disorganization. The third and final phase is reorganization, wherein the internal representations of the self and the absent partner are altered to reflect the new circumstances of the relationship. While this 3-stage

hypothesis has been challenged— the periods of specific grief reactions differ considerably, both across individuals and with respect to the varying causes of grief (Archer, 1999)—it nonetheless serves as a starting reference for visualizing the possible adaptive value of grief (i.e., "a time out" that may facilitate introspection and prevented repetition of costly behaviors).

Archer has also suggested that grief is a universal human experience, derived from observable (but less complex) forms in the animal world (1999). In its base form, the experience involves two processes: active distress (i.e., search and anger) and an inactive, depressed state. In human grief, a complex set of reactions is added involving a radical change in the personal identity of the afflicted. Grief is thus produced as a result of a "trade-off" between physiological costs and benefits. Thus, humans establish bonds that have multiple advantages and great adaptive value. However, these bonds can and do break. When they do, there is a cost to pay; Archer calls it the cost of commitment (1999), which consists of all the physical and emotional benefits of the bond. Per the adaptive value of these bonds, their severance (in most instances) proves maladaptive. As we have argued, it is likely that a strong negative emotion, such as grief, accompanies maladaptive behavior. Put simply, the greater the loss, the more intense the grieving process, and the more likely (in most instances) an individual will engage in future bond formation with an eye towards avoiding past experiences. Importantly, Archer's model shows that grief is not a homogenous entity (1999). The mental processes involved in grieving can include intrusive thoughts, hallucinations, distraction, self-blame, and anxiety. Importantly, these processes are often magnified by extant mental and physical conditions (e.g., anxiety, addictions, chronic depression) (Fisher, 2004). Archer concludes that there is little doubt that the intensity of grief reflects the lost relationship's cost of commitment.

**Depression.** Depression is a mental health condition marked by a persistent low mood or sadness and is often associated with low self-esteem and lack of interest or enjoyment in previously pleasurable activities. This cluster of symptoms is collectively classified as a mood disorder (Karp, 1997). However, the term "depression" is vague since it may be used to suggest

both a chronic disabling condition which negatively influences a person's entire life and also identifies a transitory lower mood state that does not have any clinical significance. In this chapter, when talking about a person being depressed or sad, the authors are referring to sub-clinical (i.e., not medically diagnosed and treated) depression.

Nesse has argued that low mood and depression are historically difficult to distinguish from related states such as sadness, grief, demoralization (i.e., severe loss of self-esteem with concomitant loss of motivation), and guilt (Keller & Nesse, 2005). This 'fuzziness' may reflect the nature of natural selection: gradual differentiation from a generic state of inhibition into subtypes specialized to cope with particular kinds of situations. Sadness, depression, and grief may be partially differentiated members of a behavioral suite explained partially by phylogeny and partially by the benefits certain responses offer in any potentially harmful situation. For example, Nesse has suggested that functions of depression may include communicating a need for help, signaling yielding in a hierarchy conflict, fostering disengagement from commitments to unreachable goals, and regulating patterns of investment (Keller & Nesse, 2005).

Although sex differences in emotional distress after a breakup are rarely identified in the research (Perilloux & Buss, 2008), women have historically reported more severe initial depression and hopelessness than men (Kuehner, 2003). When vulnerability factors (e.g., existing psychiatric conditions, life history variation) interact with life stressors, the risk of depression increases. In fact, women 18 to 45 years of age are at a markedly heightened risk of depression compared to older women and men of all ages (Culbertson, 1997). One study found that after losing a mate, young women are inclined to experience more emotional distress, have more invasive thoughts about the former partner, and experience higher rates of unhappiness, anxiety, and adverse emotions than men (Field, Diego, Pelaez, Deeds, & Delgado, 2010). In a case where a woman has lost her mate to a rival, it is likely that the "suite" of emotions and behaviors would be more far-reaching than in a case in which the relationship was terminated for some other reason. For example, a breakup caused by a man leaving the relationship for

another woman is more likely to incorporate the loss of self-esteem, demoralization, jealousy, and anger than a breakup caused by physical distance.

Therefore, there is an additional level of psychological toxicity to cope with when the situation is complicated by having been outcompeted for a mate by another female. Even the effects of simply competing for mates and losing can take an emotional toll since feelings of defeat are shown to be significantly correlated with depression (Gilbert & Allan, 1998). Some evolutionary models such as the social risk hypothesis claim that the accessibility of resources that will greatly enhance one's overall fitness is related to an individual's social status within a particular group. Loss of access to such resources could trigger in-group conflict. A lowered mood or more submissive attitude by individuals losing resource control might be a lesser evil than losing access to the group itself. Furthermore, it is argued that adaptations to the affective systems enable an individual to negotiate social relationships that are crucial for an individual's survival, since the affective systems are the trigger for adaptive behaviors to evade threats to a person's wellbeing (Lennox, Jacob, Calder, Lupson, & Bullmore, 2004). Thus, the social risk hypothesis implies that depression serves an adaptive function after a threat to one's status within a group by reducing behaviors that would cause a person to lose any further reproductive opportunities (Nesse, 2000). Other members of the social group can put each other at risk and may harm one another. Hence, individuals should be cautious of those who can hurt them and coordinate their responses accordingly. If an individual cannot command greater resource control, low mood may signal a level "acquiescence" that prevents further harm to an individual's social status.

Those who do not follow these social rules tend to be at risk of serious injury or death (Higley et al., 1996). Most certainly within the environment of evolutionary adaptedness, the environment in which the brain and its adaptations evolved (Bowlby, 1969; Buss, 2004), a considerable effect on fitness was incurred by social exclusion via lack of in-group protections and foraging, but also because low status individuals receive fewer acts of altruism, fewer

exchanges of resources, and less access to sexual partners (Baumeister & Leary, 1995; Buss, 1990). Furthermore, this hypothesis predicts that low mood would interrupt the evaluation mechanism that determines the value of future outcomes and instead becomes sensitive to stimuli that would provide immediate reward (e.g., after a break-up, women are likely to increase their alcohol consumption) (Allen & Badcock, 2003). However, this is only a temporary artifact during the emotional transition to normality; after a few months, women's alcohol use tends to return to pre-breakup levels (Fleming, et al., 2010).

After a breakup, many women suffer an extreme loss of self-esteem and a concurrent questioning of “what they did wrong” (Morris & Reiber, 2011). Women often doubt their self-worth, their physical appearance, and may question whether or not they themselves are responsible for “losing” their mate. For these reasons, social withdrawal (“subordination” in non-human animals) can be a response to a situation in which it is vital for an animal to have an internal, inhibitory, regulating process that confines acquisition and seeking behavior (Gilbert, 2006). Sapolsky (1990) notes that subordinate baboons are sensitive to stress induced hypercortisolism, which in part is caused by the harassment and threat signals presented by the more dominant animals, but also because the less dominant animals do not possess the ability to overpower their adversaries. Applying this theory to humans then, as part of this recalibration, women must also face the need to adjust their self-perceived mate value—the degree to which an opposite sex partner's reproductive fitness is increased by mating with them (Sugiyama, 2005)—in light of events that led to their mate loss. The self-evaluative psychological mechanisms that track one's status within a group or, more commonly, a woman's self-esteem, can be severely diminished by failing to win a mate after competition with a rival. Moreover, low self-esteem is expected to be a prominent part of depression that arises from the inability to yield in a status competition. It may also be the case that the more intimate the rival is socially, the more intense the response to the breakup may be as this scenario allows for a



greater loss of standing within the social circle in addition to possibly magnifying the feelings of anger, distrust, and betrayal that frequently accompany loss of a mate to “another woman.”

## **The Utility of Emotional Response**

Like a fever, grief is something that may initially appear to be maladaptive. With moderate fever there is discomfort, restlessness, dehydration and other unpleasant sensations. With grief, the situation is much the same—strong negative feelings that can lead to unhealthy behavior (e.g., poor diet, decreased performance at school or work) (Keller & Nesse, 2005; Nesse, 1996). It has proven difficult to offer an evolutionary theory of grief; how could grief be considered the product of evolution when it seems so maladaptive for survival and procreation? Evolutionary medicine has shown us that non-life threatening fever serves an adaptive purpose (i.e., it ‘cooks out’ pathogens). Perhaps a moderate level of grief also serves an adaptive purpose (e.g., avoidance of repeating a risky behavior, a recalibration of personal values, and a mechanism to discourage ‘bad evolutionary investments’)? Nesse (2000) has suggested that the pursuit of substantive life goals requires the construction of social enterprises which are resource intensive, emotionally costly, and difficult to replace (e.g., marriages, friendships, careers, status). A major setback or loss in one of these enterprises precipitates life crises. Nesse (2005) further argues that this dilemma is frequently resolved by changing or accepting the current situation or by moving on.

Perhaps a more broad evolutionary account arises from an attempt to ascertain in what ways the characteristics of depression increase an individual’s ability to handle the adaptive challenges that could result in harm or lost resources? For example, the loss of a romantic partner tends to be associated with external expressions of grief, as well as internal emotions that may serve an instructive purpose to prevent future occurrences of the aversive event (i.e., a possible increase in overall mating intelligence). As troubles increase and energies tend to be exhausted, a melancholy state helps individuals to separate from their hopeless situation, with

the result of seeking other ways to deal with their sadness. Women experiencing depression following a breakup may initially withdraw from social contact—avoiding rivals, friends, and family alike-- but tend to acquire much more social support (over time) than do men (Morris & Reiber, 2011). This initial social withdrawal may prevent or limit activities that might create additional losses. An example might involve the aforementioned trend of women increasing alcohol consumption following a breakup. In men, this seems to often be an act of self-destructive isolation (Morris & Reiber, 2011). In women, the consumption seems to accompany other prosocial behavior. However, drinking to excess, perhaps publically and in a highly emotional state, carries risks for women that it does not for men. In such situations, caution and lack of motivation may yield a fitness advantage by inhibiting certain actions, especially futile or dangerous challenges to dominant figures, actions in the absence of a crucial resource or a viable plan, efforts that would damage the body, and actions that could lead from an unsatisfactory social enterprise to a worse alternative (Nesse, 2005).

There is some support for the idea that these non-clinical levels of depression might have evolved as defenses that also serve fitness-enhancing functions. One of those functions is to solve fitness-reducing problems. Depressed individuals, especially those saddened by a mate loss, often think intensely about their problems (Saffrey & Ehrenberg, 2007). Called ruminations, these thoughts are persistent, and depressed individuals have difficulty thinking about anything else. For example, say that a woman was depressed because the man she was interested in pursuing a serious relationship with has picked another woman instead of her. This situation, for many women, could lead to self-doubting ruminations over factors that are mating related. For instance, since a woman's physical attractiveness and sexual chastity are highly valued by opposite sex mates (Buss, 1989) then it is likely that women would fret over their physical attributes ("What if I was prettier?") or past behaviors ("Why did I sleep with him on the first date?") (Morris & Reiber, 2011).

Though self-analysis may seem on the surface to only reinforce low self-esteem, it may also elucidate personal insights that are useful for attracting and keeping future mates. After a breakup, rejectees must first ascertain the key behaviors that triggered the breakup, and reassess their mate value. Such self-analysis, however, requires a concerted effort and sub-clinical levels of depression may help direct neurochemical fluctuations in the brain toward an unadulterated state ideal for introspection (Andrews & Thompson 2009). These physiological changes, such as lower overall energy levels, may aid individuals in analyzing their problems without distraction. Therefore, there may be a tentative relationship between why women, who in general report more depressive symptoms after a breakup, also report more personal growth than men (Bevino & Sharkin, 2003; Mearns, 1991). This was demonstrated by Morris and Reiber (2011) who, in a campus based pilot study, found that women (mostly ages 18-24) brought up this painful loss of self-esteem twice as often as men. In many cases, this loss precluded women's ability to form deep romantic relationships for quite some time. Many women also questioned their body shape, weight, and choice of clothing following a breakup. Self-doubt related to judgment and perceived personality flaws that were brought to light as part of the breakup (e.g., tolerance of poor mate behavior, regret at the pace of sexual activity) were also frequently mentioned. Nonetheless, virtually every comment identifying a "silver lining," of increased personal awareness and greater perceptivity regarding future relationships, was submitted by a woman.

Emotional response to mate loss has been studied from the neurological perspective as well as the psychological. Helen Fisher has written extensively on the neurochemical activity associated with mate rejection and relationship termination (e.g., Fisher, 2006). She concludes that breakups are metabolically expensive and time consuming; yet are likely an evolutionary adaptation. Fisher (2004b, p 1) states, "We humans are soft-wired to suffer terribly when we are rejected by someone we adore." Using the same fMRI techniques she employed when studying people in love (2004a), she studied those who had recently suffered a breakup. She found: 1)

being rejected in love is among the most painful experiences a human being can endure; 2) deserted lovers often become obsessed with winning back their former mate; 3) separation anxiety is expected; and 4) “abandonment rage”(i.e., a propensity for self-destruction vs. self-reflection) is likely, particularly in men. She concludes that this suite of responses “developed to enable jilted lovers to extricate themselves from dead-end love affairs and start again” (2004b, p.4).

**Personal growth following trauma:** If some degree of emotional trauma following a breakup is adaptive, then it follows that there must be some fitness-enhancing benefit of the experience. Researchers have examined some of these ways in which the experience of a breakup can lead to positive life changes. For example, individuals may come out of a breakup with an improved sense of self-reliance and valuable experience in managing relationships that they did not have previously. To explore potential positive outcomes following romantic relationship breakups, Tashiro and Frazier (2003) surveyed 92 undergraduate university students on their post-breakup experiences. Participants were asked to “Briefly describe what positive changes, if any, have happened as a result of your breakup that might serve to improve your future romantic relationships” (p. 118). Following a breakup, participants reported a number of positive changes related to personal growth that they felt may assist with future relationships. The most common types of changes reported by participants were related to how they had changed as a person (e.g., feeling stronger, more independent, and better off emotionally). It was also common for participants to report that they had gained wisdom that would help them with future relationships. Anecdotally, there seems to be an argument that divorced women are in better shape, more groomed, and better dressed than when they were married—perhaps as a way to compete more effectively. However, to date, no systematic data bear this out. What is often seen is that that virtually all the “improvements” relayed directly by women fall under the umbrella of higher mating intelligence. An improvement in physical health an appearance can be inferred, but it is rarely (if ever) made explicit. In another study (Clark &

Georgellis, 2012), 10,000 people in the UK were asked to rank how happy they were before and after certain major life milestones; while both men and women said that they felt happier after they were divorced than during their marriage, the effect was more pronounced for women.

**Positive rumination.** In addition to the possible fitness-enhancing aspects of depression, there is another line of evidence that suggests that people in depressed mood states are better at solving social dilemmas. It has been shown that when low mood is experimentally induced, participants show a reduction in making fundamental attribution errors (i.e., the error of explaining someone else's behavior as an internal characteristic with very little external mitigating influences) (Forgas, 1998) and likewise the halo error (i.e., the cognitive bias in which one judges a person's character by their physical appeal) (Sinclair, 1988). It is said that sad people are less likely to rely on heuristic shortcuts to process social cues and instead utilize more systematic processing strategies that invoke a cost-benefit analysis (Schaller & Cialdini, 1990). Furthermore, a woman with depression who is feeling as though she has lost control over her current social environment is more sensitive to cues that allow her to interpret social situations more accurately (Weary, Elbin, & Hill, 1987). For example, consider a woman who is pregnant and discovers that her partner is having an affair with another woman. Is her "best" strategy to ignore the affair and continue receiving benefits from her mate or should she risk abandonment by forcing him to choose between her and the other woman? Her eventual actions are contingent on multiple relationship-specific factors (e.g., the nature of the affair (Shackelford, LeBlanc, & Drass, 2000), socioeconomics (Sayer, England, Allison, & Kangas, 2011), and the wife's mate value (Shackelford & Buss, 1997). The motivation of these actions are complicated by the misattribution errors related to low mood (e.g., unnecessary self blame, misunderstanding the mate's motivations, skewed evaluation of the rival's "sex appeal"). However, the level of depression that would naturally occur in such a woman, caused by female-female competition, would be beneficial overall because it affords her the temporal and psychological resources to choose the "best" strategy.

### **Social Support and Female Competition after Mate Loss**

For women, the general competition for male attention, and specifically attention from high quality mates, is multifaceted. There are four themes of female mate competition: self-promotion, competitor derogation, mate manipulation, and competitor manipulation (Fisher & Cox, 2011). Although the tactics employed in this competition are typically psychological and relational in nature, it is no less damaging to the competitors than the physical forms of competition more commonly seen in men (Miller & Maner, 2008). Interestingly, direct aggression (i.e., physical) towards other women is not typically an expected means of competition (Björkqvist, Lagerspetz, & Kaukiainen, 1992). Instead, for the purpose of competing, women engage in various forms of indirect aggression (Björkqvist, 1994; Björkqvist, Osterman, & Lagerspetz, 1994) which are commonly referred to as relational aggression. A very simple example is that a man is far more likely to “call out” a competitor publically and engage in a physical altercation over an attempted mate poach, whereas a woman is more likely to start or spread rumors about her rival, engage in social exclusion, or otherwise impair a rival’s social network in the heat of female-female mate competition.

Regardless of whether it is less risky socially, more effective, or both, women cross culturally are more likely to use subtle forms of aggression, such as starting rumors or otherwise trying to manipulate their social circle, rather than more direct confrontations or competitions (Barkow, 1992; Björkqvist, et al., 1994). That is to say that competitor derogation, which involves the direct or indirect attack of a sexual rival, for instance indirectly insulting a rival, gossiping about her, or insinuating that she is promiscuous is one of the most likely aggressive tactics a women will employ (Fisher & Cox, 2011). In the case of female-female mate

competition, this competitor derogation is often expressed in the language used by women to describe “the other woman” (e.g., bitch, whore, slut) (Morris & Reiber, 2011).

Whether it is an intentional or unintentional artifact of seeking the support and consolation of one’s friends—indeed the woman does not necessarily need to be conscious about the purpose (Trivers, 1972)—great harm can be incurred when a woman impugns another woman’s reputation. A positive social status is imperative in communal groups since a woman’s social standing can mediate her access to resources (Gurven, Allen-Arave, Hill, & Hurtado, 2000; Kaplan, Gurven, Hill, & Hurtado, 2005), govern reciprocal partners (Brown & Moore, 2002; Gurven, Hill, Kaplan, Hurtado, & Lyles, 2000), and provide valuable information to prospective mates about potential mate attributes such as parental investment strategies (Campbell, 2004) and sexual fidelity (Hess & Hagen, 2002). Sexually permissive women are often socially stigmatized and rejected as potential friends or partners (Crawford & Popp, 2003; Vrangalova, Bukberg & Rieger, 2013).

In general, women’s perceived undesirability of others’ sexual permissiveness can place the latter at elevated risk for social rejection and peer aggression. Therefore, if a woman can successfully label another as being sexually permissive, this derision can have a powerful impact on the other woman’s social status and overall reproductive fitness. While this can be a risky strategy that may entice men to seek the more sexually available rival, it is nonetheless commonly used (Buss & Dedden, 1990; Vaillancourt, 2013). Evolutionarily, sexual promiscuity is often a short-term strategy, for while at that moment a woman may have “won the battle” by accessing additional resources, building future inter-sexual alliances, or successfully poaching a mate, she could be “losing the war” by engaging in reputation-damaging behavior that will reduce her ability to acquire a long-term mate of high quality in the future.



### **Avoiding Similar Situations**

Inclusive fitness demonstrates that relatedness is often important for human altruism (i.e., humans are inclined to behave more altruistically toward kin than toward unrelated individuals). An effective way to avoid the inclusive fitness risks of resource loss is to prevent a mate from ever getting to the point of engaging in sexual or emotional infidelity. Preventing a mate from engaging in extra-pair relationships is a major challenge faced by many sexually reproducing species. Even a single romantic infidelity can lead to large reproductive and social costs. For instance, if a man impregnates his mistress, resources may be permanently diverted from his wife and her offspring to support the offspring of his mistress (Marlowe, 2003). As a result, adaptive psychological and behavioral processes may have evolved to guard against possible rivals and to reduce the likelihood of infidelity (Buss & Shackelford, 1997; Buss, Shackelford, & McKibbin, 2008; Starratt, Shackelford, Goetz, & McKibbin, 2007). Precisely how much effort an individual allocates to mate guarding is a function of the value of the mate being guarded. Men who view themselves as married to young and physically attractive mates invest more effort in mate guarding compared to men married to older and “less attractive” women (Buss, 2002). Similarly, women married to men with high income and ambition put more effort into guarding their partners than do women married to men who earn less or strive less for status (Buss, 2002). These patterns presumably reflect the fact that physically attractive women and high status men are higher in mate value than same-sex others lacking these qualities. As a consequence, high value mates experience more frequent sexual or romantic interest from others, and hence have more potential mating options—requiring a higher allocation of mate-guarding by their current partner (Buss, 1988; Buss & Shackelford, 1997).

Relationship jealousy can be defined as thoughts, emotions, or behaviors that occur as a result of the perceived threat of losing a potential mate to an actual or imagined rival (Buunk & Dijkstra, 2004). Evolutionarily, the costs of repeated mate loss may have been severe. It would be of likely benefit for rejectees to be more vigilant in their mate guarding efforts, including experiencing frequent and intense feelings of jealousy, increasing their sensitivity to cues of partner infidelity, and behaving accordingly to prevent partner infidelity. In men, it has been suggested that the “master mechanism” for maintaining pair bonds is men’s almost pathological sexual jealousy which stems, evolutionarily, from the fear of cuckoldry (Buss, 2007). This threat of uncertain genetic parentage is not only what “keeps us together,” but is also the root cause of much dangerous male behavior, from the boorish to the brutal (Buss & Shackelford, 1997). An example would be that of an ancestral male supplying his mate with adaptively relevant resources (food and shelter), keeping competitors at bay via mate guarding and shows of social/physical dominance, and using destructive measures (e.g., physical or emotional abuse) when needed to ensure mate retention (Buss, 2003).

For women, jealousy could be adaptive if it has encouraged careful scrutiny of their partner to forestall any potential threats to her monopolization of his resources or direct paternal care. The more dependent the individual is on the relationship, the more likely he or she will be jealous, since they have more to lose (Buunk & Bringle, 1987). Jealous women may monitor their partners’ whereabouts by calling them incessantly, follow their partners everywhere, spy on their partners and/or and show up unexpectedly at their partners’ workplace or home (Breitner & Anderson, 1994; Mullins, 2010). Women employ non-physical mate-retention strategies more so than men (e.g., monopolization of time, sexual inducements, derogation of competitors) (Buss, 2002), but in some women, these intense and persistent feelings of jealousy can and do lead to morbid jealousy which can include substance abuse, harm to self, and physical assaults on the partner (Buss, 2000; Kingham & Gordon, 2004).

## **Women Who Stop Competing**

Nonetheless, even the most vigorous mate-guarding tactics are unlikely to totally prevent infidelity, desertion, or loss of a mate to another woman. If sexual selection shapes female-female competition over mating opportunities, one question worth asking is whether or not particular females are able to competitively exclude others from mating altogether? There has been some research that suggest that females do have the intention to oust others from the mating game by using competitor manipulation (Fisher & Cox, 2011). For example, women have been known to deliberately manipulate competitors by deceiving them as to the target's sexual orientation or keeping the opponent busy with other tasks. However, even without the deliberate goal of a competitor to eliminate a rival, a woman could withdraw from competition rather than remain vulnerable to the stressors that accompany the mating game.

Low-ranking animals frequently engage in submissive behavior, experience social anxiety, feel inferior to others, and generally are subject to higher stress than their higher-ranking companions (Gilbert, 2001; Sloman, Gilbert, & Hasey, 2003). However, even within the most homogeneous population, differences exist in how an individual copes with social defeat and rejection. In a study of tree shrew behavior, Von Holst (1986) found that those that experienced social adversity and lost out on resources employed either a strategy of continuing activities in a hesitant and tentative manner or a strategy of "shutting down" almost entirely, perhaps due to learned helplessness.

This behavior may be a method of demobilization designed to promote the safety of the defeated animal. Expressing subdued behavior indicates a subordinate status, thereby letting the animal's competitors know it yields defeat, is "out of the game," and is not worthy of further attacks (Price, Gardner Jr, & Erickson, 2004). These tactics allow the animal to withdraw for a

time, hopefully to recover its energies and resources to compete more successfully in the future (Price et al., 1994). However, this behavior has immediate biological costs. Levitan, Vaccarino, Brown, and Kennedy (2002) found chronic stress with increased hypothalamic-pituitary-adrenal (HPA) axis activity in subordinates that are defeated and/or harassed after they maintain these submissive behaviors (Abbott et al., 2003; Ray & Sapolsky, 1992). Studies on defeated rodents show physiological and behavioral changes, such as reduced exploratory behavior, increased defensiveness, and decreased offensive aggression (Gilbert, 2001).

While food resources or group dominance are often the focus of animal models of defeat behavior, there is also support for their application to human mating and reproductive behaviors. Wasser and Barash (1983) found that women with impaired self-esteem and poor social support from family and friends often had more reproductive complications during and following birth, and were more likely to abandon or abuse their children. Psychological stress, including the stress from mate loss and female competition, can serve as a powerful force in altering a woman's reproductive potential. For example, active competition may cause lowered reproductive fitness by mating interruption, ovulation disruptions, or increased stress (Hohmann & Fruth, 2003; Wasser & Starling, 1988). The reproductive suppression model states that when a woman is in a situation that is, at that time, unfavorable to reproduction, her lifetime reproductive success may be increased by waiting to reproduce until conditions become more favorable (e.g., lower levels of financial and social stress are frequent indicators of "improved" conditions). This down-regulation of reproductive effort may prevent her from incurring steep reproductive costs which would be better utilized in more favorable conditions (Wasser & Barash, 1983). Thus, a woman who experiences a temporary delay in reproduction through rejection by her mate may find it prudent to wait until environmental factors are improved and the pressure of intrasexual competition is reduced; evolutionarily, her short-term loss may not preclude her from long-term success.

## **Future Directions**

Despite the short-term pain of a breakup, findings indicate that most women are resilient and recover (Morris & Reiber, 2011). Furthermore, most women also report feeling significantly less distressed about the breakup than they did initially in as little as two months (Eastwick, Finkel, Krishnamurti, & Loewenstein, 2008). Ongoing research suggests that life history variation in relationship length, number of previous other relationships, and time since breakup significantly influence a woman's initial reaction as well as future recollection of the events.

Lucas et al (2003) and Stutzer and Frey (2006) explored patterns of change in marital status and concluded that any positive well-being effect does not last beyond the early years of marriage. That is to say, after the first few years of marriage people return to a baseline level of happiness set before they were married. Lucas (2005) also found approximately 50% of the initial decline in happiness following divorce is recovered after a few years but individuals do not seem to return to their pre-divorce levels of happiness. Interestingly, men derive fewer benefits from divorce compared with women (Kitson & Holmes, 1992; Marks & Lambert, 1998). Moreover, the lowest point of happiness is found to be one year before the actual breakup takes place. We would argue that this is analogous to the process of recovery from alcohol or substance abuse, where individuals must frequently "hit bottom" before becoming motivated to extricate themselves from their painful and destructive life situations. Given the costly investment individuals make in romantic relationships, it is understandable that if conscious of the relationship "hitting bottom," an individual may need time to contemplate what action is the

best to take. Future research regarding who initiated the relationship end, its timing, and its cause will provide insight into this hypothesis.

As previously noted, depression and low self-esteem may modify a person's behavior in a manner that reduces the likelihood of any further social devaluation. However, a by-product of this reduction in self-esteem might serve as a motivational mechanism by which a woman increases the frequency of actions that lead to a rise in the respect she feels from others. As one would expect, success in romantic relationships raises self-esteem (Brase & Guy, 2004; Locker, McIntosh, Hackney, Wilson, & Wiegand, 2010). Recent research suggests that women who had higher levels of depression had more short-term sexual encounters than non-depressed women (Beaussart, Kaufman, & Kaufman, 2012). Ancestral women may have used extra-pair sex to acquire resources during lean times and to form alliances with men during times of strife. This behavior may be a conscious one motivated by a cost-benefit analysis or spurred by depression and anxiety caused by environmental cues. However, a temporary increase in uncommitted sexual activity after a mate loss is a double edged sword: short-term promiscuity may be a way for a woman to recover her self-esteem and access to intersexual social status while at the same time running the risks being labelled as promiscuous and intrasexual ostracism. Researchers have also begun conducting studies to identify factors that may be associated with a speedier recovery from a breakup. For both men and women, the sooner the person began dating someone new, the sooner they recovered from the previous breakup (Locker, et al., 2010).

We have also argued that reputational difficulties after a mate poaching can reduce a poacher's inclusive fitness by labeling her as promiscuous and therefore less likely to benefit from strategic social alliances. However, what has yet to be explored is how a woman combats the negative effects of being labeled a "home-wrecker." For instance, how effective is it to challenge this title by making one's own allegations that justify her mate poaching? Can a woman improve her reputation by leveling her own allegations that the rejected woman was abusive, neglectful, or perhaps infertile? For example, we know that in many cultures, infertility

is justifiable cause to demand return of brideprice and send a woman back to her family; so if “infertility” can be “advertised”, it may devalue a woman. Are the women within a social group more inclined to forgive a mate poacher if she can effectively reduce the social status of the rejected woman (e.g., if there is a social cost for being labeled “the other woman,” can that cost be mitigated within the social group by reducing the social “value” of the mate’s prior partner)? Furthermore, what counterattacks are the most effective for “saving face?”

## **Conclusion**

Though many aspire to a love that lasts a lifetime, there are factors outside of any relationship that influence its health and longevity. Breakups, initially, can bring storms of negative and stressful emotions upon both parties. However, among the debris, positive emotional experiences and beneficial personal transformations can be found. Non-clinical depression symptoms, whether precipitated by mate loss through a break up or failure to compete successfully with another woman for a potential mate, can provide fertile ground for self-reflection from which fruitful changes in self-confidence, and mate-seeking and mate-retaining strategies can grow.

While the concept of rumination is often associated with negative aspects of low mood states, it may provide a period of intense self-analysis in which a woman can better examine and evaluate what went wrong in her lost relationship and make plans for avoiding these same issues in future relationships. This rumination, coupled with regret over what she could or could not have done to retain her mate, may allow a woman to do a comprehensive inventory of her own relational strengths and weaknesses as compared to potential rivals. While this process is not without pain and grief, the knowledge gained could potentially help a woman rise above the failed relationship and move on as a stronger and more competitive woman in search of a better mate.

Women have been shown to shun other women who are labeled as promiscuous by employing relational aggression to wreak havoc on their social value in hopes of reducing their mate value. Therefore, social support is perhaps the most powerful tool women have to combat intrasexual competition and mate loss. From the direct support given in the immediate aftermath of a breakup, to friends who actively derogate the defected mate and his new partner,



friends and family members provide a social means to restore the “defeated” woman to a position of emotional power, perhaps at the expense of the supposed “winner” of the competition.

Breakups happen to virtually all women at some point in their life, usually more than once, and have the potential to be one of the most traumatic experiences a woman ever faces. These breakups happen for varied and complex reasons (Morris & Reiber, 2011). However, we have argued that, relative to other causes of relationship termination, losing one’s mate to another woman creates unique and difficult challenges. If the force of differential parental investments is coupled with the risk of sub-par male parental investment, females are likely to be more discriminating and may actively avoid mating with poor quality males. Since women are then competing for a few high quality men this would eventually lead women to have zero sum benefits from competing. But there is an important real life feature of the game – the game changes in very significant ways when repeated, or if the players interact with each other in the future. That is, a person who fails to win the first time will likely not use the same strategy again (Engle-Warnick & Slonim, 2004 & Engle-Warnick & Slonim, 2006).

Therefore, mate loss via intrasexual competition can result in significant psychological distress and decreased life satisfaction in the short-term while also providing “the loser” with opportunities for long-term personal growth. Women seem to recover from breakups faster than men and report an overall “silver lining” of increased self-awareness and “relationship intelligence” that men do not (Morris & Reiber, 2011). Therefore, women may emerge from breakups stronger, wiser, and better equipped to succeed in their next romantic relationship. Future research may demonstrate that there are real opportunities for learning, personal growth, and an evaluation of relationship experience to be had from heartbreak. Taking advantage of these opportunities may help a woman reduce the likelihood that the next broken heart will be hers.

## References

- Abbott, D., Keverne, E., Bercovitch, F., Shively, C., Mendoza, S. P., Saltzman, W., . . . Garland, T. (2003). Are subordinates always stressed? A comparative analysis of rank differences in cortisol levels among primates. *Hormones and Behavior*, *43*(1), 67-82.
- Allen, N. B., & Badcock, P. B. (2003). The social risk hypothesis of depressed mood: evolutionary, psychosocial, and neurobiological perspectives. *Psychological Bulletin*, *129*(6), 887.
- Amato, P. R. (2000). The consequences of divorce for adults and children. *Journal of Marriage and Family*, *62*(4), 1269-1287.
- Andrews, P. W., & Thomson, J. A. (2009). The bright side of being blue: Depression as an adaptation for analyzing complex problems. *Psychological Review*, *116*(3), 620-654. doi: 10.1037/a0016242
- Archer, J. (1999). *The nature of grief: The evolution and psychology of reactions to loss*. New York: Routledge.
- Bailey, J. M., Kirk, K. M., Zhu, G., Dunne, M. P., & Martin, N. G. (2000). Do individual differences in sociosexuality represent genetic or environmentally contingent strategies? Evidence from the Australian twin registry. *Journal of Personality and Social Psychology*, *78*(3), 537.
- Barkow, J. H. (1992). Beneath new culture is old psychology: Gossip and social stratification. In J. H. Barkow, L. Cosmides & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (Vol. xii, pp. 627-637). New York: Oxford University Press.
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: desire for interpersonal attachments as a fundamental human motivation. *Psychological bulletin*, *117*(3), 497.
- Beaussart, M. L., Kaufman, S. B., & Kaufman, J. C. (2012). Creative activity, personality, mental illness, and short-term mating success. *The Journal of Creative Behavior*, *46*(3), 151-167.
- Bevino, D. L., & Sharkin, B. S. (2003). Divorce adjustment as a function of finding meaning and gender differences. *Journal of Divorce & Remarriage*, *39*(3-4), 81-97.
- Björkqvist, K. (1994). Sex differences in physical, verbal, and indirect aggression: A review of recent research. *Sex Roles*, *30*(3-4), 177-188.
- Bjorkqvist, K., Osterman, K., & Lagerspetz, K. M. (1994). Sex differences in covert aggression among adults. *Aggressive Behavior*, *20*(1), 27-33.
- Boelen, P. A., & Reijntjes, A. (2009). Negative cognitions in emotional problems following romantic relationship break ups. *Stress and Health*, *25*(1), 11-19.

- Bowlby, J. (1969). *Attachment and loss: Vol 1. Attachment*. New York: Basic Books.
- Bowlby, J. (1980). *Attachment and loss, volume 3: loss; sadness and depression*. New York: Basic Books.
- Brase, G. L., & Guy, E. C. (2004). The demographics of mate value and self-esteem. *Personality and Individual Differences, 36*(2), 471-484.
- Breitner, B. C., & Anderson, D. N. (1994). The organic and psychological antecedents of delusional jealousy in old age. *International Journal of Geriatric Psychiatry, 9*(9), 703-707.
- Brown, W. M., & Moore, C. (2002). Smile asymmetries and reputation as reliable indicators of likelihood to cooperate: An evolutionary analysis. In S. P. Shohov (Ed.), *Advances in Psychology Research* (pp. 59-78). New York: Nova Science Publishers.
- Bryson, J. B. (1991). *Modes of response to jealousy-evoking situations*. New York: Guilford Press.
- Buss, D. M. (1988). From vigilance to violence: Tactics of mate retention in American undergraduates. *Ethology and Sociobiology, 9*(5), 291-317.
- Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences, 12*(01), 1-14.
- Buss, D. M. (1990). The evolution of anxiety and social exclusion. *Journal of Social and Clinical Psychology, 9*(2), 196-201.
- Buss, D. M. (2000). The evolution of happiness. *American Psychologist, 55*(1), 15.
- Buss, D. M. (2002). Human mate guarding. *Neuroendocrinology Letters, 23*(4), 23-29.
- Buss, D. M. (2003). *The evolution of desire: Strategies of human mating*. New York: Basic Books.
- Buss, D. M. (2004). *Evolutionary psychology: The new science of the mind*. Boston: Pearson Education, Inc.
- Buss, D. M. (2007). The evolution of human mating. *Acta Psychologica Sinica, 39*(3), 502-512.
- Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: an evolutionary perspective on human mating. *Psychological Review, 100*(2), 204.
- Buss, D. M., & Shackelford, T. K. (1997). Human aggression in evolutionary psychological perspective. *Clinical Psychology Review, 17*(6), 605-619.
- Buss, D. M., Shackelford, T. K., & McKibbin, W. F. (2008). The mate retention inventory-short form (MRI-SF). *Personality and Individual Differences, 44*(1), 322-334.
- Buunk, B. P., & Bringle, R. G. (1987). Jealousy in love relationships. In D. Perlman & S. Duck (Eds.), *Intimate relationships: Development, dynamics, and deterioration* (pp. 13-42). Thousand Oaks, CA: Sage Publications, Inc.

- Buunk, B. P., & Dijkstra, P. (2004). Gender differences in rival characteristics that evoke jealousy in response to emotional versus sexual infidelity. *Personal Relationships*, *11*(4), 395-408.
- Campbell, A. (2004). Female competition: Causes, constraints, content, and contexts. *Journal of Sex Research*, *41*(1), 16-26.
- Chung, M. C., Farmer, S., Grant, K., Newton, R., Payne, S., Perry, M., . . . Stone, N. (2003). Coping with post-traumatic stress symptoms following relationship dissolution. *Stress and Health*, *19*(1), 27-36.
- Clark, A. E., & Georgellis, Y. (2013). Back to baseline in Britain: Adaptation in the British Household Panel Survey. *Economica*, *80*(319), 496-512.
- Crawford, M., & Popp, D. (2003). Sexual double standards: A review and methodological critique of two decades of research. *Journal of Sex Research*, *40*(1), 13-26.
- Davis, D., Shaver, P. R., & Vernon, M. L. (2003). Physical, emotional, and behavioral reactions to breaking up: The roles of gender, age, emotional involvement, and attachment style. *Personality and Social Psychology Bulletin*, *29*(7), 871-884.
- Dugatkin, L. A. (1992). Sexual selection and imitation: Females copy the mate choice of others. *American Naturalist*, *139*, 1384-1389.
- Eagly, A. H., & Wood, W. (1999). The origins of sex differences in human behavior: Evolved dispositions versus social roles. *American Psychologist*, *54*(6), 408.
- Eastwick, P. W., Finkel, E. J., Krishnamurti, T., & Loewenstein, G. (2008). Mispredicting distress following romantic breakup: Revealing the time course of the affective forecasting error. *Journal of Experimental Social Psychology*, *44*(3), 800-807.
- Engle-Warnick, J., & Slonim, R. L. (2004). The evolution of strategies in a repeated trust game. *Journal of Economic Behavior & Organization*, *55*(4), 553-573.
- Engle-Warnick, J., & Slonim, R. L. (2006). Inferring repeated-game strategies from actions: evidence from trust game experiments. *Economic Theory*, *28*(3), 603-632.
- Field, T., Diego, M., Pelaez, M., Deeds, O., & Delgado, J. (2010). Breakup distress and loss of intimacy in university students. *Psychology*, *1*(3), 173-177.
- Fine, M. A., & Sacher, J. A. (1997). Predictors of distress following relationship termination among dating couples. *Journal of Social and Clinical Psychology*, *16*(4), 381-388.
- Fisher, Helen. (2004a). *Why we love: The nature and chemistry of romantic love*. New York: Henry Holt and Co.
- Fisher, H. (2004b). Dumped! *New Scientist*, (2434), 40-43.
- Fisher, H. (2006). The drive to love: The neural mechanism for mate selection. In R. Sternberg, K. Weis (eds.) *The New Psychology of Love*, (pp. 87-115). New York: Yale University Press

- Fleming, C. B., White, H. R., Oesterle, S., Haggerty, K. P., & Catalano, R. F. (2010). Romantic relationship status changes and substance use among 18-to 20-year-olds. *Journal of Studies on Alcohol and Drugs, 71*(6), 847.
- Forgas, J. P. (1998). On being happy and mistaken: mood effects on the fundamental attribution error. *Journal of Personality and Social Psychology, 75*(2), 318.
- Frazier, P. A., & Cook, S. W. (1993). Correlates of distress following heterosexual relationship dissolution. *Journal of Social and Personal Relationships, 10*(1), 55-67.
- Geher, G., Bloodworth, R., Mason, J., Stoaks, C., Downey, H. J., Renstrom, K. L., & Romero, J. F. (2005). Motivational underpinnings of romantic partner perceptions: Psychological and physiological evidence. *Journal of Social and Personal Relationships, 22*(2), 255-281.
- Gigerenzer, G., & Goldstein, D. G. (1996). Reasoning the fast and frugal way: models of bounded rationality. *Psychological Review, 103*(4), 650.
- Gilbert, P. (2001). Depression and stress: A biopsychosocial exploration of evolved functions and mechanisms. *Stress: The International Journal on the Biology of Stress, 4*(2), 121-135.
- Gilbert, P. (2006). Evolution and depression: issues and implications. *Psychological Medicine, 36*(3), 287-297.
- Gilbert, P., & Allan, S. (1998). The role of defeat and entrapment (arrested flight) in depression: an exploration of an evolutionary view. *Psychological Medicine, 28*(3), 585-598.
- Gurven, M., Allen-Arave, W., Hill, K., & Hurtado, M. (2000). "It's a wonderful life": signaling generosity among the Ache of Paraguay. *Evolution and Human Behavior, 21*(4), 263-282.
- Gurven, M., Hill, K., Kaplan, H., Hurtado, A., & Lyles, R. (2000). Food transfers among Hiwi foragers of Venezuela: tests of reciprocity. *Human Ecology, 28*(2), 171-218.
- Hess, N. H., & Hagen, E. H. (2006). Sex differences in indirect aggression: Psychological evidence from young adults. *Evolution and Human Behavior, 27*(3), 231-245.
- Higley, J. D., King Jr, S. T., Hasert, M. F., Champoux, M., Suomi, S. J., & Linnoila, M. (1996). Stability of interindividual differences in serotonin function and its relationship to severe aggression and competent social behavior in rhesus macaque females. *Neuropsychopharmacology, 14*(1), 67-76.
- Hohmann, G., & Fruth, B. (2003). Intra-and inter-sexual aggression by bonobos in the context of mating. *Behaviour, 140*(11), 1389-1414.
- Jankowiak, W. R., & Fischer, E. F. (1992). A cross-cultural perspective on romantic love. *Ethnology, 149*-155.
- Jankowiak, W. R., & Paladino, T. (2008). Desiring sex, longing for love: A tripartite conundrum. *Intimacies: Love and sex across cultures, 1*-36.
- Kaplan, H., Gurven, M., Hill, K., & Hurtado, A. M. (2005). The natural history of human food sharing and cooperation: a review and a new multi-individual approach to the negotiation of norms. In H. Gintis, S. Bowles, R. Boyd & E. Fehrs (Eds.), *Moral sentiments and material*

interests: *The foundations of cooperation in economic life* (pp. 75-113). Cambridge, Ma: MIT Press.

Karp, D. A. (1997). *Speaking of sadness: Depression, disconnection, and the meanings of illness*. New York: Oxford University Press.

Keller, M. C., & Nesse, R. M. (2005). Is low mood an adaptation? Evidence for subtypes with symptoms that match precipitants. *Journal of Affective Disorders*, 86(1), 27-35.

Kendler, K. S., Hettema, J. M., Butera, F., Gardner, C. O., & Prescott, C. A. (2003). Life event dimensions of loss, humiliation, entrapment, and danger in the prediction of onsets of major depression and generalized anxiety. *Archives of General Psychiatry*, 60(8), 789.

Kingham, M., & Gordon, H. (2004). Aspects of morbid jealousy. *Advances in Psychiatric Treatment*, 10(3), 207-215.

Knox, D., Zusman, M. E., Kaluzny, M., & Cooper, C. (2000). College student recovery from a broken heart. *College Student Journal*, 34(3), 322-324.

Kuehner, C. (2003). Gender differences in unipolar depression: an update of epidemiological findings and possible explanations. *Acta Psychiatrica Scandinavica*, 108(3), 163-174.

Laumann, E. O. (1994). *The social organization of sexuality: Sexual practices in the United States*. Chicago: University of Chicago Press.

Laxmi, T. R., Stork, O., & Pape, H. C. (2003). Generalisation of conditioned fear and its behavioural expression in mice. *Behavioural Brain Research*, 145(1-2), 89-98.

Lennox, B. R., Jacob, R., Calder, A. J., Lupson, V., & Bullmore, E. T. (2004). Behavioural and neurocognitive responses to sad facial affect are attenuated in patients with mania. *Psychological Medicine*, 34(05), 795-802. doi: 10.1017/S0033291704002557

Leviton, R. D., Vaccarino, F. J., Brown, G. M., & Kennedy, S. H. (2002). Low-dose dexamethasone challenge in women with atypical major depression: pilot study. *Journal of Psychiatry and Neuroscience*, 27(1), 47.

Locker, L., McIntosh, W., Hackney, A., Wilson, J., & Wiegand, K. (2010). The breakup of romantic relationships: Situational predictors of perception of recovery. *North American Journal of Psychology*, 12(3), 565-578.

Lucas, R. E. (2005). Time does not heal all wounds a longitudinal study of reaction and adaptation to divorce. *Psychological Science*, 16(12), 945-950.

Lucas, R. E., Clark, A. E., Georgellis, Y., & Diener, E. (2003). Reexamining adaptation and the set point model of happiness: reactions to changes in marital status. *Journal of Personality and Social Psychology*, 84(3), 527.

Marlowe, F. W. (2003). A critical period for provisioning by Hadza men: Implications for pair bonding. *Evolution and Human Behavior*, 24(3), 217-229.

- Mearns, J. (1991). Coping with a breakup: negative mood regulation expectancies and depression following the end of a romantic relationship. *Journal of Personality and Social Psychology, 60*(2), 327.
- Miller, S. L., & Maner, J. K. (2008). Coping with romantic betrayal: Sex differences in responses to partner infidelity. *Evolutionary Psychology, 6*(3), 413-426.
- Moller, N. P., Fouladi, R. T., McCarthy, C. J., & Hatch, K. D. (2003). Relationship of attachment and social support to college students' adjustment following a relationship breakup. *Journal of Counseling & Development, 81*(3), 354-369.
- Monroe, S. M., Rohde, P., Seeley, J. R., & Lewinsohn, P. M. (1999). Life events and depression in adolescence: relationship loss as a prospective risk factor for first onset of major depressive disorder. *Journal of Abnormal Psychology, 108*(4), 606.
- Morris, C. E., & Reiber, C. (2011). Frequency, intensity and expression of post-relationship grief. *EvoS Journal: The Journal of the Evolutionary Studies Consortium, 3*(1), 1-11.
- Morry, M. M. (2005). Relationship satisfaction as a predictor of similarity ratings: A test of the attraction-similarity hypothesis. *Journal of Social and Personal Relationships, 22*(4), 561-584.
- Morry, M. M. (2007). The attraction-similarity hypothesis among cross-sex friends: Relationship satisfaction, perceived similarities, and self-serving perceptions. *Journal of Social and Personal Relationships, 24*(1), 117-138.
- Mullins, D. (2010). Morbid jealousy: The green-eyed monster. *Irish Journal of Psychological Medicine, 27*(2).
- Murray, S. L., Holmes, J. G., Bellavia, G., Griffin, D. W., & Dolderman, D. (2002). Kindred spirits? The benefits of egocentrism in close relationships. *Journal of Personality and Social Psychology, 82*(4), 563.
- Murray, S. L., Holmes, J. G., Griffin, D. W., Bellavia, G., & Rose, P. (2001). The mismeasure of love: How self-doubt contaminates relationship beliefs. *Personality and Social Psychology Bulletin, 27*(4), 423-436.
- Nesse, R. (1996). *Why we get sick : the new science of Darwinian medicine* (1st ed.). New York: Vintage Books.
- Nesse, R. M. (2000). Is depression an adaptation? *Archives of General Psychiatry, 57*(1), 14.
- Nesse, R. M. (2005). Evolutionary Psychology and Mental Health. In Buss, D. M. (ed.) *Handbook of Evolutionary Psychology* (pp. 903-927). Hoboken: Jon Wiley and Sons.
- Parker, J., & Burkley, M. (2009). Who's chasing whom? The impact of gender and relationship status on mate poaching. *Journal of Experimental Social Psychology, 45*(4), 1016-1019.
- Paul, L., Foss, M. A., & Galloway, J. (1993). Sexual jealousy in young women and men: Aggressive responsiveness to partner and rival. *Aggressive Behavior, 19*(6), 401-420.
- Peri, T., Ben-Shakhar, G., Orr, S. P., & Shalev, A. Y. (2000). Psychophysiological assessment of aversive conditioning in posttraumatic stress disorder. *Biological Psychiatry, 47*(6), 512-519.

Perilloux, C., & Buss, D. M. (2008). Breaking up romantic relationships: Costs experienced and coping strategies deployed. *Evolutionary Psychology*, 6(1), 164-181.

Perilloux, C., Easton, J. A., & Buss, D. M. (2012). The misperception of sexual interest. *Psychological Science*, 0956797611424162.

Price, J. S., Gardner, R., & Erickson, M. (2004). Can depression, anxiety and somatization be understood as appeasement displays? *Journal of Affective Disorders*, 79(1), 1-11.

Price, J. S., Sloman, L., Gardner, R., Gilbert, P., & Rohde, P. (1994). The social competition hypothesis of depression. *The British Journal of Psychiatry*, 164(3), 309-315.

Ray, J. C., & Sapolsky, R. M. (1992). Styles of male social behavior and their endocrine correlates among high-ranking wild baboons. *American Journal of Primatology*, 28(4), 231-250.

Rhoades, G. K., Kamp Dush, C. M., Atkins, D. C., Stanley, S. M., & Markman, H. J. (2011). Breaking up is hard to do: The impact of unmarried relationship dissolution on mental health and life satisfaction. *Journal of Family Psychology*, 25(3), 366.

Saffrey, C., & Ehrenberg, M. (2007). When thinking hurts: Attachment, rumination, and postrelationship adjustment. *Personal Relationships*, 14(3), 351-368.

Sapolsky, R. M. (1990). Adrenocortical function, social rank, and personality among wild baboons. *Biological Psychiatry*, 28(10), 862-878.

Sbarra, D. A., & Ferrer, E. (2006). The structure and process of emotional experience following nonmarital relationship dissolution: Dynamic factor analyses of love, anger, and sadness. *Emotion*, 6(2), 224.

Schaller, M., & Cialdini, R. B. (Eds.). (1990). *Happiness, sadness, and helping: A motivational integration* (Vol. xviii). New York: Guilford Press.

Schmitt, D. P. (2004). Patterns and universals of mate poaching across 53 nations: the effects of sex, culture, and personality on romantically attracting another person's partner. *Journal of Personality and Social Psychology*, 86(4), 560.

Schmitt, D. P., Alcalay, L., Allik, J., Angleitner, A., Ault, L., Austers, I., . . . Cunen, B. (2004). Patterns and universals of mate poaching across 53 nations: the effects of sex, culture, and personality on romantically attracting another person's partner. *Journal of Personality and Social Psychology*, 86(4), 560-584.

Schützwohl, A. (2008). The disengagement of attentive resources from task-irrelevant cues to sexual and emotional infidelity. *Personality and Individual Differences*, 44(3), 633-644.

Sinclair, R. C. (1988). Mood, categorization breadth, and performance appraisal: The effects of order of information acquisition and affective state on halo, accuracy, information retrieval, and evaluations. *Organizational Behavior and Human Decision Processes*, 42(1), 22-46.

Sloman, L., Gilbert, P., & Hasey, G. (2003). Evolved mechanisms in depression: the role and interaction of attachment and social rank in depression. *Journal of Affective Disorders*, 74(2), 107-121.



- Sprecher, S., Felmlee, D., Metts, S., Fehr, B., & Vanni, D. (1998). Factors associated with distress following the breakup of a close relationship. *Journal of Social and Personal Relationships*, *15*(6), 791-809.
- Starratt, V. G., Shackelford, T. K., Goetz, A. T., & McKibbin, W. F. (2007). Male mate retention behaviors vary with risk of partner infidelity and sperm competition. *Acta Psychologica Sinica*, *39*(3), 523-527.
- Stutzer, A., & Frey, B. S. (2006). Does marriage make people happy, or do happy people get married? *The Journal of Socio-Economics*, *35*(2), 326-347.
- Sugiyama, L. S. (2005). Physical attractiveness in adaptationist perspective. In Buss, David M. (ed.) *Handbook of Evolutionary Psychology* (pp. 292–234). Hoboken: Jon Wiley and Sons.
- Tashiro, T., & Frazier, P. A. (2003). “I’ll never be in a relationship like that again”: Personal growth following romantic relationship breakups. *Personal Relationships*, *10*(1), 113-128.
- Trivers, R. (1972). *Parental investment and sexual selection*. Cambridge, MA: Biological Laboratories, Harvard University.
- Uller, T., & Johansson, L. C. (2003). Human mate choice and the wedding ring effect. *Human Nature*, *14*(3), 267-276.
- Von Holst, D. (1986). Psychosocial stress and its pathophysiological effects in tree shrews (*Tupaia belangeri*). *Biological and Psychological Factors in Cardiovascular Disease, IV*, 476-490. doi: 10.1007/978-3-642-71234-0\_29
- Vrangalova, Z., Bukberg, R. E., & Rieger, G. (2014). Birds of a feather? Not when it comes to sexual permissiveness. *Journal of Social and Personal Relationships*, *31*(1), 93-113.
- Wasser, S. K., & Barash, D. P. (1983). Reproductive suppression among female mammals: implications for biomedicine and sexual selection theory. *Quarterly Review of Biology*, 513-538.
- Wasser, S. K., & Starling, A. K. (1988). Proximate and ultimate causes of reproductive suppression among female yellow baboons at Mikumi National Park, Tanzania. *American Journal of Primatology*, *16*(2), 97-121.
- Weary, G., Elbin, S., & Hill, M. G. (1987). Attributional and social comparison processes in depression. *Journal of Personality and Social Psychology*, *52*(3), 605.
- Wirtz, P. W., & Harrell, A. V. (1987). Effects of postassault exposure to attack-similar stimuli on long-term recovery of victims. *Journal of Consulting and Clinical Psychology*, *55*(1), 10-16.

## CHAPTER 3

### **Quantitative Sex Differences in Response to the Dissolution of a Romantic Relationship**

Morris, C.E., Roman, E., and Reiber, C. (2015a<sup>3</sup>) Quantitative Sex Differences in Response to the Dissolution of a Romantic Relationship. Manuscript submitted for publication.

---

<sup>3</sup> Publications under review are labeled 2015a, 2015b, and 2015c for reader convenience.

## **Abstract**

This study's purpose was to gather data that would allow us to examine evolutionarily informed predictions regarding emotional and physical responses to a breakup—a cluster of correlated responses we refer to as post-relationship grief (PRG). We tested predictions of the existing biological model of human mating and looked to replicate or expand upon the extant literature by surveying 5705 participants in 96 countries. Eighty-one percent of respondents experienced a breakup and 80% of individuals experienced multiple breakups. Most responses differed significantly by sex. Emotional response was more severe than physical, with women expressing higher levels than men in each instance. The distribution of responses was similar between sexes. Intensity of emotional response for both sexes was notable: median (and mean) response of nearly 7 (out of ten). Component responses, both physical and emotional, again showed significant variation but similar distributions. Women initiated breakups more frequently. Rejected individuals experienced higher PRG levels than those initiating the breakup or breakups via mutual agreement—however; the PRG experience was still relatively severe for both parties. “Lack of communication,” was the most prevalent breakup cause. This initial investigation suggests that PRG avails itself to continued study.

## Introduction

Romantic relationships appear to be a universal human experience (Fisher, 1995; Jankowiak, 1995). Most individuals will enter and exit a series of romantic relationships throughout their lifetimes based upon their varying needs for romance, physical and emotional support, and sexual exclusivity (Fisher, 2006a, 2006b; Jankowiak, 2008). For the majority of individuals, this process is cyclical; most relationships are not “for life”—individuals will experience failed relationships before (possibly) forming a life-long pair bond (Buss, 2003; Fisher, 2005). Extant research has shown that upwards of 85% of individuals will experience at least one romantic relationship dissolution in their lifetime (Battaglia, et.al., 1998; Morris and Reiber, 2011). The formation and maintenance of romantic relationships is well represented in evolutionary research. From Trivers’ (1972) parental investment model to Symons’ (1979) biological model of human mating, through Buss’ (2003) sexual strategies model of human sexual interactions, the proximate mechanisms and behaviors (e.g., physical attraction, mate guarding, sex) and ultimate causation (i.e., reproductive success) of human romantic attachments have been major topics of study for human behavioral ecologists and evolutionary psychologists. However, from an evolutionary perspective, the termination of romantic relationships is less well-studied.

Loss of a partner generally provokes concomitant emotional reactions. In *The Nature of Grief*, Archer (1999) explored grief induced by widowhood, arguing that such grief is a result of a “trade-off” between costs and benefits. Humans establish romantic bonds that have multiple advantages and great adaptive value but there is a cost—a series of emotions and behavioral responses—if a partner dies. Archer terms this “the cost of commitment” (p.62). Importantly,

these responses are often magnified by concurrent (possibly pre-existing) mental and physical traits of the individuals involved in the breakup (e.g., anxiety, addictions, depression) (Barbara and Dion, 2000; Fisher, 2004; Mearns, 1991). Grief often leads to depression that is often accompanied by, and inextricable from, related states (e.g., sadness, demoralization, guilt, boredom) (Keller and Nesse, 2005). Nesse suggests that the failure of “major social enterprises” (e.g., romantic relationship, friendships, careers) often leads to grief and serious depression (2005). Although the term “breakup” is a colloquialism, it will be used here as a way of differentiating relationships dissolved by the choice of one or more of the partners (the focus of this study) from those terminated by the death of a partner.

Breakups trigger an interrelated series of emotions and behaviors (Bakermans-Kranenburg and van IJzendoorn, 1997; Barbara and Dion, 2000; Fisher, 2006a; Morris and Reiber, 2011). Boelen and Reijntjes (2009) found that those who had pre-existing issues with depression and anxiety expressed stronger emotional problems following a breakup. A longitudinal study on forecasting error found that those who were more in love with their partners, who thought it was unlikely that they would soon enter a new relationship, and who did not initiate the breakup, made especially inaccurate predictions (Eastwick et al., 2008). Fisher has argued that, “We humans are soft-wired to suffer terribly when we are rejected by someone we adore” (2004; p.1). After studying individuals who had recently suffered a breakup, Fisher concluded that: 1) being rejected in love is among the most painful experiences a human being can endure; 2) deserted lovers often become obsessed with winning back their former mate; 3) separation anxiety is expected; and 4) “abandonment rage” is likely, particularly in men. We argue that in many relationships, Archer’s “cost of commitment” must also be paid after a breakup, initiating a complex suite of emotional states (e.g., depression, sadness, anxiety, rage), physical responses (e.g., insomnia, eating disorders, panic attacks) and behaviors that we refer to as *post-relationship grief* (PRG) (Morris and Reiber, 2011).

Evolutionary approaches to romantic and sexual relationships in humans are well represented in the psychological and biocultural literature. Drawing from the parental fitness model of Trivers (1972), Symons (1979) proposed a model of human pair bonds based on gamete size and mobility, in which women are predicted to invest more physical and emotional resources in a romantic relationship than are men, due to the requisite evolved biological costs of a possible pregnancy. Men, if they choose, can exit a mating encounter with no risk of additional biological cost. The relatively low cost to men leads to predictions of higher male promiscuity (Symons, 1979). This is the “investment model” of human pair bonding. Buss extended this line of reasoning to include the “men compete/women chose” model of pair bonding (Buss, 2003). This model proposed that men must acquire and situate their resources in such a way that they can win intrasexual competitions and secure mating partners who are carefully evaluating men based upon their resource acquisition, display, and deployment (Buss, 2003). Additionally, Clutton-Brock and Vincent (1991) demonstrated that the sex that has a faster potential reproductive rate (in this case, men) will face higher intrasexual competition for mates while the sex with a slower reproductive rate (women) will be more selective when choosing potential mates.

In short, 1) men must compete among themselves for mate access to a higher degree than women and are more prone to want multiple mates (Schmitt, Shackelford, and Buss, 2001); and 2) women, in general, are expected to be more selective in choosing a mate, particularly when employing a long-term mating strategy since they are likely to need various forms of assistance (e.g., time, energy, resources) to reproduce successfully (Buss and Shackelford, 2008). However, conflicting predictions concerning males’ responses to breakups can be derived from these premises. If males are selected to be highly competitive and promiscuous, the termination of a relationship should not be particularly traumatic to males since they will quickly move on to another female. However, if females are particularly choosy

concerning partners, the termination of a relationship should be highly traumatic for males, because they may expect to have a difficult time accruing a new mate. In addition, it is likely that those employing a short term mating strategy (both women and men) may experience breakups differently than those employing a long term strategy. However, we know of no current metric that allows for inclusion of this variable, as it has been argued that individuals are likely not consciously aware of the particular mating “strategy” that they are employing at any given time (Buss, 2003).

Breakups happen to the majority of individuals at some point in their life, usually more than once, and have the potential to be one of the most traumatic experiences an individual may ever face in their life (Chung et al., 2003; Fisher 2004). As part of sexual strategies theory, Buss enumerated the causes for failure of romantic relationships for ancestral humans. These include: partner imposing unacceptable costs, lost resource availability due to illness or injury, infertility, infidelity, lost mating opportunities, compelling mating alternatives becoming available, inadequate care for children, psychological abuse, physical abuse, and death of a partner (Buss, 2003; Schmitt and Shackelford, 2003). In a pilot study of 1735 university students, Morris and Reiber (2011) found that for individuals who had experienced a breakup: the termination of a romantic relationship elicited dramatic physical and emotional responses in over 95% of respondents and that both men and women experienced PRG with virtually identical frequency and intensity, but expressed PRG very differently.

One study that explored the cause of and responses to breakups using an explicit evolutionary model found that women had more negative feelings following a breakup than men (Perilloux and Buss, 2008). This finding contrasted with previous studies that suggest it is men who experience breakups with stronger negative emotions than do women (Choo et al., 1996; Sprecher, 1994; Sprecher et al., 1998). Perilloux and Buss (2008) also found that women tend to report more personal growth after breakup, which mirrors the findings of other research

(Bevino and Sharkin, 2003; Mearns, 1991; Tashiro and Frazier, 2003). A major finding of Perilloux and Buss was that those who initiated the breakup had significantly different emotional responses than did those who were rejected.

In contrast to most previous work in this area, which been based on small, college samples, the current study investigated break-ups in a large population while including variables related to more representative ranges of cultural, temporal, and sexual ecologies. We set out to investigate whether results from earlier work would be replicated in a large sample and whether existing and expanded predictions about breakup response are supported. We predict that men and women will vary in their expression of PRG behavior, but that the intensity of the experience will be more similar than we would expect by using the men compete/women chose model. We predict that the party who was rejected in the relationship will suffer higher overall PRG but we also predict that in most instances, both parties will suffer relatively high PRG levels. We seek to explore the causes of relationship dissolution and evaluate whether the predicted evolutionary causes (e.g., male infidelity, infertility) are represented in a large, cross-cultural population. Lastly, we seek to explore the intensity and expression of PRG in a large population to evaluate whether the experiences reported by this population differ from or replicate prior findings (Perilloux and Buss, 2008; Morris and Reiber, 2011).



## **Methods**

Two studies were conducted online between June, 2012, and March, 2013. The invitations and survey questions were only offered in English. A secure link led to the survey instructions. Participants were told this was an academic survey regarding past romantic relationship experiences, that responses were confidential, and that they: were not obligated to answer all questions, could quit the survey at any time, and could take as much time as needed (although each survey was designed to be completed in approximately 15 minutes). Respondents could not access either survey until agreeing to participate in the study, and were provided contact information for the principal investigator if they had questions or concerns related to the study. No tangible material or monetary compensation was offered to participants. This method of acquiring an informed consent follows the recommendations of the Board of Scientific Affairs' Advisory Group on the Conduct of Research on the Internet (Kraut et al., 2004). The surveys were hosted by Qualtrics® which has SAS 70 Certification and meets the privacy standards of the Health Insurance Portability and Accountability Act (HIPAA). Qualtrics® provides a filter option that permits only one survey submission from any individual IP address to prevent "ballot stuffing." All responses were labeled with random 15 digit alphanumeric codes and no other identifying information was associated with any responses. No names or email addresses were collected during recruitment or data analyses. These studies were approved by Binghamton University's Human Subjects Research Review Committee, and all research was performed by certified investigators who conformed to the guidelines for the ethical treatment of human subjects.

In Study A, a convenience sample of participants aged 18 and older was recruited internationally via online invitations widely distributed through academic listservs, Facebook

groups, and Reddit forums. Approximately 145,000 individuals were invited with 3914 participating, a response rate of 2.6%. Participants in Study B were recruited from invitations sent to approximately 150,000 additional individuals with 1791 participating, a response rate of 1.3%. Study B invitations were sent to different individuals than Study A, but an attempt was made to keep the approximate proportions of invitations comparable (i.e., total numbers of Facebook invitations, academic listservs, and online forums was kept comparable). The total number of invitees (~295K) reflects only recorded contacts—the true reach of the survey is unknowable (e.g., a department chair may have taken the survey, distributed it to her department, distributed it university-wide, or all/some/none of these actions).

The survey contacts were invited to participate in a brief survey on romantic relationships. No mention of breakups, divorce, or relationship termination was made in the invitation. Participants provided demographic information and responses to questions about romantic relationship history, and if applicable, breakups (e.g., Have you experienced a breakup? How severe was the breakup for you emotionally? Who do you feel initiated the breakup? What sort of physical responses did you experience as a result of the breakup?). If respondents had experienced multiple breakups, they were asked to identify and confine their responses to one breakup of their choosing (e.g., the most recent, the one that affected them most). Respondents were asked to report a self-assessment of their mate value—using whatever criteria they felt was applicable—and to rate their emotional response (ER) and physical response (PR) to their selected breakup on a scale from 0 (none) to 10 (unbearable). Participants were also asked to identify the components of their emotional and physical responses; they were provided a list of common responses that was generated from earlier pilot research, and were asked to endorse as many as applied to them. For analysis purposes, Total Response (TR) was calculated by summing (ER + PR) to reflect how severe a breakup

experience was, overall, on a scale of 1-20. In direct tests of a priori predictions, we used a two-tailed  $\alpha$  level of .05 and calculated Cohen's  $d$  as a measure of effect size.

The two surveys (A and B) differed in two major ways. First, due to the high level of "other" responses to multiple choice questions (e.g., breakup cause) in Survey A, Survey B was modified to include a text box allowing participants to specify or elaborate on what they meant by "other". Since the analysis of these textual responses is beyond the scope of this paper, quantitative data from the two studies are combined when possible for the analyses shown here. In addition, initial analysis demonstrated that depression is often accompanied by sadness, yet sadness itself was so frequently mentioned in the optional commentaries in Survey A that it was added as an additional category of emotional response in Survey B.

## Results

Of the ~295K invited individuals, 5705 individuals age 18 or older participated. Participants represented 96 countries and all 20 of the of the US Census Bureau occupation types. Only 38% of respondents were undergraduate or graduate students. Of these respondents, 95 (1.7%) did not report a binary gender identity. These individuals were excluded from the following analyses and will be represented in a future report. Individuals who do not report all basic demographic data were also excluded (N=211) Demographic information on survey participants can be seen in Table 3.1.

Table 3.1 *Demographic information for participants who experienced a breakup (M ± SD)*

	Men	Women
N	1490	2834
Age (years)	31 ± 4.66	30 ± 4.07
Income (US \$)	26714 ± 2.96	22589 ± 2.51
Self-reported mate value (1-10)	7.64 ± 2.01	7.88 ± 1.93

Across both surveys, 2834 women (84%) and 1490 men (79%) reported experiencing a breakup. Of these, 2318 women (82%) and 1159 men (78%) experienced multiple breakups. Of

those who had experienced multiple breakups, women experienced an average of 3.56 (SD=2.58) and men, 3.25 (SD=2.22). These respondents were asked to address one breakup of their choosing for the remainder of the survey queries. The length of these selected relationships averaged 2.9 years for women (N=2813, SD=2.68) and 2.51 years for men (N=1482, SD=2.47);  $t=4.576$  (4158);  $p<.0001$ . Responses addressing relationship length were not submitted by .07% of women and .05% of men. For women, the mean level of emotional response was 6.84 (SD=2.52, N=2695) and for men, 6.58 (SD=2.58, 1409);  $t(4102) = 3.115$ ,  $p=.002$ ,  $d=.102$ . Physical response levels were lower overall; the mean PR for women was 4.21 (SD=2.94, N=2682) and for men, 3.75 (SD=2.93, N=1398);  $t(4078) = 4.677$ ,  $p<.001$ ,  $d=.157$ . The distribution of physical and emotional response levels by sex can be seen in Figure 3.1. The basic components of emotional and physical responses identified by men and women are shown in Figure 3.2. The initiator of the breakup as reported by each sex is shown in Figure 3.3. Figure 3.4 shows emotional, physical, and total response levels.

Figure 3.1 *Distribution of emotional (top panel) and physical (bottom panel) response levels to a breakup, by sex.*

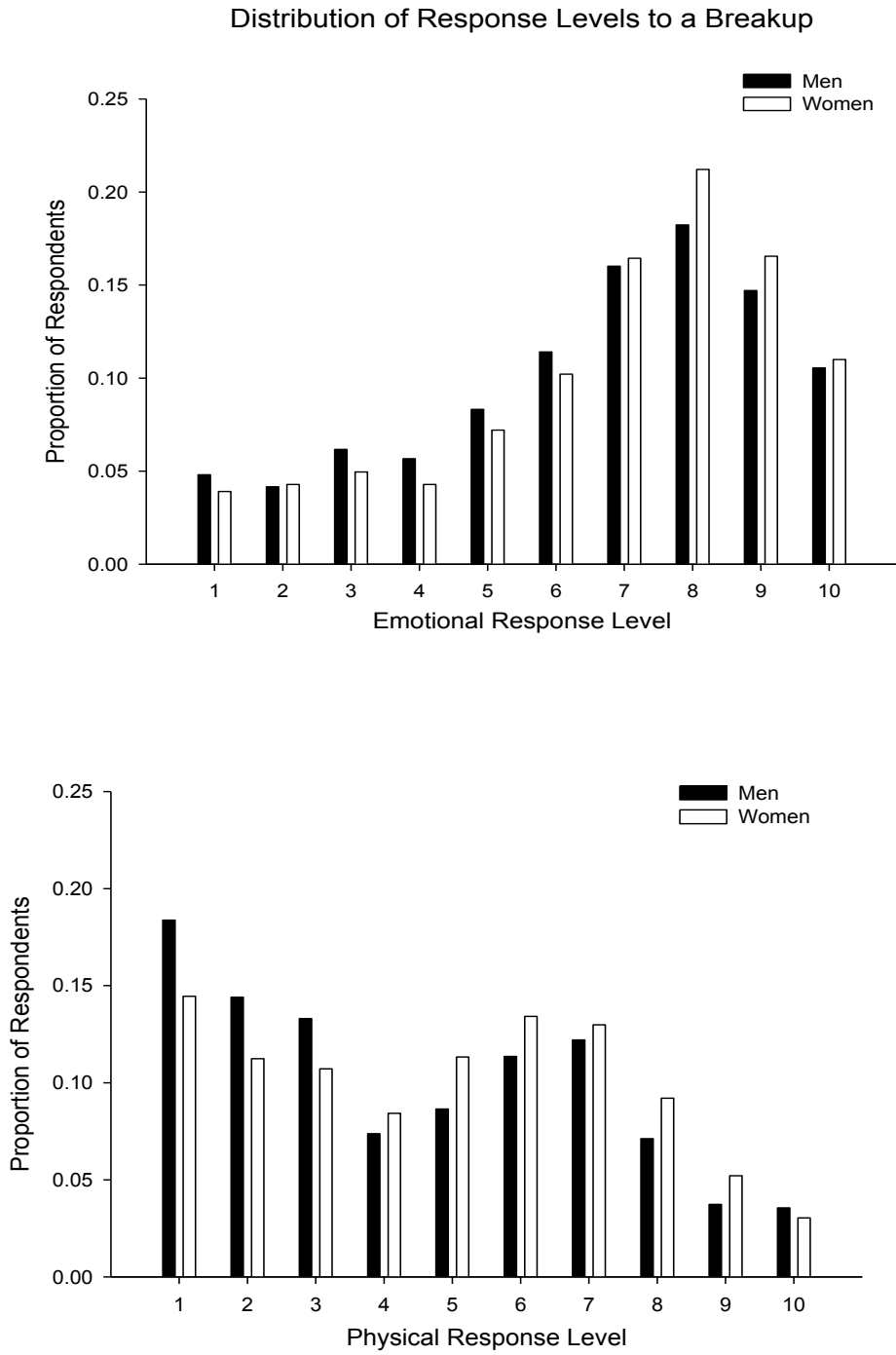
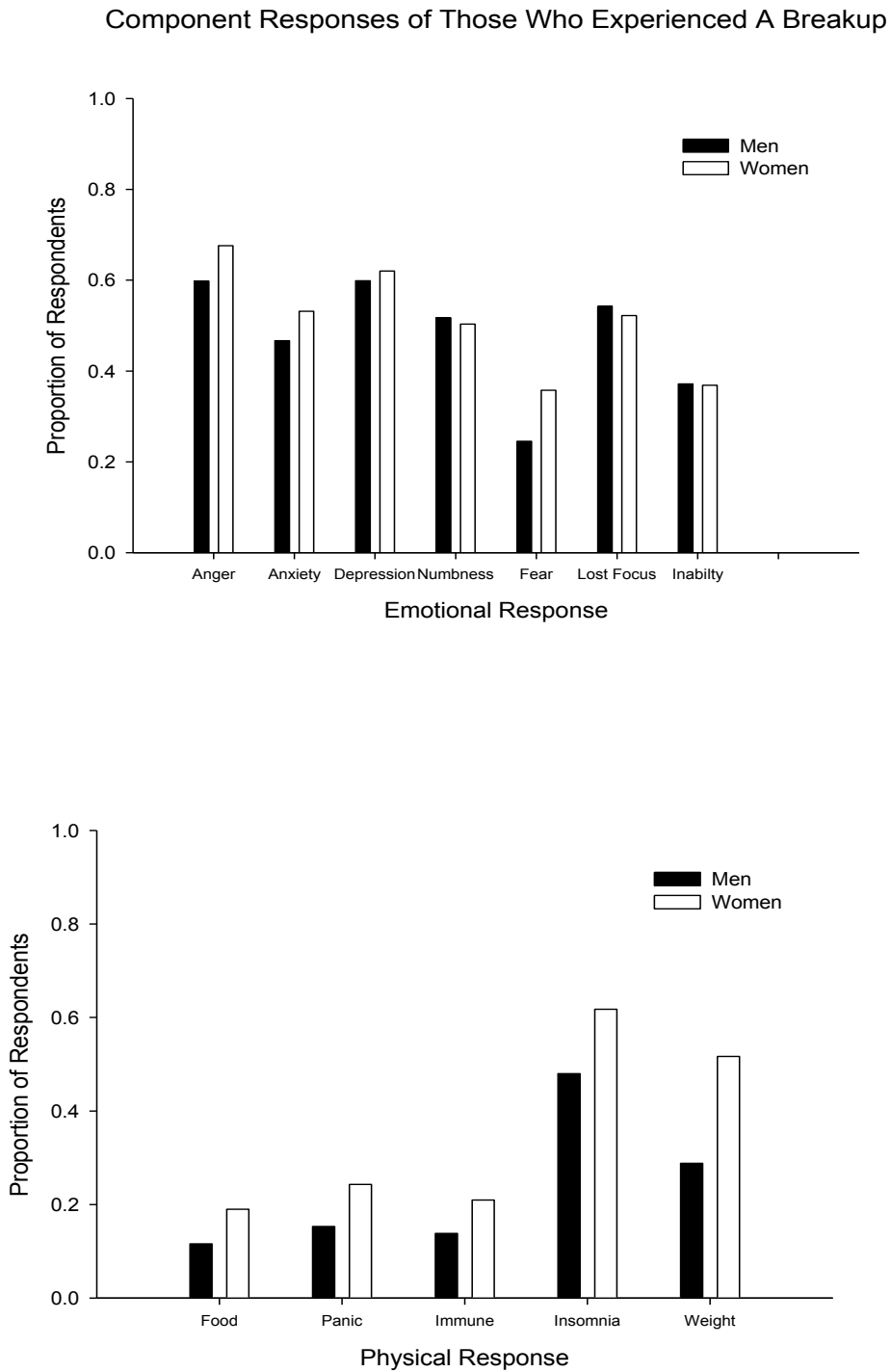


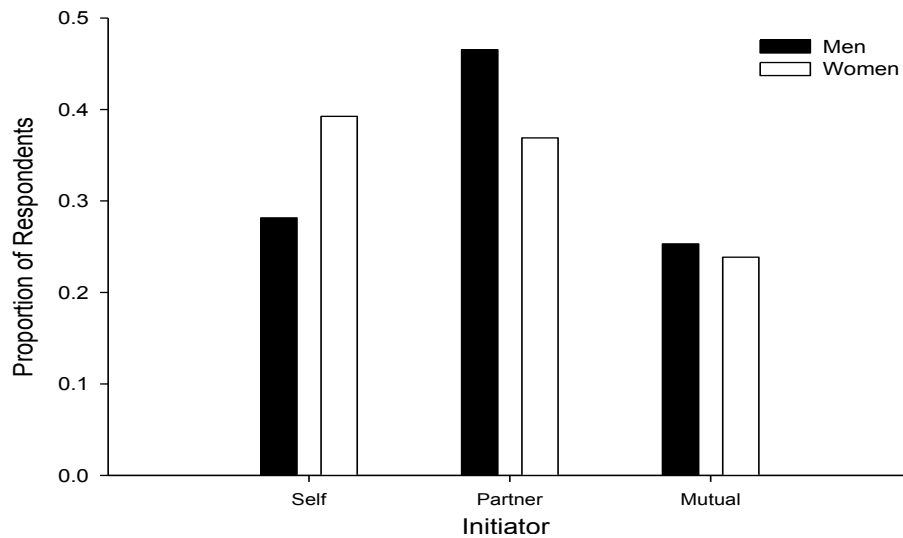
Figure 3.2 Components of emotional (top panel) and physical responses (bottom panel) to a breakup, by sex<sup>4,5</sup>



<sup>4</sup> Anger; Anxiety; Depression; Fear; General loss of focus; Inability to function at school or work

<sup>5</sup> Nausea and/or inability to eat; Panic attacks; Reduced immune system function; Insomnia; Unwanted weight loss/gain

Figure 3.3 *Initiator of breakup by sex.*



Respondents of Survey A were asked what caused their breakup<sup>6</sup>. The response options were not mutually exclusive. The results for women (N=1966) and men (N=1125) are shown in Figure 3.5. The emotional, physical, and total response based upon the cause of breakup is shown by sex in Figure 3.6.

---

<sup>6</sup> Respondents of Survey B were asked to “describe what caused your breakup” in text form only. This resulted in 1123 responses totaling 40752 words. These results require qualitative analyses that are beyond the scope of this initial inquiry.



Figure 3.4 Mean (SD) emotional (top panel), physical (middle panel), and total (bottom panel) response levels by initiator of breakup and sex

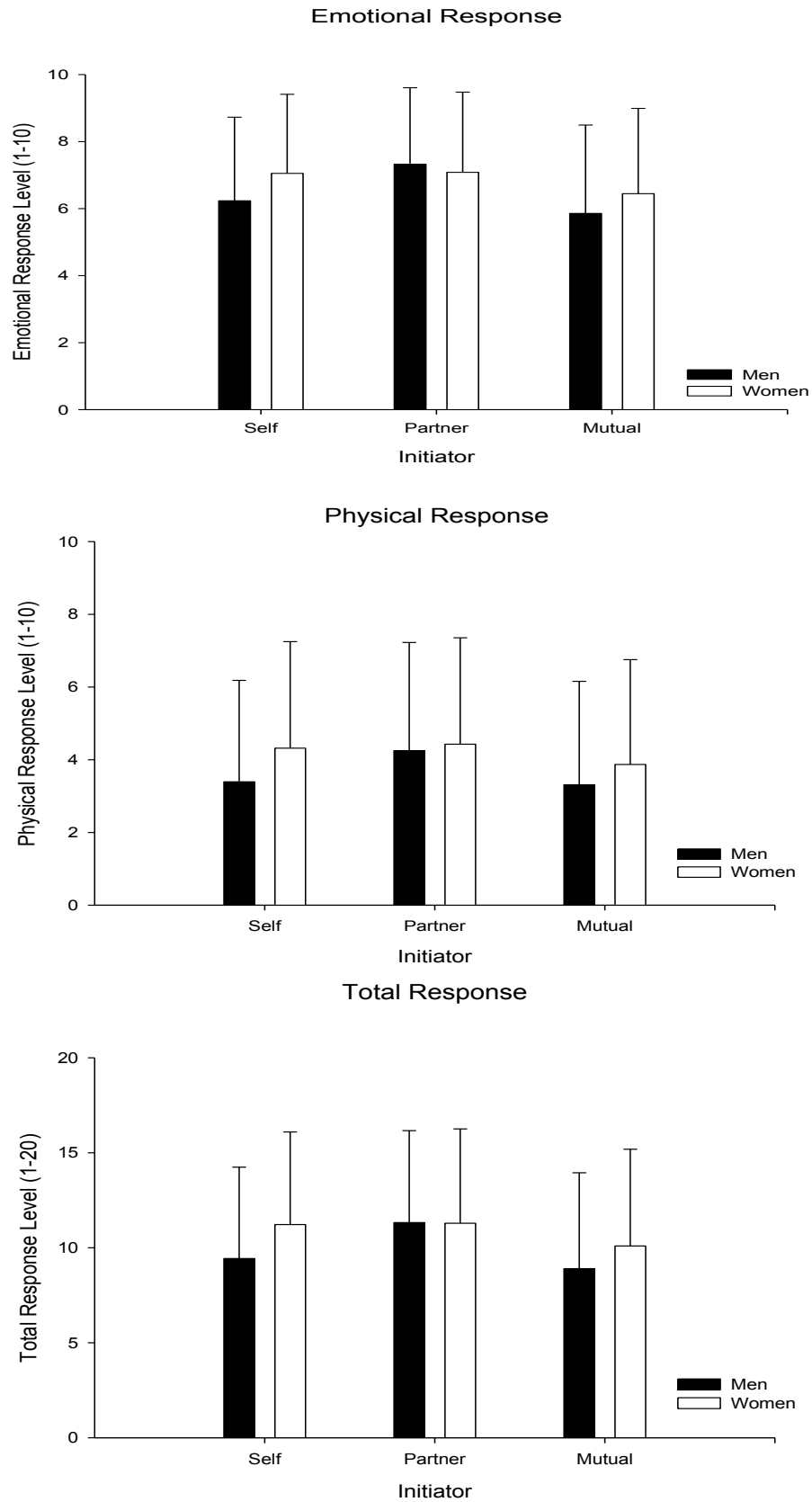


Figure 3.5 *Distribution of cause of breakup as reported by sex*

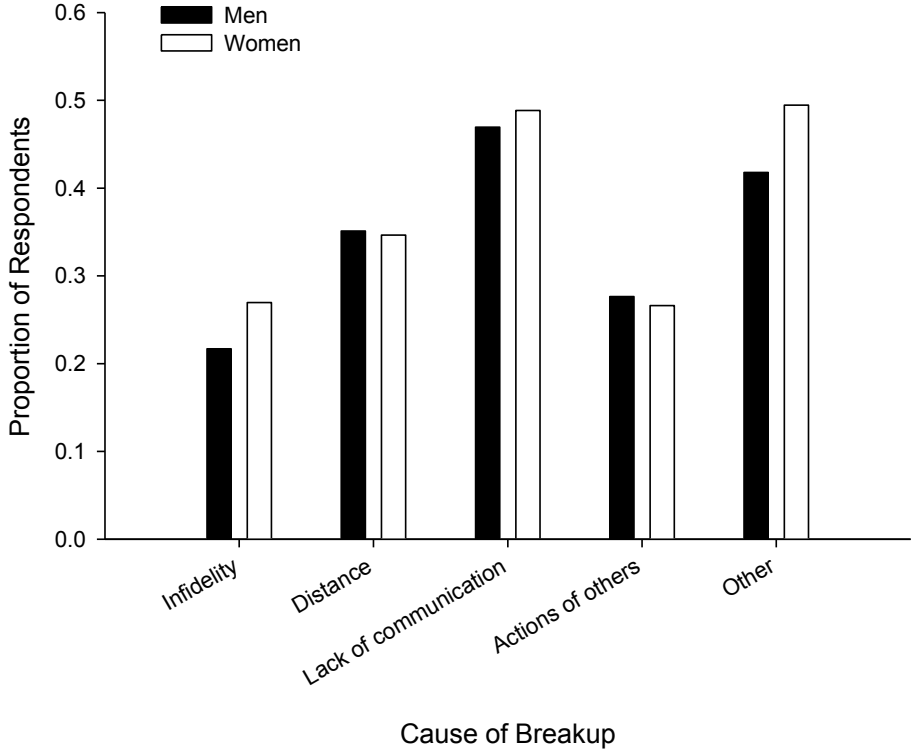
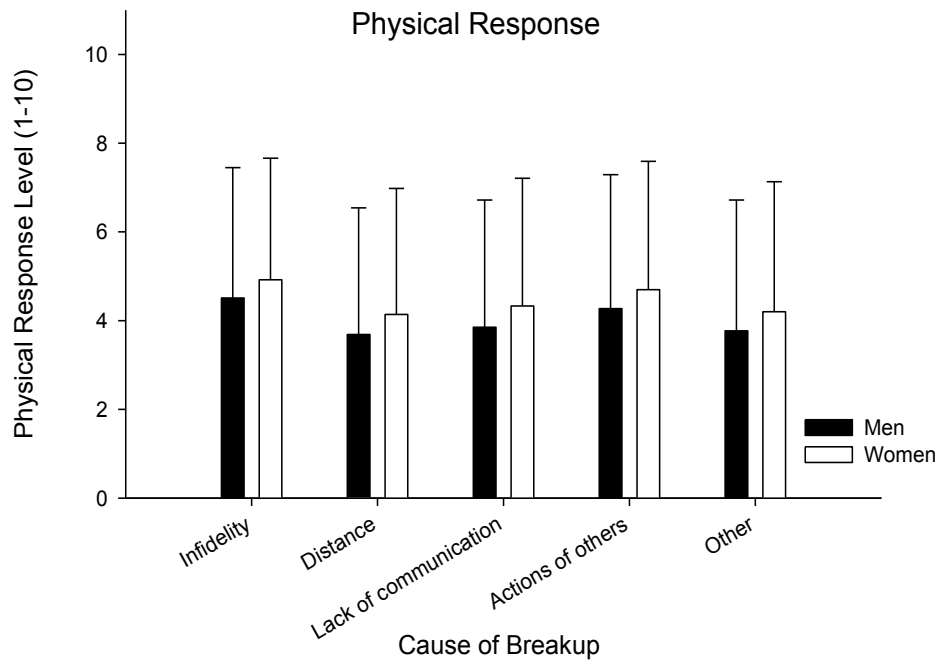
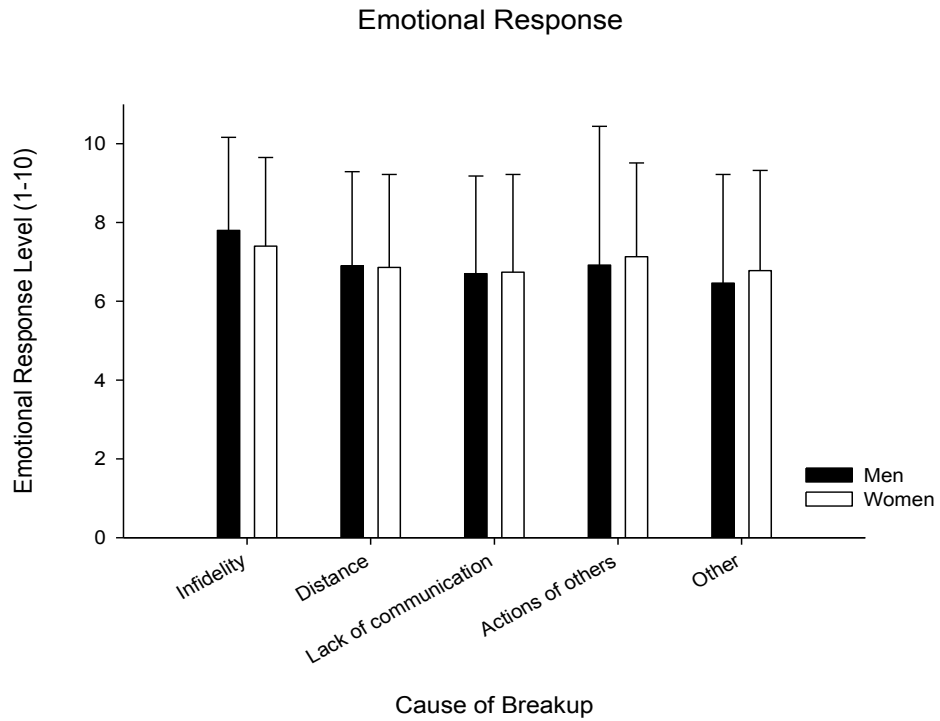
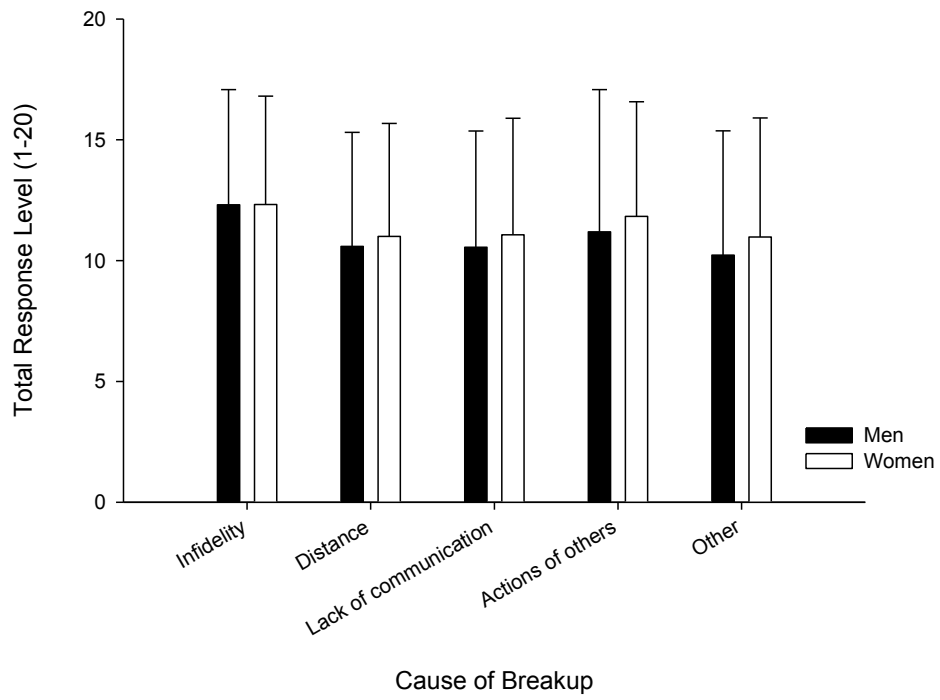


Figure 3.6 Mean (SD) emotional (top panel), physical (middle panel), and total (bottom panel) response levels by cause of breakup and sex



### Total Response



## Discussion

The purpose of this study was to examine evolutionarily informed predictions regarding emotional and physical responses to a breakup—a cluster of correlated responses that we refer to as post-relationship grief (PRG). We sought to test multiple predictions of the biological model stemming from the work of Trivers (1972), Symons (1979), and Buss (2003), and looked to replicate or expand upon the extant findings.

Over three quarters of respondents had experienced a breakup. Of these respondents, an additional three quarters had experienced multiple breakups—roughly four each for both sexes. Since the mean age of respondents of both sexes was approximately 30 years, we conclude that having multiple breakups, relatively early in life, is the norm rather than the exception. This suggests that just as mate attraction, mate guarding, and mate retention tactics are products of evolution, so too must be PRG itself, as well as a means of mitigating the PRG experience and “moving on.” As Fisher (2004) asked, “Why did our ancestors evolve brain links to cause us to hate the one we love? Perhaps because it enabled jilted lovers to extricate themselves and start again.”(p.43).

In most instances, the mean responses to a break-up differed significantly by sex. Emotional response to a breakup was substantially more severe than physical response for both sexes, with women expressing significantly higher levels than men in each instance. However, the distribution of the responses is remarkably similar across the sexes—an occurrence not predicted by a coarse interpretation of the biological model. Equally striking is the intensity of the emotional response for both sexes. Considering that a response level of zero indicated “no

effect” while ten indicated “unbearable,” the median (and mean) response of nearly seven for both men and women is notable. As with intensity of response, the component responses, both physical and emotional, showed statistically significant variation in most instances, but similar distributions by sex. Important, perhaps predictably, is the higher rate of a “fear” response in women as well as the extremely high rate of insomnia for both men and women. Unwanted weight loss or gain was also far more common in women than men, but if the qualitative analyses mirror our pilot study (Morris and Reiber, 2011), this response will, contrary to the stereotype, involve substantial unwanted weight *loss*.

Women initiated breakups more often than did men. Those who were rejected also suffered significantly higher levels of overall PRG than those who initiated the breakup or in instances where the relationship was dissolved by mutual agreement. However, it should be noted that regardless of the initiator, the PRG experience was still relatively severe for both parties.

The biological model suggests that infidelity, primarily male, is by far the most common cause of breakups (Symons, 1979; Einon, 1994; Buss, D. M., and Schmitt, D. P., 1993; Drigotas, S. M., and Barta, W, 2001; Schmitt, Shackelford, and Buss, 2001). Our data does not support that argument. “Lack of communication” was selected nearly twice as often as infidelity, by roughly half of men and women as the number one reason for the breakup. However, these causal options were *not* mutually exclusive and furthermore, the high rate of “other” as a breakup cause clearly demonstrates that the complexity of this phenomenon requires additional study.

This initial investigation into PRG suggests that the topic is one that avails itself to continued study. While the survey response rates were low (~2%), the sample size is quite large. Also, the attentiveness with which participants engaged the surveys (approximately 87% of

participants completed the full survey) and the surfeit of qualitative data gathered from the optional additional comments (over 400,000 words of text) suggest that continued investigation along these lines will provide meaningful information on relationship termination.

**Limitations and Future Directions.** Any internet-based survey presents its own set of limitations. The reach of the surveys is unknowable, and therefore a true response rate is incalculable. However, valuable data is attainable via the internet if the project is approached in a logical and diligent manner (e.g., be inclusive with the targeting of groups, strive for representative group samples). Moreover, anonymous and confidential internet-based research is an ideal way to let subjects “speak with their own voice” on sensitive topics (e.g., sexual behavior, pornography use, sexually transmitted infections) without interviewer bias and other dilemmas associated with lab interviews.

In addition, the survey was offered only in English—a conscious choice. While the survey host service offered thorough translation options, the authors felt the subject matter and question wording would, literally, get lost in translation. Hence, while 96 countries are represented, the participants are all English speakers. This may alter the true “cross cultural” nature of the surveys.

As with any survey instrument, particularly one distributed internationally, survey design is fundamental. To ensure that our data captured the reality of the participants, our methodology included a pilot survey, an initial survey, and a final survey that were refined at each step to address any issues that appeared. For example, participants spontaneously noted “sadness” so often in the “other” category of Survey A’s emotional responses (via optional comments) that we included it as a separate category in Survey B—one that was widely selected (83% of men and 82% of women selected this new category in Survey B). This is a key example of letting subjects speak for themselves.

Lastly, as with any study of this scope regarding a complex human behavior, more questions are raised than are answered. Other lines of inquiry are apparent and immediate: 1) Will the information gathered vary and/or be correlated with complex identities (e.g., relationship history, life history stage, sexual identity)? 2) Does the PRG experience vary cross-culturally, and if so, in what ways? 3) A pilot study (Morris and Reiber, 2011) demonstrated that men and women may “feel” a breakup in similar ways, but their post-breakup behavior varies dramatically. Will this finding be replicated in this wider sample? 4) What is causing the “second peak” in physical response levels? Is it individual-based (e.g., a result of attachment style, relationship history, age) or relationship-based (e.g., dependent on the cause of the breakup)? 5) Of particular importance as this project moves beyond simple sex differences is the question of whether or not intrasexual variation in PRG response may be more significant than intersexual variation in both intensity and expression. 6) Lastly, in our pilot study and both iterations of the survey reported here, women consistently participated nearly three times as often as did men. How do we gather more information on the experiences of men, and what will we find? Are they the epitome of the “promiscuous male” who has so little investment in relationships that they have no response to a breakup and thus no reason to participate in such a study? Are they examples of the purported “loser male” who has limited access to a romantic partner? We suggest that men who recover quickly from a breakup while experiencing low levels of PRG may be those who possess sufficient resources so that future mates will readily choose them. Males who have low resources and are unlikely to be selected by “choosey women” should experience severe and long-lasting PRG. However, by expressing a strong negative response to a breakup, a man may be signaling to rivals and potential future partners that he expects to have a difficult time acquiring a new mate—a behavior that is, evolutionarily, harmful to reproductive success. Therefore, the most adaptive behavior for men who have experienced a recent breakup may be to behave as if the breakup has not affected them—men who are “winners” would not care about the breakup since they would have the ability to quickly move on to another relationship.



Conversely, or perhaps for this very reason, is it possible that a portion of the male population suffers PRG so severely that they are unable to even consider participation in any such study that addresses a past romantic failure?

## References

- Archer, J. (1999). The function of grief. In *The nature of grief: the evolution and psychology of reactions to loss* (p. xiii, 317 p.). London ; New York: Routledge.
- Bakermans-Kranenburg, M., and van IJzendoorn, M. (1997). Adult attachment and the break-up of romantic relationships. *Journal of Divorce and Remarriage*, 27, 121–139.
- Barbara, A. M., and Dion, K. L. (2000). Breaking up is hard to do, especially for strongly “preoccupied” lovers. *Journal of Loss and Trauma*, 5, 315–342.
- Battaglia, D. M., Richard, F. D., Datteri, D. L., & Lord, C. G. (1998). Breaking up is (relatively) easy to do: A script for the dissolution of close relationships. *Journal of Social and Personal Relationships*, 15(6), 829-845.
- Bevino, D. L., & Sharkin, B. S. (2003). Divorce adjustment as a function of finding meaning and gender differences. *Journal of Divorce & Remarriage*, 39(3-4), 81-97.
- Boelen, P. A., and Reijntjes, A. (2009). Negative cognitions in emotional problems following romantic relationship break-ups. *Stress and Health*, 25, 11–19.
- Bonanno, G. A., Wortman, C. B., Lehman, D. R., Tweed, R. G., Haring, M., Sonnega, J., ... Nesse, R. M. (2002). Resilience to loss and chronic grief: A prospective study from preloss to 18-months postloss. *Journal of Personality and Social Psychology*, 83, 1150–1164.
- Bowlby, J. (1999). *Attachment and loss*. New York: Basic Books.
- Buss, D. (2003). *The evolution of desire : strategies of human mating*. New York: Basic Books.
- Buss, D. M., and Schmitt, D. P. (1993). Sexual strategies theory: an evolutionary perspective on human mating. *Psychological Review*, 100(2), 204.
- Buss, D. M., and Shackelford, T. K. (2008). Attractive Women Want it All: Good Genes, Economic Investment, Parenting Proclivities, and Emotional Commitment. *Evolutionary Psychology*, 6, 134–146.
- Chung, M. C., Farmer, S., Grant, K., Newton, R., Payne, S., Perry, M., Stone, N. (2003). Coping with post-traumatic stress symptoms following relationship dissolution. *Stress and Health*, 19, 27-36.
- Choo, P., Levine, T., & Hatfield, E. (1996). Gender, love schemas, and reactions to romantic break-ups. *Journal of Social Behavior and Personality*, 11(5), 143-160.
- Clutton-Brock, T. H., and Vincent, A. C. (1991). Sexual selection and the potential reproductive

rates of males and females. *Nature*, 351(6321), 58-60.

Drigotas, S. M., and Barta, W. (2001). The cheating heart: Scientific explorations of infidelity. *Current Directions in Psychological Science*, 10(5), 177-180.

Eastwick, P. W., Finkel, E. J., Krishnamurti, T., and Loewenstein, G. (2008). Mispredicting distress following romantic breakup: Revealing the time course of the affective forecasting error. *Journal of Experimental Social Psychology*, 44, 800-807.

Einon, D. (1994). Are men more promiscuous than women? *Ethology and Sociobiology*, 15(3), 131-143.

Fisher, H. (1995). The nature and evolution of romantic love. In *Romantic Passion: A Universal Experience?* New York: Columbia University Press.

Fisher, H. (2004). Dumped! *New Scientist*, 181, 40-43.

Fisher, H. (2005). Evolution of human serial pairbonding. *American Journal of Physical Anthropology*, 78, 331-354.

Fisher, H. (2006a). Broken Hearts: The Nature and Risk of Romantic Rejection. In *Romance and Sex in Adolescent and Emerging Adulthood: Risk and Opportunities* (pp. 3-28). Mahwah, New Jersey: Pennsylvania State University.

Fisher, H. (2006b). Lost Love: The Nature of Romantic Rejection. In *Cut loose : (mostly) older women talk about the end of (mostly) long-term relationships* (pp. 182-195). New Brunswick, N.J.: Rutgers University Press.

Jankowiak, W. R. (1995). *Romantic Passion : A Universal Experience?* New York: Columbia University Press.

Jankowiak, W. R. (2008). Desiring sex, longing for love: A tripartite conundrum. In *Intimacies : love and sex across cultures* (pp. 1-36). New York: Columbia University Press.

Keller, M., and Nesse, R. (2005). Is low mood an adaptation? Evidence for subtypes with symptoms that match precipitants. *Journal of Affective Disorders*, 86, 27-35.

Kraut, R., Olson, J., Banaji, M., Bruckman, A., Cohen, J., and Couper, M. (2004). Psychological research online: report of Board of Scientific Affairs' Advisory Group on the Conduct of Research on the Internet. *American Psychologist*, 59, 105.

Mearns, J. (1991). Coping with a breakup: Negative mood regulation expectancies and depression following the end of a romantic relationship. *Journal of Personality and Social Psychology*, 60, 327-334.

Morris, C. E., and Reiber, C. (2011). Frequency, Intensity and Expression of Post-Relationship Grief. *EvoS Journal: The Journal of the Evolutionary Studies Consortium*, 3, 1-11.

Schmitt, D., and Shackelford, T. (2003). Nifty ways to leave your lover: The tactics people use to entice and disguise the process of human mate poaching. *Personality and Social Psychology Bulletin*, 29, 1018.

Schmitt, D., Shackelford, T., and Buss, D. (2001). Are men really more oriented toward short-term mating than women? A critical review of theory and research. *Sexualities, Evolution and Gender*, 3, 211–239.

Sprecher, S. (1994). Two sides to the breakup of dating relationships. *Personal Relationships*, 1(3), 199-222.

Sprecher, S., Felmlee, D., Metts, S., Fehr, B., & Vanni, D. (1998). Factors associated with distress following the breakup of a close relationship. *Journal of Social and Personal Relationships*, 15(6), 791-809.

Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.

Tashiro, T. Y., & Frazier, P. (2003). “I’ll never be in a relationship like that again”: Personal growth following romantic relationship breakups. *Personal Relationships*, 10(1), 113-128.

Trivers, R. L. (1972). Parental investment and sexual selection, in Campbell B., *Sexual Selection and the Descent of Man*, 1972, 136-179.

## **CHAPTER 4**

### **Quantitative Life History Variation in Post-Relationship Grief**

Morris, C.E. and Reiber, C. (2015b) Quantitative Life History Variation in Post-Relationship Grief. Manuscript submitted for publication.

## **Abstract**

This study's purpose was to gather survey data that would allow us to examine the emotional and physical responses to the dissolution of a romantic relationship—a cluster of correlated responses we refer to as post-relationship grief (PRG)—from an evolutionary perspective in a population that represents varied life history experience. Analyses of our sample of 5705 individuals from 96 countries showed the following: Approximately 81% of individuals experience a breakup with most experiencing more than one ( $M=3.3$ ); romantic relationships tend to be short (two years or less) or long (seven years or more); lengthier relationships produce more severe PRG than do shorter ones; and in women, PRG increases with age to a peak between the ages of 40-49 before decreasing while men's PRG level remains constant with age.

## Introduction

Many consider romantic relationships to be a panhuman experience. This universality has been demonstrated in foundational literature (Fisher, 1995; Jankowiak, 1995) as well as more recent studies which show that—motivated by their varying needs for romance, physical and emotional support, and sexual exclusivity—most individuals will enter and exit a series of romantic relationships throughout their lifetimes (Fisher, 2006a, 2006b; Jankowiak, 2008). For most individuals, this process is cyclical (Buss, 2003; Fisher, 2005; Morris and Reiber, 2011). Recent findings show that upwards of 80% of all individuals will experience a failed romantic relationship at least once in their lifetime (Morris, Roman, and Reiber, 2015a).

The behaviors associated with initiating and maintaining a romantic relationship have been well-studied in evolutionary research. Trivers' parental investment model (1972), Symons' biological model of human mating (1979), and Buss' sexual strategies model of human sexual interactions (Buss, 2003), have all demonstrated that we employ proximate mechanisms and behaviors (e.g., physical attraction, mate guarding, sex) in the service of ultimate causality (i.e., reproductive success). These proximate mechanisms have been, and continue to be, a focus of interdisciplinary study among human behavioral ecologists, evolutionary psychologists, biocultural anthropologists, and others.

However, the termination of romantic relationships is less-well studied. In *The Nature of Grief*, Archer (1999) examined the grief of widowhood, arguing that such suffering is a result of a “trade-off” between costs and benefits: Romantic bonds have multiple adaptive values but there is a cost—a series of emotions and behavioral responses—if a partner dies. Archer terms

this “the cost of commitment.” It has been argued (Morris and Reiber, 2011) that this cost of commitment is also encountered by most individuals following a breakup. Although colloquial, the term “breakup” is used here as a way of differentiating relationships dissolved by choice from those terminated via death of a partner. Research suggests that the event of a breakup frequently initiates a complex set of emotional states (e.g., depression, sadness, anxiety, rage), physical responses (e.g., disordered sleep and eating patterns, panic attacks) and behaviors; this suite of responses has been termed *post-relationship grief* (PRG) (Morris and Reiber, 2011). Furthermore, breakups are experienced repeatedly by the majority of individuals throughout their lives (Morris, Roman, and Reiber, 2015a), and have the potential to be one of the most traumatic events an individual will ever experience (Chung et al., 2003; Fisher 2004; Morris and Reiber, 2011).

Fundamental contributions of the aforementioned evolutionary models are that 1) Men typically compete among themselves for mate access to a higher degree than women; 2) Men are more prone to want more lifetime mating partners than do women (Schmitt, Shackelford, and Buss, 2001); and 3) Women are expected to be more selective in choosing a mate, particularly when employing a long-term mating strategy since they are likely to need various forms of assistance (e.g., time, energy, resources) to reproduce successfully (Buss and Shackelford, 2008). This suggests a series of predictions regarding life history variation in breakup experience. For example, while men’s PRG response should remain consistent with age, we would expect late-life breakups to be particularly traumatic for women. Moreover, the intensity of PRG should be positively correlated with duration of the terminated relationship; that is, the termination of longer-term relationships should be more painful than the termination of shorter-term relationships.

This research explores the breakup experience by including basic life history variables (e.g., age, relationship length, time since breakup, number of overall breakups) to examine these



unanswered questions. This will allow the evaluation of questions such as: How prevalent are breakups? How many breakups do individuals experience? How frequent are breakups? How long do relationships last? Do responses to breakups vary by age? By relationship length? Is reported response to a breakup related to how long ago the relationship ended? Is breakup response related to how many breakups an individual has experienced?

## **Methods**

An extended discussion of the methodology of this study is elaborated in Morris, Roman, and Reiber (2015a). Briefly, two online surveys were conducted between June, 2012, and March, 2013. Invitations stated that this was an academic survey regarding past romantic relationship experiences, responses were confidential, and that participants: were not obligated to answer all questions, could quit the survey at any time, and could take as much time as needed. This method of acquiring an informed consent follows the recommendations of the Board of Scientific Affairs' Advisory Group on the Conduct of Research on the Internet (Kraut et al., 2004). The surveys were hosted by Qualtrics® which has SAS 70 Certification and meets the privacy standards of the Health Insurance Portability and Accountability Act (HIPAA). Qualtrics® provides a filter option that permits only one survey submission from any individual IP address to prevent "ballot stuffing." All responses were labeled with random 15 digit alphanumeric codes and no other identifying information was associated with any responses. No names or email addresses were collected during recruitment or data analyses. These studies were approved by Binghamton University's Human Subject's Research Review Committee and all research was performed by certified investigators who conformed to the guidelines for the ethical treatment of human subjects.

A convenience sample of participants aged 18 and older was recruited internationally via online invitations. Approximately 295,000 individuals were invited with 5705 participating, a response rate of 1.8%. The total number of invitees (~295K) reflects only recorded contacts; the true reach of the survey is unknowable (e.g., a department chair may have taken the survey,

distributed it to her department, distributed it university-wide, or all/some/none of these actions).

The survey contacts were invited to participate in a brief survey on romantic relationships. Participants provided demographic information and responses to questions about romantic history and breakups (e.g., Have you experienced a breakup? How severe was the breakup for you emotionally? Who do you feel initiated the breakup? What sort of physical responses did you experience as a result of the breakup?). If respondents had experienced multiple breakups, they were asked to confine their responses to one breakup of their choosing (e.g., the most recent, the one that affected them most). Respondents were asked to report emotional (ER) and physical response (PR) to their selected breakup on a scale from 0 (none) to 10 (unbearable). Participants were also asked relevant life history questions (e.g., How many breakups have you experienced? How long did the selected relationship last?)

## Results

We received 5705 responses from individuals age 18 or older out of the approximately 295,000 Internet invitations. While the response rate was low, the reach of the survey was unusually broad for an internet based survey (Morris, Roman, and Reiber, 2015a). Respondents represented 96 countries and all 20 of the of the US Census Bureau occupation types. Detailed demographic information on survey participants can be found in Morris, Roman, and Reiber (2015a). In the analyses shown here, we excluded participants who reported a non-binary gender (N=95) or a not-exclusively heterosexual sexuality (N=1785). This significant population will be addressed in future analyses but is beyond the scope of this report. In addition, we excluded participants who did not include the minimum requisite demographic information in their responses (N=301). Basic demographics are shown in Table 1.

Table 4.1 *Demographic information for participants (M ± SD)*

	Men	Women
N	1402	2122
Age (years)	31 ± 4.66	30 ± 4.07
Income (US \$)	28587 ± 2.96	26007 ± 2.51

Our first inquiries pertained to “the basics:” How often do individuals experience breakups, how many breakups do they have, and how do they perceive their value as a mate? Across both surveys, 2848 of 3524 participants reported having experienced a breakup (81%)—1756 women (84%) and 1092 men (80%). Of these, 81% of women and 76% of men had experienced multiple breakups. The distribution of these values can be seen in Figure 1. Women experienced an average of 3.34 breakups (N=1756 SD=2.34 Med =3.0) and men, 3.2 (N = 1092 SD=2.11 Med =3.0). Respondents reported self-assessments of mate value on a scale from 1 to 10 with 10 being highest. Men reported a mean mate value of 7.54 (N = 1092, SD = 1.95, Med = 8); women reported a mean mate value of 7.84 (N = 1756, SD = 1.81, Med = 8). The distribution of these values can be seen in Figure 2.

Figure 4.1 *Multiple breakup distribution*

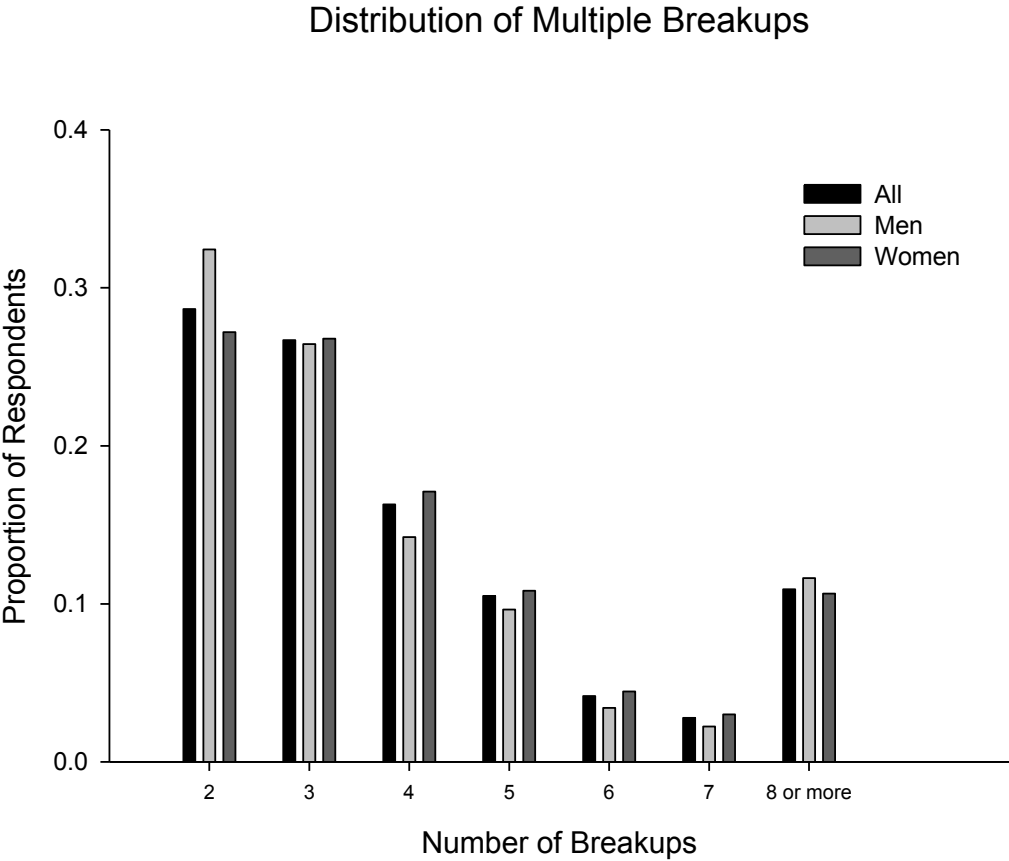
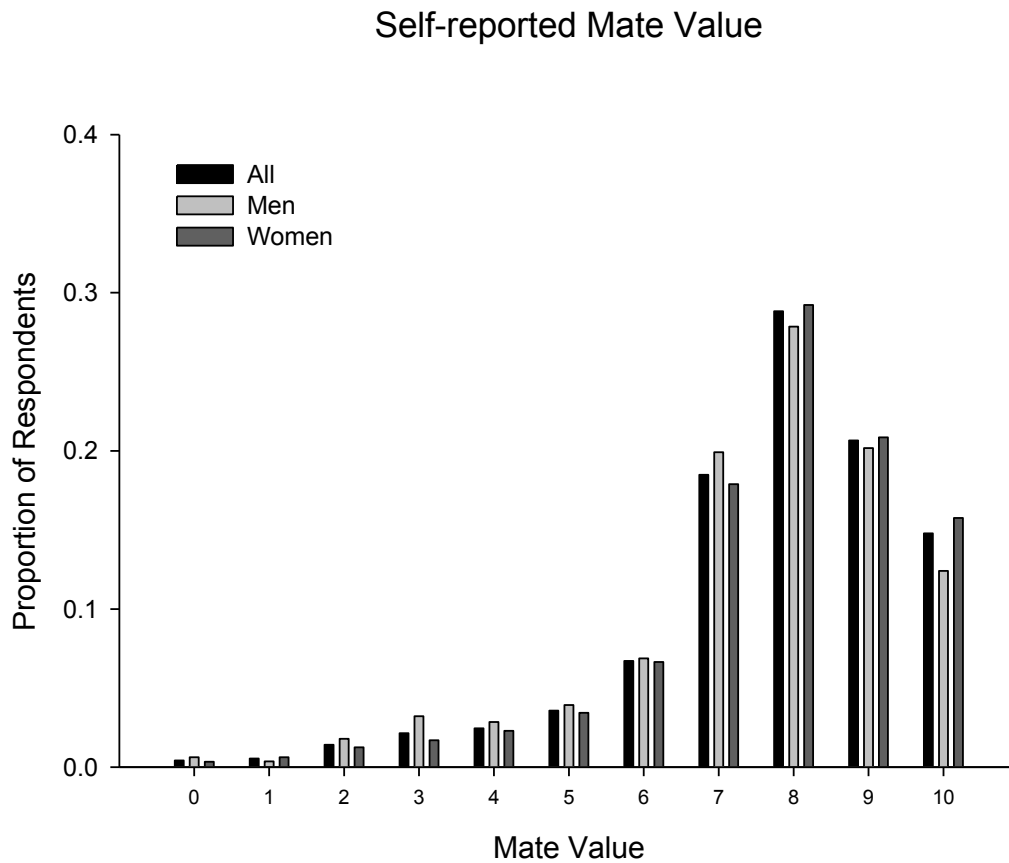


Figure 4.2 *Mate value*



Next, we wished to address relationship-specific variables: How old is the individual, how long did their relationship last, and does relationship length affect the individual's total response (TR)<sup>7</sup> to the breakup? The distribution of respondents' age can be seen in Figure 3. Respondents were asked to choose one breakup on which to report throughout the survey. The breakup on which respondents chose to report can be seen in Figure 4. The distribution of emotional and physical response levels by gender and age can be seen in Figures 5 and 6.

<sup>7</sup> Total Response is the mathematical sum of Emotional Response (1-10) and Physical Response (1-10)

Figure 4.3 Age distribution by sex

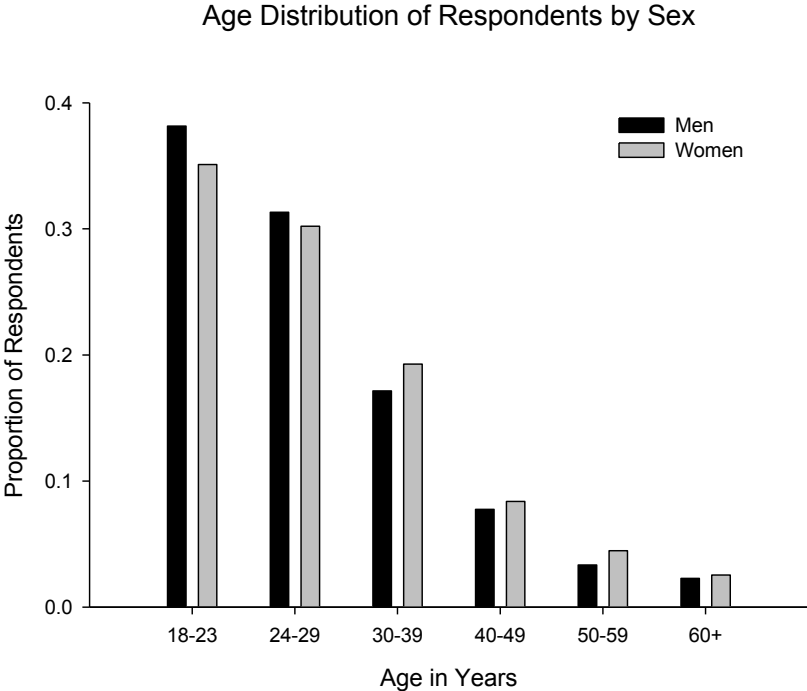
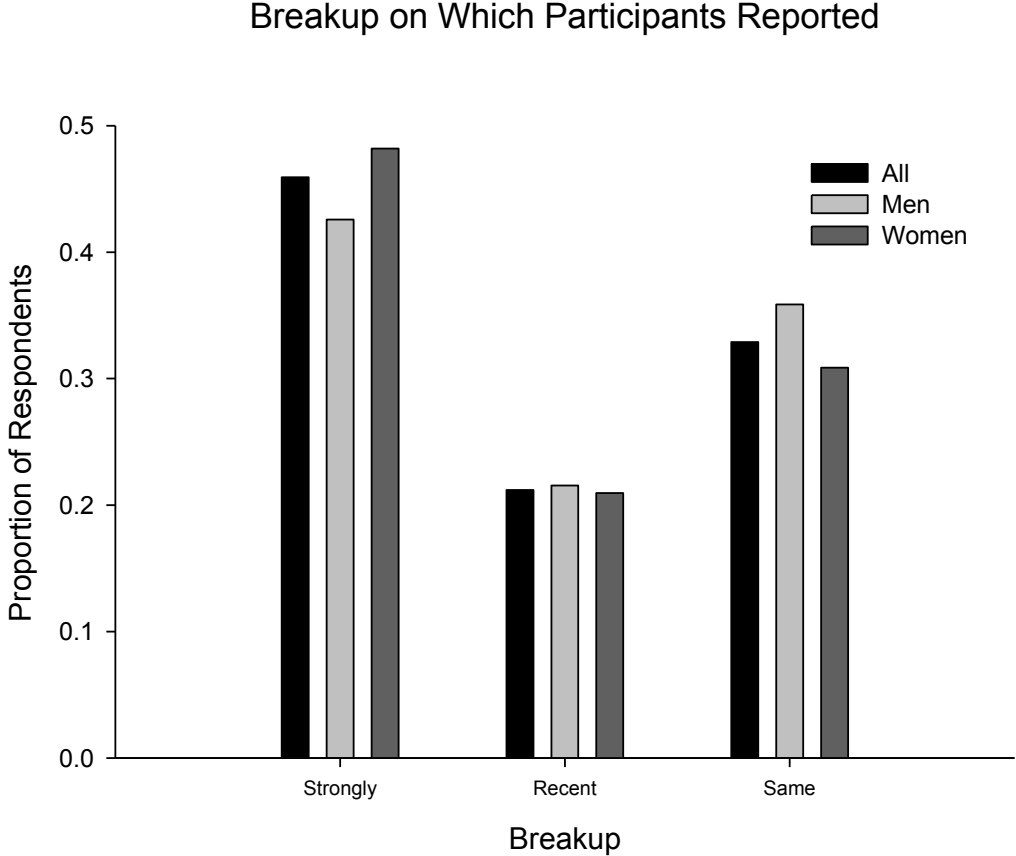




Figure 4.4<sup>8</sup> Selected Breakup



<sup>8</sup> "The breakup that affected you most strongly," "Your most recent breakup," "Both represent the same breakup."

Figure 4.5 *Distribution of emotional and physical response levels by gender*

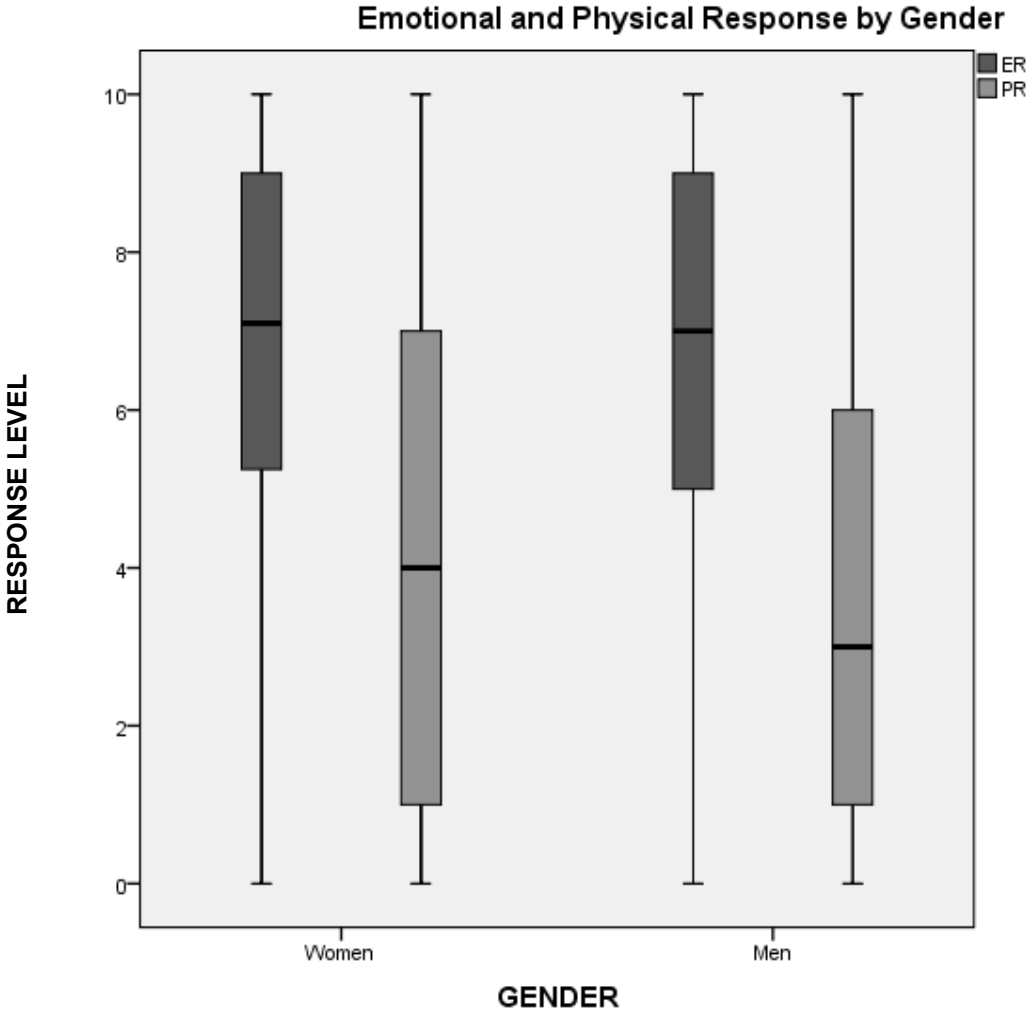
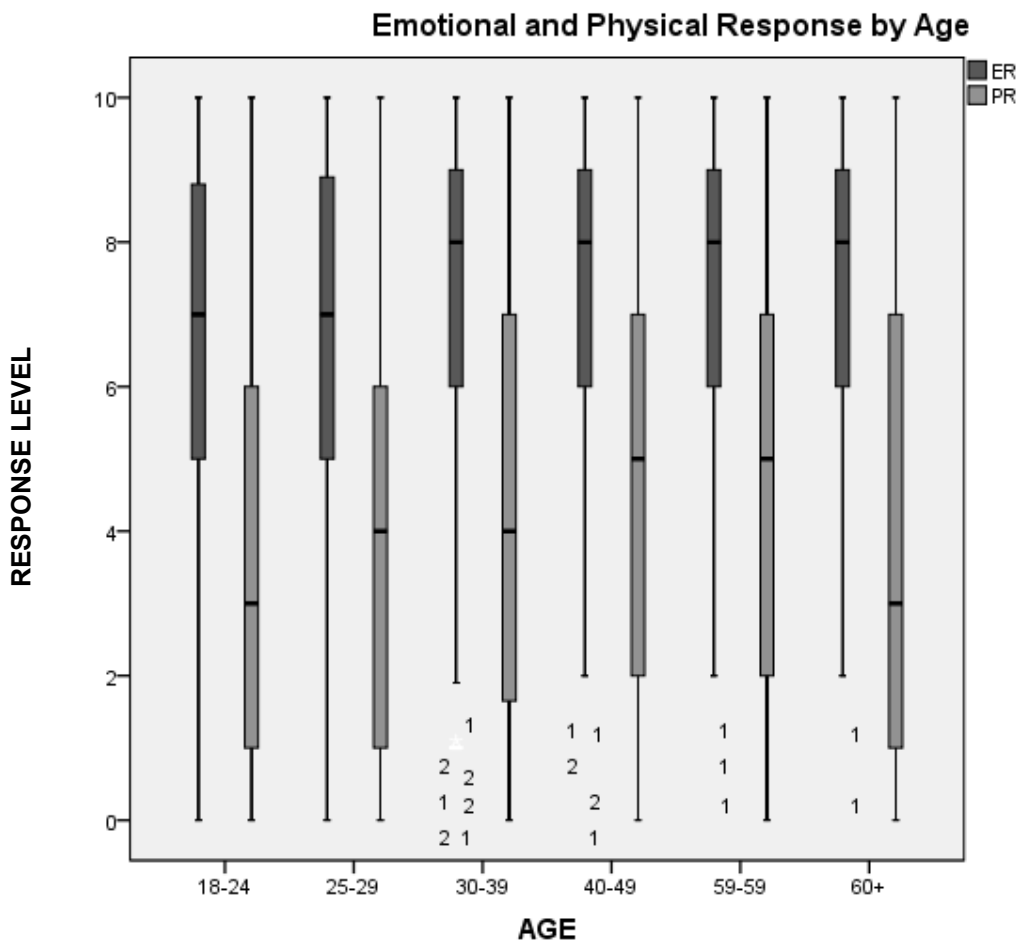


Figure 4.6 *Distribution of emotional and physical response levels by age*



The length of the selected relationships averaged 2.9 years for women (N=1756, SD=2.68) and 2.51 years for men (N=1092, SD=2.47);  $t=4.576$  (4158);  $p<.0001$ . The distribution of relationship length (RL) can be seen in Figure 7. To assess the relationship between RL and TR in women, a Spearman's product-moment correlation coefficient was computed. There was a positive correlation between the two variables,  $r = 0.267$ ,  $n = 1756$ ,  $p < .001$ . Increases in TR were significantly correlated with RL. In men, there was also a positive correlation between the two variables,  $r = 0.226$ ,  $n = 1092$ ,  $p < .001$ . Increases in TR were again significantly correlated with RL.

In addition to relationship length, respondents of Survey B were also asked how long ago the selected relationship ended. Results (in years) for all respondents was  $M = 5.4$  ( $N = 702$ ,  $SD = 7.2$ ); for men  $M = 5.8$  ( $N = 231$ ,  $SD = 7.35$ ); and for women  $M = 5.2$  ( $N = 471$ ,  $SD = 7.13$ ). Distribution of these results can be seen in Figure 8.

Figure 4.7 Length of selected relationship

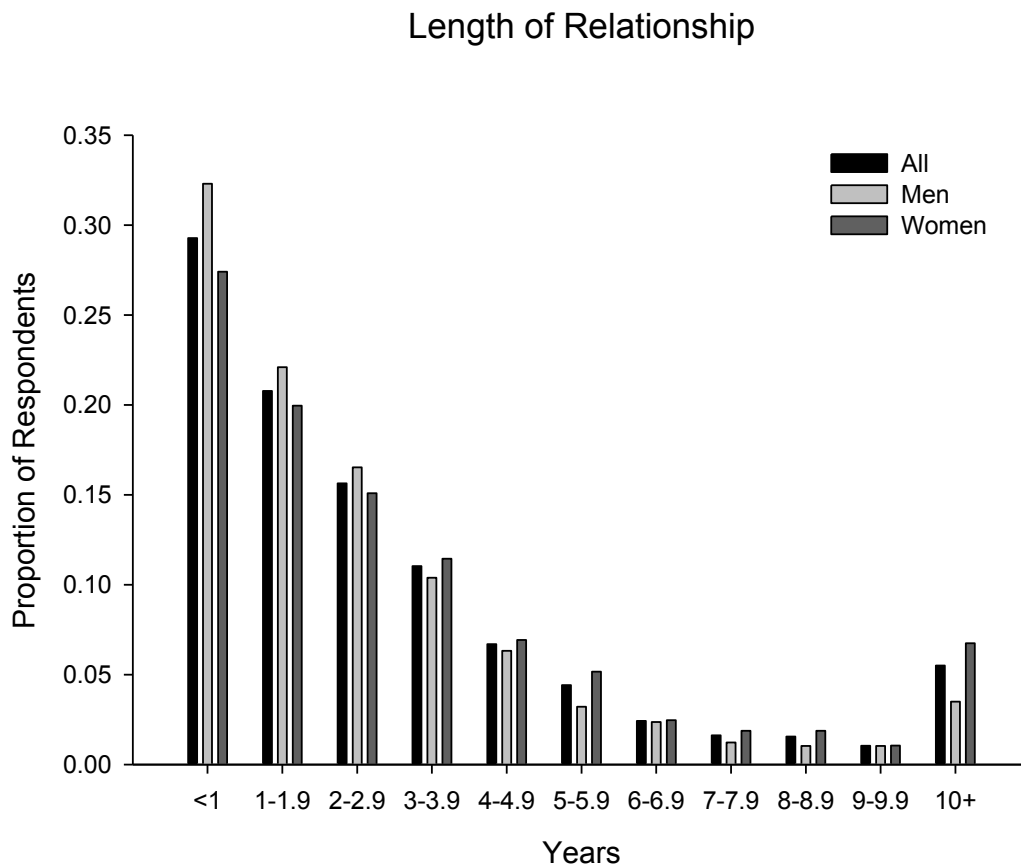
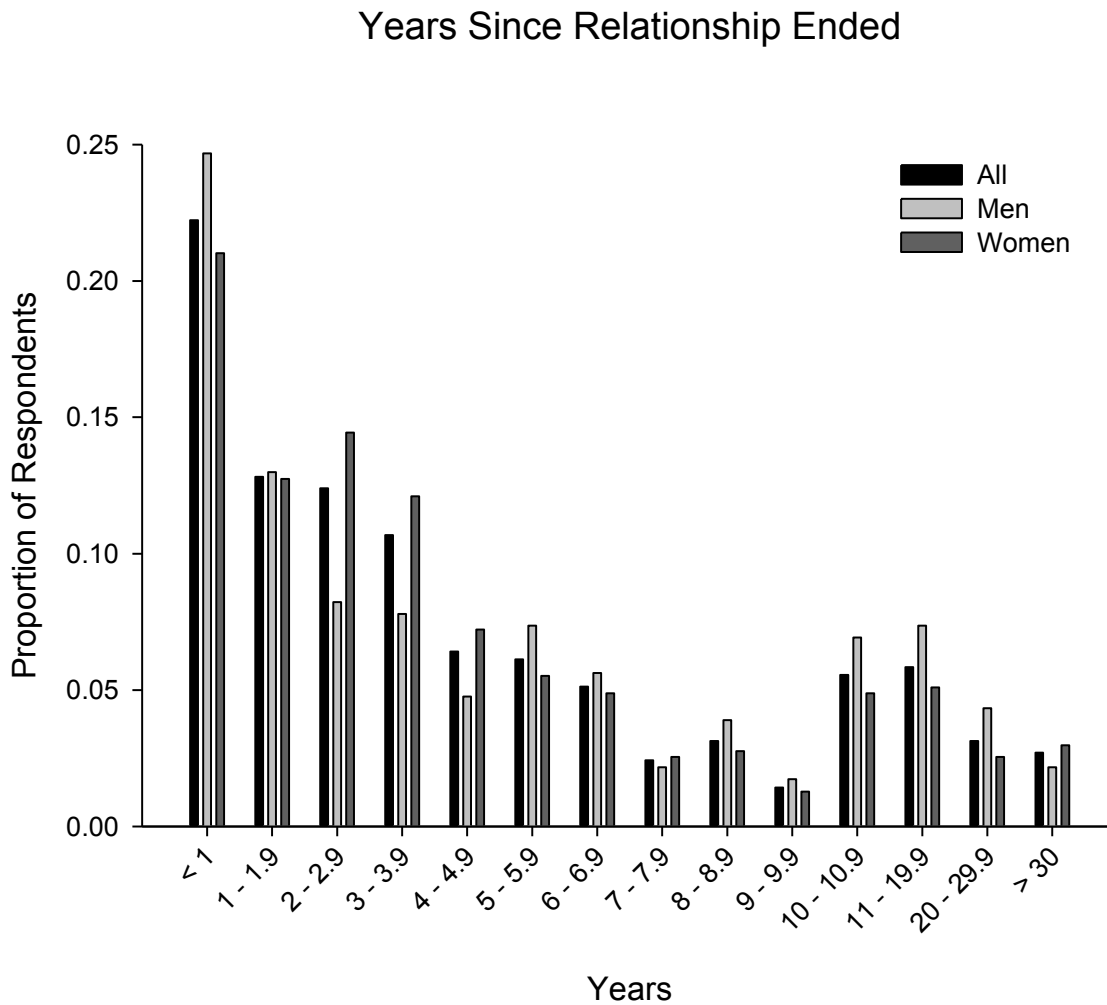


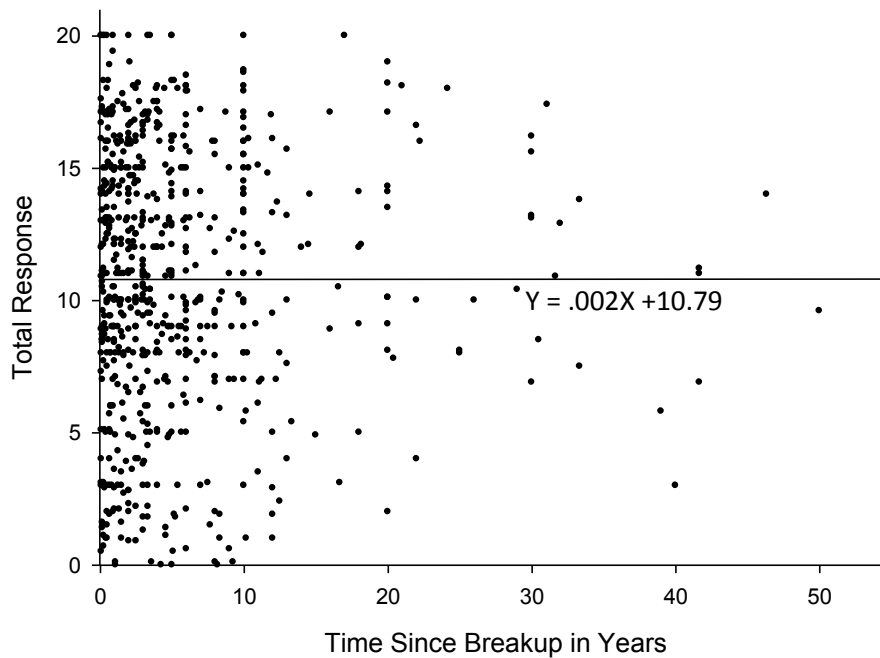
Figure 4.8 Distribution of time since relationship termination



Next we addressed whether or not the time elapsed since the breakup affected an individual's response. A linear regression analysis was conducted to evaluate the prediction of the total response level (TR) from the time since breakup (TSB) for respondent of Survey B. The scatterplot for the two variables is shown in Figure 9. The regression index for predicting total response is  $Predicted\ Total\ Response = .002\ Time\ since\ Breakup + 10.79$ . The 95% confidence

interval for the slope,  $-.053$  to  $.053$ , contains the value of zero, and therefore TSB is not significantly related to TR. Less than .001% of the variance of TR is accounted for by its linear relationship to TSB.

Figure 4.9 *Linear regression scatterplot of total response and time since breakup*



For both men and women, we examined age of respondents and time since the breakup (TSB). For the 471 women in Survey B we conducted a linear regression analysis to evaluate whether time since breakup (TSB) is predictable by the respondents' age. The regression index for predicting TSB is *Predicted Time Since Breakups* =  $.434 \text{ Age} - 7.671$ . The 95% confidence interval for the slope,  $.390$  to  $.478$ , does not contain the value of zero, and therefore TSB is significantly related to age. The correlation between TSB and age was  $.670$ . Approximately 49% of the variance of TSB is accounted for by its linear relationship to respondents' age. For the 231 men in Survey B, we also conducted a linear analysis to evaluate the prediction of the time since

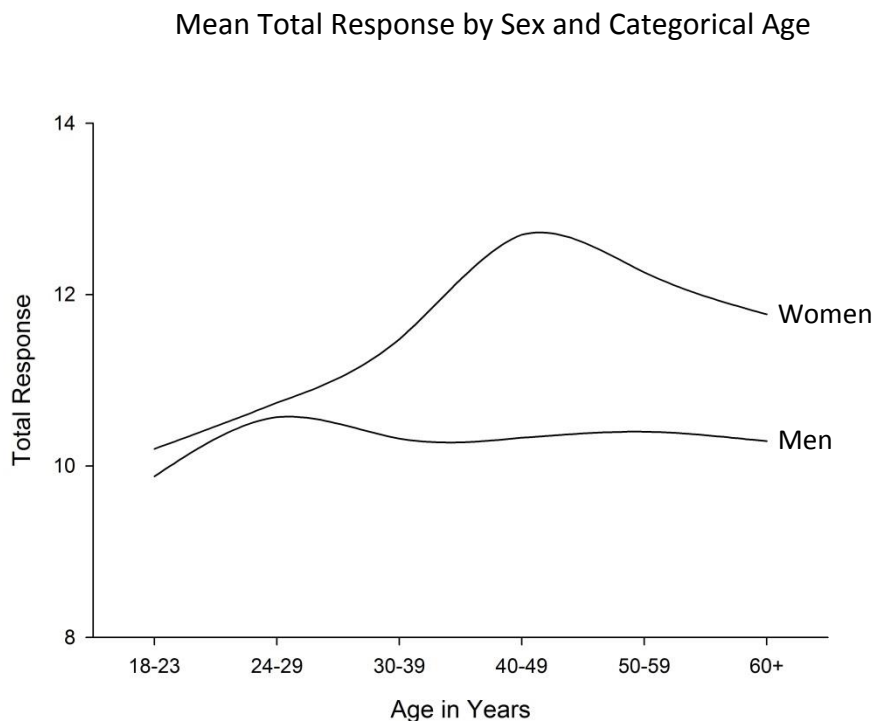
breakup from the respondents' age. The regression index for predicting TSB is *Predicted Time Since Breakups* =  $.415 \text{ Age} - 7.089$ . The 95% confidence interval for the slope, .355 to .474, does not contain the value of zero, and therefore TSB is again significantly related age. The correlation between TSB and age was .672. Approximately 45% of the variance of TSB is accounted for by its linear relationship to men's age.

A multiple regression analysis was conducted to evaluate how well age and TSB predicted total response (TR) in women. The linear combination of age and TSB was significantly related to TR,  $F(2,444) = 6.53, p = .002$ . The sample multiple correlation coefficient was .17 indicating that approximately 3% of the variance of the TR in the sample can be accounted for by the linear combination of age and TSB. The bivariate correlation between age and TR was .12 and .17 controlling for TSB. The bivariate correlation between TSB and TR was -.01 and -.12 controlling for age. All bivariate correlations were significant at  $p < .001$ . For men, a multiple regression analysis was conducted to evaluate how well age and TSB predicted TR. The linear combination of age and TSB was not significantly related to TR,  $F(2,217) = .94, p = .39$ . The sample multiple correlation coefficient was .093 indicating that approximately 1% of the variance of TR in the sample can be accounted for by the linear combination of age and TSB.

Having established the relationship between age and time since breakup, we then looked for a correlation between respondents' age and total response (TR). For the women in Survey A who reported their age categorically, a Spearman's product-moment correlation coefficient was computed to assess the relationship between age and TR. There was a positive correlation between the two variables,  $r = 0.159, n = 1201, p < .000$ . Increases in TR were significantly correlated with increasing age. For the women in Survey B who reported their age directly, a Spearman's product-moment correlation coefficient was computed to assess the relationship between age and TR. There was a positive correlation between the two variables,  $r = 0.124, n = 448, p = .009$ . Increases in TR were again significantly correlated with increasing age. For the

men in Survey A who reported their age categorically, a Spearman's product-moment correlation coefficient was computed to assess the relationship between age and TR. There was a negligible positive correlation between the two variables,  $r = 0.046$ ,  $n = 807$ ,  $p = .193$ . Increases in TR were not significantly correlated with increasing age. For the men in Survey B who reported their age directly, a Spearman's product-moment correlation coefficient was computed to assess the relationship between age and TR. There was a negligible positive correlation between the two variables,  $r = 0.078$ ,  $n = 217$ ,  $p = .253$ . Increases in TR were again not significantly correlated with increasing age. Figure 10 shows mean Total Response of all respondents by age category.

Figure 4.10 Mean total response for men and women by age category





Lastly, we addressed whether or not the number of breakups an individual had experienced affected their response to the selected breakup. A linear analysis was conducted to evaluate the prediction of the total response level from the number of breakups for the 3015 respondents who had experienced multiple breakups. The regression index for predicting total response is *Predicted Total Response = .317 Number of Breakups + 8.29*. The 95% confidence interval for the slope, .224 to .409, does not contain the value of zero, and therefore the number of breakups is significantly related to total response. The correlation between the total response and number of breakups was .122. Approximately 1.5% of the variance of the total response level is accounted for by its linear relationship to the number of breakups.

## **Discussion**

A major contribution of this study is providing a view of commonalities and trends that may not be apparent in smaller, more homogenous samples. Much of the biopsychosocial literature regarding romantic relationships relies on relatively small sample sizes, a narrow range of respondent ages (skewed to reflect populations under the age of 25), and homogenous life situations (study populations predominantly or exclusively comprised of U.S. college students). These limitations can lead to conclusions about romantic relationships and their termination that are not necessarily generalizable. The current research avoids these pitfalls by drawing on a much larger sample that is more representative of the population at large. The survey recruitment method resulted in a sample that exceeds most studies' by a factor of ten or more, represents a broader range of ages, includes hundreds of international participants, and contains thousands of responses from a non-student population.

While the current survey would be expected to show significant variation regarding most variables due to its large sample size, the survey population's reach and diversity allow us to make the following observations that reflect the breakup experience in a manner that better represents the population at large. Roughly 84% of women and 80% of men reported having experienced a breakup. These results are lower than the 90-98% reported in other studies (Baumeister and Dhavale, 2001; Baumeister, Wotman, and Stillwell, 1993; Morris and Reiber, 2011). This variation is likely an artefact of methodological differences in study design (e.g., differences in recruitment methods, advertising for studies of relationships versus studies of breakups). Such differences across studies can lead to biases in participation.

Although variation in relationship history is substantial, our data suggest that a typical survey respondent will have experienced three or four breakups by age 30—the mean age of survey respondents. Relationship histories tend to encompass two to three “short” relationships (of two years or less), along with one or two substantially longer ones. These lengthier relationships produce a more severe response upon their dissolution. There were no significant differences in prevalence or frequency of breakups between men and women. The TR (total response = emotional + physical response) to a breakup was positively correlated with an increasing number of breakups experienced. It is possible that this correlation reflects the prediction of the biological model that each successive relationship failure strikes a blow against one’s self-perceived value as a mate. However, since we do not know the sequence of breakups for respondents (i.e., are they reporting on their second breakup or their fifth?), we cannot provide further support at this time. Individuals recall and report on breakups with the same attentiveness regardless of how many years (or decades) ago the breakup occurred, with no difference in intensity of response to an “old” breakup. Lastly, men’s overall response to breakups remains consistent with age while women experience a stronger negative reaction to relationship dissolution as they age before trending towards early-life levels after age forty-nine.

While the length of relationships averaged three years for women and 2 ½ years for men, the distribution is bimodal for both with a trend towards either “short” or “long” (seven years or more) relationships evident. Studies of romantic relationships typically use one of two sample groups: college students—whose relationships average two years or less (e.g., Perilloux and Buss, 2008), or married couples—whose relationships average ten years or more in length (e.g., Stafford and Canary, 1991). Because this sample captured a wide variance in age and background, with only 1/3 of respondents identifying as university students, it is likely that this distribution is reflective of the relationship style for most individuals—multiple short relationships with one or two of substantially greater length experienced by age thirty. This assumption is supported by the distribution of responses to the query, “How long ago did the

breakup occur?” For both men and women the average was 5 1/2 years ago but again the data is bimodally distributed with approximately 25% of the selected breakups occurring within the past year while 25% occurred over ten years ago.

The time since breakup was not significantly related to an individual’s response to the breakup. Respondents do not report that breakups “hurt any less” when they occurred long ago. Related, only 1% of the variance in breakup response was accounted for by the linear combination of respondent age and time since breakup. This allows us to address the important issue of whether or not breakups cause more or less trauma as age increases. The evolutionary models suggest that breakups should affect individuals most strongly during their “prime reproductive years.” An extension of this reasoning is that while breakup response may decrease with age, we would expect it to increase in women as they near the age of menopause. The previous calculations were needed, then, to show whether or not older respondents were uniformly reporting on breakups that took place long ago (i.e., is everyone reporting on breakups that occurred at roughly the same age?) Since that is not the case, we can examine the relationship between age and breakup response. For all women, an increase in breakup response was significantly correlated with increasing age. In men however, there was no significant correlation between breakup response and age.

**Limitations.** As with most internet-based surveys, the full reach of the surveys is unknowable, and therefore a true response rate is incalculable. In addition, the survey was offered only in English; while the survey host service offered thorough translation options, the subject matter and question wording could get lost in translation. Hence, while 96 countries are represented, the participants are proficient in reading and writing English—possibly altering the “cross cultural” nature of study. Lastly, there is no way to “validate” the accuracy of responses. A forty year old woman from Cameroon may in actuality be a nineteen year old Australian male with a propensity for mischief. In spite of these limitations, anonymous and confidential

internet-based research is an ideal way to let subjects “speak with their own voice” on sensitive topics (e.g., relationships, sexual behavior) without interviewer bias and other confounds associated with lab interviews.

**Future Research.** How do individuals “rate themselves” as a mate and how does this impact the current findings? In the current studies, over 90% of individuals rated themselves as 7+ on a ten-point Mate Value scale, which rendered that metric unusable in our analyses. A more sophisticated survey instrument (e.g., a more intuitive form of question, or the inclusion of objective criteria along with the self-rating) may yield more information that would be particularly valuable as related to age and breakup response. If, for example, men’s mate value does not change over time, it could be argued that this is why their breakup response does not change in relation to number of breakups or age. In women, declining mate value is likely correlated with declining reproductive value as women age.

**Conclusions.** The formation and maintenance of romantic relationships is essential for the success of offspring (Fraley, Brumbaugh, and Marks, 2005). Long lasting romantic relationships have been selected for by natural selection to enhance rates of successful reproduction and investment in offspring (Hill and Hurtado, 1996). We have shown here and elsewhere that the termination of romantic relationships often inflicts substantial costs on both partners. Our data show that regardless of these costs, romantic relationships typically last only a few years and the relationship/breakup cycle repeats itself for most individuals. Longer relationships produce more severe effects upon their dissolution. Lastly, while men’s total response to breakups remains consistent with age, women’s total response increases until approximately age fifty—a possible effect of a biological and/or perceived decline in reproductive or mate value.

## References

- Archer, J. (1999). The function of grief. In *The nature of grief : the evolution and psychology of reactions to loss* (p. xiii, 317 p.). London ; New York: Routledge.
- Baumeister, R. F., & Dhavale, D. A. W. N. (2001). Two sides of romantic rejection. *Interpersonal rejection*, 55-71.
- Baumeister, R. F., Wotman, S. R., & Stillwell, A. M. (1993). Unrequited love: On heartbreak, anger, guilt, scriptlessness, and humiliation. *Journal of Personality and Social Psychology*, 64(3), 377.
- Buss, D. (2003). *The evolution of desire : strategies of human mating*. New York: Basic Books.
- Buss, D. M., and Shackelford, T. K. (2008). Attractive Women Want it All: Good Genes, Economic Investment, Parenting Proclivities, and Emotional Commitment. *Evolutionary Psychology*, 6, 134–146.
- Chung, M. C., Farmer, S., Grant, K., Newton, R., Payne, S., Perry, M., Stone, N. (2003). Coping with post-traumatic stress symptoms following relationship dissolution. *Stress and Health*, 19, 27-36.
- Fisher, H. (1995). The nature and evolution of romantic love. In *Romantic Passion: A Universal Experience?* New York: Columbia University Press.
- Fisher, H. (2004). Dumped! *New Scientist*, 181, 40–43.
- Fisher, H. (2005). Evolution of human serial pairbonding. *American Journal of Physical Anthropology*, 78, 331–354.
- Fisher, H. (2006a). Broken Hearts: The Nature and Risk of Romantic Rejection. In *Romance and Sex in Adolescent and Emerging Adulthood: Risk and Opportunities* (pp. 3–28). Mahwah, New Jersey: Pennsylvania State University.
- Fisher, H. (2006b). Lost Love: The Nature of Romantic Rejection. In *Cut loose : (mostly) older women talk about the end of (mostly) long-term relationships* (pp. 182–195). New Brunswick, N.J.: Rutgers University Press.
- Fraley, R. C., Brumbaugh, C. C., & Marks, M. J. (2005). The evolution and function of adult attachment: a comparative and phylogenetic analysis. *Journal of personality and social psychology*, 89(5), 731.
- Hill, K. R., & Hurtado, A. M. (1996). *Ache life history: The ecology and demography of a foraging people*. Transaction Publishers.
- Jankowiak, W. R. (1995). *Romantic Passion : A Universal Experience?* New York: Columbia

University Press.

Jankowiak, W. R. (2008). Desiring sex, longing for love: A tripartite conundrum. In *Intimacies : love and sex across cultures* (pp. 1–36). New York: Columbia University Press.

Kraut, R., Olson, J., Banaji, M., Bruckman, A., Cohen, J., and Couper, M. (2004). Psychological research online: report of Board of Scientific Affairs' Advisory Group on the Conduct of Research on the Internet. *American Psychologist*, 59, 105.

Morris, C. E., and Reiber, C. (2011). Frequency, Intensity and Expression of Post-Relationship Grief. *EvoS Journal: The Journal of the Evolutionary Studies Consortium*, 3, 1-11.

Morris, C.E., Roman, E., and Reiber, C. (2015a). Quantitative Sex Differences in Response to the Dissolution of a Romantic Relationship. Manuscript submitted for publication.

Perilloux, C., & Buss, D. M. (2008). Breaking up romantic relationships: Costs experienced and coping strategies deployed. *Evolutionary Psychology*, 6(1), 164-181.

Schmitt, D., Shackelford, T., and Buss, D. (2001). Are men really more oriented toward short-term mating than women? A critical review of theory and research. *Sexualities, Evolution and Gender*, 3, 211–239.

Stafford, L., & Canary, D. J. (1991). Maintenance strategies and romantic relationship type, gender and relational characteristics. *Journal of Social and Personal relationships*, 8(2), 217-242.

Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.

Trivers, R. L. (1972). Parental investment and sexual selection. *Sexual Selection and the Descent of Man*, 136–179.

**CHAPTER 5**  
**Sexuality and Post-Relationship Grief**

Morris, C.E. and Reiber, C. (2015c) Sexuality and Post-Relationship Grief. Manuscript submitted for publication.



## **Abstract**

This study's purpose was to gather survey data that would allow us to examine the emotional and physical responses to the dissolution of a romantic relationship—a cluster of correlated responses we refer to as post-relationship grief (PRG)—from an evolutionary perspective in a population that represents varied sexual orientations. Analyses of our sample of 5705 individuals from 96 countries showed the following: Of the 5399 cisgender respondents, 64% identified as women and 36% identified as men. Nearly 40% of women and over a quarter of men reported a non-exclusively heterosexual sexuality. Heterosexuals and homosexuals were not significantly different in self-reported mate value, while heterosexuals reported significantly higher mate values than those with complex sexuality; those with complex sexuality reported significantly lower mate value than homosexuals. In men, there was no significant variation in the number of breakups or length of relationship based on sexual orientation. In women, homosexuals experienced more breakups than heterosexuals on average, and infidelity was the cause of the breakup more often in lesbian couples than in heterosexual ones. There was no significant variation in total physical and emotional response to breakups across all sexualities for either women or men.

## Introduction

Romantic relationships, and their dissolution, are a pan-human experience (Morris, Roman, and Reiber, 2015a). Upwards of 85% of individuals will experience a breakup, usually more than once, and these breakups have the potential to be an event of extreme personal trauma (Morris, Roman, and Reiber, 2015a; Morris and Reiber, 2015b). Breakups often produce a complex set of physical and emotional responses, called Post-Relationship Grief (Morris and Reiber, 2011), that can persist for a year or more. The evolutionary literature on break-ups is all relatively recent (Morris and Reiber, 2011; Morris, Roman, and Reiber, 2015a; Morris and Reiber, 2015b; Morris, C.E., Beuassart, M.L., Reiber, C., & Krajewski, L.S. (in press)), and many questions remain to be answered, including whether the experience of a break-up differs between heterosexual and non-heterosexual individuals.

As Darwin observed in *The Descent of Man* (1871), reproduction is the engine of evolution. While this is undoubtedly the case, the existence of non-exclusively heterosexual individuals (and their romantic relationships) raises questions. Hypotheses and suppositions addressing the cause and associated relationship formation of those with “non-normative” sexuality have appeared in the evolutionary literature for forty years or more (e.g., Symons, 1979; E.O., Wilson, 1975; G.D. Wilson, 1982). Briefly, in *The Evolution of Human Sexuality* (1979), Symons argued that homosexuality is evolved sexuality unfettered by societal norms: gay men are promiscuous and lesbian women are highly monogamous. Therefore, if heterosexual men were not “constrained” by the monogamy/selectivity of heterosexual women, they would be as promiscuous as homosexual men—the concept of “hypermasculinized males.” By arguing that both heterosexual and homosexual males value youth and physical appearance in their sexual

partners (1979), he also hypothesizes that women, in a way, “control” homosexuality in men. “The Coolidge Effect”, the propensity for males in mammalian species (including humans) to find novel sexual stimuli arousing (Wilson, 1982), has also been argued as a reason for “indiscriminate” promiscuity in homosexual men.

Since homosexuals cannot reproduce directly with their partners, it has been suggested that male homosexuality could be maintained in a population via kin selection (Wilson, E.O., 1975; Weinrich, 1976; Ruse, 1982). Homosexuals have been hypothesized to provide resources and care for their relatives’ children, increasing the chance of survival and reproduction of those children, thereby indirectly passing on the actor’s genes as well. However, empirical studies (Bobrow and Bailey, 2001; Rahman and Hull, 2005) have failed to support this hypothesis.

However, even if gay men *did* provide additional care and resources for kin, such an explanation is androcentric and fails to address homosexual women. In a “refocusing” of the study of human mating—“the ovulation revolution”—Buss (2003) has demonstrated that women are, at a minimum, equal players in the mating game. However, the only arena in which lesbian romantic relationships consistently appear in evolutionary literature is under the umbrella of adolescent attachment formation (e.g., see Collins, 2003).

A full review of theories concerning non-heterosexuality is beyond the scope of this paper (see Rahman and Wilson, 2003); however, an important commonality of this literature is that, for the most part, it provides suppositions rather than empirically-supported explanations. Researchers now acknowledge that homosexuality may “exist” for reasons that we do not yet fully understand within the confines of the evolutionary framework (Burr, C., 1995; Bancroft, J. 1999; Everitt, B.J. 1990; Howard, R.C, 1995; Rosen, R.C., and Beck, J. G. 1988; Stoleru et al, 1999).

There is now a growing literature focused on aspects of mate choice and mating psychology in non-heterosexual populations. Kenrick et al (1995) compared preferences in singles ads across sexualities and found that homosexual men's mate preferences mirrored those of heterosexual men and that homosexual women showed a pattern that combined those of heterosexual women and men. These results suggest that homosexual mate choice is not a simple reversal of heterosexual preferences (1995). In a study on the effects of gender and sexual orientation on evolutionarily aspects of mating psychology, Bailey et al (1994) concluded that “The effects of sexual orientation on mating psychology were complex, with most of the seven scales exhibiting unique profiles across the four groups of subjects. This suggests that no single developmental theory, whether it focuses on innate or psychosocial factors, can completely explain all sex differences in mating psychology.” (p.109). lastly, in a study comparing heterosexual and homosexual couples, “Results indicated that individuals in committed same-sex relationships were generally not distinguishable from their committed heterosexual counterparts” (Roisman et al, 2008 p. 91).

As of yet, the dissolution of romantic relationships has received little attention in the evolutionary literature (see Perilloux and Buss, 2008; Morris and Reiber, 2011; Morris, Roman, and Reiber, 2015a; Morris and Reiber, 2015b; Morris, C.E., Beuassart, M.L., Reiber, C., & Krajewski, L.S. (in press) for exceptions); and the dissolution of romantic relationships amongst non-heterosexuals has received no attention at all. While reproduction is the engine of evolution, and a primary function of the human pair-bond is to promote reproduction (Hrdy, 1979; Symons, 1980), many non-exclusively heterosexual individuals enter and exit romantic relationships in much the same fashion as heterosexual individuals. This frames the question of whether the break-up experience differs between heterosexual and non-heterosexual individuals.

Therefore, in a large cross-cultural sample, we sought to collect empirical data with which to examine both older suppositions and newer findings about non-exclusively heterosexual romantic relationships: How long do the relationships last? How often do they end? Why do they end? What are the breakup experiences like? And lastly, are the various sexualities disparate in their formation and maintenance of romantic relationships?

## **Methods**

Details of this project's methodology have been published previously (Morris, Roman, and Reiber (2015a); Morris and Reiber (2015b)); however, a brief overview is provided here. First, two online surveys were conducted between June, 2012, and March, 2013. Invitations stated that this was an academic survey regarding past romantic relationship experiences, that responses were confidential, and that participants were not obligated to answer all questions, could quit the survey at any time, and could take as much time as needed. This method of acquiring an informed consent follows the recommendations of the Board of Scientific Affairs' Advisory Group on the Conduct of Research on the Internet (Kraut et al., 2004). The surveys were hosted by Qualtrics®, which has SAS 70 Certification and meets the privacy standards of the Health Insurance Portability and Accountability Act (HIPAA). Qualtrics® provides a filter option that permits only one survey submission from any individual IP address to prevent "ballot stuffing." Thus, respondents from Survey A could not "retake" the survey from their same IP address. We also addressed this issue by targeting the invitations to different entities for each of the surveys. All responses were labeled with random 15 digit alphanumeric codes and no other identifying information was associated with any responses. No names or email addresses were collected during recruitment or data analyses. These studies were approved by Binghamton University's Human Subject's Research Review Committee and all research was performed by certified investigators who conformed to the guidelines for the ethical treatment of human subjects.

Second, the methodology was designed to capture an international population with a wide range of ages and life experiences. By nature of being an online survey, all respondents

were individuals with Internet access. Thus, a convenience sample of participants aged 18 and older was recruited internationally via these online invitations. Approximately 295,000 individuals were invited with 5705 participating, a response rate of 1.8%. The total number of invitees (~295K) reflects only recorded contacts; the true reach of the survey is unknowable (e.g., a department chair to whom an invitation was sent may have taken the survey herself, distributed it to her department, distributed it university-wide, or all/some/none of the above). The survey targeted a general population. Our only goal in the daily administration and monitoring of the incoming results was to screen them for participant age and country of residence in an attempt to assure as wide a representation of respondent ages and countries of origin as possible. Table 5.1 provides a brief summary of this method of survey distribution.

Third, the survey contacts were invited to participate in a brief survey on romantic relationships. Participants provided demographic information and responses to questions about romantic history and breakups (e.g., Have you experienced a breakup? How severe was the breakup for you emotionally? Who do you feel initiated the breakup? What sort of physical responses did you experience as a result of the breakup?). If respondents had experienced multiple breakups, they were asked to confine their responses to one breakup of their choosing (e.g., the most recent, or the one that affected them most). Participants were also asked relevant life-historical questions (e.g., How many breakups have you experienced? How long did the selected relationship last?). Self-evaluations of emotional response (ER) and physical response (PR) to the selected breakup were solicited on a scale from 0 (none) to 10 (unbearable). For analysis purposes, a convenience value—Total Response (TR)—was generated by summing ER and PR. This value ranges from 0-20, and is an approximate indicator of how severe the breakup experience was overall.

Table 5.1 *Internet distribution of invitations to participate in a romantic relationship survey*

Type of Contact	Number of Groups/Individuals Contacted	Potential Reach
Facebook: academic interest groups	67	146,969
Facebook: survey interest groups	34	53,868
Facebook: colleagues and their contacts	27	18,281
Universities: Faculties	3	7,301
Universities: Graduate student populations	7	31,205
Universities: Undergraduate student populations	1	4,283
Academic interest groups: international	2	13,543
Professional academic organizations	1	373
General public survey forums	1	18,674



## **Results**

Of the ~295K invited individuals, 5705 individuals aged 18 years or older participated. These individuals represented 96 countries and all 20 of the US Census Bureau occupation types. Of these respondents, 87 individuals did not report their gender, and were excluded from the analyses. An additional 95 (1.7%) did not report a binary gender identity and were excluded. Of the 5399 cisgender respondents, 3447 (64%) identified as women and 1952 (36%) identified as men. The proportion of self-reported sexual identity appears in table 5.2. Table 5.3 shows basic demographic information for study participants.

Table 5.2 *Distribution of male and female self-reported sexual orientation*

	Exclusively heterosexual	Mostly heterosexual	Bisexual	Mostly homosexual	Exclusively homosexual	Asexual <sup>9</sup>	Other
Men	72%	11%	5%	2%	7%	1%	2%
Women	61%	21%	8%	2%	3%	3%	2%

Table 5.3 *Mean (SD) demographic information for participants<sup>10</sup>*

	All	Heterosexual	Complex	Homosexual
A. Men				
Age <sup>11</sup>	31.26 (1.24)	31 (3.46)	30.6 (1.28)	32.4 (1.38)
Income <sup>12</sup>	27,777 (2.48)	28,587 (2.54)	24,096 (2.29)	30,581 (2.50)
Mate Value <sup>13</sup>	7.46 (2.08)	7.60 (1.98)	6.93 (2.34)	7.68 (2.17)
B. Women				
Age	30 (1.21)	30 (1.28)	28.48 (1.20)	32.68 (1.90)
Income	24,521 (2.22)	26,007 (2.24)	21,308 (2.20)	28,358 (2.01)
Mate Value	7.73 (1.94)	7.89 (2.89)	7.43 (2.11)	8.27 (1.95)

<sup>9</sup> From *The Asexual Visibility & Education Network*<sup>®</sup>: Asexuals may regard other people as aesthetically attractive without feeling sexual attraction to them. Some asexual people also experience the desire of being romantically attracted to other people without it being sexual.

<sup>10</sup> For purposes of the remaining analyses, we have combined all reported sexualities other than exclusively heterosexual or exclusively homosexual as *complex*.

<sup>11</sup> In years

<sup>12</sup> Annually in US dollars

<sup>13</sup> A self-assessment value from 0-10

To test for variation in male and female mate value across sexualities, we conducted a one-way ANOVA with post-hoc pairwise tests. In men, the ANOVA was significant ( $F=17.048$ ,  $p<.0001$ ,  $df\ 1905$ ). The self-reported mate value of heterosexual men was significantly higher than that of complex men (mean  $\pm$  Std Dev=  $7.59 \pm 1.99$  vs  $6.93 \pm 2.34$ ;  $p<.0001$ ,  $d=.309$ ) while the self-reported mate value of complex men was significantly lower than that of homosexual men ( $6.93 \pm 2.34$  vs  $7.68 \pm 1.87$ ;  $p=.002$ ,  $d=-.354$ ). There was no significant difference between heterosexual and homosexual men.

For women, the ANOVA was also significant ( $F=24.306$ ,  $p<.0001$ ,  $df\ 3298$ ). The self-reported mate value of heterosexual women was significantly higher than that of complex women (mean  $\pm$  Std Dev=  $7.89 \pm 2.89$  vs  $7.43 \pm 2.11$ ;  $p<.0001$ ,  $d=.181$ ) and the self-reported mate value of complex women was significantly lower than that of homosexual women ( $7.43 \pm 2.11$  vs  $8.27 \pm 1.95$ ;  $p=.0055$ ,  $d=-.341$ ). Heterosexual and homosexual women showed no significant difference in mate value. These results are shown in Table 5.4

Table 5.4 *Independent samples t-test results comparing Mate Value*

	Mean	SD	t(df)	p	Effect Size <sup>14</sup>
<b>A. Men</b>					
Heterosexual	7.59	1.99	5.77 (1787)	<.0001	.309
Complex	6.93	2.34			
Heterosexual	7.59	1.99	.4195 (1494)	.6749	
Homosexual	7.68	1.87			
Complex	6.93	2.34	3.13. (529)	.002	-.354
Homosexual	7.68	1.87			
<b>B. Women</b>					
Heterosexual	7.89	2.89	4.77 (3204)	<.0001	.181
Complex	7.43	2.11			
Heterosexual	7.89	2.89	1.27 (2124)	.2049	
Homosexual	8.27	1.95			
Complex	7.43	2.89	2.78 (1268)	.0055	-.341
Homosexual	8.27	1.95			

Participants were asked if they had experienced the termination of a romantic relationship, and 4324 (82%) reported that they had (84% of women and 79% of men). The mean number of break-ups reported by women was 3.56 (N=2830, SD=2.56), and by men, 3.25 (N=1488, SD=2.19). Respondents who had experienced more than one breakup were asked to

<sup>14</sup> Cohen's *d*

confine the remainder of their responses to one breakup of their choosing. The length of these selected relationships averaged 2.9 years for women (N=2732, SD=2.68) and 2.51 years for men (N=1428, SD=2.47). Results reported by sexuality can be seen in Table 5.5.

Table 5.5 *Breakup history and characteristics for men and women by sexual orientation*

	All	Heterosexual	Complex	Homosexual
<b>A. Men</b>				
Experienced a breakup (%)	79 (2.22)	80 (2.27)	72 (2.92)	85 (3.10)
Number of breakups ( <i>M</i> )	3.25 (2.19)	3.2 (2.11)	3.47 (2.50)	3.19 (3.19)
Length of selected relationship <sup>15</sup> ( <i>M</i> )	2.51 (2.47)	2.43 (2.43)	2.84 (2.79)	2.48 (2.48)
<b>B. Women</b>				
Experienced a breakup (%)	84 (2.59)	84 (2.44)	83 (3.12)	86 (2.42)
Number of breakups ( <i>M</i> )	3.56 (2.56)	3.34 (2.34)	3.94 (2.89)	3.61 (2.22)
Length of selected relationship ( <i>M</i> )	2.90 (2.68)	2.94 (2.60)	2.76(2.52)	3.78 (3.1)

An ANOVA was conducted to test sexuality-based variation in mean number of breakups. In men, there was no significant difference in the number of breakups across groups (F=1.891, p=.151, df 1478). Conversely, for females, the ANOVA predicting mean number of breakups by sexual orientation showed significant differences (F=12.401, p<.0001, df 2814). The self-reported mean number of breakups of heterosexual women was significantly lower than that of complex women (mean ± Std Dev= 3.34 ± 2.34 vs 3.95 ± 2.89; p<.0001, d=-.228). However, there were non significant differences in self-reported mean number of breakups between heterosexual women and homosexual women, or between complex and homosexual women. These results are shown in Table 5.6

<sup>15</sup> In years

Table 5.6 *Independent samples t-test results comparing mean number of breakups*

	Mean	SD	t(df)	p	Effect Size <sup>16</sup>
<b>A. Men</b>					
Heterosexual	3.17	2.11	1.87 (1382)	.0619	
Complex	3.47	2.5			
Heterosexual	3.2	2.11	.046(1192)	.9631	
Homosexual	3.19	2.09			
Complex	3.47	2.5	1.02 (396)	.3072	
Homosexual	3.19	2.09			
<b>B. Women</b>					
Heterosexual	3.34	2.34	5.92 (2743)	<.0001	-.228
Complex	3.95	2.89			
Heterosexual	3.34	2.24	1.04 (1836)	.2979	
Homosexual	3.61	2.22			
Complex	3.95	2.89	1.058 (1075)	.2903	
Homosexual	3.61	2.22			

In men, the ANOVA between sexual orientation and relationship length revealed no significant differences ( $F=1.891$ ,  $p=.151$ ,  $df\ 1478$ ); while in women, relationship length varied significantly by sexuality ( $F=4.18$ ,  $p=.015$ ,  $df\ 3003$ ). In heterosexual women, relationship length was significantly shorter than that of homosexual women (mean  $\pm$  Std Dev=  $2.94 \pm 2.6$  vs  $3.78 \pm$

<sup>16</sup> Cohen's *d*

3.1;  $p=.0001$ ,  $d=-.294$ ). The self-reported relationship length of complex women was also significantly shorter than that of homosexual women (mean  $\pm$  Std Dev=  $2.76 \pm 2.52$  vs  $3.78 \pm 3.1$ ;  $p=.0001$ ,  $d=-.361$ ). These results are shown in Table 5.7.

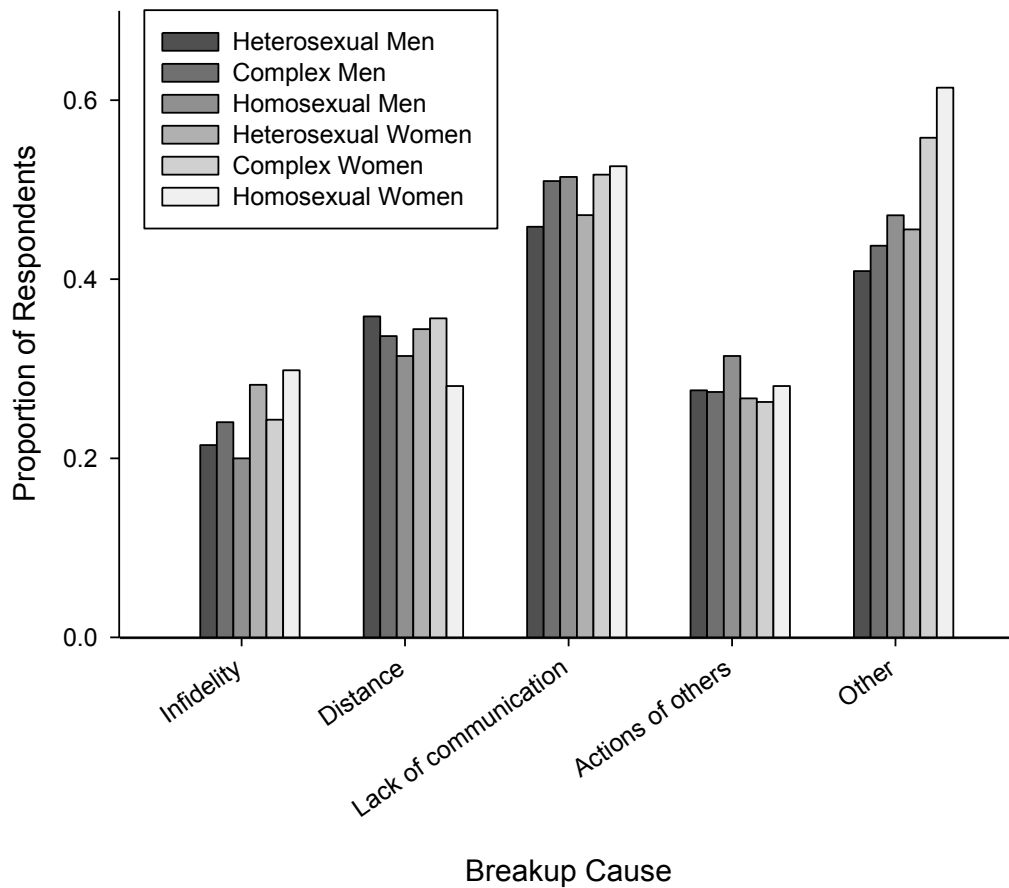
Table 5.7 *Independent samples t-test results comparing relationship length*

	Mean	SD	t(df)	p	Effect Size <sup>17</sup>
<b>A. Men</b>					
Heterosexual	2.43	2.34	2.51 (1326)	.1220	
Complex	2.84	2.79			
Heterosexual	2.43	2.34	2.2(1141)	.8407	
Homosexual	2.48	2.73			
Complex	2.84	2.79	1.111 (383)	.2672	
Homosexual	2.48	2.78			
<b>B. Women</b>					
Heterosexual	2.94	2.6	1.74 (2650)	.0828	
Complex	2.76	2.52			
Heterosexual	2.94	2.6	2.8 (1763)	.0052	-.294
Homosexual	3.78	3.1			
Complex	2.76	2.52	3.414 (1045)	.0001	-.361
Homosexual	3.78	3.1			

<sup>17</sup> Cohen's *d*

Respondents of Survey A were asked what caused their breakup<sup>18</sup>. The response options were not mutually exclusive. Figure 5.1 shows the distribution of causes of breakups by sexual orientation for women (N=1966) and men (N=1125). Lastly, we queried whether or not Total Response to a breakup varied by sexual orientation in men and women. There was no significant variation in response to breakups across sexualities for women (ANOVA  $F=.627$ ,  $p=.534$ ,  $df$  2680) or men (ANOVA  $F=1.482$ ,  $p=.228$ ,  $df$  1395).

Figure 5.1 *Distribution of Breakup Cause by sex and sexual orientation*



<sup>18</sup> Respondents of Survey B were asked to “describe what caused your breakup” in text form only. This resulted in 1123 responses totaling 40752 words. These results require qualitative analyses that are beyond the scope of this initial inquiry.



## **Discussion**

The field of human evolutionary science is making strides in beginning to address individuals of “non-normative” sexual orientations. However, much of the literature regarding romantic relationships still relies upon relatively small sample sizes, a narrow range of respondent ages, and the continued exclusion of individuals with “alternative” sexualities. These limitations can lead to conclusions about romantic relationships and their termination that are not necessarily representative of the wider, more varied population.

A major contribution of this study is that it addresses these shortcomings by empirically studying a more representative population that includes a large number of individuals across the broad spectrum of sexualities. Of the 5399 cisgender respondents, 64% identified as women and 36% identified as men. Nearly 40% of women and over a quarter of men reported a non-exclusively heterosexual sexuality. While this sample may not be representative of any specific population at large, particularly since it is an international convenience sample, the number of individuals reporting non-heterosexual orientations is notable.

Patterns of self-assessed mate value were similar in both sexes. Heterosexuals and homosexuals were not significantly different than one another, but heterosexuals reported significantly higher mate values than those with complex sexuality, and those with complex sexuality reported significantly lower mate value than homosexuals. In men, there was no significant variation in the number of breakups or length of relationship based on sexual orientation. Infidelity as the cause of breakup was also least reported by homosexual men. In women, homosexuals experienced more breakups than heterosexuals on average, and infidelity was the cause of the breakup more often in lesbian couples than in heterosexual ones.

Taken together, these results belie many of the preconceived, stereotypical suppositions and theoretical evolutionary arguments about those with alternative sexualities. For example, if gay males are free to execute “unconstrained” promiscuity (Symons, 1979; Buss 2003), then the end of a relationship might be expected to be less traumatic for gay males than for heterosexual males. However, our data shows that there is no significant variation in total breakup response between sexual orientations. Our data on breakup cause in lesbian couples also conflicts with the claim that “pathological male jealousy” (Buss, 2003) is the “master mechanism” (Buss, 2003) of relationship maintenance. The logic of this supposition is that once males secure “exclusive” reproductive access to a high value female, they will deploy a multitude of mechanisms to maintain the relationship. This “strategy” is fueled by male jealousy and is the motivator for “staying together.” However, our data show that lesbian relationships last an average of 10 months longer than those of heterosexual women—and we know of no data proposing any evolutionary arguments for “pathological female jealousy.”

**Limitations.** As with most internet-based surveys, the full reach of the surveys is unknowable, and therefore a true response rate is incalculable. The large size of the survey also predisposes toward findings of significance, requiring caution in interpretation. In addition, the survey was offered only in English. Hence, while 96 countries are represented, the participants had basic proficiency in reading English—possibly altering the “cross cultural” nature of the sample. In spite of these limitations, anonymous and confidential internet-based research is an ideal way to let subjects “speak with their own voice” on sensitive topics (e.g., relationships, sexual behavior) without interviewer bias and other confounds associated with lab interviews.

Importantly, the work of Lisa Diamond (2008) has suggested that while male sexuality “becomes fixed,” many, if not most, women’s sexuality is “fluid.” By this she means that women’s sexuality may change, often, based on environmental cues, life history variation, and person-based attractions (2008). Such changes in sexuality across the lifespan were not

represented in this study since our measure of a woman's sexual orientation captured only a single point in time. Longitudinal ethnographic study would provide ideal insight into sexual fluidity with respect to PRG in the future.

**Conclusions.** The field of evolutionary behavioral sciences is beginning to address non-heterosexual identities. As it does so, it is essential to recognize that the simple categories of “straight” and “gay” are insufficient to capture the broad spectrum of sexualities that are lived by a large number of individuals. To better capture and understand intimate relationships, research must include individuals from across the whole range of human experience.

Evolution depends upon reproduction and to that end, emotional bonds form to support interpersonal relationships (Fisher, 1995). The manifestation of these emotional bonds elicits intimacy—physical, emotional, romantic, and sexual (Jankowiak 1995; 2008; 2013)—making individuals vulnerable to the cost of commitment (Archer, 2003). Regardless of the reproductive viability of the relationship, the emotional connection and potential for loss of intimacy remain. This suggests that the experience of a breakup should not be systematically different in non-heterosexual individuals than it is in heterosexual individuals. It is clear that when romantic love itself—a vital form of intimacy—is taken away from us via a breakup, we are likely to suffer...regardless of our sexuality or the sexual orientation of the one we loved.

## References

- Archer, J. (2003). *The nature of grief: The evolution and psychology of reactions to loss*. Routledge.
- Bailey, J. M., Gaulin, S., Agyei, Y., & Gladue, B. A. (1994). Effects of gender and sexual orientation on evolutionarily relevant aspects of human mating psychology. *Journal of personality and social psychology*, 66(6), 1081.
- Bancroft, J. (1999). Central inhibition of sexual response in the male: a theoretical perspective. *Neuroscience & Biobehavioural Reviews*, 23, 763–784.
- Bobrow, D., & Bailey, J. M. (2001). Is male homosexuality maintained via kin selection? *Evolution and Human Behavior*, 22(5), 361-368.
- Burr, C. (1995). *A separate creation: how biology makes us gay*. Bantam Press.
- Buss, D. M. (2003). *The evolution of desire: Strategies of human mating* (pp. 1994-1994). New York: Basic books.
- Collins, W. A. (2003). More than myth: The developmental significance of romantic relationships during adolescence. *Journal of research on adolescence*, 13(1), 1-24.
- Darwin, C. (2003). The Descent of Man. 1871. *The Origin of Species and the Descent of Man*, 912-13.
- Diamond, L. M. (2008). *Sexual fluidity*. Harvard University Press.
- Everitt, B.J. (1990). Sexual motivation: a neural and behavioural analysis of the mechanisms underlying appetitive and copulatory responses of male rats. *Neuroscience & Biobehavioural Reviews*, 14, 217–232.
- Fisher, H. (1995). The nature and evolution of romantic love. In *Romantic Passion: A Universal Experience?* New York: Columbia University Press.
- Howard, R.C. (1995). The neurophysiology of sexual desire, with particular reference to paedophilia. *Annals for the Academy of Medicine of Singapore*, 24, 724–727.
- Hrdy, S.B., The Evolution of Human Sexuality: The Latest Word and the Last. *The Quarterly Review of Biology* Vol. 54, No. 3 (Sep., 1979), pp. 309-314
- Jankowiak, W. R. (1995). *Romantic Passion : A Universal Experience?* New York: Columbia University Press.
- Jankowiak, W. R. (2008). Desiring sex, longing for love: A tripartite conundrum. In *Intimacies : love and sex across cultures* (pp. 1–36). New York: Columbia University Press.

- Jankowiak, W. R. (Ed.). (2013). *Intimacies: Love and sex across cultures*. Columbia University Press. Chicago
- Kenrick, D. T., Keefe, R. C., Bryan, A., Barr, A., & Brown, S. (1995). Age preferences and mate choice among homosexuals and heterosexuals: A case for modular psychological mechanisms. *Journal of Personality and Social Psychology*, 69(6), 1166.
- Kraut, R., Olson, J., Banaji, M., Bruckman, A., Cohen, J., and Couper, M. (2004). *Psychological research online: report of Board of Scientific Affairs' Advisory Group on the Conduct of Research on the Internet*. *American Psychologist*, 59, 105.
- Morris, C. E., & Reiber, C. (2011). Frequency, intensity and expression of post-relationship grief. *EvoS Journal: The Journal of the Evolutionary Studies Consortium*, 3(1), 1-11.
- Morris, C.E. and Reiber, C. (2015b) Quantitative Life History Variation in Post-Relationship Grief. Manuscript submitted for publication
- Morris, C.E., Beuassart, M.L., Reiber, C., & Krajewski, L.S. (in press). Intrasexual Mate Competition and Breakups: Who Really Wins? *Oxford Handbooks Online*. ),
- Morris, C.E., Roman, E., and Reiber, C. (2015a). Quantitative Sex Differences in Response to the Dissolution of a Romantic Relationship. Manuscript submitted for publication.
- Perilloux, C., & Buss, D. M. (2008). Breaking up romantic relationships: Costs experienced and coping strategies deployed. *Evolutionary Psychology*, 6(1), 164-181.
- Rahman, Q., & Hull, M. S. (2005). An empirical test of the kin selection hypothesis for male homosexuality. *Archives of sexual behavior*, 34(4), 461-467.
- Rahman, Q., & Wilson, G. D. (2003). Born gay? The psychobiology of human sexual orientation. *Personality and Individual Differences*, 34(8), 1337-1382.
- Rosen, R.C., & Beck, J. G. (1988). *Patterns of sexual arousal: psychophysiological processes and clinical applications*. New York: Guilford.
- Roisman, G. I., Clausell, E., Holland, A., Fortuna, K., & Elieff, C. (2008). Adult romantic relationships as contexts of human development: a multimethod comparison of same-sex couples with opposite-sex dating, engaged, and married dyads. *Developmental Psychology*, 44(1), 91.
- Ruse, M. (1982). Are there gay genes? Sociobiology and homosexuality. *Journal of Homosexuality*, 6, 5-34.
- Stoleru, S., Gregoire, M. C., Gerard, D., Decety, J., LaFarge, E., Cinotti, L., Lavenne, F., Le Bars, D., Vernet-Maury, E., Rada, H., Collet, C., Mazoyer, B., Forest, M. G., Magnin, F., Spira, A., & Comar, D. (1999). Neuroanatomical correlates of visually evoked sexual arousal in human males. *Archives of Sexual Behaviour*, 28, 1-21.
- Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.
- Symons, D. (1980). The evolution of human sexuality revisited. *Behavioral and Brain Sciences*, 3(02), 203-214.
- Weinrich, J. D. (1976). Human reproductive strategy: II. Homosexuality and non-reproductive strategy; some evolutionary models. Unpublished doctoral dissertation, Harvard University.

Wilson, E. O. (1975). *Sociobiology: the new synthesis*. Cambridge, MA: Belknap Press.

Wilson, G. D. (1982). *The Coolidge Effect: An Evolutionary Account of Human Sexuality*.  
Morrow.

## Appendices

### A. Survey distribution<sup>19</sup>

#### CHRONOLOGICAL DISTRIBUTION OF SURVEY A—JUNE 8 TO OCT 16 2012

Type	Source	Topic/Location	Size
Discussion Group	Facebook	Evolutionary Psychology	226
Discussion Group	Facebook	Evolutionary Psychology	2388
Discussion Group	Facebook	Evolutionary Psychology	240
Discussion Group	Facebook	Evolutionary Psychology	50
Discussion Group	Facebook	Evolutionary Psychology	20
Discussion Group	Facebook	Anthropology	60
Discussion Group	Facebook	Surveys	400
Discussion Group	Facebook	Relationships	2000
Discussion Group	Facebook	Relationships	1400
Discussion Group	Facebook	Relationships	40478
Discussion Group	Facebook	Relationships	1000
Discussion Group	Facebook	Relationships	3066
Discussion Group	Facebook	Relationships	1283
Discussion Group	Facebook	Relationships	1106
Discussion Group	Facebook	Evolutionary Psychology	232
Discussion Group	Facebook	Psychology	548
Discussion Group	Facebook	Relationships	2264
Discussion Group	Facebook	Anthropology	116
Discussion Group	Facebook	Relationships	459
Discussion Group	Facebook	Relationships	1172
Faculty	List serv	Binghamton University	40
Faculty	List serv	California University of PA	320
General population	Reddit	Surveys	3453
General population	Mechanical Turk (Amazon)	Surveys	10000
Graduate students	List serv	Binghamton University	350
Graduate students	List serv	Binghamton University	15

<sup>19</sup> Group/Individual names and invitation date are excluded to insure confidentiality

Graduate students	List serv	Binghamton University	2750
Graduate students	List serv	Binghamton University	368
Individual	Facebook		400
Individual	Facebook		500
Individual	Facebook		445
Individual	Facebook		1110
Individual	Facebook		615
Individual	Facebook		300
Individual	Facebook		530
Individual	Facebook		50
Individual	Facebook		1232
Individual	Facebook		125
Individual	Facebook		165
Individual	Facebook		2830
Individual	Facebook		430
Individual	Facebook		300
Individual	Facebook		711
Individual	Facebook		473
Individual	Facebook		150
Individual	Facebook		320
Individual	Facebook		100
Individual	Facebook		300
Individual	Email		50
Individual	Facebook		240
Interest Group	Facebook	Anthropology	180
Interest Group	Facebook	Evolutionary Psychology	15
Interest Group	Facebook	Anthropology	2571
Interest Group	Facebook	Psychology	150
Interest Group	Facebook	Psychology	150
Interest Group	Facebook	Relationships	1200
Interest Group	Facebook	Relationships	4500
Interest Group	Facebook	Surveys	1100
Interest Group	Facebook	Relationships	1000
Interest Group	Facebook	Surveys	3400
Interest Group	Facebook	Relationships	18000
Interest Group	Facebook	Relationships	1974
Interest Group	Facebook	Relationships	600
Interest Group	Facebook	Relationships	1156
Interest Group	Facebook	Relationships	411
Interest Group	Facebook	Relationships	281
Interest Group	Facebook	Relationships	382



Interest Group	Facebook	Anthropology	343
Interest Group	Facebook	Anthropology	2424
Interest Group	Facebook	Anthropology	274
Interest Group	Facebook	Anthropology	1170
Interest Group	Facebook	Surveys	2210
Interest Group	Facebook	Anthropology	380
Interest Group	Facebook	Surveys	2685
Interest Group	List serv	Anthropology	765
Interest Group	Facebook	Relationships	734
Interest Group	Facebook	Psychology	504
Interest Group	Facebook	Surveys	331
Interest Group	Facebook	Surveys	2048
Interest Group	Facebook	Surveys	960
Interest Group	Facebook	History	217
Interest Group	Facebook	Relationships	744
Interest Group	Facebook	Psychology	793
Interest Group	Facebook	Relationships	216
Professional society	List serv	Sexology	456
Professional society	List serv	Sexology	1300
Professional society	Facebook	Psychology	99
Undergraduates	List serv	Binghamton University	406
Undergraduates	List serv	Binghamton University	71
Undergraduates	List serv	Binghamton University	50
Undergraduates	List serv	Binghamton University	25
Undergraduates	List serv	Indiana University of PA	2000
		<b>Distribution</b>	<b>145455</b>
		<b>Responses</b>	<b>3914</b>
		<b>Response rate</b>	<b>2.6%</b>

CHRONOLOGICAL DISTRIBUTION OF SURVEY B—NOVEMBER 2 TO MARCH 3 2013

Type	Source	Topic	Size
Discussion Group	Facebook	Anthropology	226
Discussion Group	Facebook	Anthropology	40
Discussion Group	Facebook	Anthropology	500
Discussion Group	Facebook	Anthropology	406
Discussion Group	Facebook	Travel	2388
Discussion Group	Facebook	Research	350
Discussion Group	Facebook	Evolutionary Psychology	530
Discussion Group	Facebook	Relationships	1206

Discussion Group	Facebook	Relationships	760
Discussion Group	Facebook	Sexology	430
Discussion Group	Facebook	Psychology	150
Discussion Group	Facebook	Psychology	320
Discussion Group	Facebook	Science	1086
Faculty	List serv	American Anthropology Association	445
Faculty	List serv	UTSC	456
Faculty	List serv	Sexology	400
General public	Reddit	Surveys	18674
Graduate students	List serv	University of Michigan	9177
Graduate students	List serv	Syracuse University	5693
Graduate students	List serv	Indiana University	8534
Individual	Facebook		645
Individual	Facebook		421
Individual	Facebook		2571
Individual	Facebook		1583
Individual	Facebook		1283
Individual	Facebook		402
Interest Group	Facebook	Surveys	2173
Interest Group	Facebook	Anthropology	285
Interest Group	Facebook	Anthropology	240
Interest Group	Facebook	Anthropology	50
Interest Group	Facebook	Biology	3453
Interest Group	Facebook	Relationships	71
Interest Group	Facebook	Relationships	1110
Interest Group	Facebook	Relationships	615
Interest Group	Facebook	Relationships	300
Interest Group	Facebook	Relationships	50
Interest Group	Facebook	Anthropology	50
Interest Group	Facebook	Evolutionary Psychology	25
Interest Group	Facebook	Evolution	1232
Interest Group	Facebook	Evolution	125
Interest Group	Facebook	Feminism	183
Interest Group	Facebook	Relationships	40478
Interest Group	Facebook	Relationships	711
Interest Group	Facebook	Relationships	473
Interest Group	Facebook	Relationships	9875
Interest Group	Facebook	Neurology	100
Interest Group	Facebook	Psychology	300
Interest Group	Facebook	Psychology	2750
Interest Group	Facebook	Relationships	150

Interest Group	Facebook	Relationships	50
Interest Group	Facebook	Surveys	1212
Interest Group	Facebook	Relationships	150
Interest Group	Facebook	Relationships	1127
Interest Group	Facebook	Anthropology	1301
Interest Group	Facebook	Psychology	2145
Interest Group	Facebook	Evolution	1412
Interest Group	Facebook	Surveys	3456
Interest Group	Facebook	Relationships	1111
Interest Group	Facebook	Surveys	3066
Interest Group	Facebook	Relationships	240
Professional Society	List serv	Sexology	373
Undergrads	Facebook	Binghamton University	4283
		<b>Distribution</b>	<b>149770</b>
		<b>Responses</b>	<b>1791</b>
		<b>Response rate</b>	<b>1.3%</b>

## B. Survey instruments

### SURVEY A

Q1 Hello, my name is Craig Eric Morris and I am a PhD candidate at Binghamton University. I am conducting research on romantic relationships for my dissertation. You are being contacted because I wish to represent the experiences of as broad a population as possible in my research. This research project has been approved by the Binghamton University Institutional Review Board for the Protection of Human Subjects and your decision whether or not to participate will not prejudice your future relations with Binghamton University.

If you decide to participate, you are not obligated to answer all questions, and may stop at any time. If you agree, I would like to ask you some questions about your past romantic relationships. The survey should take less than ten minutes. However, you are encouraged to take as much time as you feel is necessary to add additional comments. Your responses will be kept confidential.

If you have any additional questions, Dr. Chris Reiber (607) 777-2737 will be happy to answer them. If at any time you have questions concerning your rights as a research subject you may call Binghamton University's Human Subject's Research Review Committee at (607) 777-3818.

Thanks in advance for your time and honesty, I deeply appreciate it.

Craig Eric Morris

cmorris2@binghamton.edu

Q2 How old are you?

- Under 18 (1)
- 18-23 (2)
- 24-29 (3)
- 30-39 (4)
- 40-49 (5)
- 50-59 (6)
- 60 or over (7)

Q3 In which industry are you employed?

- Forestry, fishing, hunting or agriculture support (1)
- Mining (2)
- Utilities (3)
- Construction (4)
- Manufacturing (5)
- Wholesale trade (6)
- Retail trade (7)
- Transportation or warehousing (8)
- Information (9)
- Finance or insurance (10)
- Real estate or rental and leasing (11)
- Professional, scientific or technical services (12)
- Accommodation or food services (13)
- Administrative or support (14)
- Educational services (15)
- Student (16)
- Health care or social assistance (17)
- Arts, entertainment or recreation (18)
- Not currently employed (19)
- Other (20)

Q4 What is your annual income range?

- Below \$20,000 (1)
- \$20,000 - \$29,999 (2)
- \$30,000 - \$39,999 (3)
- \$40,000 - \$49,999 (4)
- \$50,000 - \$59,999 (5)
- \$60,000 - \$69,999 (6)
- \$70,000 - \$79,999 (9)
- \$80,000 - \$89,999 (7)

\$90,000 or more (8)

Q5 In which country do you reside?

- Afghanistan (1)
- Albania (2)
- Algeria (3)
- Andorra (4)
- Angola (5)
- Antigua and Barbuda (6)
- Argentina (7)
- Armenia (8)
- Australia (9)
- Austria (10)
- Azerbaijan (11)
- Bahamas (12)
- Bahrain (13)
- Bangladesh (14)
- Barbados (15)
- Belarus (16)
- Belgium (17)
- Belize (18)
- Benin (19)
- Bhutan (20)
- Bolivia (21)
- Bosnia and Herzegovina (22)
- Botswana (23)
- Brazil (24)
- Brunei Darussalam (25)
- Bulgaria (26)
- Burkina Faso (27)
- Burundi (28)
- Cambodia (29)
- Cameroon (30)
- Canada (31)
- Cape Verde (32)
- Central African Republic (33)
- Chad (34)
- Chile (35)
- China (36)
- Colombia (37)
- Comoros (38)

- Congo, Republic of the... (39)
- Costa Rica (40)
- Côte d'Ivoire (41)
- Croatia (42)
- Cuba (43)
- Cyprus (44)
- Czech Republic (45)
- Democratic People's Republic of Korea (46)
- Democratic Republic of the Congo (47)
- Denmark (48)
- Djibouti (49)
- Dominica (50)
- Dominican Republic (51)
- Ecuador (52)
- Egypt (53)
- El Salvador (54)
- Equatorial Guinea (55)
- Eritrea (56)
- Estonia (57)
- Ethiopia (58)
- Fiji (59)
- Finland (60)
- France (61)
- Gabon (62)
- Gambia (63)
- Georgia (64)
- Germany (65)
- Ghana (66)
- Greece (67)
- Grenada (68)
- Guatemala (69)
- Guinea (70)
- Guinea-Bissau (71)
- Guyana (72)
- Haiti (73)
- Honduras (74)
- Hong Kong (S.A.R.) (75)
- Hungary (76)
- Iceland (77)
- India (78)
- Indonesia (79)
- Iran, Islamic Republic of... (80)

- Iraq (81)
- Ireland (82)
- Israel (83)
- Italy (84)
- Jamaica (85)
- Japan (86)
- Jordan (87)
- Kazakhstan (88)
- Kenya (89)
- Kiribati (90)
- Kuwait (91)
- Kyrgyzstan (92)
- Lao People's Democratic Republic (93)
- Latvia (94)
- Lebanon (95)
- Lesotho (96)
- Liberia (97)
- Libyan Arab Jamahiriya (98)
- Liechtenstein (99)
- Lithuania (100)
- Luxembourg (101)
- Madagascar (102)
- Malawi (103)
- Malaysia (104)
- Maldives (105)
- Mali (106)
- Malta (107)
- Marshall Islands (108)
- Mauritania (109)
- Mauritius (110)
- Mexico (111)
- Micronesia, Federated States of... (112)
- Monaco (113)
- Mongolia (114)
- Montenegro (115)
- Morocco (116)
- Mozambique (117)
- Myanmar (118)
- Namibia (119)
- Nauru (120)
- Nepal (121)
- Netherlands (122)



- New Zealand (123)
- Nicaragua (124)
- Niger (125)
- Nigeria (126)
- Norway (127)
- Oman (128)
- Pakistan (129)
- Palau (130)
- Panama (131)
- Papua New Guinea (132)
- Paraguay (133)
- Peru (134)
- Philippines (135)
- Poland (136)
- Portugal (137)
- Qatar (138)
- Republic of Korea (139)
- Republic of Moldova (140)
- Romania (141)
- Russian Federation (142)
- Rwanda (143)
- Saint Kitts and Nevis (144)
- Saint Lucia (145)
- Saint Vincent and the Grenadines (146)
- Samoa (147)
- San Marino (148)
- Sao Tome and Principe (149)
- Saudi Arabia (150)
- Senegal (151)
- Serbia (152)
- Seychelles (153)
- Sierra Leone (154)
- Singapore (155)
- Slovakia (156)
- Slovenia (157)
- Solomon Islands (158)
- Somalia (159)
- South Africa (160)
- Spain (161)
- Sri Lanka (162)
- Sudan (163)
- Suriname (164)

- Swaziland (165)
- Sweden (166)
- Switzerland (167)
- Syrian Arab Republic (168)
- Tajikistan (169)
- Thailand (170)
- The former Yugoslav Republic of Macedonia (171)
- Timor-Leste (172)
- Togo (173)
- Tonga (174)
- Trinidad and Tobago (175)
- Tunisia (176)
- Turkey (177)
- Turkmenistan (178)
- Tuvalu (179)
- Uganda (180)
- Ukraine (181)
- United Arab Emirates (182)
- United Kingdom of Great Britain and Northern Ireland (183)
- United Republic of Tanzania (184)
- United States of America (185)
- Uruguay (186)
- Uzbekistan (187)
- Vanuatu (188)
- Venezuela, Bolivarian Republic of... (189)
- Viet Nam (190)
- Yemen (191)
- Zambia (192)
- Zimbabwe (193)

Q6 What is your gender?

- Female (1)
- Male (2)
- Transgender (3)
- Other (5)

Q7 What is your sexuality?

- Exclusively heterosexual (1)
- Mostly heterosexual (2)
- Bisexual (3)
- Mostly homosexual (4)

- Exclusively homosexual (5)
- Asexual (6)
- Other (7)

Q8 How “valuable” do you perceive yourself as a romantic partner? You are free to interpret this question in whatever way is most relevant to you (i.e. your response need not specifically be related to income, physical attractiveness, level of education). 0 = not at all valuable 10 = extremely valuable

\_\_\_\_\_ My value as a romantic partner (1)

Q9 Have you experienced the termination of a romantic relationship (e.g. breakup, divorce)?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To End of Survey

Q10 Have you experienced more than one termination of a romantic relationship?

- Yes (1)
- No (2)

Q11 If you have experienced more than one termination of a romantic relationship, how many?

- One (1)
- Two (2)
- Three (3)
- Four (4)
- Five (5)
- Six (6)
- Seven (7)
- More than seven (8)

Q12 If you have experienced more than one termination of a romantic relationship, which instance would you prefer to answer the remainder of the questions about?

- The one that affected me most strongly (1)
- The most recent (2)
- Both refer to the same instance (3)

Q13 Approximately how long did this relationship last? (10 meaning the relationship lasted ten OR MORE years.)

\_\_\_\_\_ Years (1)

Q14 Who do you feel initiated the relationship's end?

- Myself (1)
- My partner (2)
- Both of us (3)
- Not sure (4)

Q15 What do you feel caused the breakup? You may choose as many as are applicable.

- Infidelity (1)
- Distance (2)
- Lack of communication (3)
- Actions/opinions of other people (4)
- Other (5)

Q16 How severe was the experience for you emotionally? 1 = minimal effect 10 = unbearable

\_\_\_\_\_ Click to write Choice 1 (1)

Q17 Did you experience any of the following? You may choose as many as are applicable.

- Anger (1)
- Anxiety (2)
- Depression (3)
- Emotional numbness (4)
- Fear (5)
- Loss of focus (6)
- Inability to function at school or work (7)
- Other (8)
- None of the above (9)

Q18 How severe was the experience for you physically? 1 = minimal effect 10 = unbearable

\_\_\_\_\_ Click to write Choice 1 (1)

Q19 Did you experience any of the following? You may choose as many as are applicable.

- Eating disorders (1)
- Panic attacks (2)
- Reduced immune system function (3)
- Sleeplessness (4)
- Weight loss or gain (5)
- Other (6)
- None of the above (7)

Q20 What level of social support did you use to recover from the breakup (e.g. friends, family, counseling)?

- Extensive (1)
- Some (2)
- Very little (3)
- None (4)

Q21 Please use the space below to add any additional comments, thoughts, and feelings regarding your breakup experience.

## SURVEY B

Q1 Hello, my name is Craig Eric Morris and I am a PhD candidate at Binghamton University. I am conducting research on romantic relationships for my dissertation. You are being contacted because I wish to represent the experiences of as broad a population as possible in my research. This research project has been approved by the Binghamton University Institutional Review Board for the Protection of Human Subjects and your decision whether or not to participate will not prejudice your future relations with Binghamton University.

If you decide to participate, you are not obligated to answer all questions, and may stop at any time. If you agree, I would like to ask you some questions about your past romantic relationships. The survey should take less than ten minutes. However, you are encouraged to take as much time as you feel is necessary to add additional comments. Your responses will be kept confidential.

If you have any additional questions, Dr. Chris Reiber (607) 777-2737 will be happy to answer them. If at any time you have questions concerning your rights as a research subject you may call Binghamton University's Human Subject's Research Review Committee at (607) 777-3818.

Thanks in advance for your time and honesty, I deeply appreciate it.

Craig Eric Morris

cmorris2@binghamton.edu

Q2 How old are you? Please respond with a number.

Q3 In which industry are you employed?

- Forestry, fishing, hunting or agriculture support (1)
- Mining (2)
- Utilities (3)
- Construction (4)
- Manufacturing (5)
- Wholesale trade (6)
- Retail trade (7)
- Transportation or warehousing (8)
- Information (9)
- Finance or insurance (10)
- Real estate or rental and leasing (11)
- Professional, scientific or technical services (12)
- Accommodation or food services (13)
- Administrative or support (14)
- Educational services (15)
- Student (16)
- Health care or social assistance (17)
- Arts, entertainment or recreation (18)
- Not currently employed (19)
- Other (20)

Q4 What is your annual income range?

- Below \$20,000 (1)
- \$20,000 - \$29,999 (2)
- \$30,000 - \$39,999 (3)
- \$40,000 - \$49,999 (4)
- \$50,000 - \$59,999 (5)
- \$60,000 - \$69,999 (6)
- \$70,000 - \$79,999 (9)
- \$80,000 - \$89,999 (7)
- \$90,000 or more (8)

Q5 In which country do you reside?

- Afghanistan (1)
- Albania (2)
- Algeria (3)
- Andorra (4)
- Angola (5)

- Antigua and Barbuda (6)
- Argentina (7)
- Armenia (8)
- Australia (9)
- Austria (10)
- Azerbaijan (11)
- Bahamas (12)
- Bahrain (13)
- Bangladesh (14)
- Barbados (15)
- Belarus (16)
- Belgium (17)
- Belize (18)
- Benin (19)
- Bhutan (20)
- Bolivia (21)
- Bosnia and Herzegovina (22)
- Botswana (23)
- Brazil (24)
- Brunei Darussalam (25)
- Bulgaria (26)
- Burkina Faso (27)
- Burundi (28)
- Cambodia (29)
- Cameroon (30)
- Canada (31)
- Cape Verde (32)
- Central African Republic (33)
- Chad (34)
- Chile (35)
- China (36)
- Colombia (37)
- Comoros (38)
- Congo, Republic of the... (39)
- Costa Rica (40)
- Côte d'Ivoire (41)
- Croatia (42)
- Cuba (43)
- Cyprus (44)
- Czech Republic (45)
- Democratic People's Republic of Korea (46)
- Democratic Republic of the Congo (47)



- Denmark (48)
- Djibouti (49)
- Dominica (50)
- Dominican Republic (51)
- Ecuador (52)
- Egypt (53)
- El Salvador (54)
- Equatorial Guinea (55)
- Eritrea (56)
- Estonia (57)
- Ethiopia (58)
- Fiji (59)
- Finland (60)
- France (61)
- Gabon (62)
- Gambia (63)
- Georgia (64)
- Germany (65)
- Ghana (66)
- Greece (67)
- Grenada (68)
- Guatemala (69)
- Guinea (70)
- Guinea-Bissau (71)
- Guyana (72)
- Haiti (73)
- Honduras (74)
- Hong Kong (S.A.R.) (75)
- Hungary (76)
- Iceland (77)
- India (78)
- Indonesia (79)
- Iran, Islamic Republic of... (80)
- Iraq (81)
- Ireland (82)
- Israel (83)
- Italy (84)
- Jamaica (85)
- Japan (86)
- Jordan (87)
- Kazakhstan (88)
- Kenya (89)

- Kiribati (90)
- Kuwait (91)
- Kyrgyzstan (92)
- Lao People's Democratic Republic (93)
- Latvia (94)
- Lebanon (95)
- Lesotho (96)
- Liberia (97)
- Libyan Arab Jamahiriya (98)
- Liechtenstein (99)
- Lithuania (100)
- Luxembourg (101)
- Madagascar (102)
- Malawi (103)
- Malaysia (104)
- Maldives (105)
- Mali (106)
- Malta (107)
- Marshall Islands (108)
- Mauritania (109)
- Mauritius (110)
- Mexico (111)
- Micronesia, Federated States of... (112)
- Monaco (113)
- Mongolia (114)
- Montenegro (115)
- Morocco (116)
- Mozambique (117)
- Myanmar (118)
- Namibia (119)
- Nauru (120)
- Nepal (121)
- Netherlands (122)
- New Zealand (123)
- Nicaragua (124)
- Niger (125)
- Nigeria (126)
- Norway (127)
- Oman (128)
- Pakistan (129)
- Palau (130)
- Panama (131)

- Papua New Guinea (132)
- Paraguay (133)
- Peru (134)
- Philippines (135)
- Poland (136)
- Portugal (137)
- Qatar (138)
- Republic of Korea (139)
- Republic of Moldova (140)
- Romania (141)
- Russian Federation (142)
- Rwanda (143)
- Saint Kitts and Nevis (144)
- Saint Lucia (145)
- Saint Vincent and the Grenadines (146)
- Samoa (147)
- San Marino (148)
- Sao Tome and Principe (149)
- Saudi Arabia (150)
- Senegal (151)
- Serbia (152)
- Seychelles (153)
- Sierra Leone (154)
- Singapore (155)
- Slovakia (156)
- Slovenia (157)
- Solomon Islands (158)
- Somalia (159)
- South Africa (160)
- Spain (161)
- Sri Lanka (162)
- Sudan (163)
- Suriname (164)
- Swaziland (165)
- Sweden (166)
- Switzerland (167)
- Syrian Arab Republic (168)
- Tajikistan (169)
- Thailand (170)
- The former Yugoslav Republic of Macedonia (171)
- Timor-Leste (172)
- Togo (173)

- Tonga (174)
- Trinidad and Tobago (175)
- Tunisia (176)
- Turkey (177)
- Turkmenistan (178)
- Tuvalu (179)
- Uganda (180)
- Ukraine (181)
- United Arab Emirates (182)
- United Kingdom of Great Britain and Northern Ireland (183)
- United Republic of Tanzania (184)
- United States of America (185)
- Uruguay (186)
- Uzbekistan (187)
- Vanuatu (188)
- Venezuela, Bolivarian Republic of... (189)
- Viet Nam (190)
- Yemen (191)
- Zambia (192)
- Zimbabwe (193)

Q6 What is your gender? (If "other," please elaborate).

- Female (1)
- Male (2)
- Transgender (3)
- Other (4) \_\_\_\_\_

Q7 What is your sexuality? (If "other," please elaborate).

- Exclusively heterosexual (1)
- Mostly heterosexual (2)
- Bisexual (3)
- Mostly homosexual (4)
- Exclusively homosexual (5)
- Asexual (6)
- Other (7) \_\_\_\_\_

Q8 How “valuable” do you perceive yourself as a romantic partner? You are free to interpret this question in whatever way is most relevant to you (i.e. your response need not specifically be related to income, physical attractiveness, level of education). 0 = not at all valuable 10 = extremely valuable

\_\_\_\_\_ My value as a romantic partner (1)

Q9 Have you experienced the termination of a romantic relationship (e.g. breakup, divorce)?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To End of Survey

Q10 Have you experienced more than one breakup?

- Yes (1)
- No (2)

Answer If Have you experienced more than one termination of a roman... Yes Is Selected

Q11 How many breakups have you experienced?

Q12 We would like you to focus the remainder of your answers on one specific breakup. Which breakup will you answer the remainder of the questions about? (If "other," please elaborate).

- The one that affected me most strongly (1)
- The most recent (2)
- Other (3) \_\_\_\_\_

Q13 Approximately how long did this relationship last? (10 meaning the relationship lasted ten OR MORE years.)

\_\_\_\_\_ Years (1)

Q14 Who broke up with whom?

- I broke up with my partner. (1)
- My partner broke up with me. (2)
- The breakup was mutual. (3)

Q15 Why did you break up? Please be as specific as you are able.

Q16 How severe was the experience for you emotionally? 0 = minimal effect 10 = unbearable

\_\_\_\_\_ Emotional Effect (1)

Q17 Did you experience any of the following? You may choose as many as are applicable.

- Anger (1)
- Anxiety (2)
- Depression (3)
- Emotional numbness (4)
- Fear (5)
- Loss of focus (6)
- Inability to function at school or work (7)
- Sadness (8)
- Other (9) \_\_\_\_\_
- None of the above (10)

Q18 How severe was the experience for you physically? 0 = minimal effect 10 = unbearable

\_\_\_\_\_ Physical Effect (1)

Q19 Did you experience any of the following? You may choose as many as are applicable.

- Eating disorders (1)
- Panic attacks (2)
- Overall decrease in health and fitness (3)
- Sleeplessness (4)
- Weight loss or gain (5)
- Other (6) \_\_\_\_\_
- None of the above (7)

Q20 What level of social support did you receive following the breakup? (e.g. friends, family, counseling)? 0 = none 10 = extensive

\_\_\_\_\_ Support (1)

Q21 Please use the space below to add any additional comments, thoughts, and feelings regarding your breakup experience(s).

## Works Cited

1. Abbott, D., Keverne, E., Bercovitch, F., Shively, C., Mendoza, S. P., Saltzman, W., . . . Garland, T. (2003). Are subordinates always stressed? A comparative analysis of rank differences in cortisol levels among primates. *Hormones and Behavior*, 43(1), 67-82.
2. Allen, N. B., & Badcock, P. B. (2003). The social risk hypothesis of depressed mood: evolutionary, psychosocial, and neurobiological perspectives. *Psychological Bulletin*, 129(6), 887.
3. Amato, P. R. (2000). The consequences of divorce for adults and children. *Journal of Marriage and Family*, 62(4), 1269-1287.
4. Andrews, P. W., & Thomson, J. A. (2009). The bright side of being blue: Depression as an adaptation for analyzing complex problems. *Psychological Review*, 116(3), 620-654. doi: 10.1037/a0016242
5. Archer, J. (2003). *The nature of grief: The evolution and psychology of reactions to loss*. Routledge.
6. Bailey, J. M., Gaulin, S., Agyei, Y., & Gladue, B. A. (1994). Effects of gender and sexual orientation on evolutionarily relevant aspects of human mating psychology. *Journal of personality and social psychology*, 66(6), 1081.
7. Bailey, J. M., Kirk, K. M., Zhu, G., Dunne, M. P., & Martin, N. G. (2000). Do individual differences in sociosexuality represent genetic or environmentally contingent strategies? Evidence from the Australian twin registry. *Journal of Personality and Social Psychology*, 78(3), 537.
8. Bakermans-Kranenburg, M., and van IJzendoorn, M. (1997). Adult attachment and the break-up of romantic relationships. *Journal of Divorce and Remarriage*, 27, 121-139.
9. Bancroft, J. (1999). Central inhibition of sexual response in the male: a theoretical perspective. *Neuroscience & Biobehavioural Reviews*, 23, 763-784.
10. Barbara, A. M., and Dion, K. L. (2000). Breaking up is hard to do, especially for strongly "preoccupied" lovers. *Journal of Loss and Trauma*, 5, 315-342.



11. Barkow, J. H. (1992). Beneath new culture is old psychology: Gossip and social stratification. In J. H. Barkow, L. Cosmides & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (Vol. xii, pp. 627-637). New York: Oxford University Press.
12. Bartels, A., and Zeki, S. (2004) The neural correlates of maternal and romantic love. *NeuroImage*, 21, 1155–1166
13. Battaglia, D. M., Richard, F. D., Datteri, D. L., & Lord, C. G. (1998). Breaking up is (relatively) easy to do: A script for the dissolution of close relationships. *Journal of Social and Personal Relationships*, 15(6), 829-845.
14. Baumeister, R. F., & Dhavale, D. A. W. N. (2001). Two sides of romantic rejection. *Interpersonal rejection*, 55-71.
15. Baumeister, R. F., & Leary, M. R. (1995). The need to belong: desire for interpersonal attachments as a fundamental human motivation. *Psychological bulletin*, 117(3), 497.
16. Baumeister, R. F., Wotman, S. R., & Stillwell, A. M. (1993). Unrequited love: On heartbreak, anger, guilt, scriptlessness, and humiliation. *Journal of Personality and Social Psychology*, 64(3), 377.
17. Beaussart, M. L., Kaufman, S. B., & Kaufman, J. C. (2012). Creative activity, personality, mental illness, and short-term mating success. *The Journal of Creative Behavior*, 46(3), 151-167.
18. Bevino, D. L., & Sharkin, B. S. (2003). Divorce adjustment as a function of finding meaning and gender differences. *Journal of Divorce & Remarriage*, 39(3-4), 81-97.
19. Björkqvist, K. (1994). Sex differences in physical, verbal, and indirect aggression: A review of recent research. *Sex Roles*, 30(3-4), 177-188.
20. Bjorkqvist, K., Osterman, K., & Lagerspetz, K. M. (1994). Sex differences in covert aggression among adults. *Aggressive Behavior*, 20(1), 27-33.
21. Bobrow, D., & Bailey, J. M. (2001). Is male homosexuality maintained via kin selection? *Evolution and Human Behavior*, 22(5), 361-368.
22. Boelen, P. A., & Reijntjes, A. (2009). Negative cognitions in emotional problems following romantic relationship break ups. *Stress and Health*, 25(1), 11–19.
23. Bonanno, G. A., Wortman, C. B., Lehman, D. R., Tweed, R. G., Haring, M., Sonnega, J., ... Nesse, R. M. (2002). Resilience to loss and chronic grief: A prospective study from preloss to 18-months postloss. *Journal of Personality and Social Psychology*, 83, 1150–1164.

24. Bowlby, J. (1969). *Attachment and loss: Vol 1. Attachment*. New York: Basic Books.
25. Bowlby, J. (1980). *Attachment and loss, volume 3: loss; sadness and depression*. New York: Basic Books.
26. Brase, G. L., & Guy, E. C. (2004). The demographics of mate value and self-esteem. *Personality and Individual Differences*, 36(2), 471-484.
27. Breitner, B. C., & Anderson, D. N. (1994). The organic and psychological antecedents of delusional jealousy in old age. *International Journal of Geriatric Psychiatry*, 9(9), 703-707.
28. Brown, W. M., & Moore, C. (2002). Smile asymmetries and reputation as reliable indicators of likelihood to cooperate: An evolutionary analysis. In S. P. Shohov (Ed.), *Advances in Psychology Research* (pp. 59-78). New York: Nova Science Publishers.
29. Bryson, J. B. (1991). *Modes of response to jealousy-evoking situations*. New York: Guilford Press.
30. Burr, C. (1995). *A separate creation: how biology makes us gay*. Bantam Press.
31. Buss, D. (2001) *The dangerous passion: Why jealousy is as necessary as love and sex*. New York, NY: The Free Press
32. Buss, D. M. (1988). From vigilance to violence: Tactics of mate retention in American undergraduates. *Ethology and Sociobiology*, 9(5), 291-317.
33. Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences*, 12(01), 1-14.
34. Buss, D. M. (1990). The evolution of anxiety and social exclusion. *Journal of Social and Clinical Psychology*, 9(2), 196-201.
35. Buss, D. M. (2000). The evolution of happiness. *American Psychologist*, 55(1), 15.
36. Buss, D. M. (2002). Human mate guarding. *Neuroendocrinology Letters*, 23(4), 23-29.
37. Buss, D. M. (2003). *The evolution of desire: Strategies of human mating*. New York: Basic Books.
38. Buss, D. M. (2004). *Evolutionary psychology: The new science of the mind*. Boston: Pearson Education, Inc.
39. Buss, D. M. (2007). The evolution of human mating. *Acta Psychologica Sinica*, 39(3), 502-512.

40. Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: an evolutionary perspective on human mating. *Psychological Review*, 100(2), 204.
41. Buss, D. M., & Shackelford, T. K. (1997). Human aggression in evolutionary psychological perspective. *Clinical Psychology Review*, 17(6), 605-619.
42. Buss, D. M., and Shackelford, T. K. (2008). Attractive Women Want it All: Good Genes, Economic Investment, Parenting Proclivities, and Emotional Commitment. *Evolutionary Psychology*, 6, 134-146.
43. Buss, D. M., Shackelford, T. K., & McKibbin, W. F. (2008). The mate retention inventory-short form (MRI-SF). *Personality and Individual Differences*, 44(1), 322-334.
44. Buss, D.M., and Dedden, L. (1990) Derogation of competitors. *Journal of Social and Personal Relationships*. 7, 395-422
45. Buunk, B. P., & Bringle, R. G. (1987). Jealousy in love relationships. In D. Perlman & S. Duck (Eds.), *Intimate relationships: Development, dynamics, and deterioration* (pp. 13-42). Thousand Oaks, CA: Sage Publications, Inc.
46. Buunk, B. P., & Dijkstra, P. (2004). Gender differences in rival characteristics that evoke jealousy in response to emotional versus sexual infidelity. *Personal Relationships*, 11(4), 395-408.
47. Campbell, A. (2004). Female competition: Causes, constraints, content, and contexts. *Journal of Sex Research*, 41(1), 16-26.
48. Choo, P., Levine, T., & Hatfield, E. (1996). Gender, love schemas, and reactions to romantic break-ups. *Journal of Social Behavior and Personality*, 11(5), 143-160.
49. Chung, M. C., Farmer, S., Grant, K., Newton, R., Payne, S., Perry, M., . . . Stone, N. (2003). Coping with post-traumatic stress symptoms following relationship dissolution. *Stress and Health*, 19(1), 27-36.
50. Clark, A. E., & Georgellis, Y. (2013). Back to baseline in Britain: Adaptation in the British Household Panel Survey. *Economica*, 80(319), 496-512. Crawford, M., & Popp, D. (2003). Sexual double standards: A review and methodological critique of two decades of research. *Journal of Sex Research*, 40(1), 13-26.
51. Clark, R. and Hatfield, E. (1989) Gender differences in receptivity to sexual offers. *Journal of Psychology and Human Sexuality* 2, 39-55
52. Clutton-Brock, T. H., and Vincent, A. C. (1991). Sexual selection and the potential reproductive rates of males and females. *Nature*, 351(6321), 58-60.

53. Collins, W. A. (2003). More than myth: The developmental significance of romantic relationships during adolescence. *Journal of research on adolescence*, 13(1), 1-24.
54. Darwin, C. (2003). *The Descent of Man*. 1871. *The Origin of Species and the Descent of Man*, 912-13.
55. Davis, D., Shaver, P. R., & Vernon, M. L. (2003). Physical, emotional, and behavioral reactions to breaking up: The roles of gender, age, emotional involvement, and attachment style. *Personality and Social Psychology Bulletin*, 29(7), 871-884.
56. Diamond, L. M. (2008). *Sexual fluidity*. Harvard University Press.
57. Drigotas, S. M., and Barta, W. (2001). The cheating heart: Scientific explorations of infidelity. *Current Directions in Psychological Science*, 10(5), 177-180.
58. Dugatkin, L. A. (1992). Sexual selection and imitation: Females copy the mate choice of others. *American Naturalist*, 139, 1384-1389.
59. Dürschlag, M., Hirzel, D. and Sachser, N. (1998) Social relationships and the management of stress. *Psychoneuroendocrinology*, 8, 891-904.
60. Eagly, A. H., & Wood, W. (1999). The origins of sex differences in human behavior: Evolved dispositions versus social roles. *American Psychologist*, 54(6), 408.
61. Eastwick, P. W., Finkel, E. J., Krishnamurti, T., & Loewenstein, G. (2008). Mispredicting distress following romantic breakup: Revealing the time course of the affective forecasting error. *Journal of Experimental Social Psychology*, 44(3), 800-807.
62. Einon, D. (1994). Are men more promiscuous than women? *Ethology and Sociobiology*, 15(3), 131-143.
63. Engle-Warnick, J., & Slonim, R. L. (2004). The evolution of strategies in a repeated trust game. *Journal of Economic Behavior & Organization*, 55(4), 553-573.
64. Engle-Warnick, J., & Slonim, R. L. (2006). Inferring repeated-game strategies from actions: evidence from trust game experiments. *Economic Theory*, 28(3), 603-632.
65. Everitt, B.J. (1990). Sexual motivation: a neural and behavioural analysis of the mechanisms underlying appetitive and copulatory responses of male rats. *Neuroscience & Biobehavioural Reviews*, 14, 217-232.
66. Field, T., Diego, M., Pelaez, M., Deeds, O., & Delgado, J. (2010). Breakup distress and loss of intimacy in university students. *Psychology*, 1(3), 173-177.
67. Fine, M. A., & Sacher, J. A. (1997). Predictors of distress following relationship termination among dating couples. *Journal of Social and Clinical Psychology*, 16(4), 381-388.

68. Fisher, H. (1995). The nature and evolution of romantic love. In *Romantic Passion: A Universal Experience?* New York: Columbia University Press.
69. Fisher, H. (2002) Defining the brain systems of lust, romantic attraction, and attachment. *Archives of Sexual Behavior* 31, 413-420
70. Fisher, H. (2004). Dumped! *New Scientist*, 181, 40–43.
71. Fisher, H. (2005). Evolution of human serial pairbonding. *American Journal of Physical Anthropology*, 78, 331–354.
72. Fisher, H. (2006a). Broken Hearts: The Nature and Risk of Romantic Rejection. In *Romance and Sex in Adolescent and Emerging Adulthood: Risk and Opportunities* (pp. 3–28). Mahwah, New Jersey: Pennsylvania State University.
73. Fisher, H. (2006b). Lost Love: The Nature of Romantic Rejection. In *Cut loose : (mostly) older women talk about the end of (mostly) long-term relationships* (pp. 182–195). New Brunswick, N.J.: Rutgers University Press.
74. Fisher, Helen. (2004a). *Why we love: The nature and chemistry of romantic love*. New York: Henry Holt and Co.
75. Fleming, C. B., White, H. R., Oesterle, S., Haggerty, K. P., & Catalano, R. F. (2010). Romantic relationship status changes and substance use among 18-to 20-year-olds. *Journal of Studies on Alcohol and Drugs*, 71(6), 847.
76. Forgas, J. P. (1998). On being happy and mistaken: mood effects on the fundamental attribution error. *Journal of Personality and Social Psychology*, 75(2), 318.
77. Fraley, R. C., Brumbaugh, C. C., & Marks, M. J. (2005). The evolution and function of adult attachment: a comparative and phylogenetic analysis. *Journal of personality and social psychology*, 89(5), 731.
78. Frazier, P. A., & Cook, S. W. (1993). Correlates of distress following heterosexual relationship dissolution. *Journal of Social and Personal Relationships*, 10(1), 55-67.
79. Garcia, J.R. and Reiber, C. (2009) Hook-up behavior: A biopsychosocial perspective, 2009. *Journal of Social, Evolutionary & Cultural Psychology* Vol. 208.
80. Geher, G., Bloodworth, R., Mason, J., Stoaks, C., Downey, H. J., Renstrom, K. L., & Romero, J. F. (2005). Motivational underpinnings of romantic partner perceptions: Psychological and physiological evidence. *Journal of Social and Personal Relationships*, 22(2), 255-281.

81. Gigerenzer, G., & Goldstein, D. G. (1996). Reasoning the fast and frugal way: models of bounded rationality. *Psychological Review*, 103(4), 650.
82. Gilbert, P. (2001). Depression and stress: A biopsychosocial exploration of evolved functions and mechanisms. *Stress: The International Journal on the Biology of Stress*, 4(2), 121-135.
83. Gilbert, P. (2006). Evolution and depression: issues and implications. *Psychological Medicine*, 36(3), 287-297.
84. Gilbert, P., & Allan, S. (1998). The role of defeat and entrapment (arrested flight) in depression: an exploration of an evolutionary view. *Psychological Medicine*, 28(3), 585-598.
85. Gurven, M., Allen-Arave, W., Hill, K., & Hurtado, M. (2000). "It's a wonderful life": signaling generosity among the Ache of Paraguay. *Evolution and Human Behavior*, 21(4), 263-282.
86. Gurven, M., Hill, K., Kaplan, H., Hurtado, A., & Lyles, R. (2000). Food transfers among Hiwi foragers of Venezuela: tests of reciprocity. *Human Ecology*, 28(2), 171-218.
87. Harris, C.R. (2004) The evolution of jealousy: Did men and women, facing different selective pressures, evolve different "brands" of jealousy? Sigma Xi, The Scientific Research Society. Electronic document, <http://www.americanscientist.org/IssueTOC/issue/521>, accessed November 2, 2006
88. Hess, N. H., & Hagen, E. H. (2006). Sex differences in indirect aggression: Psychological evidence from young adults. *Evolution and Human Behavior*, 27(3), 231-245.
89. Higley, J. D., King Jr, S. T., Hasert, M. F., Champoux, M., Suomi, S. J., & Linnoila, M. (1996). Stability of interindividual differences in serotonin function and its relationship to severe aggression and competent social behavior in rhesus macaque females. *Neuropsychopharmacology*, 14(1), 67-76.
90. Hill, K. R., & Hurtado, A. M. (1996). *Ache life history: The ecology and demography of a foraging people*. Transaction Publishers.
91. Hohmann, G., & Fruth, B. (2003). Intra- and inter-sexual aggression by bonobos in the context of mating. *Behaviour*, 140(11), 1389-1414.
92. Howard, R.C. (1995). The neurophysiology of sexual desire, with particular reference to paedophilia. *Annals for the Academy of Medicine of Singapore*, 24, 724-727.
93. Hrdy, S.B., *The Evolution of Human Sexuality: The Latest Word and the Last*. *The Quarterly Review of Biology* Vol. 54, No. 3 (Sep., 1979), pp. 309-314

94. Jankowiak, W. R. (1995). *Romantic Passion : A Universal Experience?* New York: Columbia University Press.
95. *love and sex across cultures* (pp. 1–36). New York: Columbia University Press.
96. Jankowiak, W. R. (2008). Desiring sex, longing for love: A tripartite conundrum. In *Intimacies : love and sex across cultures* (pp. 1–36). New York: Columbia University Press.
97. Jankowiak, W. R. (Ed.). (2013). *Intimacies: Love and sex across cultures*. Columbia University Press. Chicago
98. Jankowiak, W. R., & Fischer, E. F. (1992). A cross-cultural perspective on romantic love. *Ethnology*, 149-155.
99. Kaplan, H., Gurven, M., Hill, K., & Hurtado, A. M. (2005). The natural history of human food sharing and cooperation: a review and a new multi-individual approach to the negotiation of norms. In H. Gintis, S. Bowles, R. Boyd & E. Fehr (Eds.), *Moral sentiments and material interests: The foundations of cooperation in economic life* (pp. 75-113). Cambridge, Ma: MIT Press.
100. Karp, D. A. (1997). *Speaking of sadness: Depression, disconnection, and the meanings of illness*. New York: Oxford University Press.
101. Keller, M. C., & Nesse, R. M. (2005). Is low mood an adaptation? Evidence for subtypes with symptoms that match precipitants. *Journal of Affective Disorders*, 86(1), 27-35.
102. Kendler, K. S., Hettema, J. M., Butera, F., Gardner, C. O., & Prescott, C. A. (2003). Life event dimensions of loss, humiliation, entrapment, and danger in the prediction of onsets of major depression and generalized anxiety. *Archives of General Psychiatry*, 60(8), 789.
103. Kenrick, D. T., Keefe, R. C., Bryan, A., Barr, A., & Brown, S. (1995). Age preferences and mate choice among homosexuals and heterosexuals: A case for modular psychological mechanisms. *Journal of Personality and Social Psychology*, 69(6), 1166.
104. Kingham, M., & Gordon, H. (2004). Aspects of morbid jealousy. *Advances in Psychiatric Treatment*, 10(3), 207-215.
105. Kling, K. C., Hyde, J. S., Showers, C. J., & Buswell, B. N. (1999). Gender differences in self-esteem: A meta-analysis. *Psychological Bulletin*, 125(4), 470-500.
106. Knox, D., Zusman, M. E., Kaluzny, M., & Cooper, C. (2000). College student recovery from a broken heart. *College Student Journal*, 34(3), 322-324.

107. Kraut, R., Olson, J., Banaji, M., Bruckman, A., Cohen, J., and Couper, M. (2004). Psychological research online: report of Board of Scientific Affairs' Advisory Group on the Conduct of Research on the Internet. *American Psychologist*, 59, 105.
108. Krendle, C. (1998) Neuroendocrine perspectives on social attachment. *Psychoneuroendocrinology* 23, 779-818
109. Kuehner, C. (2003). Gender differences in unipolar depression: an update of epidemiological findings and possible explanations. *Acta Psychiatrica Scandinavica*, 108(3), 163-174.
110. Lampert, A. (1997). *The evolution of love*. Westport, CT: Praeger Publishers
111. Laumann, E. O. (1994). *The social organization of sexuality: Sexual practices in the United States*. Chicago: University of Chicago Press.
112. Laxmi, T. R., Stork, O., & Pape, H. C. (2003). Generalisation of conditioned fear and its behavioural expression in mice. *Behavioural Brain Research*, 145(1-2), 89-98.
113. Lennox, B. R., Jacob, R., Calder, A. J., Lupson, V., & Bullmore, E. T. (2004). Behavioural and neurocognitive responses to sad facial affect are attenuated in patients with mania. *Psychological Medicine*, 34(05), 795-802. doi: 10.1017/S0033291704002557
114. Levitan, R. D., Vaccarino, F. J., Brown, G. M., & Kennedy, S. H. (2002). Low-dose dexamethasone challenge in women with atypical major depression: pilot study. *Journal of Psychiatry and Neuroscience*, 27(1), 47.
115. Locker, L., McIntosh, W., Hackney, A., Wilson, J., & Wiegand, K. (2010). The breakup of romantic relationships: Situational predictors of perception of recovery. *North American Journal of Psychology*, 12(3), 565-578.
116. Lucas, R. E. (2005). Time does not heal all wounds a longitudinal study of reaction and adaptation to divorce. *Psychological Science*, 16(12), 945-950.
117. Lucas, R. E., Clark, A. E., Georgellis, Y., & Diener, E. (2003). Reexamining adaptation and the set point model of happiness: reactions to changes in marital status. *Journal of Personality and Social Psychology*, 84(3), 527.
118. Marlowe, F. W. (2003). A critical period for provisioning by Hadza men: Implications for pair bonding. *Evolution and Human Behavior*, 24(3), 217-229.
119. Mearns, J. (1991). Coping with a breakup: negative mood regulation expectancies and depression following the end of a romantic relationship. *Journal of Personality and Social Psychology*, 60(2), 327.



120. Miller, S. L., & Maner, J. K. (2008). Coping with romantic betrayal: Sex differences in responses to partner infidelity. *Evolutionary Psychology*, 6(3), 413-426.
121. Moller, N. P., Fouladi, R. T., McCarthy, C. J., & Hatch, K. D. (2003). Relationship of attachment and social support to college students' adjustment following a relationship breakup. *Journal of Counseling & Development*, 81(3), 354-369.
122. Monroe, S. M., Rohde, P., Seeley, J. R., & Lewinsohn, P. M. (1999). Life events and depression in adolescence: relationship loss as a prospective risk factor for first onset of major depressive disorder. *Journal of Abnormal Psychology*, 108(4), 606.
123. Morris, C. E., & Reiber, C. (2011). Frequency, intensity and expression of post-relationship grief. *EvoS Journal: The Journal of the Evolutionary Studies Consortium*, 3(1), 1-11.
124. Morris, C.E. and Reiber, C. (2015b) Quantitative Life History Variation in Post-Relationship Grief. Manuscript submitted for publication
125. Morris, C.E., Beuassart, M.L., Reiber, C., & Krajewski, L.S. (in press). Intrasexual Mate Competition and Breakups: Who Really Wins? (in press) Oxford Handbooks Online.
126. Morris, C.E., Roman, E., and Reiber, C. (2015a). Quantitative Sex Differences in Response to the Dissolution of a Romantic Relationship. Manuscript submitted for publication.
127. Morry, M. M. (2005). Relationship satisfaction as a predictor of similarity ratings: A test of the attraction-similarity hypothesis. *Journal of Social and Personal Relationships*, 22(4), 561-584.
128. Morry, M. M. (2007). The attraction-similarity hypothesis among cross-sex friends: Relationship satisfaction, perceived similarities, and self-serving perceptions. *Journal of Social and Personal Relationships*, 24(1), 117-138.
129. Mullins, D. (2010). Morbid jealousy: The green-eyed monster. *Irish Journal of Psychological Medicine*, 27(2).
130. Murray, S. L., Holmes, J. G., Bellavia, G., Griffin, D. W., & Dolderman, D. (2002). Kindred spirits? The benefits of egocentrism in close relationships. *Journal of Personality and Social Psychology*, 82(4), 563.
131. Murray, S. L., Holmes, J. G., Griffin, D. W., Bellavia, G., & Rose, P. (2001). The mismeasure of love: How self-doubt contaminates relationship beliefs. *Personality and Social Psychology Bulletin*, 27(4), 423-436.

132. Najib, A. and Lorberbaum, J. (2004) Regional brain activity in women grieving a romantic relationship breakup. *American Journal of Psychiatry*, 161, 2245-56
133. Nesse, R. (1996). *Why we get sick : the new science of Darwinian medicine* (1st ed.). New York: Vintage Books.
134. Nesse, R. M. (2000). Is depression an adaptation? *Archives of General Psychiatry*, 57(1), 14.
135. Nesse, R. M. (2005). Evolutionary Psychology and Mental Health. In Buss, D. M. (ed.) *Handbook of Evolutionary Psychology* (pp. 903–927). Hoboken: Jon Wiley and Sons.
136. Parker, J., & Burkley, M. (2009). Who's chasing whom? The impact of gender and relationship status on mate poaching. *Journal of Experimental Social Psychology*, 45(4), 1016-1019.
137. Paul, L., Foss, M. A., & Galloway, J. (1993). Sexual jealousy in young women and men: Aggressive responsiveness to partner and rival. *Aggressive Behavior*, 19(6), 401-420.
138. Peri, T., Ben-Shakhar, G., Orr, S. P., & Shalev, A. Y. (2000). Psychophysiological assessment of aversive conditioning in posttraumatic stress disorder. *Biological Psychiatry*, 47(6), 512-519.
139. Perilloux, C., & Buss, D. M. (2008). Breaking up romantic relationships: Costs experienced and coping strategies deployed. *Evolutionary Psychology*, 6(1), 164-181.
140. Perilloux, C., Easton, J. A., & Buss, D. M. (2012). The misperception of sexual interest. *Psychological Science*, 0956797611424162.
141. Price, J. S., Gardner, R., & Erickson, M. (2004). Can depression, anxiety and somatization be understood as appeasement displays? *Journal of Affective Disorders*, 79(1), 1-11.
142. Price, J. S., Sloman, L., Gardner, R., Gilbert, P., & Rohde, P. (1994). The social competition hypothesis of depression. *The British Journal of Psychiatry*, 164(3), 309-315.
143. Rahman, Q., & Hull, M. S. (2005). An empirical test of the kin selection hypothesis for male homosexuality. *Archives of sexual behavior*, 34(4), 461-467.
144. Rahman, Q., & Wilson, G. D. (2003). Born gay? The psychobiology of human sexual orientation. *Personality and Individual Differences*, 34(8), 1337-1382.

145. Ray, J. C., & Sapolsky, R. M. (1992). Styles of male social behavior and their endocrine correlates among high-ranking wild baboons. *American Journal of Primatology*, 28(4), 231-250.
146. Reiber, C. and Garcia, J.R. (2010) Hooking Up: Gender Differences, Evolution, and Pluralistic Ignorance. *Evolutionary Psychology* 8(3).
147. Rhoades, G. K., Kamp Dush, C. M., Atkins, D. C., Stanley, S. M., & Markman, H. J. (2011). Breaking up is hard to do: The impact of unmarried relationship dissolution on mental health and life satisfaction. *Journal of Family Psychology*, 25(3), 366.
148. Roisman, G. I., Clausell, E., Holland, A., Fortuna, K., & Elieff, C. (2008). Adult romantic relationships as contexts of human development: a multimethod comparison of same-sex couples with opposite-sex dating, engaged, and married dyads. *Developmental Psychology*, 44(1), 91.
149. Rosen, R.C., & Beck, J. G. (1988). Patterns of sexual arousal: psychophysiological processes and clinical applications. New York: Guilford.
150. Ruse, M. (1982). Are there gay genes? Sociobiology and homosexuality. *Journal of Homosexuality*, 6, 5-34.
151. Saffrey, C., & Ehrenberg, M. (2007). When thinking hurts: Attachment, rumination, and postrelationship adjustment. *Personal Relationships*, 14(3), 351-368.
152. Sapolsky, R. M. (1990). Adrenocortical function, social rank, and personality among wild baboons. *Biological Psychiatry*, 28(10), 862-878.
153. Sbarra, D. A., & Ferrer, E. (2006). The structure and process of emotional experience following nonmarital relationship dissolution: Dynamic factor analyses of love, anger, and sadness. *Emotion*, 6(2), 224.
154. Schaller, M., & Cialdini, R. B. (Eds.). (1990). Happiness, sadness, and helping: A motivational integration (Vol. xviii). New York: Guilford Press.
155. Schmitt, D. P. (2004). Patterns and universals of mate poaching across 53 nations: the effects of sex, culture, and personality on romantically attracting another person's partner. *Journal of Personality and Social Psychology*, 86(4), 560.
156. Schmitt, D. P. and 118 Members of the International Sexuality Description Project (2003). Universal sex differences in the desire for sexual variety: Tests from 52 Nations, 6 Continents, and 13 Islands. *Journal of Personality and Social Psychology*, 85(1), 85-104.
157. Schmitt, D. P., Alcalay, L., Allik, J., Angleitner, A., Ault, L., Austers, I., . . . Cunen, B. (2004). Patterns and universals of mate poaching across 53 nations: the effects of sex,

- culture, and personality on romantically attracting another person's partner. *Journal of Personality and Social Psychology*, 86(4), 560-584.
158. Schmitt, D., and Shackelford, T. (2003). Nifty ways to leave your lover: The tactics people use to entice and disguise the process of human mate poaching. *Personality and Social Psychology Bulletin*, 29, 1018.
  159. Schmitt, D., Shackelford, T., and Buss, D. (2001). Are men really more oriented toward short-term mating than women? A critical review of theory and research. *Sexualities, Evolution and Gender*, 3, 211–239.
  160. Schützwohl, A. (2008). The disengagement of attentive resources from task-irrelevant cues to sexual and emotional infidelity. *Personality and Individual Differences*, 44(3), 633-644.
  161. Sinclair, R. C. (1988). Mood, categorization breadth, and performance appraisal: The effects of order of information acquisition and affective state on halo, accuracy, information retrieval, and evaluations. *Organizational Behavior and Human Decision Processes*, 42(1), 22-46.
  162. Sloman, L., Gilbert, P., & Hasey, G. (2003). Evolved mechanisms in depression: the role and interaction of attachment and social rank in depression. *Journal of Affective Disorders*, 74(2), 107-121.
  163. Sprecher, S. "Two sides to the breakup of dating relationships." *Personal Relationships* 1, no. 3 (1994): 199-222.
  164. Sprecher, S., Felmlee, D., Metts, S., Fehr, B., & Vanni, D. (1998). Factors associated with distress following the breakup of a close relationship. *Journal of Social and Personal Relationships*, 15(6), 791-809.
  165. Sprecher, S., Sullivan, Q., and Hatfield, E. (1994) Mate selection preferences: Gender differences examined in a national sample. *Personality Processes and Individual Differences*, 66, 1074-1080
  166. Stafford, L., & Canary, D. J. (1991). Maintenance strategies and romantic relationship type, gender and relational characteristics. *Journal of Social and Personal Relationships*, 8(2), 217-242.
  167. Starratt, V. G., Shackelford, T. K., Goetz, A. T., & McKibbin, W. F. (2007). Male mate retention behaviors vary with risk of partner infidelity and sperm competition. *Acta Psychologica Sinica*, 39(3), 523-527. .
  168. Stoleru, S., Gregoire, M. C., Gerard, D., Decety, J., LaFarge, E., Cinotti, L., Lavenne, F., Le Bars, D., Vernet-Maury, E., Rada, H., Collet, C., Mazoyer, B., Forest, M.

- G., Magnin, F., Spira, A., & Comar, D. (1999). Neuroanatomical correlates of visually evoked sexual arousal in human males. *Archives of Sexual Behaviour*, 28, 1–21.
169. Stutzer, A., & Frey, B. S. (2006). Does marriage make people happy, or do happy people get married? *The Journal of Socio-Economics*, 35(2), 326-347.
170. Sugiyama, L. S. (2005). Physical attractiveness in adaptationist perspective. In Buss, David M. (ed.) *Handbook of Evolutionary Psychology* (pp. 292–234). Hoboken: Jon Wiley and Sons.
171. Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.
172. Symons, D. (1980). The evolution of human sexuality revisited. *Behavioral and Brain Sciences*, 3(02), 203-214.
173. Tashiro, T., & Frazier, P. A. (2003). “I’ll never be in a relationship like that again”: Personal growth following romantic relationship breakups. *Personal Relationships*, 10(1), 113-128.
174. Trivers, R. L. (1972). Parental investment and sexual selection, in Campbell B., *Sexual Selection and the Descent of Man*, 1972, 136-179.
175. Uller, T., & Johansson, L. C. (2003). Human mate choice and the wedding ring effect. *Human Nature*, 14(3), 267-276.
176. Von Holst, D. (1986). Psychosocial stress and its pathophysiological effects in tree shrews (*Tupaia belangeri*). *Biological and Psychological Factors in Cardiovascular Disease*, IV, 476-490. doi: 10.1007/978-3-642-71234-0\_29
177. Vrangalova, Z., Bukberg, R. E., & Rieger, G. (2014). Birds of a feather? Not when it comes to sexual permissiveness. *Journal of Social and Personal Relationships*, 31(1), 93-113.
- Wasser, S. K., & Barash, D. P. (1983). Reproductive suppression among female mammals: implications for biomedicine and sexual selection theory. *Quarterly Review of Biology*, 513-538.
178. Wasser, S. K., & Starling, A. K. (1988). Proximate and ultimate causes of reproductive suppression among female yellow baboons at Mikumi National Park, Tanzania. *American Journal of Primatology*, 16(2), 97-121.
179. Weary, G., Elbin, S., & Hill, M. G. (1987). Attributional and social comparison processes in depression. *Journal of Personality and Social Psychology*, 52(3), 605.
180. Weinrich, J. D. (1976). Human reproductive strategy: II. Homosexuality and non-reproductive strategy; some evolutionary models. Unpublished doctoral dissertation, Harvard University.

181. Wilson, E. O. (1975). *Sociobiology: the new synthesis*. Cambridge, MA: Belknap Press.
182. Wilson, G. D. (1982). *The Coolidge Effect: An Evolutionary Account of Human Sexuality*. Morrow.
183. Wirtz, P. W., & Harrell, A. V. (1987). Effects of postassault exposure to attack-similar stimuli on long-term recovery of victims. *Journal of Consulting and Clinical Psychology*, 55(1), 10-16.