Evolutionary Behavioral Sciences

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Online First Publication, October 14, 2019. http://dx.doi.org/10.1037/ebs0000188

American Psychological Association

Evolutionary Behavioral Sciences

ISSN: 2330-2925

http://dx.doi.org/10.1037/ebs0000188

Hostility Mediates the Relations Between Self-Perceived Physical Health Status and Cost-Inflicting Mate Retention

Adam C. Davis
University of Ottawa

Jacob Belanger, Amy Mattsson, and Steven Arnocky
Nipissing University

Physical health has been argued to provide a range of reproductive advantages such as being preferentially chosen as a mate, having more disease-resistant children, and possessing a higher capacity to invest in mates, offspring, allies, and kin. Few researchers have, however, examined how self-perceptions of physical health status may correspond to the strategies that individuals use to vie for and to retain desired mates. In the current study, we asked 144 Canadian young adults currently in long-term romantic relationships to report their self-perceived severity and frequency of a range of physical health symptoms, feelings of romantic jealousy, and engagement in 2 domains of mate retention behavior (benefit-provisioning and cost-inflicting). Contrary to our hypothesis, those perceiving themselves to be in poorer physical health were not more jealous, but they did enact more cost-inflicting mate retention behavior. This led to the speculation that other kinds of negative emotionality may explain this relation. Hostility was explored post hoc as a potential mediator of the above association. As predicted, controlling for age, sex, and relationship length, higher hostility significantly mediated the positive link between the severity and frequency of self-perceived physical health issues and engagement in cost-inflicting mate retention. Results support the importance of self-perceived physical health status in guiding mate competition tactics and the role of hostility in understanding why those seeing themselves as poorer in health use more cost-inflicting behavior to retain their romantic partners.

Public Significance Statement
Across species, physical health status carries important information about an animal's desirability as a mate and their tendency to engage in particular kinds of behavior when competing for mates. Our results show that lower self-perceived physical health status among humans may encourage a greater expression of hostile feelings, which may facilitate the use of cost-inflicting behavior (e.g., manipulation and deceit) to guard a valued romantic relationship.

Keywords: health status, romantic jealousy, mate retention, mate competition, hostility

Across species, physically healthy organisms have a lower probability of transmitting communicable diseases to their mates and offspring (Borgia, 1986). As well as having a heightened resistance to disease, they may also have a greater capacity to compete for and provide resources (Hamilton & Zuk, 1982; Tybur & Gangestad, 2011). Among humans, women and men across cultures express a preference for healthy mates (Buss et al., 1990). Ostensibly,

Adam C. Davis, Faculty of Education, University of Ottawa; Jacob Belanger, Amy Mattsson, and Steven Arnocky, Department of Psychology, Nipissing University.

The current research was funded through the Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Development Grant. This grant was awarded to Steven Arnocky, (DDG-2017-00013).

Correspondence concerning this article should be addressed to Adam C. Davis, Faculty of Education, University of Ottawa, 145 Jean-Jacques-Lussier Private, Ottawa, ON K1N6N5, Canada. E-mail: adavi154@uottawa.ca

this is because physical health is a signal of genetic quality that increases the likelihood of having and rearing offspring to reproductive age so that one's genetic material may be passed on to future generations. Therefore, in the ancestral environment, healthy women and men may have been conferred several reproductive advantages, which is why many researchers have posited that health has likely played a key role in sexual selection among humans (Foo, Simmons, & Rhodes, 2017; Gangestad & Buss, 1993; Little, Jones, & DeBruine, 2011; Thornhill & Gangestad, 1999; Rhodes, 2006; Wincenciak et al., 2015).

Despite the putative relevance of health to reproductive fitness, few researchers have examined self-perceptions of physical health in relation to affect and behavior that facilitate mate competition (Arnocky, Pearson, & Vaillancourt, 2015). In particular, *romantic jealousy*—an aversive emotional response to a perceived threat to a valued romantic relationship (Bringle & Buunk, 1985; Buss, 2000, 2013; Buss, Larsen, Westen, & Semmelroth, 1992; Daly, Wilson, & Weghorst, 1982)—is regarded as the key emotion that helps to initiate behavior intended to prevent infidelity and defection from a relationship, as well as to drive off interlopers (i.e., *mate retention*; Albert & Arnocky, 2016; Buss, Shackelford, Choe, Buunk, & Dijkstra, 2000; Davis, Desrochers, DiFilippo, Vaillancourt, & Arnocky, 2018). Therefore, there is a need to further explore how self-perceptions of physical health may impact the tactics that individuals use to vie for and retain desired partners. In the current study, we sought to address this gap by assessing the relations between self-perceived physical health status, romantic jealousy, and engagement in acts of mate retention.

Health and Reproductive Success

Health can be defined as the capacity to perform psychological and physiological processes linked to fitness, which is supported by disease resistance and the absence of pathogens and physical injury (Tybur & Gangestad, 2011). An organism's physical health impacts its reproductive success in many ways, in addition to the fitness of its mates, offspring, kin, and allies (Adamo & Spiteri, 2009; Gangestad & Simpson, 2000; Miller & Todd, 1998; Thornhill & Gangestad, 1993, 1999). In terms of direct benefits, a physically healthy mate may be better able to reliably provide material resources and parental care for offspring (Roberts & Little, 2008). This may be particularly important among humans, because we are a species that tends to engage in biparental care in the service of raising relatively altricial young (Marlowe, 2000; Tybur & Gangestad, 2011). Parents in poorer health have been found to have a lower capacity to provide consistent care for their children in early development (Allaire, 1988; Drotar, 1994; Finney & Miller, 1999; Thorne, 1990).

Physically healthy mates also have a reduced risk of carrying, and therefore transmitting, infectious diseases (e.g., sexually transmitted infections; Able, 1996; Tybur & Gangestad, 2011), which is of relevance in both short-term (i.e., casual sexual encounters) and long-term (i.e., romantic) relationships. Infectious diseases can produce a host of negative physiological outcomes tied to fitness, such as sterility, infertility, and an increased risk of mortality (Boutayeb, 2010; Weström, 1994). During gestation and postnatal care, offspring can also be transmitted diseases that endanger their viability and health, again underscoring the benefit of choosing a healthy mate (Tybur & Gangestad, 2011). In terms of indirect benefits, insomuch as health is a heritable quality, selectively mating with physically healthy partners can increase the likelihood of producing healthier young (Tybur & Gangestad, 2011). Disease-resistant genes may be inherited by offspring, helping them to build antibodies in order to ward off dangerous pathogens (Hamilton & Zuk, 1982). Additionally, physical health may impact an organism's ability to compete for sexual access to mates (i.e., intrasexual competition; Foo et al., 2017; Howard & Minchella, 1990; Puts, 2010). Healthy animals can devote more resources (e.g., time, energy, and effort) to vying with same-sex others for access to sexual partners. Furthermore, healthy individuals can invest in metabolically expensive traits that facilitate success in intrasexual competition, such as physical size, or energetically costly morphological traits that are attractive to members of the opposite sex and aid in intersexual selection (see Arnocky, Bird, & Perilloux, 2014 for review).

In regard to mate choice, across cultures health is consistently found to be a key trait that

women and men reportedly search for in a mate (Apostolou, 2008; Buss et al., 1990; Shackelford, Schmitt, & Buss, 2005). Some physical features (e.g., bilateral symmetry, height in men, and a small waist-to-hip ratio in women) may be signals of underlying immunocompetence, which are preferentially sought in a potential partner and may consequently increase mating success (see Arnocky et al., 2014 for discussion).

Health, Jealousy, and Mate Retention

The preference for physically healthy mates implies an increased risk of relationship desertion as well as cuckoldry for less healthy individuals. A romantic partner's infidelity or relationship dissolution would have negatively impacted ancestral women's and men's reproductive fitness. Due to internal fertilization of the sperm and ovum, ancestral men could not be sure of the genetic relationship that they shared with their children, leading to paternity uncertainty (Daly et al., 1982; Symons, 1979). Therefore, ancestral women's extrapair copulations could have led to their partners unknowingly investing in genetically unrelated offspring (Buss & Shackelford, 1997; Davis, Vaillancourt, & Arnocky, 2016). In contrast, because of women's greater obligatory parental investment (e.g., pregnancy, childbirth, and postnatal care), an ancestral man's infidelity may have led to the diversion of social-emotional, protective, and material resources. Therefore, unhealthy women and men are likely at a mating disadvantage, an adaptive problem they may overcome by accurately identifying rivals and remaining vigilant to suspected infidelity. Jealousy has been argued to be a key emotion that helps to coordinate these interrelated efforts (Buss, 2013; Buunk & Bringle, 1987; Daly et al., 1982; Davis et al., 2016; Symons, 1979), leading to the proposal that poorer self-perceived physical health status may be linked to a greater expression of jealous feelings (Arnocky, Pearson, & Vaillancourt, 2015).

Despite being described as an aversive emotion linked to interpersonally destructive behavior (e.g., relationship dysfunction; Barnett, Martinez, & Bluestein, 1995; Buunk & Bringle, 1987), jealousy may be adaptive in several ways (Buss, 2013; Davis et al., 2016). The expression of romantic jealousy facilitates identifying and responding to rivals that represent a threat to one's relationship. This is putatively achieved through the coordinated use of various mate retention tactics intended to guard and prevent defection from the pair bond, as well as to deter attempts at mate poaching (Albert & Arnocky, 2016; Arnocky, Sunderani, & Vaillancourt, 2013; Brewer & Riley, 2009; Buss et al., 2000; Buunk, Massar, & Dijkstra, 2007; Maner & Shackelford, 2008; Shackelford, Goetz, & Buss, 2005). People vary considerably, however, in their immunocompetence and in their perceived desirability as sexual and romantic relationship partners (i.e., their mate value; Fisher, Cox, Bennett, & Gavric, 2008). This asymmetry leads to differences in the probability of losing one's mate or having them commit infidelity.

Those mated to higher mate value partners report greater relationship satisfaction (Salkicevic, Stanic, & Grabovac, 2014), even in the presence of attractive relationship alternatives (Conroy-Beam, Goetz, & Buss, 2016). Furthermore, several studies have supported the links between higher anticipated partner infidelity (i.e., the perceived probability of a mate engaging in sexual activity with others in the future; Goetz & Causey, 2009), jealous feelings, and markers of lower mate value in women and men (Arnocky, Sunderani, Miller, & Vaillancourt, 2012; Brown & Moore, 2003; Buss & Shackelford, 1997; Sidelinger & Booth–Butterfield, 2007). For example, height, as a morphological feature of men's mate value, has been linked to lower reported levels of jealousy (Brewer & Riley, 2009; Buunk, Park, Zurriaga, Klavina, & Massar, 2008). Few studies, however, have been devoted to assessing the links between self-perceived health status and jealous feelings. In previous work, people with mates in poor health have been found to be more likely to commit infidelity (Rolland, 1994) and to defect from their romantic relationships (Amato & Previti, 2003; Walsh, Manuel, & Avis, 2005). Arnocky, Pearson, and Vaillancourt (2015) found that the frequency and severity of self-perceived physical health problems was linked to stronger feelings of romantic jealousy. These authors further demonstrated that this relation was mediated (i.e., explained) by anticipated partner infidelity. Therefore, those with poorer self-perceived physical health appear to be more likely to suspect their partners of being unfaithful, which may correspond to a heightened expression of jealousy (Arnocky, Pearson, & Vaillancourt, 2015).

Additionally, many researchers have examined the links between women's and men's mate value and mate retention behavior. Haselton and Gangestad (2006) discovered that men with indicators of low genetic quality (low sexual attractiveness relative to investment attractiveness) were reported by their partners to be more jealous and to engage in more mate guarding than men with good-gene indicators. Women's reports indicate that higher mate value men use more benefit-provisioning (e.g., gift giving, complimenting one's partner, and hand holding) as opposed to cost-inflicting forms of mate retention (e.g., monopolizing a mate's time, inducing jealousy, and threatening same-sex rivals; Miner, Shackelford, & Starratt, 2009; Miner, Starratt, & Shackelford, 2009; Starratt & Shackelford, 2012). Salkicevic et al. (2014) demonstrated that, for both women and men, benefit-provisioning was used for and by higher mate value partners, whereas cost-inflicting mate retention was used more by and toward lower mate value mates. These authors also found that less mate value discrepancy (i.e., having a similar mate value relative to one's partner) corresponded to engagement in more benefit-provisioning and less cost-inflicting acts. Conroy-Beam et al. (2016) found that relationship satisfaction mediated the link between mate value discrepancy and mate retention behavior, such that when people felt that their partners would be difficult to replace, they were more satisfied with, and engaged in more acts of mate retention toward, their mates. Similarly, Sela, Mogilski, Shackelford, Zeigler-Hill, and Fink (2017) found that those with higher self-perceived short-term mate value engaged in less benefit-provisioning mate retention when paired with a lower short-term value mate. These authors also showed that a heightened risk of partner infidelity (i.e., being more replaceable) corresponded to an increase in both benefit-provisioning and cost-inflicting mate retention.

These studies point to important links between markers of mate value and genetic quality, jealousy, and mate retention behavior. They also demonstrate the significance of examining dimensions of mate retention acts that fall into benefit-provisioning and cost-inflicting categories. To our knowledge, researchers have yet to examine if perceptions of one's own physical health status, as a marker of mate value and good genes, correspond to greater reported engagement in benefit-provisioning and cost-inflicting mate retention behavior. If jealousy is a key emotion that helps to coordinate acts of mate retention, then it may explain (i.e., mediate) this potential positive relation.

Present Study

The goal of the present study was to explore the relations between self-perceived health status, jealousy, and two domains of mate retention behavior (benefit-provisioning and cost-inflicting). Following the rationale and findings described by Arnocky, Pearson, and Vaillancourt (2015), we predicted that women and men who believed themselves to be in poorer health would express stronger feelings of jealousy (Hypothesis 1) and would engage in more benefit-provisioning and cost-inflicting mate retention (Hypothesis 2). Jealousy is argued to be a salient emotional mechanism that coordinates the use of behavior intended to guard the mateship (Buss, 2013; Daly et al., 1982; Symons, 1979); therefore, we predicted that the potential positive relation between poorer self-perceived health and domains of mate retention would be mediated by heightened levels of jealousy (Hypothesis 3).

Method

Participants

A total of 144 university and college students who were currently in a heterosexual long-term romantic relationship volunteered to participate in the current study (M_{age} = 20.23; SD = 2.18; Range = 18–30 years of age). Regarding biological sex, 54.2% (n = 78) of the sample identified as female and 45.8% (n = 66) identified as male. Median relationship length corresponded to 1–2 years, and mode relationship length was greater than 2 years (n = 42). In terms of ethnicity, 91.7% (n = 132) of the sample reported that they were White. As part of a larger data set on mating psychology and behavior in young adults, data from this research project were also published elsewhere on the links between different types of jealousy and domains of mate retention (see Davis et al., 2018).

Materials

Severity and frequency of health-related problems. Participants completed the Health Symptoms Survey (Knack, 2009). This self-report instrument was used to examine the severity and frequency of various physical health problems (e.g., fatigue, muscle aches, chest pain, sleep problems, fever, headache, etc.). Participants first reported the perceived severity of 26 physical health symptoms using a 4-point Likert-type response scale ranging from 1 (*Does not hurt at all*) to 4 (*Unbearable*). These items were summed to yield a health symptoms severity score, which had good internal consistency ($\alpha = .86$). Participants were asked to report the perceived frequency of the same 26 physical health symptoms using a different 4-point Likert-type scale ranging from 1 (*Not at all*) to 4 (*All the time*). These items were summed to create a health symptoms frequency score, which had good internal consistency ($\alpha = .84$).

Jealousy. The Revised Anticipated Sexual Jealousy Scale (Buunk, 1997) is a 15-item self-report measure that was used to assess a participant's feelings of jealousy in regard to anxious thoughts about a partner's potential infidelity, the tendency to prevent interactions between one's romantic partner and others, and the intensity of jealous reactions to the actual occurrence of infidelity. Items were scored on 5-point Likert-type scales. Example items included "I worry about the idea that my partner could have a sexual relationship with someone else," "It is not acceptable to me if my partner sees people of the opposite sex on a friendly basis," and "How would you feel if your partner was flirting with someone else?" A total scale score was calculated by averaging all 15 items describing overall levels of jealousy. Internal consistency reliability for the Revised Anticipated Sexual Jealousy Scale fell within an acceptable range ($\alpha = .88$).

Mate retention tactics. Buss, Shackelford, and McKibbin's (2008) 38-item Mate Retention Inventory—Short Form was used to examine the reported tendency to engage in acts of mate retention. Participants were asked how often they have performed each mate retention act within the past year and responded along a 4-point Likert-type response scale ranging from 0 (*Never*) to 3 (*Often*). Following other authors (e.g., Arnocky, Albert, Carré, & Ortiz, 2018; Miner, Shackelford, & Starratt, 2009; Shackelford, Goetz, et al., 2005), we categorized the items into two broad domains of mate retention behavior: benefit-provisioning and cost-inflicting. This two-factor structure has been supported in previous research (Lopes, Shackelford, Santos, Farias, & Segundo, 2016). Items within each domain were summed to yield benefit-provisioning and cost-inflicting frequency scores. Example items of benefit-provisioning behavior included "Took my partner to a nice restaurant" and "Held my partner's hand when other women/men were around." Example items for cost-inflicting mate retention included "Stared coldly at a woman/man who was looking at my partner" and "Insisted that my partner spend all of her/his free time with me." Internal consistency reliability values for the Benefit-Provisioning subscale, $\alpha = .80$, and Cost-Inflicting subscale, $\alpha = .85$, fell within an acceptable range.

Procedure

Students were invited to participate in the "Immunity Study" and were recruited from a university and college in Ontario, Canada using an online research participation system and recruitment stations in common areas in campus buildings. Informed consent was obtained from all participants in the present study. The current research received approval from an appointed institutional research ethics board.

Results

SPSS (Version 20) was used for all statistical analyses. The EXPLORE program was run to observe whether the assumptions of normality were met for each variable, as well as to detect extreme univariate values. In total, 14 univariate outliers were flagged. These outlying values were winsorized to the next highest or lowest value for the scale to retain data (Ghosh & Vogt, 2012). This resulted in no more univariate outliers, and each variable approximated a normal distribution. Mahalanobis' distance (see Flury & Riedwyl, 1986) was also used to examine the presence of any multivariate outlying values regarding focal predictors (health symptom severity, health symptom frequency, and jealousy). No multivariate outliers were found.

Descriptive statistics were calculated for each variable (see Table 1). A series of independent samples *t* tests were conducted to test for the

Table 1
Descriptive Statistics for All Measures

Measured variables	Total		Women		Men	
	M (*SD*)	*N*	*M* (*SD*)	*n*	*M* (*SD*)	*n*
1. Health symptom severity	41.59 (7.69)	118	43.03 (7.78)	63	40.00 (7.49)	55
2. Health symptom frequency	49.53 (7.66)	131	51.10 (7.66)	70	47.72 (7.31)	61
3. Jealousy	2.66 (.60)	144	2.78 (.60)	78	2.52 (.58)	66
4. Hostility	2.43 (.91)	143	2.52 (.96)	78	2.32 (.84)	65
5. Benefit-provisioning MR	24.25 (6.62)	141	24.09 (6.43)	76	24.43 (6.88)	65
6. Cost-inflicting MR	10.69 (6.65)	140	11.22 (6.97)	77	10.03 (6.23)	63

Note. MR = mate retention.

presence of sex differences. Women reported higher self-perceived health symptom severity, $t(116) = -2.14$, $p = .04$, $d = 0.40$, health symptom frequency, $t(129) = -2.57$, $p = .01$, $d = 0.45$, and jealousy, $t(142) = -2.64$, $p = .01$, $d = 0.44$, in comparison to men.

Bivariate Correlations

Zero-order correlations were calculated for all measured variables in the current study, in addition to age and relationship length (see Table 2). Of note, self-perceived health symptom severity and frequency were trending positively but did not significantly correlate with jealousy or benefit-provisioning mate retention. However, both self-perceived severity and frequency of physical health-related symptoms correlated positively with cost-inflicting mate retention. Age also correlated significantly in a positive direction with the perceived severity of health symptoms, whereas relationship length varied significantly with both benefit-provisioning and cost-inflicting mate retention.

Exploratory Analyses

The results showed that self-perceived health symptom severity and frequency were not significantly positively related to jealousy (Hypothesis 1) or the performance of benefit-provisioning behavior (Hypothesis 2). Therefore, jealousy could not possibly mediate the relation between self-perceived health status and mate retention behavior (Hypothesis 3). However, the reported severity and frequency of self-perceived health-related symptoms were significantly positively linked to cost-inflicting mate retention. We speculated that variables denoting negative emotionality may explain why those perceiving themselves to be in poorer health engaged in more cost-inflicting acts. For instance, anxiety has been shown to mediate the relation between anticipated partner infidelity and intimate partner violence (a form of cost-inflicting mate retention; Arnocky, Sunderani, Gomes, & Vaillancourt, 2015). Hostility has also been shown to relate positively to cost-inflicting, but not benefit-provisioning mate

Table 2
Zero-Order Correlations for All Measured Variables

Measured variables	1	2	3	4	5	6
1. Health symptom severity	—					
2. Health symptom frequency	.71**	—				
3. Jealousy	.15	.10	—			
4. Hostility	.28**	.35**	.38**	—		
5. Benefit-provisioning MR	.13	.15	.30**	.15	—	
6. Cost-inflicting MR	.25**	.24**	.63**	.35**	.51**	—
Age	.26**	.11	−.13	.04	.03	.07
Relationship length	.16	.06	.07	−.02	.26**	.31**

Note. MR = mate retention.
** $p < .01$, two-tailed.

retention (Holden, Roof, McCabe, & Zeigler-Hill, 2015). Moreover, hostility has been positively linked to physical health problems in previous work (e.g., cardiovascular issues; see Miller, Smith, Turner, Guijarro, & Hallet, 1996 for meta-analysis).

Having access to data for the 3-item Hostility subscale (example item: "I wonder why sometimes I feel so bitter about things") of the Aggression Questionnaire Short Form (Bryant & Smith, 2001), the hypothesis that hostility would mediate the relation between self-perceived health status and cost-inflicting mate retention was tested (Hypothesis 4). The Hostility subscale had adequate internal consistency reliability ($\alpha = .68$). The EXPLORE program revealed that the Hostility subscale approximated a normal distribution and had no univariate or multivariate outliers. Descriptive statistics for hostility can be seen in Table 1. A *t* test showed that women and men did not differ in reported hostility scores. Bivariate correlations indicated that hostility correlated positively with the self-perceived severity and frequency of physical health symptoms, as well as cost-inflicting mate retention (see Table 2).

To test Hypothesis 4, two mediation models were created using Hayes' (2013) PROCESS macro for SPSS (Model 4). Age, biological sex, and relationship length were controlled in the analyses. PROCESS uses bootstrapping (a nonparametric resampling technique) to test for the indirect (i.e., mediating) effect of the predictor on the outcome variable of interest. This approach is regarded as superior to parametric methods of testing mediation (e.g., causal steps approach), because it is more robust to deviations from normality and issues linked to Type I errors (Hayes, 2013). The macro generated 1,000 bootstrapping samples and bias-corrected 95% confidence intervals were used for both models. Mediation is said to occur when the value of zero is absent from a confidence interval range (Hayes, 2013). As recommended, unstandardized regression coefficients and standard errors were reported.

In the first model, health symptom severity positively predicted hostility (the a-path), $b = 0.03$, $SE = 0.01$, $p = .008$, and hostility in turn positively predicted cost-inflicting mate retention (the b-path), $b = 2.91$, $SE = 0.56$, $p < .001$. Health symptom severity positively predicted cost-inflicting mate retention (the total effect or c-path), $b = 0.16$, $SE = 0.08$, $p = .039$, which was reduced to nonsignificance with the inclusion of the mediator (the direct effect or c'-path), $b = 0.07$, $SE = 0.08$, $p = .346$. The indirect effect was also significant, $b = 0.09$, $SE = 0.04$, LLCI = 0.03, ULCI = 0.20), suggesting a significant mediating role of hostility.

In the second model, health symptom frequency positively predicted hostility (the a-path), $b = 0.04$, $SE = 0.11$, $p < .001$, and hostility positively predicted cost-inflicting mate retention (the b-path), $b = 2.85$, $SE = 0.56$, $p < .001$. Health symptom frequency also positively predicted cost-inflicting mate retention (the total effect or c-path), $b = 0.17$, $SE = 0.09$, $p = .048$, which was reduced to nonsignificance with the addition of the mediator (the direct effect or c'-path), $b = 0.05$, $SE = 0.08$, $p = .55$. The indirect effect was also found to be significant, $b = 0.12$, $SE = 0.04$, LLCI = 0.06, ULCI = 0.21.

Discussion

Due to the potential costs associated with mating with an unhealthy partner, it is likely that selection has favored adaptations sensitive to physical health status that motivate mate competition strategies (Arnocky, Pearson, & Vaillancourt, 2015; Hamilton & Zuk, 1982; Tybur & Gangestad, 2011). Few researchers have, however, examined indicators of physical health regarding key emotions that help to facilitate mate competition (e.g., jealousy) and the actions through which this end may be achieved (e.g., mate retention). In previous work, Arnocky, Pearson, and Vaillancourt (2015) found that the self-perceived severity and frequency of physical health-related problems corresponded to greater feelings of romantic jealousy among heterosexual women and men in long-term romantic relationships (controlling for sex). We were unable to replicate these findings in the current study (Hypothesis 1) using a similar sample. Although correlations were trending in a positive direction ($r = .10–.15$), the relations between self-perceived health status and jealousy were nonsignificant.

It is possible, therefore, that the findings by Arnocky, Pearson, and Vaillancourt (2015) were the result of a Type I error. Alternatively, the relation between self-perceived physical

health status and jealousy may be characterized by a small effect that was not detected in the current study (i.e., a Type II error). Indeed, the positive correlations found by Arnocky, Pearson, and Vaillancourt (2015) between jealousy and the self-perceived severity, $r = .24$, $p < .01$, and frequency of health symptoms, $r = .21$, $p < .01$, were denoted by small effect sizes ($r = .10–.30$; Cohen, 1992). Using G*Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007), post hoc power analysis for bivariate correlations revealed that, with $N = 144$ and $\alpha = .05$, we had 22% power to detect a small effect (i.e., $r = .10$) in the current study. This suggests that we were statistically underpowered to adequately test for the purported positive relations between these variables.

Neither self-perceived health symptom frequency nor symptom severity predicted engagement in benefit-provisioning mate retention. In contrast, when examining cost-inflicting behavior, both self-perceived symptom severity and frequency were found to positively predict this kind of mate retention (Hypothesis 2). Since jealousy could not have possibly been a mediating variable between self-perceived health status and mate retention acts in our study (Hypothesis 3), we speculated that other kinds of negative emotionality may explain this relation. Higher reported negative emotions such as anxiety have been argued and empirically supported to be linked to more cost-inflicting mate retention (Arnocky, Sunderani et al., 2015). For example, heightened neuroticism (i.e., emotional instability; de Miguel & Buss, 2011), and borderline features (Tragesser & Benfield, 2012), characterized by emotional lability, have been positively associated with cost-inflicting behavior. An anxious romantic attachment bond (i.e., being overdependent on one's partner for a sense of security/stability) has also been positively linked to the performance of cost-inflicting acts (Barbaro, Sela, Atari, Shackelford, & Zeigler-Hill, 2019).

In previous work, higher hostility, as a feature of a pathological personality, has been positively associated with costly forms of mate retention underpinned by deceit, manipulation, and violence (Holden et al., 2015). Moreover, many researchers agree that heightened hostility is associated with physical health problems, particularly cardiovascular disease, likely as a consequence of increased stress which alters autonomic nervous system functioning and metabolic activity (Barefoot & Williams, 2010; Miller et al., 1996). Having access to data for the Hostility subscale of Bryant and Smith's (2001) Aggression Questionnaire Short Form, we explored the possibility that hostility may mediate the positive relation between self-perceived physical health status and cost-inflicting behavior (Hypothesis 4). Indeed, controlling for age, sex, and relationship length, hostility was found to significantly mediate the positive association between both the severity and frequency of self-perceived physical health symptoms and cost-inflicting mate retention acts. Some may argue that this research decision is evidence of HARKing, or hypothesizing after the results are known (Kerr, 1998). However, in the current study we inferred and examined relations post hoc based on patterns in the data, which Kerr (1998) distinguished from HARKing as inductive science. In contrast, HARKing involves disguising post hoc hypotheses as a priori predictions.

Findings in the present study generally accord with those found by other researchers that men (Buss & Shackelford, 1997; Miner, Shackelford, & Starratt, 2009; Miner, Starratt, & Shackelford, 2009; Starratt & Shackelford, 2012) and women (Arnocky et al., 2012; Salkicevic et al., 2014; Sela et al., 2017) who are (actually or perceivably) lower in mate value tend to engage in more cost-inflicting acts. Therefore, although all women and men have a vested interest in retaining mates to some degree (Miner, Shackelford, & Starratt, 2009, Miner, Starratt, & Shackelford, 2009), lower mate value women and men may rely more on the performance of cost-inflicting, rather than benefit-provisioning, behavior to guard and retain their mates. The use of cost-inflicting acts in this context by those lower in mate value, although abhorrent in many circumstances, is sensible given the higher probability that their partners may desert or cheat on them relative to higher mate value conspecifics (Amato & Previti, 2003; Rolland, 1994; Walsh et al., 2005).

Limitations

The current study was limited in several ways. A relatively small convenience sample of Canadian university and college students was used, which may not be representative of young

adult women and men. The data examined was also cross-sectional, precluding an analysis of temporal precedence. Furthermore, only self-report measures were employed, which may have resulted in common error variance (Lindell & Whitney, 2001). Moreover, participants were not asked to indicate the perceived physical health of their partners, preventing an examination of mate value discrepancy which has been shown to be an important consideration in this research (e.g., Conroy-Beam et al., 2016). Therefore, in future work it would be beneficial to assess reports of physical health status provided by different informants (e.g., self, partner, and family physicians) in a larger sample of more demographically diverse young adults across time. In addition, the significant positive relations between self-perceived physical health problems, hostility, and cost-inflicting mate retention were characterized by small effect sizes, ranging from $r = .24–.35$ (Cohen, 1992). This suggests that a host of other relevant intrapsychic (e.g., dark personality traits; Jonason, Li, & Buss, 2010), interpersonal (e.g., attachment bonds; Barbaro et al., 2019), cultural (e.g., gender parity; Archer, 2000), and environmental (e.g., prevalence of disease; Gangestad & Buss, 1993) factors govern the strategic use of particular mate retention strategies, as well as the affective and cognitive variables that help to coordinate these acts.

Implications

Despite these limitations, there are several noteworthy implications of our findings. Physical health status is regarded as an important variable that impacts mate competition and mating success; however, empirical support for this claim among humans is limited. Like other researchers (e.g., Arnocky, Pearson, & Vaillancourt, 2015), we provide evidence that self-perceptions of physical health status influence mating and interpersonal romantic relationship dynamics. Although jealousy is considered to be the main emotion driving mate retention strategies (Albert & Arnocky, 2016; Davis et al., 2018), we show, like other authors (e.g., Holden et al., 2015), how hostility is positively linked to the performance of cost-inflicting mate retention. In a more applied context, cost-inflicting behavior has also been shown to negatively impact marital happiness, relationship satisfaction, and relational longevity (e.g., Shackelford & Buss, 2000). Therefore, studying which physiological and psychological processes facilitate the use of these tactics should be of concern to clinicians, counselors, and educators. For instance, reports of somatic complaints may be important to inquire about when attempting to provide couples with marital or relational counseling.

Conclusion

In the current study, we endeavored to build off of the work by Arnocky, Pearson, and Vaillancourt (2015) in order to examine the purported positive relations between self-perceived physical health status and jealousy among heterosexual young adult women and men in long-term romantic relationships. This finding was not replicated in the current study; however, we supported that those perceiving themselves to be in poorer physical health engaged in more cost-inflicting, but not more benefit-provisioning, acts of mate retention. This led to the speculation that perhaps other kinds of negative emotionality besides jealousy may account for the aforementioned relation. Controlling for age, biological sex, and relationship length, hostility was found to significantly mediate the positive associations between both the severity and frequency of self-perceived physical health problems and cost-inflicting mate retention behavior. Collectively, the results found in the current study support the idea that people believing themselves to be in poorer physical health may be at a mating disadvantage; an adaptive challenge that relatively lower mate value women and men may seek to overcome by elevating their levels of hostility and engaging in more acts of cost-inflicting mate retention.

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Received April 2, 2019
Revision received June 30, 2019
Accepted August 21, 2019 ■