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ORIGINAL PAPER

Erectile Dysfunction, Suspicious Jealousy, and Partner-Directed Behaviors in Heterosexual Romantic Couples

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Abstract

Erectile dysfunction (ED) can have negative consequences for men and their intimate partners. The purpose of the present research was to replicate and extend the results of previous studies concerning the connections that ED has with partner-directed behaviors using a sample of heterosexual romantic couples. Specifically, we used an actor-partner interdependence mediation model to examine whether the associations that ED had with men's mate retention behaviors, partner-directed insults, partner-directed violence, and partner-inflicted injuries were mediated by suspicious jealousy, but not reactive jealousy. These associations were examined in 113 romantic couples, using men's self-reports, and partner-reports provided by their female partners. Results indicated that suspicious jealousy (but not reactive jealousy) mediated the associations that ED had with men's use of partner-directed behaviors, such that higher levels of ED were associated with men experiencing more suspicious jealousy, which, in turn, was associated with more cost-inflicting mate retention behaviors, benefit-provisioning mate retention behaviors, partner-directed insults, partner-directed violence, and partner-inflicted injury. However, there were some discrepancies between the reports provided by men and women such that these associations emerged more consistently in the partner-reports provided by women than in the self-reports provided by men. Discussion addresses evolutionary implications of these findings, as well as limitations of this research and directions for research concerning ED.

Keywords Erectile dysfunction · Evolutionary psychology · Jealousy · Mate retention · Intimate partner violence

Introduction

Erectile dysfunction (ED) is defined as the inability to maintain an erection sufficient for satisfactory sexual intercourse (NIH Consensus Development Panel on Impotence, 1993). ED is associated with a range of physical health problems, including heart disease, hypertension, diabetes, and obesity (e.g., Laumann et al., 2007; Nicolosi et al., 2003; Saigal et al., 2006) as well as psychological issues including depression and anxiety (Althof, 2002). ED is also associated with a range of negative outcomes for the intimate partners of men. For example, women with partners who experience ED report lower sexual and emotional satisfaction with their relationship (Althof, 2002), lower overall relationship satisfaction (Corona et al., 2009), decreased sexual activity (McCabe & Matic, 2008), and lower sexual desire and poorer sexual functioning (e.g., Chevret et al., 2004; Fisher et al., 2005). ED may be indicative of further relationship problems because it has been shown to be associated with men's feelings of jealousy toward their intimate partner (e.g., Cornwell & Laumann, 2011; Kingham & Gordon, 2004; Vance et al., 2022a), men's use of sexual coercion with their partner (Vance et al., 2022b), and increased risk of a female partner's infidelity (McDaniel et al., 2017; Pereira et al., 2014).

The feelings of jealousy experienced by men may have a particularly important role in the connections that ED has with difficulties in romantic relationships. Previous research has provided evidence for a link between men's experience with ED and their feelings of jealousy within their romantic relationships (e.g., Cornwell & Laumann, 2011; Kingham & Gordon, 2004). However, these previous studies often conceptualized jealousy as a unidimensional construct, whereas it has been suggested during recent years that a multidimensional conceptualization of jealousy may have greater utility, especially when considering the associations that jealousy has with outcomes in intimate relationships. For example,

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Rydell and Bringle (2007) distinguished between reactive jealousy (i.e., a partner's emotional response to incontrovertible evidence of infidelity) and suspicious jealousy (i.e., a partner's thoughts and behaviors in response to suspected infidelity without clear evidence). Previous research has found that reactive jealousy does not appear to be problematic for romantic relationships and often is associated with relatively positive outcomes (e.g., greater trust, higher levels of relationship satisfaction, greater feelings of love, lower chronic jealousy), whereas suspicious jealousy is more problematic for relationships as evidenced by its associations with an array of negative outcomes (e.g., greater insecurity, higher levels of anxious attachment, more chronic jealousy, lower self-esteem; Attridge, 2013; Barelds & Dijkstra, 2006; Rydell & Bringle, 2007).

Although most research concerning reactive jealousy and suspicious jealousy has focused on their role as predictors of relationship outcomes, there is some evidence that poor sexual functioning may have implications for feelings of suspicious jealousy. More specifically, ED has been shown to be associated with suspicious jealousy, but not reactive jealousy, and suspicious jealousy has been shown to uniquely mediate the associations that ED has with aversive behaviors that men target at their female partners (i.e., partner-directed behaviors) including violence and sexual coercion (Vance et al., 2022a). This pattern suggests that difficulties with sexual functioning may foster feelings of suspicious jealousy in men (e.g., interpreting ambiguous information as indicating that their female partner is being unfaithful), which, in turn, may have important consequences for how men experience their romantic relationships as well as how they interact with their romantic partners. These results align with Error Management Theory (Haselton & Buss, 2000) because the detection of infidelity in a romantic partner would have been a recurring problem throughout the course of evolution with asymmetrical costs for false positives (i.e., detecting infidelity when it has not occurred) and false negatives (i.e., failing to detect infidelity when it has occurred). Failing to detect infidelity when it has occurred would likely have had greater costs for both men and women than mistakenly believing that infidelity has occurred when it has not. For example, men who fail to detect infidelity may experience cuckoldry (i.e., they may invest considerable resources in raising a child they believe to be their own but that is actually another man's offspring). The asymmetrical costs associated with these errors may explain why men overestimate the likelihood that their female partners have engaged in infidelity (e.g., Goetz & Causey, 2009). Further, it is possible that ED may lead men to be concerned that their female partners will seek sexual satisfaction elsewhere, which, in turn, may make them especially sensitive to potential cues to infidelity and amplify their feelings of suspicious jealousy (see Buss & Abrams, 2017, for a similar argument).

Recent work has continued to apply an adaptive lens to men's experience with ED and its consequences for men's intimate partners. In particular, this work has used an evolutionary framework to provide potential explanations for the associations that men's experience with ED has with their feelings of jealousy toward their intimate partners and their use of certain partner-directed behaviors. For example, Vance et al. (2022a) found that the level of suspicious jealousy reported by men mediated the associations that their experience with ED had with their use of partner-directed behaviors, including cost-inflicting mate retention behaviors, insults, and violence. In addition, Vance et al. (2022b) found that the perceived risk of experiencing sperm competition reported by men—which was operationalized as a composite of the partner's perceived romantic involvement with other men, perception of the amount of time that the partner spends with other men, and the perceived attractiveness of the partner to other men—mediated the association between their experience with ED and their use of partner-directed sexual coercion. These results suggest that men's use of certain partner-directed behaviors may be a way for them to mitigate concerns regarding their partners' infidelity that may be exacerbated by their own difficulties with ED. For example, men who experience ED may be more likely than other men to use violence—or the threat of violence—against their female partners in an effort to reduce the likelihood that they would engage in infidelity or dissolve the relationship.

Previous research has presented evidence consistent with the idea that men's sexual jealousy is an evolved response to the adaptive problems associated with partner infidelity (e.g., cuckoldry; Buss et al., 1992). Previous research has also shown that individuals engage in more behaviors intended to prevent or correct their partner's infidelity when they are at greater perceived risk of partner infidelity (e.g., Goetz et al., 2005; Starratt et al., 2007) and when they experience greater feelings of jealousy toward their partner (Davis et al., 2018). Additionally, men employ a range of tactics to prevent or correct their partner's infidelity, including verbal insults (McKibbin et al., 2007), violence (Kaighobadi & Shackelford, 2009), and sexual coercion (Goetz & Shackelford, 2010). Taken together, the results of past research suggest that men who experience ED may be especially likely to be concerned about their partner's infidelity and may attempt to mitigate these concerns using a range of partner-directed behaviors. Although Vance et al. (2022a) found evidence that men's experiences with ED were associated with their feelings of suspicious jealousy and their use of partner-directed behaviors, those studies included two notable limitations. The first limitation was that those studies relied on independent reports provided by men and women (i.e., the male participants in Study 1 were not romantically involved with the female participants in Study 2). This is an important limitation because those results may have been impacted by

issues such as socially desirable responding or intentional underreporting. The second limitation was that those studies observed relatively low levels of ED which was most likely due to the relatively young age of the participants.

The purpose of the present research was to replicate and extend what is known about the role that suspicious jealousy plays in the associations that ED has with the behaviors that men direct toward their romantic partners. Although this issue had been addressed in previous research (e.g., Vance et al., 2022a), those previous studies relied on independent reports of men and women who were not involved in romantic relationships with each other. To address this limitation, the present study utilized dyadic data from heterosexual men and their female partners because it may be important to address multiple perspectives for this kind of research due to the possibility that men may underreport the severity of their ED symptoms (e.g., Frost et al., 2012) as well as the frequency and intensity of behaviors such as intimate partner violence (e.g., Dobash et al., 1998).

Overview and Hypothesis

The goal of the present study was to replicate and extend the results of Vance et al. (2022a) by securing dyadic reports from heterosexual romantic couples regarding men's experience with ED, feelings of jealousy, and use of certain partner-directed behaviors (i.e., mate retention behaviors, partner-directed insults, partner-directed violence, and partner-inflicted injuries). Securing dyadic reports from men and their romantic partners allowed us to partially mitigate potential issues with biased or inaccurate reports from independent men and women. For example, concerns about social desirability may lead men to underreport their experience with ED, or their use of aversive, partner-directed behaviors. Securing dyadic reports also allowed us to examine our hypothesis that men's suspicious jealousy would mediate the associations that ED had with their use of partner-directed behaviors according to their own self-reports or the reports provided by their female partners. More specifically, we hypothesized that men who experienced more problems with ED would report greater feelings of suspicious jealousy toward their partner, which, in turn, would be associated with greater use of certain partner-directed behaviors (i.e., mate retention behaviors, partner-directed insults, partner-directed violence, and partner-inflicted injuries). We also hypothesized that women's reports of their partners' experience with ED, feelings of jealousy, and partner-directed behaviors would align with the associations observed using men's self-reports. These hypotheses were largely informed by the results of Vance et al. (2022a), who found a similar pattern of relationships, as well as previous research showing that suspicious and reactive jealousy often have divergent associations with romantic outcomes (e.g., Attridge, 2013; Rydell & Bringle, 2007).

Method

Participants and Procedure

Participants were 280 community members (i.e., 140 romantic couples) recruited from Prolific who participated in exchange for financial compensation ($10.00 USD). Our goal was to secure data from at least 80 to 100 romantic couples, which aligns with the sample size recommendations for APIM analyses (Ledermann & Kenny, 2017). However, we used a financially based stopping rule to determine the actual sample size for this study (i.e., we secured data from as many couples as possible until the funds for the study were exhausted), which allowed us to slightly exceed this minimum number of couples because we expected to exclude data from some couples due to issues such as inattentive responding. All participants reported that they were involved in a committed heterosexual relationship for a minimum of 6 months. Participants completed measures of ED, jealousy, mate retention behaviors, partner-directed insults, partner-directed violence, and partner-inflicted injuries via a secure website. Participants were instructed to provide this information separately (i.e., one partner was not supposed to be aware of the specific responses provided by their partner). Data were excluded for 14 couples because at least one member of the couple failed to correctly complete two or more directed-response items that were included in the instruments to detect inattentive responding (e.g., "For this item, please select '1' as your response"). In addition, data were excluded for 13 couples due to at least one member of the couple being a univariate outlier for at least one of the variables (i.e., more than three standard deviations above or below the mean for the sample). The final 113 couples had a mean relationship length of 4.05 years ($SD = 3.60$; *range* = 6 months–19 years; *median* = 3.08 years). The mean age for men was 27.34 years ($SD = 7.84$; *range* = 18–60 years), and the racial/ethnic composition of the male participants was 83% White, 5% Asian, 4% Hispanic, 2% Black, and 6% other. The mean age for women was 26.23 years ($SD = 7.38$; *range* = 18–58 years), and the racial/ethnic composition of the female participants was 79% White, 7% Asian, 8% Hispanic, 2% Black, and 4% other.

Measures

Erectile Dysfunction

The International Index of Erectile Function (IIEF-5; Rosen et al., 1999) was used to assess male self-reported erectile function over the past six months (5 items; e.g., "When you had erections with sexual stimulation, how often were your erections hard enough for penetration?" [$\alpha = 0.86$]). Male participants were asked to respond to each question using a 5-point scale with specific anchors that differed across

the items (e.g., 1 [*Almost never/never*] to 5 [*Almost always/always*]). Due to our interest in erectile *dysfunction*, we reverse-scored each of the IIEF-5 items so that higher scores for this instrument indicated greater ED. Female participants responded to a modified version of the IIEF-5 that captured their perceptions of their male partner's ED (5 items; e.g., "When your partner had erections during sexual stimulation, how often were your partner's erections hard enough for penetration?" [$\alpha = 0.93$]).

Jealousy

The Multidimensional Jealousy Scale (Pfeiffer & Wong, 1989; Rydell & Bringle, 2007) was used to assess male self-reported suspicious jealousy (16 items; e.g., "I suspect that [my partner] may be attracted to someone else" [$a = 0.88$]) and reactive jealousy (8 items; e.g., "Someone of the opposite sex is dating [my partner]" [$a = 0.76$]). Male participants were asked to respond to each item using a 7-point scale with specific anchors that differed across the items (e.g., 1 [*never*] to 7 [*always*]). Female participants responded to a modified version of the Multidimensional Jealousy Scale that captured their perceptions of their male partner's suspicious jealousy (16 items; e.g., "[My partner] suspects that I may be attracted to someone else" [$\alpha = 0.90$]) and reactive jealousy (8 items; e.g., "Someone of the opposite sex is dating you" [$\alpha = 0.90$]).

Mate Retention Behaviors

The self-reported mate retention behaviors of male participants were measured using the Mate Retention Inventory-Short Form (MRI-SF; Buss et al., 2008). The MRI-SF assesses two types of mate retention: cost-inflicting behaviors (22 items; "Called to make sure my partner was where they said they would be" [$\alpha = 0.89$]) and benefit-provisioning behaviors (16 items; e.g., "Bought my partner an expensive gift" [$\alpha = 0.84$]). Male participants were asked to report how frequently they had engaged in each behavior in the past year using a scale ranging from 1 (*never performed this act*) to 4 (*often performed this act*). Female participants responded to a modified version of the MRI-SF that captured their perceptions of their male partner's cost-inflicting behaviors (22 items; "Called to make sure I was where I said I'd be" [$\alpha = 0.88$]) and benefit-provisioning behaviors (16 items; e.g., "Bought me an expensive gift" [$\alpha = 0.86$]).

Partner-Directed Insults

The Partner-Directed Insult Scale (Goetz et al., 2006) was used to assess male self-reported insults directed at a romantic partner (47 items; e.g., "I told my partner that she is fat" [$\alpha = 0.86$]). Male participants were asked to report how frequently they had employed each insult using a scale ranging from 1 (*never*) to 6 (*25 or more times*). Female participants responded to a modified version of the Partner-Directed Insult Scale that captured their perceptions of partner-directed insults from their male partner (47 items; e.g., "My partner told me that I am fat" [$\alpha = 0.86$]).

Partner-Directed Violence

The Violence Assessment Index (Dobash et al., 1995, 1996) was used to assess how frequently male participants reported using violence against their romantic partner (24 items; e.g., "Kicked partner in the body, arms, or legs" [$\alpha = 0.60$]). Male participants were asked to report how frequently they had engaged in each behavior using a scale ranging from 1 (*Act never occurred in this relationship*) to 6 (*Act occurred 11 or more times in this relationship*). Female participants responded to a modified version of the Violence Assessment Index that captured their perceptions of partner-directed violence from their male partner (24 items; e.g., "Kicked me in the body, arms, or legs" [$\alpha = 0.77$]).

Partner-Inflicted Injury

The Injury Assessment Index (Dobash et al., 1998) was used to assess how frequently male participants had injured their romantic partner as a consequence of using violence against them (20 items; e.g., "Black eye" [$\alpha = 0.78$]). Male participants were asked to report how frequently their partner had sustained various injuries using a scale ranging from 1 (*Partner never sustained this injury as a result of my physical aggression*) to 6 (*Partner sustained this injury 11 or more times as a result of my physical aggression*). Female participants responded to a modified version of the Injury Assessment Index that captured their perceptions of injuries inflicted by their male partner (20 items; e.g., "Black eye" [$\alpha = 0.75$]).

Data Analysis

We examined the associations that ED had with partner-directed behaviors (i.e., cost-inflicting behaviors, benefit-provisioning behaviors, partner-directed insults, partner-directed violence, and partner-inflicted injuries) through suspicious and reactive jealousy using an extension of the Actor-Partner Interdependence Model (APIM; Kenny et al., 2020) that has often been used to analyze dyadic data. The APIM accounts for romantic partners influencing each other by allowing outcomes experienced by one individual to be associated with factors concerning both the individual (an actor effect) and their partner (a partner effect). For example, a man's level of ED may be associated with his self-reported

use of cost-inflicting mate retention behaviors (actor effect) as well as his female partner's perception of his use of these cost-inflicting behaviors (partner effect).

Our hypotheses were consistent with an indirect effects model such that we expected the associations that ED had with partner-directed behaviors to be due, at least in part, to suspicious jealousy but not reactive jealousy. As a consequence, we used an extension of the APIM that is known as the actor-partner interdependence mediation model (APIMeM; Ledermann et al., 2011) because it is capable of examining indirect associations in dyadic data structures (e.g., a man's level of ED may have an indirect association with his female partner's perception of his use of cost-inflicting behaviors through either his self-reported suspicious jealousy or her perception of his suspicious jealousy). We examined the possibility of indirect dyadic associations by conducting a separate APIMeM analysis for each partner-directed behavior (i.e., cost-inflicting behaviors, benefit-provisioning behaviors, partner-directed insults, partner-directed violence, and partner-inflicted injuries) using the MEDYAD macro (Coutts et al., 2019). MEDYAD uses a bootstrap resampling process that was repeated 10,000 times to generate 95% percentile bootstrap confidence intervals for each direct and indirect association. Each of these APIMeM analyses included two predictor variables (i.e., men's self-reported ED and women's perceptions of their partner's ED), four mediators (i.e., men's self-reported suspicious jealousy and reactive jealousy, as well as women's perceptions of their male partner's suspicious jealousy and reactive jealousy), and two outcomes (i.e., men's self-reports and women's partner-reports of cost-inflicting behaviors, benefit-provisioning behaviors, partner-directed insults, partner-directed violence, and partner-inflicted injuries). The variables were standardized in an effort to clarify the interpretation of the resulting coefficients. Multicollinearity was not an issue for these analyses because the variance inflation factor (VIF) values were less than 1.90 (Darlington & Hayes, 2017). The effect sizes for these analyses were reported using Cohen's f^2 and interpreted using the guidelines provided by Cohen (1988).

Results

Descriptive statistics and zero-order correlations are presented in Table 1.[1] We used the guidelines provided by Funder and Ozer (2019) for interpreting the effect sizes for these correlation coefficients. Male self-reported ED had medium positive correlations with their self-reported suspicious jealousy and cost-inflicting behaviors. Further, male self-reported ED had large positive correlations with female perceptions of her partner's suspicious jealousy and cost-inflicting behaviors. Female perceptions of her partner's ED had large-to-very large positive correlations with female perceptions of her partner's suspicious jealousy and cost-inflicting behaviors. It is also important to note that there were large-to-very large positive correlations between the self-reports provided by men and the partner-reports provided by women (e.g., the self-reported ED for men and female perceptions of her male partner's ED). However, these correlations did not approach 1 (i.e., the largest of these correlations was $r = 0.64$ for benefit-provisioning behaviors) which indicates that men and women had similar—but not identical—perceptions of these variables.

The results of the APIMeM analyses revealed that male self-reported ED had a small positive association with male self-reported suspicious jealousy ($a_1 = 0.36$, $t = 3.25$, $p = 0.002$, $CI_{95\%}$ [0.14, 0.58], $f^2 = 0.09$) but not with male self-reported reactive jealousy ($a_2 = -0.03$, $t = -0.24$, $p = 0.810$, $CI_{95\%}$ [−0.26, 0.20], $f^2 = 0.00$). Male self-reported ED was not associated with female perceptions of her partner's suspicious jealousy ($a_3 = 0.14$, $t = 1.33$, $p = 0.186$, $CI_{95\%}$ [−0.07, 0.34], $f^2 = 0.02$) or reactive jealousy ($a_4 = 0.04$, $t = 0.32$, $p = 0.752$, $CI_{95\%}$ [−0.19, 0.26], $f^2 = 0.00$). Women's reports of their partners' experience with ED followed a similar pattern. More specifically, female perceptions of her partner's ED had a small positive association with female perceptions of her partner's suspicious jealousy ($a_7 = 0.36$, $t = 3.41$, $p < 0.001$, $CI_{95\%}$ [0.15, 0.56], $f^2 = 0.11$) but not with female perceptions of her partner's reactive jealousy ($a_8 = -0.17$, $t = -1.46$, $p = 0.148$, $CI_{95\%}$ [−0.40, 0.06], $f^2 = 0.02$), male self-reports of suspicious jealousy ($a_5 = -0.17$, $t = -1.50$, $p = 0.136$, $CI_{95\%}$ [−0.39, 0.05], $f^2 = 0.02$), or male self-reports of reactive jealousy ($a_6 = -0.09$, $t = -0.78$, $p = 0.438$, $CI_{95\%}$ [−0.32, 0.14], $f^2 = 0.01$). Overall, our results revealed that men's self-reported ED was only associated with their self-reported suspicious jealousy. Similarly, women's perception of their partner's ED was only associated with women's perceptions of her partner's suspicious jealousy.

Cost-Inflicting Behaviors

The results of the APIMeM analysis for cost-inflicting behaviors are presented in Fig. 1. This analysis revealed that male self-reported ED was not associated with male self-reported cost-inflicting behaviors ($c_1' = 0.06$, $t = 0.67$, $p = 0.503$, $CI_{95\%}$ [−0.12, 0.24], $f^2 = 0.00$) nor was it associated with female perceptions of her partner's cost-inflicting behaviors ($c_2' = 0.09$, $t = 0.96$, $p = 0.341$, $CI_{95\%}$ [−0.10, 0.27], $f^2 = 0.01$). Similarly, female perceptions of her partner's ED were not

[1] Both male self-reports and female partner-reports of ED had positively skewed distributions. This led us to conduct additional analyses that used log-transformed versions of the ED scores that reduced their skew. The results of the analyses using the log-transformed ED scores were similar to the results using the untransformed scores. As a consequence, we only present the results for the untransformed scores in the interest of parsimony.

Table 1 Intercorrelations and descriptive statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Male self-reports																
1. Erectile dysfunction	–															
2. Suspicious jealousy	0.27**	–														
3. Reactive jealousy	−0.08	0.30***	–													
4. Cost-inflicting behavior	0.27**	0.62***	0.23*	–												
5. Benefit-provisioning behavior	−0.02	0.28**	0.25**	0.42***	–											
6. Partner-directed insults	0.17	0.25**	0.19*	0.24**	−0.12	–										
7. Partner-directed violence	0.01	0.08	0.06	0.24**	0.06	0.45***	–									
8. Partner-inflicted injuries	0.07	0.01	−0.04	0.02	−0.01	0.19*	0.33***	–								
Female perceptions																
9. Erectile dysfunction	0.58***	0.04	−0.11	0.15	−0.01	−0.03	−0.12	0.11	–							
10. Suspicious jealousy	0.34***	0.47***	0.08	0.50***	0.18	0.21*	0.03	0.08	0.44***	–						
11. Reactive jealousy	−0.06	0.04	0.38***	0.20*	0.36***	0.19*	0.14	0.02	−0.15	0.07	–					
12. Cost-inflicting behavior	0.35***	0.39***	0.07	0.61***	0.17	0.10	0.00	0.13	0.37***	0.64***	0.13	–				
13. Benefit-provisioning behavior	−0.01	0.08	0.09	0.25**	0.64***	−0.14	−0.02	0.12	−0.02	0.19*	0.30***	0.43***	–			
14. Partner-directed insults	0.05	−0.03	−0.06	−0.05	−0.16	0.46***	0.30**	0.50***	0.03	0.22*	0.09	0.21*	0.04	–		
15. Partner-directed violence	−0.03	−0.03	0.00	0.08	−0.03	0.32***	0.43***	0.42***	−0.03	0.17	0.13	0.16	0.03	0.61***	–	
16. Partner-inflicted injuries	0.06	−0.01	−0.04	−0.01	−0.05	0.21*	0.11	0.54***	0.10	0.22*	0.06	0.20*	−0.01	0.61***	0.58***	–
Mean	1.41	1.71	5.01	1.35	2.36	1.14	1.10	1.01	1.38	1.64	4.97	1.26	2.24	1.12	1.09	1.01
Standard deviation	0.45	0.65	0.59	0.36	0.50	0.19	0.15	0.13	0.54	0.64	0.88	0.31	0.55	0.17	0.18	0.14

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

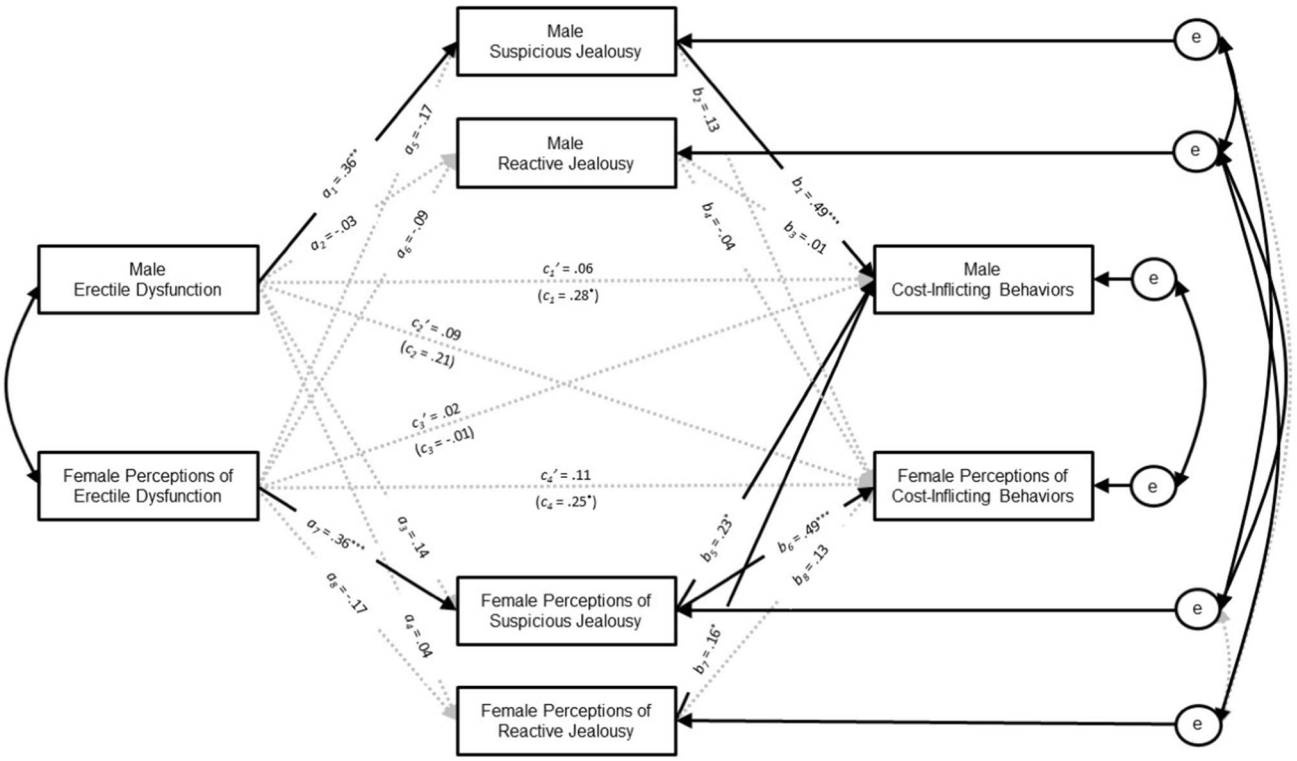

Fig. 1 The results of the APIMeM analysis with suspicious jealousy and reactive jealousy mediating the associations that erectile dysfunction had with cost-inflicting behaviors. *Note* The significant positive associations are indicated by solid black arrows, and the non-significant associations are indicated by dotted gray lines. The "e" terms represent the errors for suspicious jealousy, reactive jealousy, and cost-inflicting behaviors. The correlations among the predictors, mediators, and outcomes are indicated by curved bidirectional arrows. $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$

associated with male self-reported cost-inflicting behaviors ($c_3' = 0.02$, $t = 0.18$, $p = 0.859$, $CI_{95\%}$ [−0.18, 0.21], $f^2 = 0.00$) or female perceptions of her partner's cost-inflicting behaviors ($c_4' = 0.11$, $t = 1.14$, $p = 0.257$, $CI_{95\%}$ [−0.08, 0.31], $f^2 = 0.01$). Thus, ED did not have direct associations with men's use of cost-inflicting behaviors according to the reports of men and their female partners. Male self-reported suspicious jealousy had a medium positive association with male self-reported cost-inflicting behavior ($b_1 = 0.49$, $t = 5.42$, $p < 0.001$, $CI_{95\%}$ [0.31, 0.67], $f^2 = 0.28$), whereas female perceptions of her partner's suspicious jealousy ($b_5 = 0.23$, $t = 2.52$, $p = 0.013$, $CI_{95\%}$ [0.05, 0.41], $f^2 = 0.06$) and reactive jealousy ($b_7 = 0.17$, $t = 2.12$, $p = 0.037$, $CI_{95\%}$ [0.01, 0.32], $f^2 = 0.04$) had small positive associations with male self-reported cost-inflicting behavior. Female perceptions of her partner's suspicious jealousy had a medium positive association with female perceptions of her partner's cost-inflicting behaviors ($b_6 = 0.50$, $t = 5.31$, $p < 0.001$, $CI_{95\%}$ [0.31, 0.68], $f^2 = 0.26$). Thus, suspicious jealousy was associated with men's use of cost-inflicting behaviors according to the reports of both men and their romantic partner. However, women's perceptions of their partner's reactive jealousy also had an unexpected association with their male partner's self-reported use of cost-inflicting behaviors.

Tests of mediation revealed an actor effect for men such that male self-reported ED had a positive indirect association with male self-reported cost-inflicting behaviors through male self-reported suspicious jealousy ($a_1b_1 = 0.18$, $z = 2.76$, $p = 0.003$, $CI_{95\%}$ [0.06, 0.33]). A similar actor effect emerged for women such that female perceptions of her partner's ED had a positive indirect association with female perceptions of her partner's cost-inflicting behaviors through female perceptions of her partner's suspicious jealousy ($a_7b_6 = 0.18$, $z = 2.84$, $p = 0.002$, $CI_{95\%}$ [0.01, 0.34]). A partner effect also emerged for women such that female perceptions of her partner's ED had a positive indirect association with male self-reported cost-inflicting behaviors through female perceptions of her partner's suspicious jealousy ($a_7b_5 = 0.08$, $z = 1.98$, $p = 0.024$, $CI_{95\%}$ [0.00, 0.16]). Thus, the reports of both men and women are consistent with mediation such that ED had a positive indirect association with cost-inflicting behaviors through suspicious jealousy.

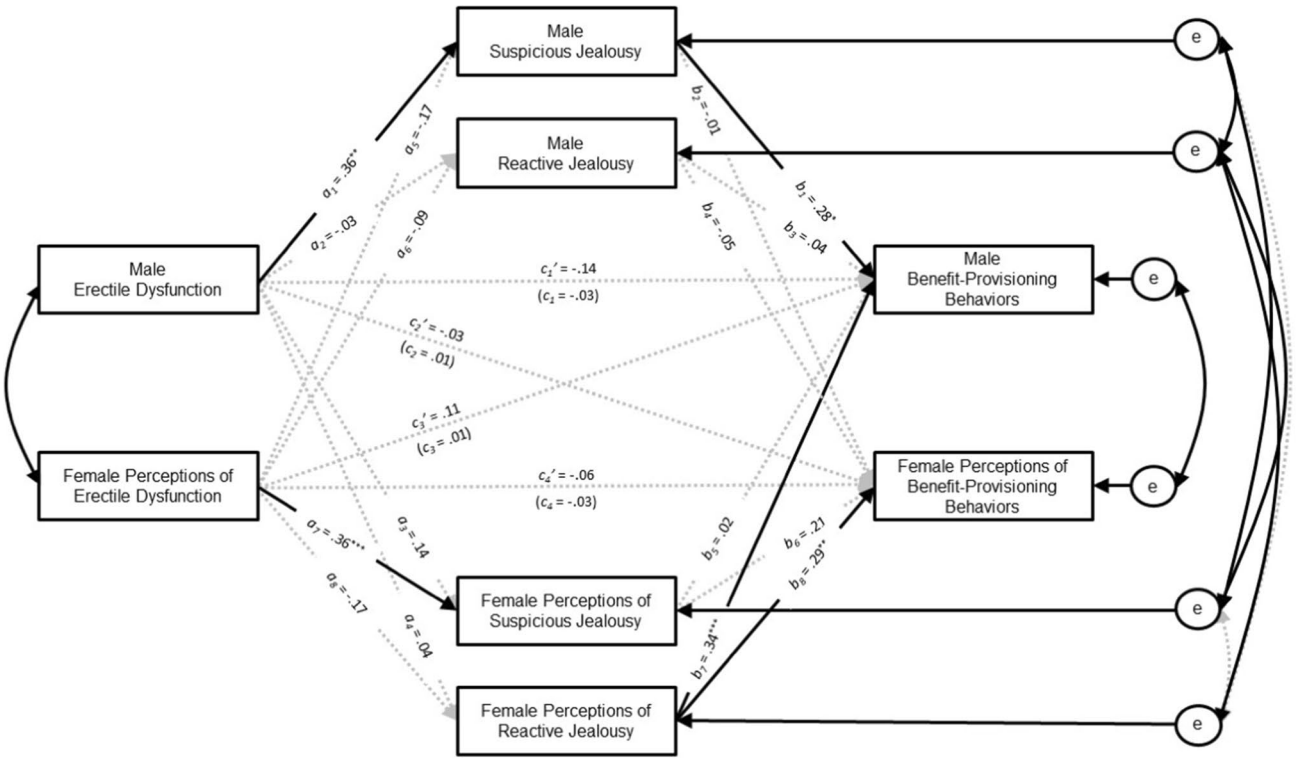

Fig. 2 The results of the APIMeM analysis with suspicious jealousy and reactive jealousy mediating the associations that erectile dysfunction had with benefit-provisioning behaviors. *Note* The significant positive associations are indicated by solid black arrows, and the nonsignificant associations are indicated by dotted gray lines. The "e" terms represent the errors for suspicious jealousy, reactive jealousy, and benefit-provisioning behaviors. The correlations among the predictors, mediators, and outcomes are indicated by curved bidirectional arrows. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Benefit-Provisioning Behaviors

The results of the APIMeM analysis for benefit-provisioning behaviors are presented in Fig. 2. This analysis revealed that male self-reported ED was not associated with male self-reported benefit-provisioning behaviors ($c_1' = -0.14$, $t = -1.29$, $p = 0.201$, $CI_{95\%}$ [−0.36, 0.08], $f^2 = 0.02$) nor was it associated with female perceptions of her partner's benefit-provisioning behaviors ($c_2' = -0.03$, $t = -0.25$, $p = 0.807$, $CI_{95\%}$ [−0.26, 0.20], $f^2 = 0.00$). Similarly, female perceptions of her partner's ED were not associated with male self-reported benefit-provisioning behaviors ($c_3' = 0.11$, $t = 0.90$, $p = 0.370$, $CI_{95\%}$ [−0.13, 0.34], $f^2 = 0.01$) or female perceptions of her partner's benefit-provisioning behaviors ($c_4' = -0.06$, $t = -0.47$, $p = 0.642$, $CI_{95\%}$ [−0.31, 0.19], $f^2 = 0.00$). Overall, ED did not have direct associations with benefit-provisioning behaviors according to the reports of men or women. Male self-reported suspicious jealousy ($b_1 = 0.28$, $t = 2.54$, $p = 0.013$, $CI_{95\%}$ [0.06, 0.50], $f^2 = 0.06$) and female perceptions of her partner's reactive jealousy ($b_7 = 0.34$, $t = 3.51$, $p < 0.001$, $CI_{95\%}$ [0.15, 0.52], $f^2 = 0.12$) had small positive associations with male self-reported benefit-provisioning behavior. Female perceptions of her partner's reactive jealousy had a small positive association with female perceptions of her partner's benefit-provisioning behaviors ($b_6 = 0.29$, $t = 2.86$, $p = 0.005$, $CI_{95\%}$ [0.09, 0.49], $f^2 = 0.08$). Suspicious jealousy had a positive association with benefit-provisioning behaviors according to the reports of both men and women. Tests of mediation revealed the only significant indirect association to be an actor effect for men such that male self-reported ED had a positive indirect association with male self-reported benefit-provisioning behaviors through male self-reported suspicious jealousy ($a_1 b_1 = 0.10$, $z = 1.95$, $p = 0.026$, $CI_{95\%}$ [0.02, 0.21]). Thus, the reports of men, but not their female partners, were consistent with mediation such that ED had a positive indirect association with benefit-provisioning behaviors through suspicious jealousy.

Partner-Directed Insults

The results of the APIMeM analysis for partner-directed insults are presented in Fig. 3. This analysis revealed that male self-reported ED was not associated with male self-reported partner-directed insults ($c_1' = 0.23$, $t = 1.93$, $p = 0.056$, $CI_{95\%}$ [−0.01, 0.46], $f^2 = 0.04$) nor was it associated with female perceptions of partner-directed insults ($c_2' = 0.07$, $t = 0.58$,

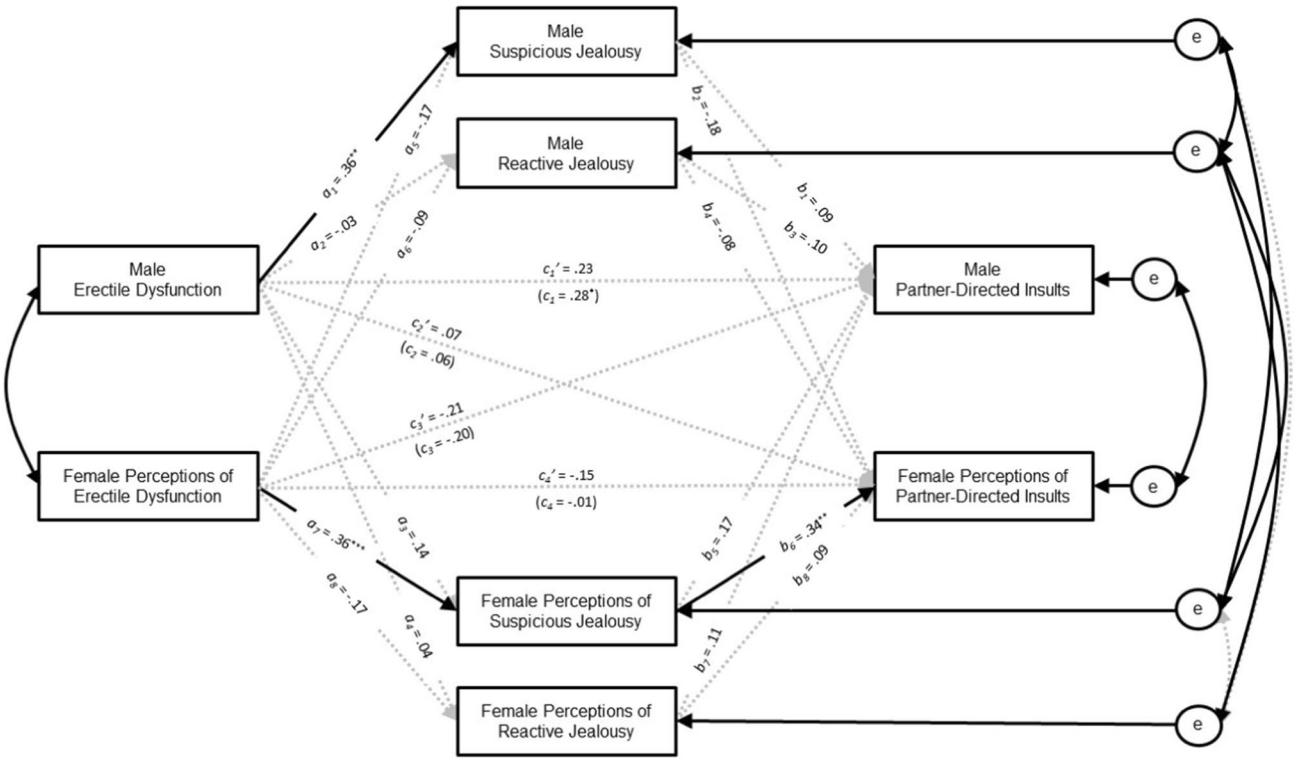

Fig. 3 The results of the APIMeM analysis with suspicious jealousy and reactive jealousy mediating the associations that erectile dysfunction had with partner-directed insults. *Note* The significant positive associations are indicated by solid black arrows, and the nonsignificant associations are indicated by dotted gray lines. The "e" terms represent the errors for suspicious jealousy, reactive jealousy, and partner-directed insults. The correlations among the predictors, mediators, and outcomes are indicated by curved bidirectional arrows. $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$

$p = 0.566$, $CI_{95\%}$ [−0.17, 0.31], $f^2 = 0.00$). Similarly, female perceptions of her partner's ED were not associated with male self-reported partner-directed insults ($c_3' = -0.21$, $t = -1.71$, $p = 0.090$, $CI_{95\%}$ [−0.46, 0.03], $f^2 = 0.03$) or female perceptions of partner-directed insults ($c_4' = -0.15$, $t = -1.18$, $p = 0.242$, $CI_{95\%}$ [−0.40, 0.10], $f^2 = 0.01$). ED did not have a direct association with men's use of partner-directed insults according to the reports of men or women. Female perceptions of her partner's suspicious jealousy had a small positive association with female perceptions of partner-directed insults ($b_6 = 0.34$, $t = 2.85$, $p = 0.005$, $CI_{95\%}$ [0.10, 0.58], $f^2 = 0.08$). Suspicious jealousy had a positive association with men's use of partner-directed insults according to the reports of women, but not their male partners. Tests of mediation revealed the only significant indirect association to be an actor effect for women such that female perceptions of her partner's ED had a positive indirect association with female perceptions of partner-directed insults through female perceptions of her partner's suspicious jealousy ($a_7 b_6 = 0.12$, $z = 2.14$, $p = 0.016$, $CI_{95\%}$ [0.01, 0.23]). Thus, the reports of women, but not their male partners, were consistent with mediation such that ED had a positive indirect association with partner-directed insults through suspicious jealousy.

Partner-Directed Violence

The results of the APIMeM analysis for partner-directed violence are presented in Fig. 4. This analysis revealed that male self-reported ED was not associated with male self-reported partner-directed violence ($c_1' = 0.10$, $t = 0.79$, $p = 0.430$, $CI_{95\%}$ [−0.15, 0.34], $f^2 = 0.01$) nor was it associated with female perceptions of partner-directed violence ($c_2' = 0.00$, $t = -0.04$, $p = 0.971$, $CI_{95\%}$ [−0.24, 0.24], $f^2 = 0.00$). Similarly, female perceptions of her partner's ED were not associated with male self-reported partner-directed violence ($c_3' = -0.19$, $t = -1.43$, $p = 0.155$, $CI_{95\%}$ [−0.45, 0.07], $f^2 = 0.02$) or female perceptions of partner-directed violence ($c_4' = -0.13$, $t = -1.04$, $p = 0.300$, $CI_{95\%}$ [−0.39, 0.12], $f^2 = 0.01$). ED did not have a direct association with men's use of partner-directed violence according to the reports of men or women. Female perceptions of her partner's suspicious jealousy had a small positive association with female perceptions of partner-directed violence ($b_6 = 0.29$, $t = 2.40$, $p = 0.018$, $CI_{95\%}$ [0.05, 0.53], $f^2 = 0.05$). Suspicious jealousy was positively associated with men's use of partner-directed violence according to the reports of women, but not their male partners. Tests of mediation revealed the

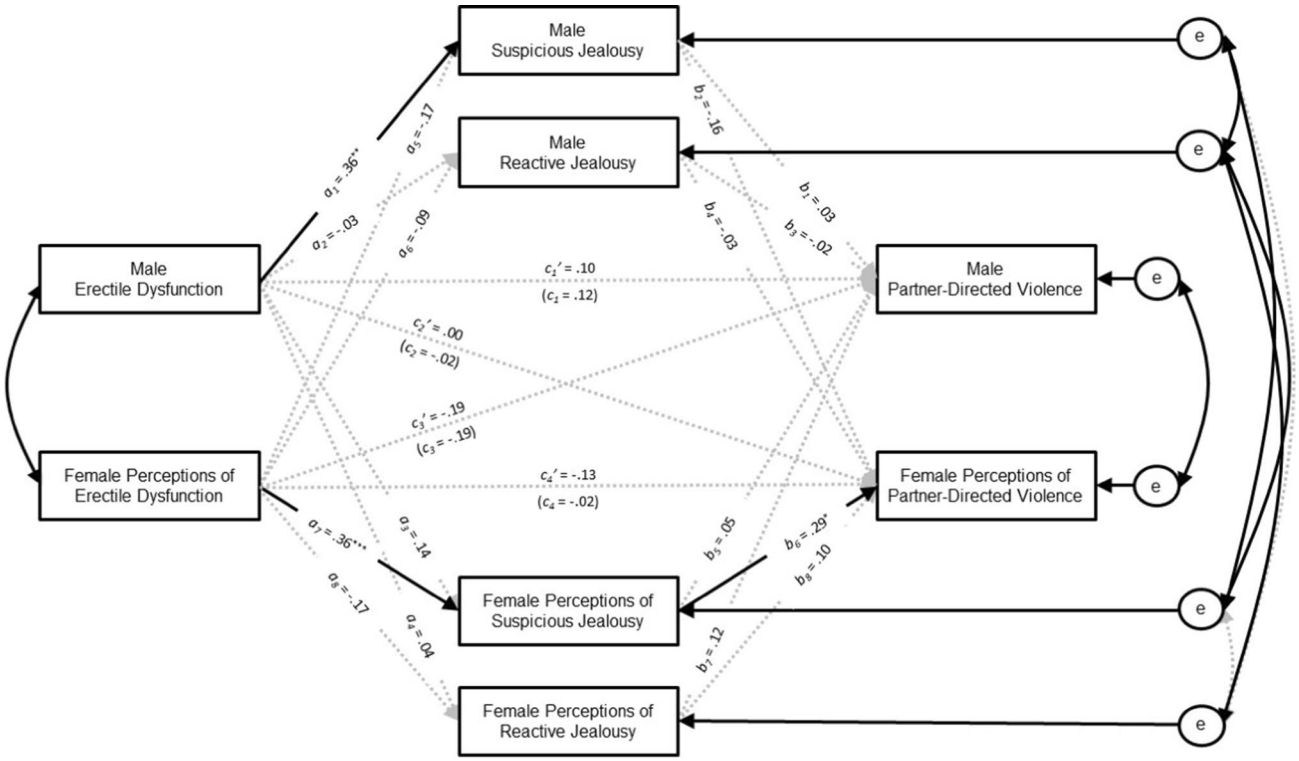

Fig. 4 The results of the APIMeM analysis with suspicious jealousy and reactive jealousy mediating the associations that erectile dysfunction had with partner-directed violence. *Note* The significant positive associations are indicated by solid black arrows, and the non-significant associations are indicated by dotted gray lines. The "e" terms represent the errors for suspicious jealousy, reactive jealousy, and partner-directed violence. The correlations among the predictors, mediators, and outcomes are indicated by curved bidirectional arrows. $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$

only significant indirect association to be an actor effect for women such that female perceptions of her partner's ED had a positive indirect association with female perceptions of partner-directed violence through female perceptions of her partner's suspicious jealousy ($a_7b_6 = 0.10$, $z = 1.91$, $p = 0.028$, $CI_{95\%}$ [0.00, 0.27]). Thus, the reports of women, but not their male partners, were consistent with mediation such that ED had a positive indirect association with men's use of partner-directed violence through suspicious jealousy.

Partner-Inflicted Injuries

The results of the APIMeM analysis for partner-inflicted injuries are presented in Fig. 5. This analysis revealed that male self-reported ED was not associated with male self-reported partner-inflicted injuries ($c_1' = 0.00$, $t = 0.00$, $p = 0.998$, $CI_{95\%}$ [−0.25, 0.25], $f^2 = 0.00$) nor was it associated with female perceptions of partner-inflicted injuries ($c_2' = 0.01$, $t = 0.10$, $p = 0.924$, $CI_{95\%}$ [−0.23, 0.25], $f^2 = 0.00$). Similarly, female perceptions of her partner's ED were not associated with male self-reported partner-inflicted injuries ($c_3' = 0.09$, $t = 0.66$, $p = 0.508$, $CI_{95\%}$ [−0.18, 0.35], $f^2 = 0.01$) or female perceptions of partner-inflicted injuries ($c_4' = -0.02$, $t = -0.15$, $p = 0.878$, $CI_{95\%}$ [−0.28, 0.24], $f^2 = 0.00$). ED did not a direct association with partner-inflicted injuries according to the reports of men or women. Female perceptions of her partner's suspicious jealousy had a small positive association with female perceptions of partner-inflicted injuries ($b_6 = 0.29$, $t = 2.38$, $p = 0.019$, $CI_{95\%}$ [0.05, 0.53], $f^2 = 0.05$). Suspicious jealousy had a positive association with partner-inflicted injuries according to the reports of women, but not their male partners. Tests of mediation revealed the only significant indirect association to be an actor effect for women such that female perceptions of her partner's ED had a positive indirect association with female perceptions of partner-inflicted injuries through female perceptions of her partner's suspicious jealousy ($a_7b_6 = 0.10$, $z = 1.90$, $p = 0.029$, $CI_{95\%}$ [0.00, 0.21]). Thus, the reports of women, but not their male partners, were consistent with mediation such that ED had a positive indirect association with partner-inflicted injuries through suspicious jealousy.

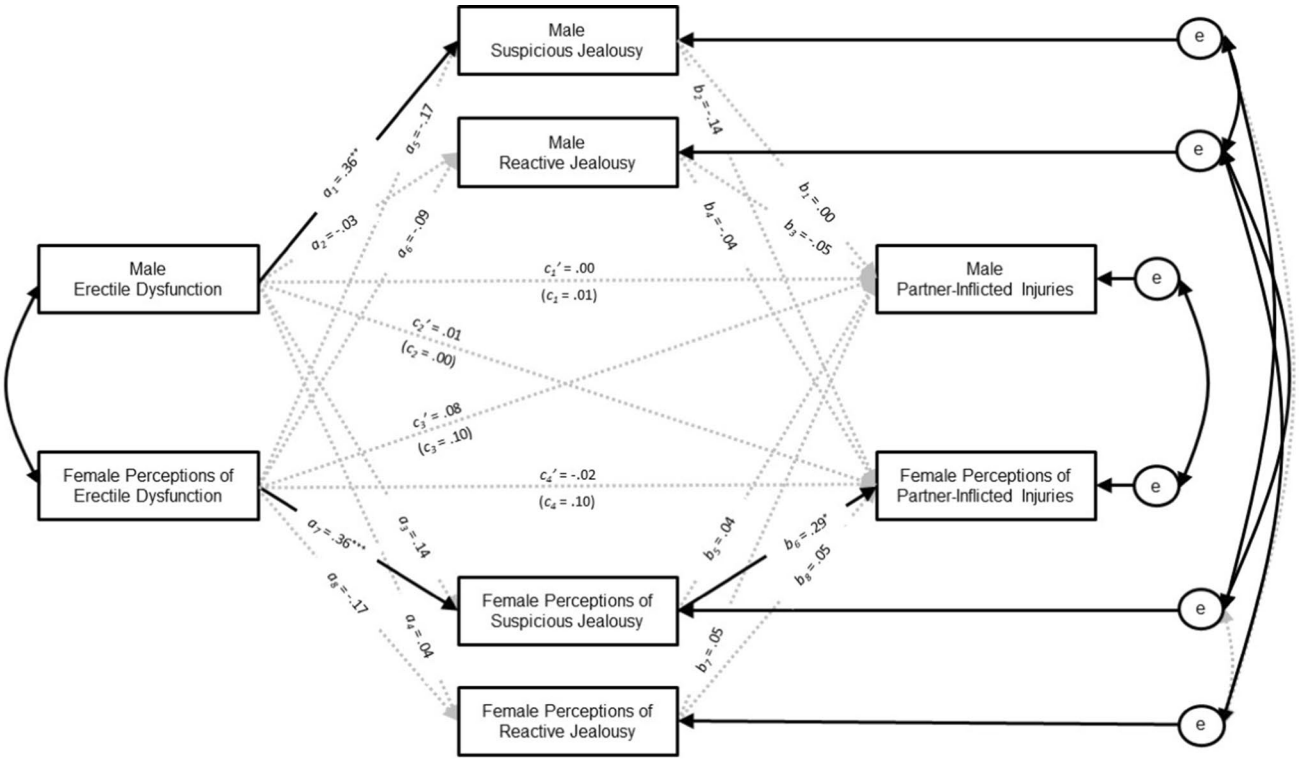

Fig. 5 The results of the APIMeM analysis with suspicious jealousy and reactive jealousy mediating the associations that erectile dysfunction had with partner-inflicted injuries. *Note* The significant positive associations are indicated by solid black arrows, and the non-significant associations are indicated by dotted gray lines. The "e" terms represent the errors for suspicious jealousy, reactive jealousy, and partner-inflicted injuries. The correlations among the predictors, mediators, and outcomes are indicated by curved bidirectional arrows. $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$

Discussion

The goal of the present study was to replicate and extend the work of Vance et al. (2022a) using dyadic reports from heterosexual romantic couples regarding men's experience with ED, feelings of jealousy, and use of certain partner-directed behaviors. The results of the present study mostly supported our hypothesis that ED would be positively associated with suspicious jealousy, which, in turn, would be associated with partner-directed behaviors. Our results mostly aligned with the patterns observed by Vance et al. (2022a). For example, ED was positively associated with suspicious jealousy according to the self-reports of men and the partner-reports provided by women. Further, men who reported more ED experienced higher levels of suspicious jealousy, which, in turn, was associated with their more frequent use of cost-inflicting mate retention behaviors. The partner-reports provided by women revealed a similar pattern. These results suggest that men who experience suspicious jealousy as a result of their ED symptoms may use cost-inflicting behaviors in an effort to mitigate their concerns over their partner's potential infidelity.

Although the results that emerged for the use of cost-inflicting behaviors by men were similar according to the reports provided by men and women, the results for the other partner-directed behaviors diverged between the self-reports of men and the partner-reports provided by women. For example, suspicious jealousy mediated the association that ED had with benefit-provisioning behaviors according to the self-reports of men, but not according to the partner-reports provided by women. In contrast, suspicious jealousy mediated the associations that ED had with partner-directed insults, partner-directed violence, and partner-inflicted injuries according to the partner-reports provided by women, but not the self-reports of men. This pattern suggests a divergence in the perceived consequences of men's suspicious jealousy from the perspectives of men and women. That is, the self-reports of men suggest that their suspicious jealousy is connected with attempts to maintain their relationship through the use of both cost-inflicting behaviors and benefit-provisioning behaviors. In contrast, women tend to perceive the consequences of their male partner's suspicious jealousy as being largely negative. Some of the discrepancies between the results of men and women may be explained, in part, by the bivariate correlations between men and their intimate

partners on the same constructs (e.g., the correlation between men's self-reported ED, and women's reports of their partner's ED). These correlations ranged from 0.38 to 0.64, and all were statistically significant. On the one hand, these correlations may be considered lower than what would be expected for romantic couples reporting on the same behaviors. For example, the level of agreement between men and women's perceptions of the male partner's experience of ED may have been impacted by factors such as men's intentional underreporting of their ED symptoms. Another possible explanation for the magnitude of this association is that men may have more accurate knowledge of their own experiences with ED relative to the perceptions of their female partner. On the other hand, Funder and Ozer (2019) have argued that effect sizes for bivariate correlations are often erroneously labeled "small," and that, when studies are sufficiently powered, an effect size *r* of 0.30 indicates a large effect. Additionally, previous reports of heterosexual romantic couples suggest that levels of agreement can vary substantially across samples depending on the construct that is being assessed. For example, a study of intimate partner aggression in men with alcohol use disorder reported correlations between 0.34 and 0.75 for self-reports and partner-reports of male-perpetrated and female-perpetrated physical and psychological aggression (Panuzio et al., 2006). Further, a review of the literature concerning intimate partner violence found that agreement between romantic dyads varied substantially between studies (Armstrong et al., 2002). In either case, our results suggest that, to some degree, the romantic couples in the present study hold incongruent perceptions regarding the frequency of partner-directed behaviors in the relationship and the prevalence of the male partner's experience with ED.

Unlike the results of Vance et al. (2022a), the self-reports of men did not show that suspicious jealousy was associated with partner-directed insults, partner-directed violence, or partner-inflicted injuries. In contrast, women perceived largely negative consequences for men's suspicious jealousy such that it was associated with the use of cost-inflicting mate retention behaviors, partner-directed insults, partner-directed violence, and partner-inflicted injuries. These discrepancies may be indicative of biased reporting by men, such that they underestimate—or deliberately underreport—the severity of their ED symptoms (e.g., Frost et al., 2012) or their use of aversive partner-directed behaviors (e.g., Dobash et al., 1998). Another possibility is that women may be misperceiving the behavior of their male partners (e.g., assuming that their male partner's use of partner-directed insults was motivated by suspicious jealousy). In either case, the results of the present study highlight the importance of securing dyadic reports when investigating heterosexual romantic relationships.

An evolutionary perspective predicts that men will engage in partner-directed behaviors that are intended to retain their mate when they perceive themselves to be at greater risk of experiencing partner infidelity in an effort to reduce the risk that they will unwittingly invest time and resources in genetically unrelated offspring (e.g., Buss & Shackelford, 1997). The results of the present study align with previous research (e.g., 2022b; Vance et al., 2022a) in suggesting that men's experience with ED may lead to concerns regarding partner infidelity, which, in turn, may promote the use of certain partner-directed behaviors (e.g., cost-inflicting mate retention behaviors, sexual coercion). Although ED may not entirely prevent a man from having sex with his partner, it almost certainly reduces his ability to do so. Thus, partner-directed behaviors such as mate retention behaviors, verbal insults, and physical violence—or the threat of physical violence—may serve as alternative strategies for men to reduce the risk of partner infidelity.

There were some notable differences between the results of the present study and those of Vance et al. (2022a). Perhaps the most striking contrast is the lack of direct associations between ED and some of the partner-directed behaviors, including benefit-provisioning mate retention behaviors, partner-directed insults, partner-directed violence, and partner-inflicted injury. The absence of direct associations between ED and many of the partner-directed behaviors we examined suggests that experience with ED may not be sufficient by itself to motivate the use of many partner-directed behaviors such as partner-directed violence. Rather, it appears that the problematic consequences of ED largely stem from the feelings of suspicious jealousy that it may promote. These results further support the possibility that men who report more ED symptoms experience greater feelings of suspicious jealousy, possibly as a result of reduced self-perceived mate value or threatened masculinity.

Limitations and Future Directions

The present study contains notable improvements over the research conducted by Vance et al. (2022a). For example, we secured dyadic data from romantic couples and we did not restrict our sample to men between the ages of 18 and 45 years. However, the present study also has some important limitations. The first limitation is that we are unable to determine the direction of causality between ED, suspicious jealousy, and partner-directed behaviors due to the correlational nature of the present study. Our analyses reflected the assumption that ED would lead to suspicious jealousy, which, in turn, would promote the use of partner-directed behaviors and our results were mostly consistent with this possibility. However, these results do not necessarily indicate this particular causal pattern because it is possible that other causal patterns could exist between these variables. One alternative possibility is that suspicious jealousy could contribute to the development of ED rather than being a consequence of ED.

It could also be the case that one or more other variables that we did not examine (e.g., mate value discrepancies between men and their female partners) could play a role in the associations that ED has with suspicious jealousy and partner-directed behaviors. It would be beneficial for future studies to clarify the causal links between these variables by using experimental designs or longitudinal studies.

The second limitation is that we observed relatively low levels of ED despite recruiting a broader age range for the male participants compared to Vance et al. (2022a). That is, the oldest men in our sample were 60 years, whereas the oldest men in Vance et al. (2022a) were only 45 years. Despite our decision to include older men in our sample, the average levels of ED in the present study were 1.50 according to men's self-reported experience (or 1.47 according to women's perceptions of their partners' experience with ED) with potential scores ranging from 1 to 5 such that higher scores indicated more severe symptoms. This suggests that the levels of ED experienced by men in the present study were relatively low and may not adequately represent men who experience more severe symptoms of ED. It would be beneficial for future studies to attempt to replicate the results of the present study using clinical samples of men who are seeking medical treatment for their ED symptoms.

The third limitation is that we relied on an unvalidated version of the multi-dimensional jealousy scale to assess women's perceptions of their male partners' suspicious and reactive jealousy. It is possible that this issue may partially account for the differences in the results that were observed between the self-reports of men and the partner-reports provided by women. For example, it is possible that women may have had at least some difficulty recognizing the extent to which their male partners were experiencing suspicious jealousy. Although Vance et al. (2022a) observed similar patterns of results using the same partner-report versions of the Multi-Dimensional Jealousy Scale, it would be useful if future studies investigated the validity of this measure.

A related potential limitation concerns our conceptualization of ED as a continuous construct rather than as a categorical construct. For example, it may be the case that men who scored a 1 on the IIEF-5 should be considered to have no experience with ED, and men who scored above 1 should be considered to have some experience with ED, and that these two groups of men should be treated as categorically distinct from one another. Although many clinical studies have used measures such as the IIEF-5 to determine "cut-offs" for categorical approaches to ED (e.g., "mild vs. severe," "ED vs. no ED"; Quinta Gomes & Nobre, 2011; Rosen et al., 1999), it is more common to treat scores for the IIEF-5 as a continuous measure of ED when examining its associations with various psychological, behavioral, and relationship outcomes (Calzo et al., 2021; Ng & Cheng, 2007; Swindle et al., 2004; Velten et al., 2019). These studies provide evidence for the utility of treating ED as a continuous variable, rather than as a categorical variable. Nevertheless, future research may wish to investigate whether the associations between ED and partner-directed behaviors persist when adopting a categorical approach to measuring ED.

The final limitation is that our sample size was relatively modest and we relied on a convenience sample recruited through Prolific. This modest sample size may have limited our ability to detect small effects despite being sufficient for dyadic analyses (e.g., Du & Wang, 2016; Ledermann & Kenny, 2017). Although the present study provided convincing evidence for the associations between ED, suspicious jealousy, and partner-directed behaviors in a relatively young and healthy sample of men and women, some uncertainty remains about the connections that ED would have with partner-directed behaviors among men who were experiencing more difficulties with ED. Thus, it may be beneficial for future research to determine the extent to which the present results would generalize to clinical samples of men who are seeking treatment for ED or older men who are likely to have more issues with ED. Those studies would also likely include greater diversity in terms of relationship length which may allow for a better understanding of whether the connections between ED, suspicious jealousy, and partner-directed behaviors depend to at least some extent on the length of the relationship.

Conclusion

We examined the partner-directed behaviors that may be used by men who experience ED in an effort to reduce their risk of partner infidelity or the dissolution of the relationship. The results of the present study suggest that suspicious jealousy mediates the associations that ED had with various partner-directed behaviors in romantic relationships (i.e., cost-inflicting behavior, benefit-provisioning behavior, partner-directed insults, partner-directed violence, and partner-inflicted injury). However, it is important to note that our results were more consistent when considering the perceptions of women compared with the self-reports of their male partners. Our results are consistent with the possibility that men's partner-directed behaviors may reflect aspects of evolved male psychology that have been co-opted to address the evolutionarily novel issue of ED.

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Data Availability The data presented in the present study are available on Open Science Framework at the following link: https://osf.io/d53zr/?view_only=66267d6283294f789489882e39fae918.

Code Availability Not applicable.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval This study was approved by the Oakland University IRB.

Informed Consent Informed consent was collected from all participants prior to their participation.

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