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It's Complicated: Marital Ambivalence on Ambulatory Blood Pressure and Daily Interpersonal Functioning

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Abstract

Background—Marriage decreases cardiovascular morbidity although relationship quality matters. While some marriages contain highly positive aspects (supportive), marriages may also simultaneously contain both positive and negative aspects (ambivalent). Individuals whose spouses or own behavior is ambivalent may not experience the same cardiovascular-protective benefits of marriage.

Purpose—The purpose of this study is to elucidate the physiological pathways by which marital quality may influence long-term health and examine ambivalent behavior on interpersonal-functioning and ambulatory blood pressure (ABP).

Methods—Interpersonal functioning and ABP were examined in 94 couples.

Results—Spousal and own ambivalent behavior was associated with lower intimacy ($p < .01$) and higher systolic ABP ($p < .01$). Spousal ambivalent behavior was associated with lower ratings of partner responsiveness ($p < .01$) and less self- and spousal-disclosure ($p < .05$). Mediation analyses indicated that own behavior mediated links between spousal ambivalent behavior and ABP.

Conclusions—Despite the positivity in relationships, individuals whose spouses' or own behavior is ambivalent may not receive cardiovascular protection from this positivity.

Keywords

Ambulatory blood pressure; Marriage; Cardiovascular; Social support; Ambivalence

A growing body of research supports the supposition that social support may lower disease risk and lack of social support is associated with impaired mental and physical health including cardiovascular disease, depression, and immune function [1–4]. A current review

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by Holt-Lunstad, Smith & Layton [5] found evidence suggesting that the link between social relationships and health was as predictive of disease as risk factors such as smoking and lack of physical exercise. Further, the association between social relationships and cardiovascular functioning is strong and consistent; socially supportive relationships predict reductions in blood pressure and heart rate [6, 7] and reduced odds of myocardial infarction and postmyocardial infarction survival [8, 9].

Prior research has also generally emphasized the structural features of social relationships and for most adults marriage is the most central relationship in their lives. Much research has focused on the marital relationship and its contribution to the happiness and well-being of individuals, including the health benefits of marriage, and there is much evidence demonstrating the health advantages of marriage. For instance, studies have shown that married individuals have lower rates of morbidity and mortality than their unmarried counterparts [10], lower risk for depression, and greater life satisfaction and greater happiness [11–13].

The quality of marriage appears to influence the health benefits derived from marriage. In fact, prior research indicates that marriage must be high quality to be advantageous or one is better off single [14], but marital relationships, like other social relationships, are not always positive. Marital partners, like other social ties, can be sources of support and understanding (i.e., *positivity*) but can also be sources of criticism, conflict, and jealousy (i.e., *negativity*). Conflicts in marriage can include aversive and ineffectual responses leading to nagging, complaining, distancing, or creating a coercive atmosphere [15]. Ineffective problem solving can fuel hostility and tension [16], and such negative social exchanges can extract a toll on individuals, leading to greater difficulty with daily life activities [17]. Additionally, individuals may expect their spouse to be a source of support during times of stress. Actions meant to be supportive by a spouse can actually be viewed negatively by the individual, and this can add to the individual's distress during their time of need [18].

Further, unhappily married couples are unlikely to experience the same physiological health benefits as their happily married counterparts [19], with women gaining benefits from marriage only when marital satisfaction is high [20]. Likewise, low marital quality can reduce otherwise beneficial effects marriage may provide for men on the progression of atherosclerosis [21]. Research has also found that those couples who indicate less satisfaction with their relationship have worse cardiovascular function [22], poorer self-rated health, and more health problems [17]. Thus, research seems to support that married individuals who are satisfied with their relationship show greater benefits psychologically and physiologically than do couples in unsatisfactory relationships, leading us to presume that quality of the relationship is an important aspect when looking at the benefits available to the couple through the marital relationship.

Despite the research showing the detrimental physical and mental effects unsatisfactory relationships may have, many remain intact [23]. There are reasons why a marriage low in quality may remain intact. It may be that these marriages also contain varying degrees of both positivity (e.g., support and understanding) and negativity (e.g., criticism, conflict, and jealousy). This is an important point as most prior research on marriage and health has

implicitly conceptualized marital quality as ranging from high negativity to high positivity (see Fincham & Linfield [24] for an exception). However, these two dimensions can co-occur within close relationships (i.e., ambivalence) and may provide a more accurate representation of marital processes [25]. In point, a recent meta-analysis on health and marriage found that most standard unidimensional measures of marital quality do not adequately distinguish between positive and negative aspects of marital behavior [13] and suggests that future research includes measures that assess and score both aspects of marital quality. As shown in Fig. 1, we have proposed a model [25] representing a more integrated view of social relationships and the way they may influence health outcomes. As shown in the model, there may be those in the social network that are mostly sources of support and pleasant interactions (i.e., supportive network ties). There are also those who are mostly sources of negative interactions, such as a critical boss (i.e., aversive network tie). There are those in the social network who carry little importance, such as a casual co-worker (i.e., indifferent network tie). Finally, there are those who represent the prototypical ambivalent behavior relationship member. This could be a wayward child or an emotionally unavailable spouse (i.e., ambivalent network tie).

There are reasons why a study of ambivalent behavior in marital relationships separate from supportive behaviors in marital relationships may be important especially in the context of health. While supportive ties reduce cardiovascular reactivity, perceptions of ambivalence in one's social network predict worse mental health outcomes such as depression, perceived stress, and lower satisfaction with life [25, 26]. In fact, perceptions of relationship ambivalence may lead to significant interpersonal stress above and beyond that of aversive ties [25, 27–29]. However, most of the prior work in this area has focused on overall network ambivalence or friendships. Given the centrality of marriage in adulthood, one aim of this study is to examine if ambivalent behavior in the marital context predicts health-relevant physiological pathways which may ultimately influence long-term health. Thus, to determine ambivalent behavior in the marital context, and consistent with our theoretical model of relationship quality [25], we utilized a two dimensional approach in which participants rate their spouse's behavior in both negative and positive aspects. In our prior work [30, 31], we have utilized unidimensional conceptualizations of marital quality and found the links between health outcomes and ambivalent behavior to be independent of marital quality.

One important biological pathway by which relationships may impact health is through cardiovascular functioning. While evidence links marital conflict to heart rate and blood pressure (BP) in laboratory studies [22, 32], much less is known about how relationship quality affects blood pressure over the course of the day. Clinical BP readings may not necessarily be representative of the individual's true cardiovascular functioning. Ambulatory blood pressure (ABP) measures, however, offer a large number of readings across the day, chronicling daily fluctuations, providing a more complete picture of cardiovascular functioning [33]. ABP monitoring is an essential measure in determining cardiovascular risk as ABP can predict complications of hypertension above and beyond what is possible to determine with resting or clinical BP measures alone [33, 34]. Importantly, studies suggest that elevated ABP is a stronger predictor of left ventricular hypertrophy and overall morbidity and mortality than are clinic BP readings [35].

A second aim is to examine these links in the context of one's own ambivalent behavior or attitude. Prior work has focused exclusively on perceptions of another's behavior, but what about one's own behavior? Relationship quality likely reflects more complex processes involving perceptions of other that influence one's interpretation and reactions to interpersonal events [36]. Interpersonal theory holds that an actor's behavior invites or evokes behavior from the interacting partner that is *similar* in affiliation (warmth and hostility) [37]. For instance, if a husband shows warmth by complimenting his wife's dinner, this behavior will usually evoke a warm (kind) response in return while if the husband criticizes his wife's dinner, he will likely evoke a hostile response in return. This work implies that positive and negative behaviors by one spouse may evoke similar responses from another as they are mutually reinforcing over time. Additionally, as relationships progress through multiple interactions, the behavioral styles of the spouses may be altered in ways that establish even greater complementarity in behavior [38].

In the current study, participants completed a 1-day ABP assessment in which a blood pressure reading was randomly taken once during every 30-min period. We predicted that those individuals who perceive their spouse's behavior as ambivalent (i.e., relatively high in both positivity and negativity) would exhibit greater ABP. We further predicted that those individuals who themselves exhibit behavior that is ambivalent would exhibit greater ABP and worse daily interpersonal processes. Based on interpersonal theory and complementarity, we also tested a mediational model in which one's perception of the spouse's ambivalent behavior is associated with one's own ambivalent behavior which in turn negatively influences ABP.

Although not a primary aim due to our emphasis on health-relevant biological pathways, we also examined general psychological processes that are influenced by relationship factors including state self-esteem, positive and negative affect, and intimacy (spousal responsiveness and spousal- and self-disclosure) in married couples during daily life. We predicted that individuals who viewed their spouses' behavior as ambivalent would report worse daily interpersonal processes such as lower partner responsiveness, self- and spousal disclosure, and negative affect. We further predicted that those individuals who exhibit ambivalent behavior would exhibit worse daily interpersonal processes. In order to advance our conceptual understanding of the role, these interpersonal processes may play, we tested mediational models in which spouse's ambivalent behavior and own ambivalent behavior are associated with interpersonal relationship processes which in turn negatively influences ABP.

Method

Participants

Ninety-seven healthy couples ($n=194$) were recruited from the community and were paid \$75. Exclusion criteria included those who were not generally healthy or who had medical conditions with a cardiovascular component (e.g., no hypertension or psychological problems for which they were being medically treated). To be eligible, participants were required to commit to spending at least part of the study day together (this was generally the evening). Participants were all legally married and living together and ranged in age from 18

years to 63 years with a mean age of 29.5. Most were White (83 %), college educated (62.4 %), and had an income over \$40,000 per year (66 %). Three couples did not spend time during the evening together and were eliminated from the study resulting in a total of 94 couples.

Measures

Physiological Measures—The Oscar 2 (Suntech Medical Instruments, Raleigh, NC) was used to estimate ambulatory SBP and DBP. The Oscar was designed specifically for ambulatory assessments and is validated to international standards of reliability [39]. Outliers associated with artifactual readings were identified using the criteria by Marler, Jacobs, Lehoczky, and Shapiro [34]. These include (a) SBP<70 mmHg or >250 mmHg, (b) DBP< 45 mmHg or >150 mmHg, and (c) SBP / DBP<[1.065+ (.00125 X DBP)] or >3.0. Less than 3 % of the ABP readings were discarded due to these criteria.

General Psychological Measures—The ambulatory diary record (ADR) [29] includes information on standard control variables (e.g., posture and prior caffeine consumption), as well as within-participant factors such as state positive and negative affect and state self-esteem. Participants also reported if they were interacting with their spouse at the time of the blood pressure reading and if they confirmed they were, perceived partner responsiveness, intimacy, and disclosure [40, 41] were assessed. The ADR was programmed into a palm pilot device that allowed for easy downloading for data reduction and analyses and was relatively easy to complete (about 2 min) in order to maximize cooperation. The time / date stamp also allowed us to verify that the ADR was completed soon after each programmed ambulatory cardiovascular reading. Readings were examined to ensure compliance and were discarded if not instigated within 5 min of a blood pressure reading. 286 diary items (7.15 %) that were not instigated within the 5-min period were discarded. The average participant had less than one ADR dropped ($M=.8$, with a range from 0 to 7).

Relationship Quality—The Social Relationship Index (SRI) was initially developed as a self-report version of the social support interview [42]. Consistent with prior work, we used a scoring system of positivity and negativity categorizing participants as either viewing their spouse's behavior as supportive or ambivalent [25] in three differing conditions: when the participant is happy, proud, or excited; when the participant is in need of social support; during daily interactions with their spouse. In addition, each spouse rated how they perceive their own behavior toward their spouse as supportive or ambivalent in the three conditions. For instance, individuals were asked to rate on a six-point scale from “Not at all” to “Extremely”, “When you are really excited, happy, or proud of something, how positive is your spouse?”, and “How upsetting is your spouse?”

Based on our model and prior work, we operationalized these relationships as purely positive or ambivalent. Thus, a spouse viewed as a source of positivity only was rated as a “2” or greater on positivity and only a “1” on negativity, whereas a spouse viewed as a source of ambivalence was rated a “2” or greater on both positivity and negativity. These cut-off points have been used consistently in our prior work and are based on our broad relationship framework [25, 43]. An alternative analytic approach would be to model the

positivity X negativity interaction using continuous ratings. One conceptual issue with this approach, however, is that there are typically no longer term spouses rated as aversive (only negative). Thus, in treating the spouse positivity and negativity ratings as continuous variables and testing a product term representing their interaction, key relationship types (e.g., aversive) would be seriously under represented. This would be inconsistent with the tenets of our model and the resulting analytical approach in our prior studies [25, 43]. Of course, with other relationships, this might be appropriate (e.g., co-workers) in which one might expect the full range of relationships. Nevertheless, it is possible that our classification approach might mean that spouses viewed as sources of ambivalence differ primarily on negativity ratings. Thus, to determine whether there is something unique about the co-occurrence of these relationship dimensions, we report ancillary analyses results in which we statistically controlled for continuous ratings of relationship positivity and negativity.

Procedure

Eligible couples arrived at the laboratory on the morning of a typical work day. Height, weight, and demographic information were collected, and participants completed the SRI. Couples were seated across the room from each other and were reminded that the survey results were confidential and that the other spouse would not have access to their answers.

Participants were fitted with the ambulatory blood pressure monitor, given the palm pilot device and detailed instructions on use. Monitors were set to randomly obtain readings every 30 min from time of fitting until bedtime (approximately 10:30 pm). This random sampling procedure prevented participants from anticipating a reading and thus altering their activities. Total readings spaced across the workday and home ranged between 20 and 35. An appointment was set for the following day for participants to return the equipment and to receive compensation.

Results

Statistical Model and Preliminary Analyses

A main goal of this study was to examine how spousal and own ambivalent behavior vs. supportive behavior would affect relationship processes and physiological benefits previously seen in married couples. We used PROC MIXED (SAS institute) in order to examine ABP and the diary ratings of interpersonal processes. One advantage of PROC MIXED is the ability to model more accurate covariance structures for the repeated measure assessments. We modeled the covariance structure for the two repeated measure factors of dyad (i.e., husband, wife) and measurement occasion (i.e., each individual ABP or diary reading number) using the direct (Kronecker) product [44]. PROC MIXED currently allows only a few possible combinations for calculating the Kronecker product. Based on the recommendations of Park and Lee [44], we modeled the covariance matrices for dyad and measurement occasion using the “type=un@ar(1)” option. As recommended by Campbell and Kashy [45], we also used the Satterthwaite approximation to determine the appropriate degrees of freedom. In preliminary analysis, we first examined the frequency distribution of ambivalent vs. supportive spouses. 77 % of spouses were perceived as sources of ambivalent

behavior whereas 23 % were seen as sources of purely supportive behavior. These data are consistent with our prior work suggesting that relationship ambivalent behavior is not an isolated feature of close relationships. Interestingly, 86 % of participants perceived their own behavior as ambivalent toward their spouse. Correlations between participants' positivity and negativity and their perceptions of their own and their spouses' behavior are presented in Table 1.

We then examined potential covariates that might need to be controlled in studies of ABP [46, 47]. Importantly, we replicated prior work indicating factors such as age, posture, and activity level influenced blood pressure [29, 46–49]. Our analysis also indicated that temperature, alcohol, recent meals, exercise, talking, and body mass index influenced blood pressure (p 's < .05). Consistent with prior work, these factors along with time (i.e., first reading, second reading) were statistically controlled in all analyses involving ABP [47].

Relationship Quality and Daily Life Interactions

We first examined relationship processes such as partner responsiveness, intimacy, disclosure, relationship quality, and psychological processes such as state affect. Partner responsiveness included feelings of being understood, valued, and accepted. Consistent with our predictions, we found that individuals who viewed their spouse's behavior as ambivalent had lower ratings of partner responsiveness [$b = -.1679$, $SE = .047$, $t(308) = -3.51$, $p = .0005$] and lower ratings of intimacy [$b = -.3316$, $SE = .067$, $t(278) = -4.93$, $p < .0001$]. Individuals who viewed their spouse's behavior as ambivalent also perceived less spousal disclosure [$b = -.122$, $SE = .056$, $t(341) = -2.17$, $p = .03$] and less self disclosure [$b = .12$, $SE = .058$, $t(326) = -2.07$, $p = .038$]. We also examined measures of state affect which included measures of sad, frustrated, stressed, and upset. Individuals who viewed their spouse's behavior as ambivalent had significantly higher negative affect [$b = .038$, $SE = .017$, $t(586) = 2.23$, $p = .02$] (see Table 2). We next examined how the participants' own behaviors affected relationship processes during daily life. Individuals who reported they behaved in a more ambivalent manner toward their spouse had significantly lower reported intimacy [$b = -.249$, $SE = .083$, $t(271) = -2.99$, $p = .003$]. Individuals who reported they behaved in a more ambivalent manner toward their spouse also evidenced significantly higher negative affect [$b = .06$, $t(588) = 3.17$, $p = .0016$] and higher positive affect [$b = .07$, $t(688) = 3.39$, $p = .0007$] (see Table 2).

Relationship Quality and Daily Life ABP

To better understand how relationship quality may affect blood pressure in daily life, we next examined ABP and relationship quality as noted earlier. Consistent with our prediction, we found that those individuals who viewed their spouses' behavior as ambivalent (see Table 3) exhibited significantly higher SBP [$b = 1.19$, $SE = .501$, $t(680) = 2.37$, $p = .018$] (Fig. 2). Additionally, individuals who rated their own behavior as ambivalent also exhibited significantly higher SBP [$b = 2.21$, $SE = .585$, $t(696) = 3.77$, $p = .0002$] (Fig. 3) and significantly higher DBP [$b = .968$, $SE = .371$, $t(844) = 2.61$, $p = .009$] (Fig. 4).

Mediational Analysis

We were interested in examining whether one's own ambivalent behavior operated as a pathway linking spouse's ambivalent behavior with ABP based directly on the principles of

complementarity from the interpersonal circumplex. Mediation testing creates a conundrum for this circumstance in that SBP and DBP varied in time while one's own and spouse's ambivalence did not. While mediation has been described in this circumstance [50], we are unaware of any work done to account for some of the inherent distributional issues for mediation [51]. We therefore incorporated a two-stage process allowing us to estimate mediation using bootstrapping. First, we conducted mixed models on SBP and DBP including all of the time varying covariates in the models. These models included an autoregressive error structure in time and within the couple. In each case, we saved out the residuals from the model; we then averaged these residuals (the average is zero across all individuals but differs by individual). These averages were then treated as outcomes in regression following the procedure dictated by Preacher & Hayes [52]; two regression models were estimated that represent the *a* and *b* components from Baron and Kenny [53] in a series of 5000 bootstrapped samples. This distribution is then used to generate confidence intervals (CI) around the *aXb* product, in this case accelerated bias-corrected 95 % CI. The results of this analysis indicated evidence of a significant indirect effect of spousal behavior on SBP via the individuals' own behavior ($\beta=1.035$, $SE=.506$, 95 % CI [.189 to 2.237]). Figure 5 presents a graphical depiction of the model along with the statistics measuring the significance of each pathway. We further examined the differences in magnitude between the direct ($\beta=.9561$, $SE=1.2483$, 95 % CI [-1.49 to 3.402] and indirect effects. The results of this analysis indicated that the direct and indirect effects are not significantly different from one another and there is substantial overlap in the CIs. These results support the assumption that the individual's own behavior partially mediates the relationship between spousal behavior and SBP.

Ancillary Analysis

Our operationalization of ambivalence has a similar cut-off point for positivity but differs primarily in the cut-off for negativity. Although we have used our scoring approach consistently to avoid interpretive issues that might arise due to differences in how we operationalize relationship quality, it is possible that our classification approach might mean that spouses viewed as sources of ambivalence differ primarily on negativity ratings. Thus, to determine whether there is something unique about the co-occurrence of these relationship dimensions, we repeated our analysis while statistically controlling for continuous ratings of relationship positivity and negativity.

We first examined relationship processes controlling for continuous ratings of positivity and negativity. We found that those who viewed their spouse's behavior as ambivalent still showed lower ratings of daily intimacy [$b=-.2143$, $SE=.079$, $t(281)=-2.7$, $p<.0074$] and perceived less daily spousal disclosure [$b=-.127$, $SE=.067$, $t(340)=-1.9$, $p=.05$]. Individuals who reported they behaved in a more ambivalent manner toward their spouse had significantly higher positive affect [$b=.10$, $t(691)=4.14$, $p=.0001$].

We then examined ABP and relationship quality controlling for continuous ratings of positivity and negativity. We found that the significant associations for spousal ambivalent behavior on SBP [$b=1.35$, $SE=.6$, $t(674)=2.25$, $p=.02$] remained unchanged suggesting that there is something unique in the combination of positivity and negativity in spousal

ambivalent behavior predicting SBP. However, the links for own ambivalent behavior on SBP [$b=1.34$, $SE=.687$, $t(696)=1.95$, $p=.05$] and DBP [$b=.702$, $SE=.43$, $t(848)=1.61$, $p=.10$] were impacted, while the link to SBP remained significant, and the link to DBP became nonsignificant.

Twenty-nine percent of ABP and diary ratings were completed when the participants were home together. Thus, it is possible that the links between relationship quality and ABP may be moderated by the context in which those readings were assessed as participants' ABP was assessed while they were at work and also when they were at home. A beneficial cardiovascular profile following work would be a reduction in blood pressure as individuals recover from the work day [49, 54], although this may depend on the couples' relationship quality. We thus examined whether being at home versus being at work would have an effect on ABP and found that being home versus being at work was significantly associated with lower DBP [$b=-1.26$, $SE=.606$, $t(2760)=-2.08$, $p=.037$]. We also examined whether this association was moderated by relationship quality but did not find a significant interaction between home and relationship quality on either SBP [$b=-0.445$, $SE=0.816$, $t(2775)=-0.54$, $p=0.585$] or DBP [$b=-0.5092$, $SE=0.5868$, $t(2247)=-0.87$, $p=0.3856$]. It is also possible that our classification approach might confound ambivalent behavior with a negativity main effect. To further address this possibility, we tested a mediational model with one's own negative behavior as a mediator of the link between spousal ambivalent behavior and SBP. The results of this analysis indicated no evidence of a significant indirect effect of spousal behavior on SBP via spousal negativity.

Finally, we were interested in examining whether interpersonal processes of intimacy, self- and spouse-disclosure, and partner responsiveness operated as pathways linking perceptions of spousal ambivalent behavior with ABP. Using procedures dictated by Selig and Preacher [55], we found no evidence of a significant indirect effect of spousal ambivalent behavior on SBP via interpersonal relationship processes of intimacy (95 % CI [-0.2141 to 0.24]), self-disclosure (95 % CI, [-0.10 to 0.09]), spouse disclosure (95 % CI [-0.17 to 0.03]), or partner responsiveness ([95 % CI [-0.25 to 0.07]).

Discussion

A main aim of this study was to examine marriage positivity and negativity as separate dimensions, to determine how relationship processes may affect benefits previously seen in marriage, and to elucidate the physiological pathways by which marriage impacts health. Hypertension is a known major risk factor for coronary artery disease and a common cause of heart failure, kidney failure, stroke, and blindness [56]. Because ABP monitoring has been demonstrated to be more accurate and effective at diagnosing hypertension than looking only at blood pressure in the clinic [33, 35, 57], we examined relationship processes and ABP across a typical work day in a sample of married couples. Our results not only replicated prior research on the importance of examining positivity and negativity as separate dimensions but also extended previous findings on the importance of relationship quality in marital benefits on both psychological well-being and physiological health. Psychologically, results showed that relationship processes were affected by relationship quality such that perceiving a spouse's behavior as ambivalent resulted in lower self-and

spousal disclosure, lower perceptions of partner responsiveness, and lower perceived intimacy. When we statistically controlled for continuous ratings of positivity and negativity we found that ambivalent spousal behavior were still linked to lower ratings of daily intimacy and less daily spousal disclosure. Physiologically, viewing one's spouse's behavior as ambivalent resulted in greater SBP across the day and viewing one's own behavior as ambivalent resulted in greater SBP and greater DBP across the day. Importantly, results from ancillary analyses in which we statistically controlled for continuous ratings of positivity and negativity did not alter the findings linking spousal ambivalent behavior to SBP, although the links between one's own ambivalent behavior and DBP were impacted. This suggests that there is something unique in the combination of positivity and negativity in spousal behavior predicting SBP.

It is interesting that controlling for positivity and negativity seems to have a stronger effect when one self reports their own behavior. One's perceptions of a spouse's behavior may be constrained by past spousal behavior and thus are more grounded in reality than perceptions of one's own behavior. Further, our finding of no evidence of an indirect effect of spousal ambivalent behavior on SBP via interpersonal relationship processes of intimacy, self-disclosure, and spouse disclosure or partner responsiveness suggests that in order to advance conceptual understanding of the role that interpersonal processes may play, researchers may need to expand their consideration of psychological mechanisms more generally. There are a number of relevant psychological mechanisms postulated in work on social support that need to be examined including "mattering" [58], a view that one is important and meaningful to another. Additionally and more generally, there are a number of psychological mechanisms that remain untested such as trust, acceptance, companionship, and reciprocity. Such constructs merit examination. Further research will be needed to determine which mechanisms may be most important.

Prior research has purported that being married is beneficial and health protective [10, 11], and several mechanisms have been proposed that may account for these benefits including the social support available within the relationship. But, not all marital relationships consistently offer positive social support, and most research has not separated positive and negative aspects of relationships. Marriages that are high in both positivity and negativity may not offer the same benefits seen in supportive marriages. Further, much of the physiological work on the health benefits of marriage has focused on laboratory paradigms. When we examined relationship processes in a naturalistic setting, we found that relationship quality could impact health through physiological pathways. Our data showed that individuals who viewed their spouses' and their own behavior as ambivalent did indeed exhibit greater SBP over the course of the day. Our data further showed that individuals who viewed their own behavior as ambivalent exhibited greater DBP over the course of the day than individuals whose own behavior was perceived as supportive. SBP has been recognized in both men and women as a strong linear predictor of cardiovascular disease [59, 60] with increased risk already evident with high-normal SBP (120–139) [61]. A sustained 12-mmHg decrease in SBP for 10 years will prevent one death for every 11 hypertensive patients treated [62]. Thus, if a sustained decrease in blood pressure reduces risk of cardiovascular disease, then these findings suggest clinically significant differences in ABP as a function of marital relationship quality. These findings complement and build upon prior research

showing relationship quality is linked to lower ABP and extend such findings by directly examining ambivalent marital relationship behavior in naturalistic conditions. ABP appears to be a strong predictor of future cardiovascular disorders [35], and even minor elevations in BP may place strain on the cardiovascular system and lead to greater cardiovascular risk [63, 64]. Thus, marriages where partners perceive the marital context as relatively high in ambivalent behaviors may not be as beneficial as supportive marriages and in fact may be more harmful to cardiovascular health although longitudinal studies among both normotensive and hypertensive couples are needed to clarify what long-term effects these relationships may have on cardiovascular health.

Based on work showing BP changes after the work day, we expected to see blood pressure decrease as our participants came home. Consistent with prior research, when we looked at specific contexts in which ABP was assessed (work vs home), we found DBP to be significantly lower when individuals were at home [65, 66] although we found no differences between ambivalent and supportive couples. This suggests that the effects of ambivalent ties may have a cumulative influence on ABP over the course of the day and not simply restricted to being in the mere presence of the spouse. Longitudinal studies (e.g., young newlyweds) will be necessary to evaluate this possibility.

We also found that those who viewed their spouse's behavior as ambivalent were associated with worse relationship processes. Such lower evaluations of relationship processes can have a detrimental effect on the marriage itself. Marital interaction research emphasizes the importance of perceiving a spouse as responsive and supportive [67] [36]. Responsive listening has been shown to distinguish distressed from nondistressed couples [67]. Reis and Shaver's [68] intimacy model also proposes that the partner's response to self disclosure allows the individual to feel understood, validated, and cared for. In fact, research shows that perceived invalidation is more detrimental than perceived validation is beneficial [69]. Further, researchers have demonstrated that marriages where one spouse views their partner as less responsive may be more likely to dissolve [70].

A final aim of this study was to examine relationship quality in terms of the individual's own behavior toward the spouse based on principles of complementarity from the interpersonal circumplex. Interpersonal complementarity is said to exist when the behavior of one person is a function of the behavior of another person [71]. We found no evidence of mediation when we examined relationship processes and ABP; however, when we examined a mediational model of spouses' ambivalent behavior and one's own ambivalent behavior, we found evidence consistent with mediation. While it is certainly true that mediation could work in either direction, complementarity and interpersonal theory posits that an individuals' own behavior may be evoked from the partner's behavior [72] such that one partner's behavior invites or evokes behavior from the interacting partner that is similar in warmth or hostility. Past research examining complementarity has often utilized laboratory paradigms with confederates rather than naturally occurring contexts and relationships. In contrast, we examined an important existing relationship and sampled ABP in daily life. We predicted and found that perceptions of ambivalent behavior from the spouse would elicit an individual to engage in more ambivalent behavior. More importantly, we tested if one's own ambivalent behavior mediated the associations we found between ambivalent spousal

behavior and ABP. Following the mediational model criteria established by Preacher and Hays [51], we tested a mediational pathway and found evidence consistent with mediation, such that the individuals' own behavior showed evidence of mediating the association between spouse's ambivalent behavior and ABP. When two individuals interact with each other, their behaviors are often intertwined and the more interactions one has with another (as can be seen with married couples), the more intertwined those behaviors become. Often, after years of interactions, partners know each other well enough to anticipate and expect certain behaviors and thus alter their own behaviors to match those of their partner. However, while anticipating a partner's behavior and altering one's own behavior can have a positive impact on relationship functioning, the individual may pay a price physiologically. Rusbult, Verette, Whitney, Slovik, and Lipkus [73] found that when an individual is engaged in negative or destructive behaviors, relationship distress can be reduced if the partner inhibits their inclination to react in a similar fashion. Rusbult termed this kind of response "accommodation." However, while accommodation clearly is in the best interest of the relationship, it is often experienced as costly or effortful by the individual. Instead of reacting to a negative interaction with an equally nasty remark, the individual needs to exert effort and bite his or her tongue. Research has shown that exerting effort to maintain relationship quality can have a detrimental effect on cardiovascular functioning [74]. Efforts to manage or avoid negative interactions can drain or deplete self-regulatory capacity with evidence seen in parasympathetic-mediated heart rate variability, which has been associated with an increased risk for morbidity and mortality [75]. If such recurring patterns continue over the course of the relationship, they may contribute to long-term negative cardiovascular health effects. We should note that although these data are statistically consistent with a hypothesized mediational model, these theoretical pathways are likely recursive, and laboratory manipulations will be needed to examine direct causal processes.

Our findings also more generally speak to the ways in which individuals engage in their relationships both inside and outside of marriage. Ambivalence in different types of relationships is quite common [25, 76] and also related to health [26, 27, 77] although marriage is a particularly important relationship for most adults. Behavioral medicine interventions could target ambivalent-behavior couples to reduce ambivalent behavior not just in their own relationship but in their broader networks as well.

The limitations in this study are worth noting. We sampled over 1 day, and our sample was predominantly White, educated, fairly young, and healthy. Although blood pressure can be a predictor of future cardiovascular disease, whether the blood pressure differences we saw are indicative of actual cardiovascular risk is something that will require further study. Additionally, our sample contained only legally married heterosexual couples. It is unclear to what extent these data apply to other relationships (e.g., same-sex, cohabitating, and/or dating couples). In addition, because our study was correlational in nature, we cannot say for certain that ambivalence in relationships causes higher blood pressure. Despite these limitations, this study demonstrates the value of examining relationship ambivalence in naturalistic settings in order to more fully understand how relationships affect cardiovascular health. More broadly, our findings should encourage researchers interested in relationships

and health to embrace the complexity of relationship perceptions which may have unique influences on cardiovascular health.

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Fig. 1.
A general framework for examining positive and negative aspects of relationships on health

Fig. 2.
The effect of relationship quality in participants' view of spousal behavior on systolic blood pressure

Fig. 3.
The effect of relationship quality in participants' view of own behavior on systolic blood pressure

Fig. 4.
The effect of relationship quality in participants' view of own behavior on diastolic blood pressure

Fig. 5. Mediation model: indirect effect of participants' view of spousal behavior on systolic blood pressure (SBP). Direct effect coefficients represent the effect of participants' view of spousal behavior on SBP after controlling for the influence of participants' own behavior

Table 1

Correlations between participants' positivity and negativity ratings of their own and spouses' behavior

<i>n</i> =188	Spouse behavior	Own behavior	Spouse positivity	Spouse negativity	Own positivity	Own negativity	<i>mean</i>	<i>SD</i>
Spouse behavior	1.00	0.42	−0.34	0.57	−0.22	0.36		.85
Own behavior		1.00	−0.20	0.30	−0.19	0.51		.70
Spouse positivity			1.00	−0.49	0.37	−0.19	4.95	.73
Spouse negativity				1.00	−0.18	0.59	1.82	.78
Own positivity					1.00	−0.23	4.86	.62
Own negativity						1.00	1.84	.67

Table 2
Participants' view of spouses' behavior and own behavior on interpersonal and psychological processes

Variable	Estimate	SE	Df	t value	p value
Partner responsiveness	-.168	.047	308	-3.51	.0005
Intimacy	-.332	.067	278	-4.93	<.0001
Self-disclosure	-.122	.058	326	-2.07	.03
Spouse disclosure	-.122	.05	341	-2.17	.03
Negative affect	.037	.017	586	2.23	.026
Positive affect	.004	.017	678	.24	.809
Partner responsiveness	-.033	.058	303	-.57	.57
Intimacy	-.249	.08	271	-2.99	.003
Self-disclosure	.006	.07	330	.09	.92
Spouse disclosure	.001	.06	345	.02	.98
Negative affect	.06	.02	588	3.17	.0016
Positive affect	.07	.02	688	3.39	.0007

Table 3
Participants' view of spousal and own ambivalent behavior on ambulatory blood pressure

Variable	Behavior	Estimate	SE	Df	t value	p value
SBP	Spousal	1.19	.5	680	2.37	.01
DBP	Spousal	.45	.31	831	1.42	.15
SBP	Own	2.2	.585	696	3.77	.0002
DBP	Own	.968	.37	844	2.61	.009

SBP systolic blood pressure, DBP diastolic blood pressure