

# Gender Differences in Short-Term Cardiovascular Effects of Giving and Receiving Support for Health Concerns in Marriage

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**Objective:** Little is known about the cardiovascular effects of mutual emotional spousal support given for health concerns. We examined the hypotheses that: (a) mutual support (both spouses giving and receiving support) compared to one-sided or no support, would decrease blood pressure and heart rate in both spouses during a recovery period; and (b) wives would benefit more from mutual support than would husbands. A second aim was to examine gender differences in cardiovascular reactivity, distress, and closeness in response to receiving support regardless of mutuality. **Method:** In 98 married couples (Age 50+), spouses discussed health concerns and were assigned randomly to one of four conditions: neither spouse received support ( $n = 26$ ), only the wife received support from the husband ( $n = 22$ ), only the husband received support from the wife ( $n = 23$ ), or both received support ( $n = 27$ ). Systolic and diastolic blood pressure and heart rate were measured during baseline, the discussions, and recovery. Distress, closeness, and support were self-reported. Support quality was observationally coded. **Results:** Mutual support did not affect cardiovascular reactivity. When husbands received support from wives, husbands' blood pressure and distress decreased, and both partners' closeness increased. When wives received support, husbands and wives felt closer, but both partners' heart rate remained elevated and wives felt more distressed. **Conclusions:** Receiving support individually may be more important than receiving support mutually for older adult spouses coping with their health concerns. Also, support interventions for couples coping with health conditions should take into account that husbands receive greater benefits from spousal support than wives.

**Keywords:** cardiovascular reactivity, mutual support, aging, marriage, chronic conditions

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Chronic health conditions are on the rise. From 2008 to 2014 the percent of Americans with at least one chronic condition has held steady at 60%, with 42% having multiple chronic conditions

(Buttorff, Ruder, & Bauman, 2017). Adults over 50 years of age have an increased risk of having multiple chronic conditions (Ward, Schiller, & Goodman, 2014). Thus, for midlife and older married couples, it is common for not one, but two spouses to be coping with at least one condition. Indeed, in marriage, when one partner has poor health, it is more likely for the other partner's health to decline (Hoppmann & Gerstorff, 2009; Monin et al., 2016). Managing chronic conditions as a couple can have its advantages and disadvantages. On the one hand, the emotional and physical demands of supporting an ill spouse can take a toll on a person's psychological and physical health (Monin & Schulz, 2009; Schulz & Eden, 2016). On the other hand, spouses can be an important care resource for one another (Franks et al., 2012; R. B. Williams et al., 1992), and there is mounting evidence that mutual responsiveness within marriage promotes physical and psychological health (Clark & Monin, 2006; Uchino, Cacioppo, & Kiecolt-Glaser, 1996).

Much of the research on spousal support in illness contexts is contained in the caregiving literature, in which one person is designated as the "caregiver" and the other the "care recipient." In

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some disease contexts (e.g., late stages of dementia) there is a clear distinction between the spouse who provides care and the one who receives it. However, for many midlife and older married adults, caregiving is dynamic, two directional in nature, and not clearly defined (Lingler, Sherwood, Crighton, Song, & Happ, 2008). It is important for clinicians and public health professionals to better understand how spouses support each other with their health concerns. To develop and to implement psychosocial, preventative interventions (Holt-Lunstad, Robles, & Sbarra, 2017), it is especially important to understand these processes before older married couples have severe chronic conditions and disabilities.

In this study, to examine support dynamics when spouses each have their own health concerns, we draw from communal coping theories that emphasize the importance of mutual emotional support (Clark & Monin, 2006; Helgeson, Jakubiak, Van Vleet, & Zajdel, 2018). For example, according to communal relationships theory, following relationship formation most couples assume equivalent responsibility for meeting each other's needs (Mills, Clark, Ford, & Johnson, 2004). On a day-to-day basis spouses switch their roles as a caregiver and care recipient, providing support as needed (Bowlby, 1980). However, as people age and experience health stressors, support dynamics in marriage can change, with one or both partners requiring more support from their partner. Many researchers have addressed how partners exchange support when one person becomes chronically ill or disabled (Berg & Upchurch, 2007; Helgeson et al., 2018; Wright & Aquilino, 1998); however, little is known about how spouses cope when each person experiences their own health stressor or stressors. It is possible that, at times, one's own health concern may conflict with the ability to help a partner cope with their health concern. Conversely, one's own health condition may foster empathy for a spouse's condition, especially if spouses' health conditions are similar.

Here we define mutual support as occurring when both partners in a relationship give and receive emotional support from each other in response to their respective needs. Communal relationships theory states that both partners' health is protected when partners are genuinely concerned about each other's well-being and respond to each other's needs noncontingently, as opposed to responding in a quid pro quo fashion (Williamson & Shaffer, 2001). This theoretical framework takes into account the interactive dyadic context and that relationship partners' health conditions are highly correlated (Hoppmann & Gerstorf, 2009). More specifically, we focus on emotional support (e.g., showing compassion, listening) that can be given regardless of the level of one's physical functioning. Whereas the psychological and physical effects of receiving support, as well as of giving support (Uchino, 2006), have received a great deal of attention in the literature, no research, to our knowledge, has compared both giving and receiving support to only giving or to only receiving support within marriage. Our primary focus is on systolic and diastolic blood pressure (SBP and DBP, respectively) and heart rate (HR) responses as an extensive literature demonstrates that social support affects these pathways to cardiovascular disease (Uchino, 2006). We also examine self-reported distress and relationship closeness, or perceived interpersonal connectedness, as indicators of individual and relational well-being (Aron, Aron, & Smollan, 1992).

This study also provides an opportunity to examine gender differences in the health benefits of marriage that are not fully

understood (Kiecolt-Glaser & Newton, 2001). For example, past research, which consists mostly of self-report studies or analyses of laboratory conflict situations, shows that husbands receive health benefits from being married regardless of the perceived supportiveness of the relationship; whereas, less support in the marriage can dampen the health benefit of marriage for wives (Monin & Clark, 2011). Interdependent self-construal theory asserts that wives are more sensitive to threats to interpersonal harmony than husbands because women are socialized to base their self-worth on the success of their relationships (Eagly & Steffen, 1986; Kiecolt-Glaser & Newton, 2001). It also is thought that wives pay more attention to the quality of their interactions with their partners than do husbands because they usually have less power than do husbands and need to be more vigilant to signs of threat (Monin & Clark, 2011). Although there has been growing research on how older couples' conflict discussions relate to emotions and cardiovascular reactivity (Wanic & Kulik, 2011), less is known about social support interactions. No researchers, to our knowledge, have examined gender differences in whether both support provision and receipt relate to cardiovascular responses when both spouses are coping with health concerns.

## The Present Study

The present study was an experiment in which older and midlife married couples came into the laboratory and had discussions about both spouses' health concerns. The primary aim of the study was to test the effects of experimentally manipulated mutual support during these discussions on levels of SBP and DBP and HR during a recovery period. We expected that for both husbands and wives, mutual support would lead to lower SBP and DBP and HR at recovery (Hypothesis 1) relative to one-sided support or no support. Next, we hypothesized there would be gender differences in how beneficial mutual support would be. Drawing from interdependent self-construal theory (Eagly & Steffen, 1986), we hypothesized that wives, more so than husbands, would have decreased SBP and DBP and HR at recovery when there was mutual support compared to one-sided or no support (Hypothesis 2). In addition, we conducted secondary analyses to examine the independent effects of receiving support on both cardiovascular reactivity and recovery, self-reported distress, and closeness, as well as potential gender differences in these effects. To test our hypotheses and to conduct secondary analyses, we used a  $2 \times 2$  between-subject design with wives' receipt of support (support vs. not support) and husbands' receipt of support (support vs. not support) as the independent variables and our physiological measures as the dependent variables.

## Method

### Participants

Ninety-eight married couples ( $N = 196$ ) met eligibility criteria and had complete data for analysis. We limited recruitment to participants Age 50 and older because the presence of chronic conditions increases with older age (Ward et al., 2014). We limited recruitment to heterosexual couples to maximize homogeneity concerning the historical and developmental context of traditional husband and wife roles. One hundred and one couples enrolled in

the study; however, one couple completed only the background questionnaires and two couples included one partner who was not yet 50 years old. Data from these three couples were not included in any analysis. Participants were unaware of the study hypotheses. They were told the study was about how couples support each other with their health and were debriefed at the end of the study. Participants were recruited from newspaper advertisements and community bulletins. Eligibility criteria also included that couples had lived together for at least 6 months and neither partner was taking beta blockers, because this medication affects HR. We did not exclude participants for taking other blood pressure medication, as this would substantially limit recruitment and result in an ungeneralizable sample. This study was approved by Yale University's institutional review board and complies with American Psychological Association ethical standards in the treatment of the sample.

## Procedure

**Background questionnaire.** Before the laboratory session, participants were sent a questionnaire in the mail assessing background variables: sociodemographics, their health, and their relationship. Participants were asked to complete the surveys on their own and not to share responses with each other. They were asked to bring in the completed surveys to the laboratory session. The laboratory consisted of a room with two comfortable chairs with psychophysiology and video equipment. There was a removable partition between the chairs that was used to minimize interpersonal communication during certain tasks (e.g., baseline, recovery).

**Overview of the experiment.** Spouses took turns talking about a personal health concern, and mutual support was manipulated. The speaking procedure was modeled after the one developed by Holt-Lunstad and colleagues and is validated for use in psychophysiology research on social support processes (Holt-Lunstad, Uchino, Smith, & Hicks, 2007). This manipulation involved alternating speaking for set time intervals among dyad members to control for equality of speaking time and associated effects on physiology. This procedure has been found to be convincing and engaging to participants in past studies and in the present study (Holt-Lunstad et al., 2007; Reblin, Uchino, & Smith, 2010).

Couples were assigned randomly to one of four conditions prior to the session using a random digit generator program. Detailed instructions for each condition follow this paragraph. Participants were not aware of their condition. In Condition 1, the "no support" condition, both partners took turns talking about their own health concern in each other's presence (but not in view), and neither person received support. This condition was the control condition, modeling when both partners are dealing with their own stress at the same time as witnessing their partners' stress without support. In Conditions 2 and 3, the "one-sided support" conditions, both partners took turns talking about their own health concern but only one partner received support. This condition represents situations in which there is imbalanced support when both partners are coping with a stressor. Two conditions were needed to account for the potential effects of having immediate experience talking about a health concern or immediate distress from witnessing the partner talk about their health concern. In Condition 4, the "mutual support" condition, both partners took turns talking about health

concerns and each person gave and received support from their partner. This condition models the situation in which both participants give and receive support to one another. Our primary outcomes were SBP and DBP and HR. Secondary outcomes were self-reported distress and closeness. Conditions were counterbalanced for the order in which husbands' and wives' concerns were discussed.

**Detailed procedures of the experiment.** Figure 1 displays a schematic of the procedures. Participants in all conditions completed five task periods: (a) baseline (6 min), (b) practice discussion (6 min), (c) the first health concern discussion (6 min), (d) the second health concern discussion, and (e) recovery (6 min). During each period, each partner was videotaped with their knowledge; blood pressure, HR, and respiration were monitored; and self-reported emotions (which included distress) and closeness to their partner were measured. Each participant also reported their received support after each period as a manipulation check.

1. **Baseline:** Partners were in one room, seated in comfortable chairs, separated by a partition to minimize communication and asked to sit quietly without speaking for 6 min.
2. **Practice discussion:** The partition was removed, and couples were asked to talk about how they first met. The purpose of this discussion was to practice and become accustomed to turn-taking during the "health concern discussions." The experimenter controlled a remote warning light that flashed each minute to indicate that it is time for the next partner to speak.
3. **Health concern instructions:** Each partner was asked to list up to five stressful health concerns and rate how distressing each problem was on a scale from 1 to 5. The experimenter then chose the topic with the highest rating from the list (Holt-Lunstad et al., 2007). The participant was asked to talk about this health concern. Participants were asked "to describe the health concern, their thoughts and feelings about their health concern, how it affects their life, and how they handle or plan to handle the health concern." In conditions where the spouse provided support, the spouses were asked:

how they felt they could support their partner with his/her health concern, what their reaction was to their partners' feelings about their health concern, and if they had ideas about how their partner could manage his/her health concern right now and in the future.

In the conditions where there was no support, the partition was placed between the couple members and the spouse was asked to listen to the partner's health concern but not talk.

4. **Health discussions:** Partners took turns discussing their own health concern with partner support or lack thereof governed by the experimental condition to which they were assigned.
5. **Recovery:** The partition was placed between partners and they were asked to sit quietly without communicating for 6 min.

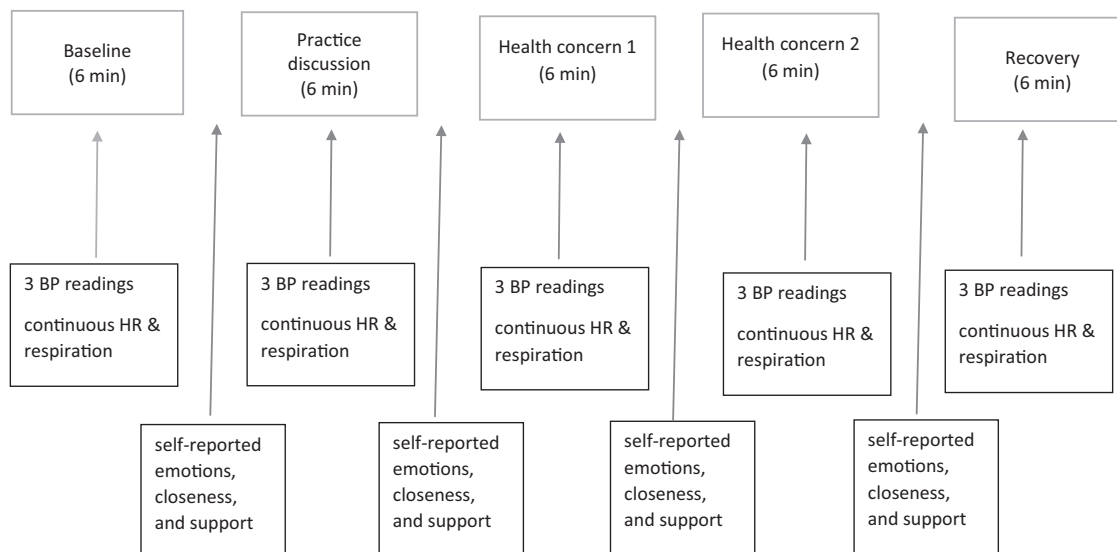


Figure 1. Schematic of procedures.

## Measures

**Experimental group.** The experimental group (mutual support, wife received support only, husband received support only, or no support) was the main predictor.

**Blood pressure.** The primary outcome variables SBP and DBP were taken with an automated blood pressure monitor (GE CARESCAPE V100, GE Medical Systems, Milwaukee, WI) every 60 s. Mean SBP and DBP were calculated by averaging each of the three automated measurements taken over each period. Infrequently there were technical problems with the blood pressure monitor, and one reading was missed (baseline: 6 husbands and 3 wives; practice: 20 husbands and 9 wives; first task: 12 husbands and 8 wives; second task: 9 husbands and 9 wives; recovery: 9 husbands and 5 wives). In these cases, we averaged two readings.

**HR.** To assess the primary outcome of HR, R-wave markers in the ECG signal were assessed for artifacts by visual inspection and by an automatic artifact detection algorithm available in a customized software package (Mindware Heart Rate Variability Scoring Module, Version 2.16; Bertson, Quigley, Jang, & Boyesen, 1990). After corrections of suspected artifacts (i.e., making sure the Mindware data points were all on r peaks), the program estimated mean HR for each period.

**Self-reported distress.** To assess the secondary outcome of distress, participants indicated the extent to which they felt a series of negative and positive emotions, using a scale from 1 (*not at all*) to 7 (*extremely*; e.g., *nervous, ashamed, hurt, excited, frustrated, touched, grateful, and embarrassed*). We limited our analysis to items indicating distress: worried, anxious, distressed, and nervous. The Cronbach's alpha for husbands was 0.71 and for wives it was 0.73.

**Self-reported relationship closeness.** To assess the secondary outcome of closeness, the Inclusion of Other in the Self scale (IOS) was used (Aron et al., 1992). The IOS is a single-item, pictorial measure that is well accepted for measuring a sense of closeness or interconnectedness with another individual. Participants chose the

picture which best described their relationship with their spouse from a series of seven Venn-like diagrams depicting linear, progressive degrees of overlap between circles labeled "Self" and "Other." The scale is scored from 1 (*no overlap*) to 7 (*almost complete overlap*). This measure has been used to examine short-term change in closeness (Aron, Melinat, Aron, Vallone, & Bator, 1997).

**Manipulation check.** Received support was measured with a 100-mm visual analogue scale asking participants "How supported do you feel in the relationship with your partner *right now*?" Participants responded by placing an X on the line where the left side was labeled "not at all supported" and the right side was labeled "very supported." The lines were measured in mm to indicate each participant's score. The mean score at baseline for wives was 84.03 ( $SD = 21.89$ , range = 5–100; skewness =  $-1.99$ , kurtosis = 3.76), and for husbands it was 87.27 ( $SD = 18.88$ , range = 8–100; skewness =  $-2.65$ , kurtosis = 7.18).

**Covariates.** In addition to the sociodemographic variables and presence of blood pressure medication, the following covariates were measured. The Physical Comorbidity Index (Katz, Chang, Sangha, Fossel, & Bates, 1996) assessed the presence of 24 health conditions (e.g., heart disease, stroke, lung disease, cancer) that cause the person to have difficulty or prevent an activity of daily living/instrumental activity of daily living. Participants indicate their response with a "yes" or "no" for each item. The score was an unweighted sum of the yes responses. Marital satisfaction was assessed using the 16-item Locke and Wallace Marital Adjustment Test (Locke & Wallace, 1959). This measure assesses several aspects of marital quality including general level of marital happiness on scales from 1 (*very unhappy*) to 7 (*perfectly happy*) and spousal agreement on issues such as handling family finances, matters of recreation, friends, and sexual relations on scales from 1 (*always disagree*) to 6 (*always agree*). The remaining multiple choice items assessed views about the partner and disagreement, and values were assigned to each choice according to the scoring

algorithm (Jiang et al., 2013). The mean for husbands was 94.27 ( $SD = 15.64$ ); for wives was 93.19 ( $SD = 16.06$ ).

#### Self-reported received emotional support in the past month.

For follow-up analysis, to examine received spousal emotional support concerning health conditions in everyday life, we used a modified version of a measure originally developed by Stephens and Clark (1996) and modified by Stephens, Martire, Creameans-Smith, Druley, and Wojno (2006). Participants were asked to think about things their spouse may have said or done to help them feel better when they were bothered by a health condition or when they were upset about their health in the past month. Participants rated 17 items (e.g., “listen to you talk about how you were feeling?,” “ask you to share your feelings and thoughts about your symptoms,” and “seem disinterested in what you were saying (reversed)”) on a scale from 1 (*rarely or none of the time*) to 4 (*most or all of the time*). The Cronbach’s alpha for wives was 0.76 and for husbands was 0.73.

### Data Analysis

**Preliminary analyses.** First, to examine potential confounds, we ran Pearson correlations between age, marital satisfaction, relationship length, and the baseline outcomes (SBP and DBP, HR, distress, and closeness) as well as received support. Spearman’s rank test was used for associations with education. Second, we conducted *t* tests to examine differences in baseline outcomes by gender. Third, we conducted *t* tests between individuals who took blood pressure medications and those who did not. Fourth, we examined differences in participant and relationship characteristics (age, education, income, marital satisfaction, relationship length) by experimental condition with analyses of variance.

**Test of primary hypotheses and secondary analysis.** Changes in outcomes (i.e., SBP, DBP, HR) as a function of time (i.e., change from baseline), study conditions (manipulations of wife’s receipt of support and husband’s receipt of support), and sex (male vs. female) were analyzed using maximum likelihood mixed linear models with SAS Version 9.4. Repeated measurements of outcomes (sampling occasion level) were nested within individuals (individual level) and individuals were nested within dyads (dyad level), resulting in a three-level model. To quantify task recovery slopes, time was dummy coded to contrast baseline (coded as 0) with recovery (coded as 1). To quantify task reactivity slopes, two dummy coded variables were created where the variable contrasting baseline with the wife’s health concern discussion was coded as (0 = *baseline*; 1 = *wife discussion*) and the variable contrasting baseline with husband’s health concern discussion was coded as (*baseline*; 1 = *husband discussion*). Wife’s receipt of support and husband’s receipt of support were entered as two separate dummy coded variables (where 0 = *not supported*; 1 = *received support*). Biological sex was coded as: 1 = *female*, 0 = *male*. Finally, individual and dyad level intercepts were modeled as random effects using an unstructured covariance matrix.

To examine mutual support, initial tests included the four-way interaction of Time  $\times$  Wife’s Receipt of Support  $\times$  Husband’s Receipt of Support  $\times$  Sex in nested models (i.e., all 3-way, 2-way, and main effects were included). To examine secondary aims, all significant nested interactions (e.g., 3-way interactions) were tested in separate (nested) models. Tests of manipulation checks (e.g., main effect of the health concern discussion on blood pres-

sure) were conducted using the same multilevel models used to test primary hypotheses but only included fixed effects of time. Tests of simple slopes used to characterize significant interactions were adjusted using the Bonferroni procedure to limit family wise Type I error rates. All significant findings remained significant under Bonferroni adjustment unless otherwise noted in the Results section. Primary analyses were repeated excluding the nine wives and seven husbands who reported no conditions on the Physical Comorbidity Index and doing so did not significantly impact analyses unless otherwise noted in the Results section.

Before conducting this study, we performed power calculations using Optimal Design Software (Spybrook et al., 2011). Past between-subjects experimental studies of social support processes and stress have yielded an effect size of  $r = .28$  (Uchino et al., 1996). Therefore, using an effect size of  $r = .28$  and assuming an intraclass correlation (ICC) = .30 and a two-sided alpha of .05, we would need a sample size of 100 couples (25 for each condition) to have .80 power.

### Results

#### Participant Characteristics

Table 1 displays participant characteristics. Forty-nine husbands and 32 wives took medications that affect blood pressure. Husbands had a mean of 3.36 ( $SD = 2.14$ , range = 0–9) health conditions, and

Table 1  
Participant Characteristics

Characteristic	Wives ( $N = 98$ )	Husbands ( $N = 98$ )
Age in years ( $SD$ )	67.40 $\pm$ (7.14)	70.03 $\pm$ (7.66)
Range	51–89	56–90
Race (%)		
White, Caucasian	95 (97)	91 (92)
Black, African American	0 (0)	1 (1)
Asian	0 (0)	1 (1)
No primary group	3 (3)	5 (6)
Education (%)		
Less than high school	0 (0)	1 (1)
High school	13 (13)	10 (10)
Some college credit	13 (13)	15 (15)
Associate’s degree	8 (8)	7 (7)
Bachelor’s degree	15 (15)	21 (21)
Some graduate school	17 (17)	13 (13)
Professional degree (e.g., PhD, MD, etc.)	32 (33)	31 (32)
Employment (%)		
Employed for pay, full time	14 (14)	15 (15)
Employed for pay, part time	20 (20)	24 (24)
Homemaker	8 (8)	0 (0)
Retired	49 (50)	54 (55)
Unemployed	6 (6)	5 (5)
Self employed	1 (1)	0 (0)
Household income <sup>a</sup> (%)		
<\$10,000		3 (3)
\$10,000–\$39,999		16 (16)
\$40,000–\$69,999		27 (28)
\$70,000–\$99,999		21 (21)
\$100,000 or more		29 (30)
Months married	429.44 $\pm$ (176.03)	
Range	28–743	

<sup>a</sup> Reported for the couple using husbands’ report. There were no major discrepancies.

wives had a mean of 3.24 (*SD* = 2.05, range = 0–12) health conditions. Although all participants reported they had a health concern during screening, nine wives and seven husbands reported no conditions when completing the Physical Comorbidity Index.

**Description of Health Concerns Discussed**

Husbands’ and wives’ health concern topics were similar. The most common topics for husbands were: musculoskeletal pain, heart issues, weight problems, diabetes/prediabetes. Vision problems and fear of future memory problems were tied for fifth. The most common topics for wives were: musculoskeletal pain, weight problems, hypertension, cancer, and gastrointestinal problems. The average distress for the health concern topics were not significantly different between husbands and wives ( $t(94) = -1.35, p = .18$ ; husbands:  $M = 3.42, SD = 1.04, range = 1-5$ ; wives:  $M = 3.60, SD = 1.01, range = 1-5$ ) or between support conditions ( $F(3, 187) = .319, p = .81$ ); no support:  $M = 3.58, SD = 1.06$ ; wife received support:  $M = 3.56, SD = 1.06$ ; husband received support:  $M = 3.41, SD = 1.04$ ; mutual support:  $M = 3.46, SD = 0.95$ ). Note that this rating is different from the distress outcome. The nine wives and seven husbands that indicated they did not currently have a health concern talked about a concern for the future. See the supplemental table for a list of all health concerns that were discussed.

**Examining Potential Confounders**

As shown in Table 2, husbands who were older reported less distress and greater closeness and had lower DBP and HR relative to those who were younger. Wives who were older had greater SBP relative to those who were younger. Wives who reported greater marital satisfaction reported greater support and closeness. Husbands who reported greater marital satisfaction also reported greater support receipt, closeness, and they had lower HRs. Second, in terms of gender differences, Tables 3 and 4 show the means and standard deviations of husbands’ and wives’ outcome variables at baseline, during practice, during the two health concern discussions, and during recovery periods. At baseline, husbands had significantly higher SBP,  $t(97) = 2.28, p = .025$  and DBP,

$t(97) = 4.80, p < .001$  than wives; wives had significantly higher HRs,  $t(97) = -2.19, p = .031$  than husbands. Third, husbands who took blood pressure medication had significantly higher baseline SBP than those who did not,  $t(95) = 2.22, p = .030$ , but there were no significant differences by blood pressure medication for wives. Fourth, there was a significant difference in husbands’ marital satisfaction across experimental conditions,  $F(3) = 4.15, p < .001$  with more satisfied husbands in the mutual support condition than in the husband receives support only condition (Tukey’s honestly significant difference mean difference = 13.06,  $p = .014$ ). There were no significant differences between conditions for all other variables ( $F$ s ranged from .31 to 1.04,  $ps > .400$ ). Thus, we included the following covariates in our original models: age, marital satisfaction, and blood pressure medication. None of these variables remained significant, so they were not included in the final simplified models.

**Manipulation Checks**

**Did the health concern discussions increase blood pressure, HR, closeness, and distress?** HR, SBP, DBP, closeness, and self-reported distress all significantly increased for both men and women from baseline to the wife’s health concern discussion,  $t(380) = 2.65, p = .008, t(382) = 14.17, p < .001, t(382) = 12.77, p < .001, t(379) = 6.14, p < .001, and t(384) = 7.10, p < .001$ , respectively. Similarly, HR, SBP, and DBP, closeness, and distress significantly increased for both men and women from baseline to the husband’s health concern discussion,  $t(380) = 2.05, p = .041, t(382) = 14.65, p < .001, t(382) = 11.78, p < .001, t(379) = 4.96, p < .001, and t(384) = 7.66, p < .001$ , respectively. HR, DBP, and distress reactivity slopes were not moderated by sex (all  $ps > .21$ ). However, SBP increases from baseline to the wife’s discussion,  $t(380) = -2.05, p = .041$ , and from baseline to the husband’s discussion,  $t(380) = -2.38, p = .017$ , were significantly larger for women relative to men. Finally, HR, SBP and DBP, and distress reactivity slopes were not moderated by talk order (all  $ps > .18$ ).

**Did participants HR and blood pressure decrease from discussions to the recovery period?** HR significantly decreased from baseline to the recovery period  $F(1, 191) = 105.25, p < .001$ . SBP and DBP remained above baseline levels during the recovery

Table 2  
*Pearson Correlations Between Age, Education, Marital Satisfaction, Relationship Length, and Baseline Outcome Variables for Wives and Husbands*

Baseline outcome	W age	W edu <sup>a</sup>	W marital satisfaction	H age	H edu <sup>a</sup>	H marital satisfaction	Relationship length
W perceived support	-.03; $p = .798$	.05; $p = .602$	.59; $p < .001$				.12; $p = .271$
W distress	-.16; $p = .124$	.04; $p = .686$	-.11; $p = .271$				-.12; $p = .238$
W closeness	.07; $p = .487$	-.29; $p = .004$	.50; $p < .001$				.08; $p = .461$
W SBP	.35; $p = .001$	-.12; $p = .242$	.02; $p = .827$				.01; $p = .904$
W DBP	.14; $p = .190$	-.07; $p = .480$	-.04; $p = .728$				-.16; $p = .131$
W HR	-.03; $p = .785$	-.13; $p = .221$	.045; $p = .662$				.02; $p = .846$
H perceived support				.08; $p = .457$	-.02; $p = .871$	.50; $p < .001$	-.00; $p = .982$
H distress				-.28; $p = .005$	-.05; $p = .618$	-.19; $p = .066$	-.17; $p = .111$
H closeness				.21; $p = .041$	-.10; $p = .348$	.48; $p < .001$	.13; $p = .222$
H SBP				.06; $p = .571$	-.14; $p = .162$	-.05; $p = .665$	-.08; $p = .466$
H DBP				-.26; $p = .010$	-.08; $p = .434$	-.11; $p = .299$	-.17; $p = .110$
H HR				-.22; $p = .034$	-.06; $p = .535$	-.28; $p = .005$	-.13; $p = .203$

Note. W = wives; H = husbands; edu = education; SBP = systolic blood pressure; DBP = diastolic blood pressure; HR = heart rate.  
<sup>a</sup> Spearman’s rho.

**Table 3**  
*Husbands' Perceived Support, Distress, Closeness, and Systolic and Diastolic Blood Pressure at Each Period of the Experiment*

Period	H perceived support, <i>M</i> ( <i>SD</i> ); range	H distress, <i>M</i> ( <i>SD</i> ); range	H closeness, <i>M</i> ( <i>SD</i> ); range	H SBP, <i>M</i> ( <i>SD</i> ); range	H DBP, <i>M</i> ( <i>SD</i> ); range	H HR, <i>M</i> ( <i>SD</i> ); range
Baseline	87.27 (18.87); 8–100	1.35 (.42); 1–3	5.44 (1.51); 1–7	129.35 (17.37); 92.67–184.67	70.47 (9.67); 54.67–95.00	64.33 (11.06); 39.81–98.12
Husband's health concern	87.93 (20.19); 3–100	1.72 (.73); 1–4	5.78 (1.40); 1–7	144.64 (19.33); 108.67–184.50	78.42 (10.93); 58.00–104.33	65.77 (11.11); 43.25–94.30
Wife's health concern	88.58 (15.86); 2–100	1.79 (.85); 1–5	5.82 (1.27); 1–7	136.41 (18.19); 100.33–190.00	73.59 (10.12); 56.00–99.33	64.93 (10.75); 43.55–91.38
Recovery	Not assessed at this period.	Not assessed at this period.	Not assessed at this period.	133.71 (18.05); 98.00–181.33	71.96 (10.64); 56.00–109.00	61.76 (10.52); 42.16–89.40

*Note.* W = wives; H = husbands; SBP = systolic blood pressure; DBP = diastolic blood pressure; HR = heart rate.

**Table 4**  
*Wives' Perceived Support, Distress, Closeness, and Systolic and Diastolic Blood Pressure at Each Period of the Experiment*

Period	W perceived support, <i>M</i> ( <i>SD</i> ); range	W distress, <i>M</i> ( <i>SD</i> ); range	W closeness, <i>M</i> ( <i>SD</i> ); range	W SBP, <i>M</i> ( <i>SD</i> ); range	W DBP, <i>M</i> ( <i>SD</i> ); range	W HR, <i>M</i> ( <i>SD</i> ); range
Baseline	84.03 (21.89); 5–100	1.40 (.46); 1–2.75	5.11 (1.57); 1–7	124.19 (15.24); 91.00–162.33	51.33 (7.04); 51.33–83.67	67.61 (10.72); 45.67–93.40
Husband's health concern	85.26 (21.10); 4–100	1.87 (.77); 1–5	5.64 (1.49); 1–7	135.23 (17.75); 90.33–186.00	69.16 (8.41); 52.00–90.67	66.98 (9.67); 44.33–92.25
Wife's health concern	86.14 (20.38); 4–100	1.91 (.91); 1–4.50	5.46 (1.51); 1–7	143.77 (21.25); 99.00–201.00	73.75 (10.12); 55.00–103.33	69.11 (9.68); 47.74–90.40
Recovery	Not assessed at this period.	Not assessed at this period.	Not assessed at this period.	129.90 (16.01); 90.67–169.67	66.41 (7.89); 50.33–91.00	64.12 (9.69); 42.45–89.93

*Note.* W = wives; H = husbands; SBP = systolic blood pressure; DBP = diastolic blood pressure; HR = heart rate.

period ( $F(1, 192) = 57.84, p < .001$ , and  $F(1, 192) = 18.85, p < .001$ , respectively).

**Did participants report greater received support in the support conditions compared to the no support conditions?** The effect of wives' receipt of support was moderated by sex,  $F(1, 377) = 6.72, p = .01$ , such that wives reported lower support when they received support relative to when they did not,  $F(1, 378) = 4.00, p = .046$ , whereas husbands who provided support to their wives reported similar levels of support relative to husbands who did not support their wives,  $F(1, 378) = 0.49, p = .48$ . All interactions including both wife's receipt of support and husband's receipt of support were nonsignificant (all  $ps > .49$ ).

## Main Hypotheses

**Effect of mutual support on blood pressure recovery.**  $H_1$  and  $H_2$  were not supported. The four-way interaction of Sex  $\times$  Husband's Receipt of Support  $\times$  Wife's Receipt of Support  $\times$  Recovery Slopes was nonsignificant when predicting SBP and DBP ( $F(3, 185) = 0.15, p = .85$ , and  $F(2, 185) = 0.68, p = .50$ , respectively). No nested interactions were significant.

**Effect of mutual support on HR recovery.**  $H_1$  and  $H_2$  were not supported. The four-way interaction of Sex  $\times$  Husband's Receipt of Support  $\times$  Wife's Receipt of Support  $\times$  Recovery Slope was nonsignificant when predicting HR,  $F(2, 184) = 0.52, p = .59$ . However, a nested interaction revealed that recovery slopes were moderated by wife's receipt of support,  $F(1, 190) = 6.65, p = .010$ , such that, for both husbands and wives, HR decreases from baseline to the recovery period were smaller when wives received support relative to when they did not,  $t(190) = 2.58, p = .010$ . The interaction of wife's receipt of support by recovery slope remained significant after controlling for marital satisfaction, age, sex, and use of medication with cardiac side effects,  $F(1, 187) = 6.56, p = .011$ .

**Additional tests of recovery slopes.** For completeness, we repeated primary analyses (i.e., interactions of Sex  $\times$  Husband's Receipt of Support  $\times$  Wife's Receipt of Support  $\times$  Recovery Slope) using a time coding scheme contrasting the last health concern discussion with the recovery period. These tests revealed no significant four-way interactions or nested interactions when predicting HR, SBP, or DBP (all  $ps > .05$ ).

## Secondary Analysis

**Effect of support conditions on blood pressure reactivity.** There was a significant interaction of Sex  $\times$  Husband's Receipt of Support  $\times$  Reactivity Slopes predicting SBP,  $F(2, 376) = 7.10, p > .001$ , such that, for husbands, SBP increases from baseline to the husband's health concern discussion were smaller when husbands received support relative to when they did not,  $t(376) = 3.11, p = .002$ . The same interaction was found when predicting DBP,  $F(2, 376) = 8.91, p > .001$ . Husbands' DBP increases from baseline to the husband's health concern discussion were smaller when husbands received support relative to when they did not,  $t(376) = 2.58, p = .010$ . These interactions remained significant after controlling for marital satisfaction, age, sex, and use of medication with cardiac side effects (SBP:  $F(2, 374) = 7.12, p > .001$ ; DBP:  $F(2, 374) = 8.90, p > .001$ ). For wives, SBP increases from baseline to the husband's health concern discussion did not

significantly differ when husbands received support relative to when they did not,  $t(376) = -1.08, p = .27$ . A graphic representation of these interactions is presented in Figure 2.

**Effect of support conditions on HR reactivity.** The interactions of Sex  $\times$  Husband's Receipt of Support  $\times$  Reactivity Slopes,  $F(2, 366) = 1.23, p = .29$  and Sex  $\times$  Wife's Receipt of Support  $\times$  Reactivity Slopes,  $F(2, 366) = 0.19, p = .82$  were both nonsignificant.

**Effect of support conditions on self-reported distress.** An interaction was found with Husband's Receipt of Support  $\times$  Reactivity Slopes,  $F(2, 382) = 3.57, p = .029$ . When the husband received support, participants felt less distressed during the husband's health concern discussion than the wife's health concern discussion,  $t(382) = 2.58, p = .010$ . This interaction remained significant after controlling for marital satisfaction, age, sex, and use of medication with cardiac side effects,  $F(2, 378) = 3.81, p = .022$ . However, excluding individuals who reported no current health concern rendered this interaction marginally significant,  $F(2, 350) = 2.83, p = .060$ .

**Effect of support conditions on self-reported closeness.** A significant interaction of Husband's Receipt of Support  $\times$  Reactivity Slopes was found,  $F(2, 377) = 4.25, p = .015$  such that, for both husbands and wives, the increase in closeness from baseline to the wife's discussion was larger when husbands received support relative to when they did not,  $t(377) = 2.00, p = .046$ ; nonsignificant under Bonferroni adjustment. Similarly, for both husbands and wives, the increase in closeness from baseline to the husband's discussion was larger when husbands received support relative to when they did not,  $t(377) = 2.84, p = .004$ . This interaction remained significant after controlling for marital satisfaction, age, sex, and use of medication with cardiac side effects,  $F(2, 371) = 4.10, p = .017$ . A significant interaction of Wife's Receipt of Support  $\times$  Reactivity Slopes was also found,  $F(2, 377) = 7.43, p < .001$ , such that, for both husbands and wives, the increase in closeness from baseline to the wife's discussion was larger when wives received support relative to when they did not,  $t(377) = 3.58, p < .001$ . Similarly, for both husbands and wives, the increase in closeness from baseline to the husband's discussion was larger when wives received support relative to when they did not,  $t(377) = 3.03, p = .002$ . This interaction remained significant after controlling for marital satisfaction, age, sex, and use of medication with cardiac side effects,  $F(2, 372) = 7.59, p < .001$ .

## Follow-Up Analysis

**Did husbands give lower quality support than wives?** All discussions involving support were coded by trained, independent coders using Feeney's caregiving behavior manual (Collins & Feeney, 2000). The coders were unaware of the study hypotheses. For this study, we used the emotional support code, which is defined as providing support that is focused on the emotional needs of the partner. This includes behaviors such as communicating to the partner that his or her stressor and any concerns about his or her stressor are understood; conveying reassurance, compassion, and understanding to the disclosing partner; attempting to lift the partner's mood; and providing of physical or verbal affection. Although our focus was on emotional support behavior, we



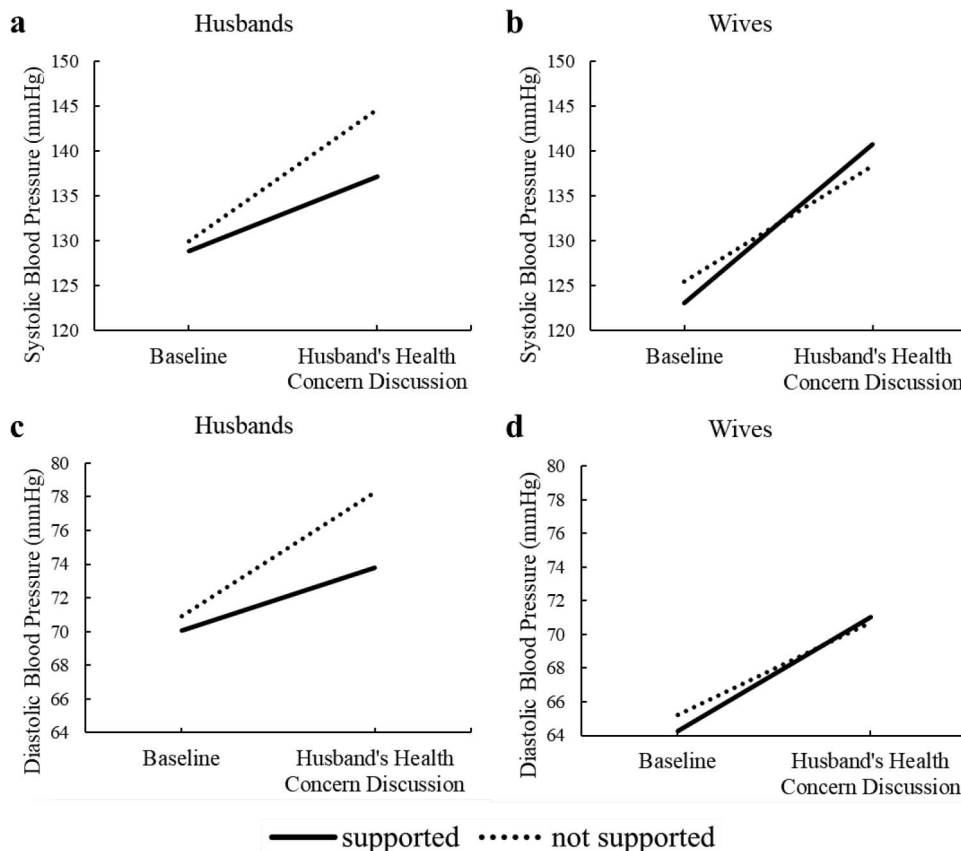


Figure 2. Systolic (a and b) and diastolic (c and d) blood pressure as a function of sex, time, and husband's receipt of support. Data points presented are untransformed mean diastolic and systolic blood pressure values.

also coded for informational support behavior, which was any type of support aimed at problem solving. This included behaviors such as providing advice, asking clarifying questions, and helping to figure out the cause of the problem. Coders use a scale from 1 (*not at all*) to 5 (*consistent and high quality*) for the emotional support code and the informational support code after they have taken notes on specific behaviors noted in each code's description. Twenty-five percent of the discussions were coded by two raters; the other 75% were coded by one of these raters. The ICC between the coders rating was 0.83 for emotional support and 0.82 for informational support. We averaged the ratings when there was a discrepancy between codes for the final analysis. To examine differences between husbands and wives support codes, we used independent samples *t* tests. There was no significant difference between emotional support behavior between husbands ( $M = 3.07$ ,  $SD = 1.29$ ) and wives ( $M = 2.71$ ,  $SD = 1.17$ ) over the entire sample,  $t(89) = -1.39$ ,  $p = .168$ . The same was true for informational support (husbands:  $M = 2.95$ ,  $SD = 1.15$ ; wives:  $M = 2.63$ ,  $SD = 1.11$ ;  $t(87) = -1.33$ ,  $p = .187$ ).

**Did husbands report receiving more support for their health conditions in everyday life than wives did?** To examine differences in the extent to which husbands and wives reported receiving support for their health in everyday life we ran an actor partner interdependence model (Kenny, Kashy, & Cook, 2006) with an SPSS mixed model. We controlled for actor and partner

marital satisfaction, age, and number of chronic conditions. Results indicated that husbands reported receiving greater emotional support than wives ( $\beta = -0.15$ ,  $SE = 0.06$ ,  $t(91.37) = -2.60$ ,  $p = .01$ ).

**Were self-reports of partner support in the past week, self-reports of partner support in the laboratory, and observer ratings of partner emotional support in the laboratory associated?** We performed Pearson correlations among self-reported emotional support from the partner in the past week (past week support), emotional support from the partner after the task (task support), and observer ratings of the partner's emotional support (observed support) for husbands and wives separately. For husbands, past week support was significantly correlated with task support,  $r = .43$ ,  $p < .001$  but not observed support,  $r = .23$ ,  $p = .118$ , and task support was not significantly associated with observed support,  $r = .06$ ,  $p = .718$ . For wives, past week support was significantly correlated with task support,  $r = .56$ ,  $p < .001$  as well as observed partner support,  $r(43) = .41$ ,  $p = .006$ , but task support was not significantly associated with observed support,  $r = .24$ ,  $p = .119$ .

## Discussion

In this study we examined husbands' and wives' cardiovascular responses to mutual support in response to both spouses' health

concerns. We hypothesized that mutual support, compared to one-sided or no support, would lead to the greatest decreases in both spouses' blood pressure and HR at recovery. Contrary to hypotheses, mutual support was not associated with decreased cardiovascular responses for either husbands or wives.

The results of this study suggest that receiving emotional support from a spouse individually may be more impactful for immediate cardiovascular reactivity than both partners giving and receiving support. Alternatively, the lack of evidence for the unique benefits of mutual support could be due to its operationalization and the way in which the outcomes were measured in this study. First, we operationalized the concept of mutual support as giving each partner the opportunity to provide support to each other using their own words and behavior, in effort to maximize ecological validity. However, this approach did not allow for ensuring that the quality of the support was equal between partners. Future research on mutual support may benefit from more tightly controlling the support messages to be equally supportive. Second, the outcome measurement period may have been inadequate to see effects of mutual support on cardiovascular responses. Couples may need more time to process the meaning of both discussions and of both partners giving and receiving support as a whole. A longer recovery measurement period may have increased the opportunity for significant cardiovascular effects of mutual support.

Following the second aim of our study, we found gender differences in cardiovascular reactivity and self-reported emotions to support receipt regardless of mutuality. Specifically, we found that husbands had lower SBP and DBP reactivity and self-reported distress and they felt closer to their wives when they received support than when they did not. In terms of the potential clinical significance of the blood pressure effects, the difference in mmHg between husbands who received support compared to husbands who did not receive support was roughly 8 mmHg. This is a larger difference than what has been found in randomized control trials examining the effects of nonselective beta blockers to reduce resting blood pressure (Wong & Wright, 2014). However, when making this comparison it is important to consider that changes in blood pressure reactivity, as found in our study, are different than changes in resting blood pressure.

In contrast, experimentally manipulated support was less beneficial for wives. Wives felt more distress and less supported when they received support than when they did not, and both husbands and wives HRs remained elevated at recovery when wives received support. However, wives reported feeling closer to their partner when they received support, and wives reported less distress when they gave support to their spouse. Yet, wives were more reactive in terms of SBP in all conditions, whether they were discussing their own health concern or listening to their husband's health concern and whether they were receiving or providing support. These findings suggest that although wives are more physiologically aroused, support interactions may still be important for wives' intimacy building and regulating distress that results from a spouse's distress (Monin, Xu, Mitchell, Buurman, & Riffin, 2018).

Differences between husbands and wives in reactivity are interesting, given that observational coding indicated that there were no significant differences in the quality of the emotional or informational support provided by husbands and wives. This lack of a gender difference in the quality of support provision in the lab fits

with past research showing that if men are asked to engage in intimate conversations with their partners in the lab, they are just as capable as women of intimacy (Reis, Senchak, & Solomon, 1985). However, past research has also shown that men are normally less intimate in their social interactions in everyday life according to daily diary measures (Reis et al., 1985). Thus, the difference in husbands' and wives' cardiovascular reactivity to their spouses' support could be a result of engaging in social interactions that are either typical or atypical of that person's behavior. In other words, husbands may expect and feel less stressed when they receive support from their wives in the lab, because they are used to receiving this type of support in everyday life. In contrast, wives may not expect their husbands to engage in this type of support and are either physiologically activated or uncomfortable with their support in the lab. This possible explanation is also in line with the results of our follow-up analyses showing that both husbands' and wives' perceptions of emotional support in the laboratory were positively associated with their perceptions of emotional support in everyday life. Because husbands reported receiving greater emotional support from their spouses compared to wives in their everyday lives, this may have translated to greater perceptions of support from wives in the laboratory (Monin & Clark, 2011).

These gender difference findings also fit with the theory that women are more attuned to close other's distress because of their interdependent self-construal (Eagly & Steffen, 1986). Wives are more responsible for the health behavior work and emotional labor in marriages (Umberson, 1992), and both men and women report that they count on female family members for their needs more than they can count on male family members (Monin, Clark, & Lemay, 2008). This study extends these past findings by showing that even when both partners are asked to focus on their own health concerns and support from husbands and wives is experimentally manipulated, husbands benefit more from receiving emotional support.

There are some limitations to this work. First, this sample was heterosexual and almost exclusively White and well-educated. In future research it will be interesting to see how our study extends to other populations including same-sex couples. Second, the influence of baseline levels of blood pressure and HR on subsequent change could not be appropriately modeled using random time effects because of the limited sample size. Third, we did not directly examine whether feeling that one spouse's health concern conflicted with the other or increased empathy were mechanisms through which support affected cardiovascular outcomes. Future research should examine whether emotional experiences mediated these associations. Fourth, it is possible that blood pressure measurements were distracting or distressing, impacting reactions to support behavior that may have otherwise been comforting in a more naturalistic setting.

This study had many strengths. This was an experiment with midlife and older married couples from the community. This study did not focus on one health condition, but captured couples dealing with a variety of health concerns. There were multiple self-report and objective measures of support and well-being. Participants provided the type of support that they would provide in everyday life, which enhances ecological validity. Importantly, this work addresses the need for experimental evidence identifying mecha-

nisms through which social connection can impact health for people coping with multiple chronic conditions.

The results of this study may help explain the pervasive finding that men receive more health benefits from marriage than women do, for example, as evidenced by studies showing that men tend to die sooner than wives after the death of their spouse (Martikainen & Valkonen, 1996) or the hospitalization of a spouse (Christakis & Allison, 2006). Our study results also suggests that men and women are differentially attuned to and differentially respond to the presence or absence of emotional support about health concerns and potentially the quality of this support, and that these patterns may be affected by gender roles. There are now a growing number of behavioral interventions designed to help spouses support each other with chronic conditions in mid- to late-life marriages. Many of these interventions show reductions in blood pressure by improving emotional support behaviors. For example, a warm touch intervention for married couples has shown reduction in blood pressure for husbands over time (Holt-Lunstad, Birmingham, & Light, 2008), and emotional coping skills training for spouses of people with Alzheimer's disease and related dementias has shown lasting blood pressure reductions in men and women over time (V. P. Williams et al., 2010). It may be beneficial for these interventions as well as couples' interventions that address both spouses' multiple chronic conditions to be differentially tailored to husbands and wives. Doing so may make these existing interventions more effective. Husbands and wives may need to work together to improve emotional support for wives, in particular.

## References

- Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of Other in the Self Scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology*, *63*, 596–612. <http://dx.doi.org/10.1037/0022-3514.63.4.596>
- Aron, A., Melinat, E., Aron, E. N., Vallone, R. D., & Bator, R. J. (1997). The experimental generation of interpersonal closeness: A procedure and some preliminary findings. *Personality and Social Psychology Bulletin*, *23*, 363–377. <http://dx.doi.org/10.1177/0146167297234003>
- Berg, C. A., & Upchurch, R. (2007). A developmental-contextual model of couples coping with chronic illness across the adult life span. *Psychological Bulletin*, *133*, 920–954. <http://dx.doi.org/10.1037/0033-2909.133.6.920>
- Berntson, G. G., Quigley, K. S., Jang, J., & Boysen, S. T. (1990). An approach to artifact identification: application to heart period data. *Psychophysiology*, *27*, 586–598.
- Bowlby, J. (1980). *Attachment and loss* (Vol. 3). New York, NY: Basic Books.
- Buttorff, C., Ruder, T., & Bauman, M. (2017). *Multiple chronic conditions in the United States* (Document No. TL-221-PFCD). Santa Monica, CA: RAND Corporation. <http://dx.doi.org/10.7249/TL221>
- Christakis, N. A., & Allison, P. D. (2006). Mortality after the hospitalization of a spouse. *The New England Journal of Medicine*, *354*, 719–730. <http://dx.doi.org/10.1056/NEJMs050196>
- Clark, M. S., & Monin, J. K. (2006). Giving and receiving communal responsiveness as love. In S. Weis (Ed.), *The new psychology of love* (2nd ed., pp. 200–221). New Haven, CT: Yale University Press.
- Collins, N. L., & Feeney, B. C. (2000). A safe haven: An attachment theory perspective on support seeking and caregiving in intimate relationships. *Journal of Personality and Social Psychology*, *78*, 1053–1073. <http://dx.doi.org/10.1037/0022-3514.78.6.1053>
- Eagly, A. H., & Steffen, V. J. (1986). Gender and aggressive behavior: A meta-analytic review of the social psychological literature. *Psychological Bulletin*, *100*, 309–330. <http://dx.doi.org/10.1037/0033-2909.100.3.309>
- Franks, M. M., Shields, C. G., Lim, E., Sands, L. P., Mobley, S., & Boushey, C. J. (2012). I will if you will: Similarity in married partners' readiness to change health risk behaviors. *Health Education & Behavior*, *39*, 324–331. <http://dx.doi.org/10.1177/1090198111402824>
- Helgeson, V. S., Jakubiak, B., Van Vleet, M., & Zajdel, M. (2018). Communal coping and adjustment to chronic illness: Theory update and evidence. *Personality and Social Psychology Review*, *22*, 170–195.
- Holt-Lunstad, J., Birmingham, W. A., & Light, K. C. (2008). Influence of a "warm touch" support enhancement intervention among married couples on ambulatory blood pressure, oxytocin, alpha amylase, and cortisol. *Psychosomatic Medicine*, *70*, 976–985. <http://dx.doi.org/10.1097/PSY.0b013e318187ae7>
- Holt-Lunstad, J., Robles, T. F., & Sbarra, D. A. (2017). Advancing social connection as a public health priority in the United States. *American Psychologist*, *72*, 517–530. <http://dx.doi.org/10.1037/amp0000103>
- Holt-Lunstad, J., Uchino, B. N., Smith, T. W., & Hicks, A. (2007). On the importance of relationship quality: The impact of ambivalence in friendships on cardiovascular functioning. *Annals of Behavioral Medicine*, *33*, 278–290. <http://dx.doi.org/10.1007/BF02879910>
- Hoppmann, C., & Gerstorf, D. (2009). Spousal interrelations in old age—A mini-review. *Gerontology*, *55*, 449–459. <http://dx.doi.org/10.1159/000211948>
- Jiang, Y., Terhorst, L., Donovan, H. S., Weimer, J. M., Choi, C.-W. J., Schulz, R., . . . Sherwood, P. R. (2013). Locke-Wallace Short Marital-Adjustment Test: Psychometric evaluation in caregivers for persons with primary malignant brain tumor. *Journal of Nursing Measurement*, *21*, 502–515. <http://dx.doi.org/10.1891/1061-3749.21.3.502>
- Katz, J. N., Chang, L. C., Sangha, O., Fossel, A. H., & Bates, D. W. (1996). Can comorbidity be measured by questionnaire rather than medical record review? *Medical Care*, *34*, 73–84. <http://dx.doi.org/10.1097/00005650-199601000-00006>
- Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic data analysis*. New York, NY: Guilford Press.
- Kiecolt-Glaser, J. K., & Newton, T. L. (2001). Marriage and health: His and hers. *Psychological Bulletin*, *127*, 472–503. <http://dx.doi.org/10.1037/0033-2909.127.4.472>
- Lingler, J. H., Sherwood, P. R., Crighton, M. H., Song, M.-K., & Happ, M. B. (2008). Conceptual challenges in the study of caregiver-care recipient relationships. *Nursing Research*, *57*, 367–372. <http://dx.doi.org/10.1097/01.NNR.0000313499.99851.0c>
- Locke, H. J., & Wallace, K. M. (1959). Short marital-adjustment and prediction tests: Their reliability and validity. *Marriage & Family Living*, *21*, 251–255. <http://dx.doi.org/10.2307/348022>
- Martikainen, P. T., & Valkonen, T. (1996). Excess mortality of unemployed men and women during a period of rapidly increasing unemployment. *Lancet*, *348*, 909–912. [http://dx.doi.org/10.1016/S0140-6736\(96\)03291-6](http://dx.doi.org/10.1016/S0140-6736(96)03291-6)
- Mills, J., Clark, M. S., Ford, T. E., & Johnson, M. (2004). Measurement of communal strength. *Personal Relationships*, *11*, 213–230. <http://dx.doi.org/10.1111/j.1475-6811.2004.00079.x>
- Monin, J., Doyle, M., Levy, B., Schulz, R., Fried, T., & Kershaw, T. (2016). Spousal associations between frailty and depressive symptoms: Longitudinal Findings from the Cardiovascular Health Study. *Journal of the American Geriatrics Society*, *64*, 824–830. <http://dx.doi.org/10.1111/jgs.14023>
- Monin, J. K., & Clark, M. S. (2011). Why do men benefit more from marriage than do women? Thinking more broadly about interpersonal processes that occur within and outside of marriage. *Sex Roles: A Journal of Research*, *65*, 320–326. <http://dx.doi.org/10.1007/s11199-011-0008-3>

- Monin, J. K., Clark, M. S., & Lemay, E. P. (2008). Communal responsiveness in relationships with female versus male family members. *Sex Roles: A Journal of Research*, *59*, 176–188. <http://dx.doi.org/10.1007/s11199-008-9420-8>
- Monin, J. K., & Schulz, R. (2009). Interpersonal effects of suffering in older adult caregiving relationships. *Psychology and Aging*, *24*, 681–695. <http://dx.doi.org/10.1037/a0016355>
- Monin, J. K., Xu, A., Mitchell, H.-R., Buurman, F., & Riffin, C. (2018). Recalling support provision decreases distress and anger in response to partner suffering. *Aging & Mental Health*, *22*, 587–594.
- Reblin, M., Uchino, B. N., & Smith, T. W. (2010). Provider and recipient factors that may moderate the effectiveness of received support: Examining the effects of relationship quality and expectations for support on behavioral and cardiovascular reactions. *Journal of Behavioral Medicine*, *33*, 423–431. <http://dx.doi.org/10.1007/s10865-010-9270-z>
- Reis, H. T., Senchak, M., & Solomon, B. (1985). Sex differences in the intimacy of social interaction: Further examination of potential explanations. *Journal of Personality and Social Psychology*, *48*, 1204–1217. <http://dx.doi.org/10.1037/0022-3514.48.5.1204>
- Schulz, R., & Eden, J. (Eds.). (2016). *Families caring for an aging America*. Washington, DC: The National Academies Press. <http://dx.doi.org/10.17226/23606>
- Spybrook, J., Bloom, H., Congdon, R., Hill, C., Martinez, A., Raudenbush, S., & TO, A. (2011). Optimal design plus empirical evidence: Documentation for the “Optimal Design” software. *William T. Grant Foundation*. Retrieved on November, 5, 2012.
- Stephens, M. A. P., & Clark, S. L. (1996). Interpersonal relationships in multi-generational families. In N. Vanzetti & S. Duck (Eds.), *A lifetime of relationships* (pp. 431–454). Belmont, CA: Thomson Brooks/Cole.
- Stephens, M. A. P., Martire, L. M., Cremeans-Smith, J. K., Druley, J. A., & Wojno, W. C. (2006). Older women with osteoarthritis and their caregiving husbands: Effects of pain and pain expression on husbands’ well-being and support. *Rehabilitation Psychology*, *51*, 3–12. <http://dx.doi.org/10.1037/0090-5550.51.1.3>
- Uchino, B. N. (2006). Social support and health: A review of physiological processes potentially underlying links to disease outcomes. *Journal of Behavioral Medicine*, *29*, 377–387. <http://dx.doi.org/10.1007/s10865-006-9056-5>
- Uchino, B. N., Cacioppo, J. T., & Kiecolt-Glaser, J. K. (1996). The relationship between social support and physiological processes: A review with emphasis on underlying mechanisms and implications for health. *Psychological Bulletin*, *119*, 488–531. <http://dx.doi.org/10.1037/0033-2909.119.3.488>
- Umberson, D. (1992). Gender, marital status and the social control of health behavior. *Social Science & Medicine*, *34*, 907–917. [http://dx.doi.org/10.1016/0277-9536\(92\)90259-S](http://dx.doi.org/10.1016/0277-9536(92)90259-S)
- Wanic, R., & Kulik, J. (2011). Toward an understanding of gender differences in the impact of marital conflict on health. *Sex Roles: A Journal of Research*, *65*, 297–312. <http://dx.doi.org/10.1007/s11199-011-9968-6>
- Ward, B. W., Schiller, J. S., & Goodman, R. A. (2014). Multiple chronic conditions among U.S. adults: A 2012 update. *Preventing Chronic Disease: Public Health Research, Practice, and Policy*, *11*, E62. <http://dx.doi.org/10.5888/pcd11.130389>
- Williams, R. B., Barefoot, J. C., Califf, R. M., Haney, T. L., Saunders, W. B., Pryor, D. B., . . . Mark, D. B. (1992). Prognostic importance of social and economic resources among medically treated patients with angiographically documented coronary artery disease. *Journal of the American Medical Association*, *267*, 520–524. <http://dx.doi.org/10.1001/jama.1992.03480040068032>
- Williams, V. P., Bishop-Fitzpatrick, L., Lane, J. D., Gwyther, L. P., Ballard, E. L., Vendittelli, A. P., . . . Williams, R. B. (2010). Video-based coping skills to reduce health risk and improve psychological and physical well-being in Alzheimer’s disease family caregivers. *Psychosomatic Medicine*, *72*, 897–904. <http://dx.doi.org/10.1097/PSY.0b013e3181fc2d09>
- Williamson, G. M., & Shaffer, D. R. (2001). Relationship quality and potentially harmful behaviors by spousal caregivers: How we were then, how we are now. *Psychology and Aging*, *16*, 217–226. <http://dx.doi.org/10.1037/0882-7974.16.2.217>
- Wong, G. W., & Wright, J. M. (2014). Blood pressure lowering efficacy of nonselective beta-blockers for primary hypertension. *Cochrane Database of Systematic Reviews*, *2*, CD007452. <http://dx.doi.org/10.1002/14651858.CD007452.pub2>
- Wright, D. L., & Aquilino, W. S. (1998). Influence of emotional support exchange in marriage on caregiving wives’ burden and marital satisfaction. *Family Relations: An Interdisciplinary Journal of Applied Family Studies*, *47*, 195–204. <http://dx.doi.org/10.2307/585624>

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