

# Doing it all: Effects of Family Responsibilities and Marital Relationship Quality on Mothers' Ambulatory Blood Pressure

Tyler C. Graff, PhD<sup>1</sup> · Wendy C. Birmingham, PhD<sup>1</sup> · Lori L. Wadsworth, PhD<sup>2</sup> · Man Hung, PhD<sup>3,4</sup>

<sup>1</sup>Department of Psychology, Brigham Young University, Provo, UT, USA

<sup>2</sup>Romney Institute of Public Service and Ethics, Brigham Young University, Provo, UT, USA

<sup>3</sup>Division of Public Health, University of Utah, Salt Lake City, UT, USA

<sup>4</sup>College of Dental Medicine, Roseman University of Health Sciences, South Jordan, UT, USA

Tyler Graff

[tygraff@gmail.com](mailto:tygraff@gmail.com)

## Abstract

**Background** The shared provider responsibility between married couples does not translate to equally shared division of childcare (CC) and household labor. While some marriages contain highly positive aspects, marriages may also simultaneously contain both positive and negative aspects. The negativity in these relationships can negate the positivity and could potentially lead to the detriment of mothers' health.

**Purpose** We examined mothers' ambulatory blood pressure (ABP) associated with their marital relationship quality and perceived equity with her spouse on CC and household tasks.

**Methods** We investigate these associations using a mixed multilevel model analysis on a sample of 224 mothers in heterosexual marriages, all of whom had children under the age of 18 years currently living in the home.

**Results** Mothers' perception of equity in the division of CC responsibilities contributed to lower ABP. Additionally, mothers in supportive marital relationships (low negativity and high positivity) had lower ABP than those in ambivalent relationships (both high negativity and positivity). There was a crossover interaction such that the effect of relationship quality on ABP was moderated by the perception of equity in the division of CC. For mothers who report doing all the CC, they had lower ABP if they had a supportive marital relationship compared with mothers in ambivalent relationships. Whereas mothers who report more equity in CC and have a supportive relationship have higher ABP compared with mothers in ambivalent relationships.

**Conclusions** This study has implications related to dynamics within marital relationships. These results demonstrate important relational influences on mothers' ABP.

## Lay summary

Married mothers disproportionately shoulder the responsibilities of childcare (CC) and household labor. This inequity of the division of family responsibilities can negatively affect the relationship between husbands and wives with marital satisfaction being higher when the load is more equally shared between partners. Additionally, marital satisfaction is associated with numerous health benefits including lower blood pressure. We examined mothers' ambulatory blood pressure (ABP) associated with their marital relationship quality and perceived equity with her spouse on CC and household tasks on a sample of 224 mothers in heterosexual marriages. Mothers' perception of equity in the division of CC responsibilities contributed to lower ABP. Additionally, mothers in supportive marital relationships had lower ABP than those reporting less supportive relationships. There was an interaction between the perception of equity in the division of CC and the effect that relationship quality had on mothers' ABP. Mothers who reported doing all the CC had lower ABP if they had a supportive marital relationship compared with mothers in less supportive relationships. Whereas mothers who reported more equity in CC and had a supportive relationship had higher ABP compared with mothers in less supportive relationships.

**Keywords** Mothers · Ambulatory blood pressure · Relationship quality · Childcare · Household work

## Introduction

The shared provider responsibility between husbands and wives does not extend to equally shared division of childcare (CC) and household (HH) tasks [1]. CC tasks include helping with homework, taking children to routine appointments, bedtime, arranging for daycare, disciplining, etc. HH tasks consist of routine house cleaning and repairs, paying bills, grocery shopping, car and lawn care, planning and

making meals, etc. The literature shows mothers perceive having a disproportionate responsibility for the majority of the CC and HH tasks [2] and mothers who work outside the home often come home to a "second shift" of parental, home, and family responsibilities [3]. Married women perceive they spend about twice as much time on CC and HH responsibilities than their husbands [4–7], whether they are a stay-at-home mother or working outside the home [8]. These

perceptions of inequality in division of HH and CC with their partner can lead to worse mental health, well-being, satisfaction with life, psychological distress, and depression for women and mothers [2, 9–11]. Additionally, when relationships are imbalanced in terms of domestic equity, a variety of physiological health problems can develop, including sexual malfunction, anorexia, and higher ambulatory systolic and diastolic blood pressure (hypertension) [12, 13].

Hypertension is a strong indicator of a multitude of cardiovascular health complications and is the leading cause of disability worldwide [14]. Hypertension increases ones risk for heart attack, stroke, and organ failure [15], all of which contribute to coronary heart disease, morbidity, and mortality [15, 16]. Importantly, clinical blood pressure readings taken at a single time-point may not necessarily be representative of an individual's true cardiovascular functioning. Ambulatory blood pressure (ABP) measures, however, offer a large number of readings across the day while participants carry out their normal activities. This allows for the chronicling of daily fluctuations and provides a more complete picture of cardiovascular functioning [16, 17]. ABP monitoring has become part of the diagnostic process in determining cardiovascular risk as ABP can predict complications of hypertension above and beyond what is possible to determine with resting or clinical blood pressure measures alone [17, 18]. The typical upper limit of normal daytime ABP is considered 135/85 mm Hg [17].

### CC and HH Work: Effects on Health and Marital Quality

There has been a significant amount of research regarding *why* there is an inequality of CC and HH tasks, including the second shift, with much less research focused on the effects these may have on the mother's physical health [5, 19, 20]. Of those studies that have looked at these effects, many have operationally defined this imbalance as housework and either excluded measures of CC altogether or included items with insufficient detail [5, 21]. For example, Thurston et al. [12] looked at employed hypertensive males and females and ambulatory blood pressure (ABP) and found that higher perceived responsibility of CC and HH tasks was associated with higher diurnal blood pressure. However, the study lumped the two categories into one measure of HH responsibilities, conflating the concept. Studies that have lumped both concepts into a broader division of labor have found that inequality of CC and HH tasks influence well-being, depression, and mental and physical health [2, 11]. However, of the very few studies that have examined CC and HH as separate domains, CC but not HH was associated with women's distress [10]. Thus, there may be something fundamentally different about CC and HH work. In their study, Almeida et al. [22] call for future studies to use more specified operational definitions and measures of family work. Using separate measures of both CC and HH work can more accurately and robustly explicate their influences.

Further, research that has prioritized the contributions of CC and HH labor influences on health typically examine perceived equity and fairness based on the notion that unequal sharing of CC and HH responsibilities leads to mental and physical health problems [23, 24]. Indeed, perceptions of unequal division of HH work has been associated with greater distress, poorer mental health, and poorer well-being for women [23–27]. It is this body of literature on perceived

equity that we model the present study's research method. Much of the work in this area has focused specifically on mental health with much less investigating physical health [2] and has relied mainly on self-report measures of health [28] rather than objective measures.

The perception of unequal CC and HH burden can negatively affect the relationship between husbands and wives [29–31] with marital satisfaction and relationship quality being higher when the load is perceived to be more equally shared between partners [32–35]. This is one of the most prevalent topics of marital discord [36–38]. Importantly, marital quality is associated with numerous health benefits including lower blood pressure [39, 40], while dissatisfaction in marriage is associated with increased health problems and poorer overall health [41]. Specifically for women, having a supportive marriage offers emotional support and is salubrious for both her mental and physical health [42]. Relationship conflict influences her health [43] and is more detrimental to her health than emotional support is protective [44].

However, despite research showing that unsatisfactory marital relationships may have detrimental physical and mental effects for women, many marriages remain intact. This could be because these marriages simultaneously contain varying degrees of both positivity and negativity (i.e., ambivalence) [45, 46], with the positivity keeping individuals invested in maintaining the relationship. In other words, while marital partners provide positive support such as care and acceptance, they can also concurrently be sources of negativity in the form of insensitivity, conflict, interference, and jealousy [47–49]. Much of the research on health and marriage has conceptualized marital quality in a unidimensional way, with high levels of *either* positivity or negativity [50]. One meta-analysis found that most standard unidimensional measures of marital quality did not adequately distinguish between positive and negative aspects of marital behavior [51], and may not fully capture the nuances of marital relationships [52]. Reblin et al. [53] showed that the inclusion of multiple dimensions of relationship quality improved prediction of marital functioning over that of unidimensional scales. Indeed, Birmingham et al. [39] found that despite the positivity in these ambivalent relationships, individuals whose spouses' or own behavior was ambivalent, did not receive the same cardiovascular protection in the form of lower blood pressure as supportive marriages. In the present study, we investigate the perceived imbalance of CC and HH work with mothers' marital relationship quality and how these constructs interact to influence her ABP.

### Motherhood

Motherhood can change the dynamics of marital relationships. A meta-analysis by Twenge et al. [54] found that children have an impact on the quality of the marital relationship that can be detrimental to the relationship. Specifically, parents have reported that marital satisfaction diminishes significantly after the first year of parenthood [55, 56]. However, it is important to note the mixed findings in the literature on this topic. Whereas many new mothers find themselves dissatisfied with their marital relationship after the birth of a child, many new mothers do not. Indeed, some relationships maintain the same level of satisfaction, while others actually become more satisfying [57–60].

In their review, Coltrane [5] noted that the amount of time women spent on CC and HH work increased after marriage

and again after the birth of a child, whereas the amount of time men participated decreased after each of these occurrences. Grunow et al. [61] similarly add that husbands decrease their contribution and time to CC and HH work even when their wives work longer hours and earn a higher income. This effect was especially strong after having children.

Overall, studies investigating health outcomes of motherhood have been mixed. Some studies have reported positive health benefits associated with motherhood [62, 63]. For example, in a study by Light et al. [64] investigating breast feeding mothers, all participants showed lower systolic blood pressure reactivity to a stressor after contact with their baby versus the no-baby-contact control group. Becoming a parent is also associated with protective health behaviors (less smoking and alcohol consumption, and increased physical exercise) for the parent [65]. A study by Holt-Lunstad et al. [66] found that mothers were more likely than nonmothers to have lower blood pressure regardless of children's ages or number of children. However, other research has found motherhood related to increased strain and psychological distress [67] and negative health outcomes [68]. Being a parent has been associated with less nocturnal dipping of diastolic blood pressure [69], more depressive symptoms [70], and worse self-reported mental and physical health [71]. Since women are usually the primary caretaker of the children in the family, it may be that the stress-inducing conditions inherent in caregiving play a role in a women's greater health risks following motherhood [72].

## Hypotheses

This study was aimed at examining mothers' diurnal blood pressure associated with the influence of her perceived equality of CC and HH labor, and the influence of a supportive versus an ambivalent marital relationship on these health outcomes. As per our preregistered report, we hypothesized the following: Mothers who perceive more spousal CC (*H1a*) and HH work (*H1b*) equity would have lower systolic and diastolic ABP. Mothers who report an ambivalent marital relationship would have higher systolic and diastolic ABP (*H2*) compared with those who report a supportive relationship. The relation between ABP and marital relationship quality would be moderated (*H3*) by the perceived equity in CC and HH work.

## Method

This study was part of a larger project which was preregistered on the OSF framework prior to viewing any data (preregistration can be found at <https://osf.io/t8ydu>. All data files can be found at <https://osf.io/nkft/>). For transparency, preregistration was created for that larger project and thus includes additional research questions and analyses not reported in this article. However, for this study, we followed our a priori method protocols as outlined in that preregistration.

This study used purposive and snowball sampling procedures to recruit participants from various western U.S. communities and one east coast community. Additionally, a referral bonus was offered for referring participants who fully completed the study. Eligible individuals were contacted by email providing them with scheduling instructions for setting up their appointment. We conducted an a priori power analysis through G\*Power Software including a repeated measures design with 22 total predictors, and a sample size of 224

participants. This achieved 0.94 power with a 0.05 alpha to detect an effect size of 0.10. Thus, we continued data collection until reaching a total of 224 mothers to fully complete this study. This study was approved by the University Institutional Review Board.

## Participants

For the purposes of this study, eligible mothers were in a heterosexual marriage. They had at least one child living in the home who was under the age of 18 years. Participants could be employed or stay-at-home mothers. Mothers must have been married for more than 2 years. The married mothers' spouses were required to be currently living in the home so relationship quality measures were current and accurate. Only the immediate family (mother, husband, and children) were living at the residence, allowing us to conduct between-participant comparisons and decrease the potential for various confounding home-living situations. Because cardiovascular measures were the main dependent variables, exclusion criteria included those who had medical conditions with cardiovascular components (e.g., hypertension; see Cacioppo et al. [73]), those who were currently pregnant [74], and those with a body mass index (BMI) below 18.5 or above 29.9 [75, 76]. Participant information is located in Table 1.

## Procedures

All participating mothers wore an ABP monitor during a typical day for approximately 12 hr. Blood pressure was measured for each mother approximately 24 times within the 12-hr period (once every 30 min). Additionally, part of the 12-hr study period requirement was that the participants need to spend some time at home with their family. This stipulation was implemented to control for location (home and work) during blood pressure readings. Participants also were required to refrain from exercise for the duration of the study to control for blood pressure inflation due to exertion.

Data collection took place from October 2017 to October 2019. Participating mothers were scheduled for appointments in the mornings, prior to the start of a typical day. If the participants were employed, they would be scheduled for the study procedures prior to going into work. In the case where a mother had an atypical work schedule (e.g., graveyard shift) they were scheduled for appointments at times that were convenient for them to participate while still meeting the study criteria. Upon arriving at the lab, participants received paper consent forms. Following informed consent, each mother was fitted with a blood pressure cuff and rested for approximately 5 min, after which we obtained three baseline readings, each one minute apart. Participant height and weight were collected for assessment of BMI and they then completed relevant relationship surveys (see Measures). Participants were then fitted with the ABP monitor and were provided a personalized link to their specific ambulatory diary record (ADR) which they accessed on their phone or other electronic device for the duration of the study and which needed to be completed at each blood pressure assessment throughout the day. Monitors were set to obtain readings every  $30 \pm 5$  min (following the completion of the previous reading) until participant-designated bedtime. An appointment was set for the following day for participants to return the equipment to the research team and receive compensation.

**Table 1** Demographics

	Mean	SD	Range	N	%
Age in years	32.28	6.73	22–57	224	100
Marriage length (years)	9.55	5.85	2–31	224	100
Body mass index <sup>a</sup>	24.00	4.10	17.27–41.63	224	100
Stress	21.10	2.99	10–31	224	100
Mothers' marital relationship quality					
Supportive				111	49.55
Ambivalent				113	50.45
Ethnicity					
White				198	88.39
Hispanic				18	8.04
Asian/Other				8	3.57
Education status					
High school				9	4.02
Partial/completed college				182	81.25
Partial/completed graduate school				33	14.73
Self-reported health					
Poor/fair				29	12.94
Good/excellent				195	87.05
Annual income (self only)					
<\$15,000				107	47.76
\$15–\$29,000				35	15.63
\$30–\$49,000				39	17.43
\$50–\$69,000				17	7.58
≥\$70,000				26	11.60
Child(ren) age(s)					
<6 years old				182	81.25
6–12 years old				111	49.55
12–18 years old				49	21.87

*Note.* Our recruitment protocol screened participants based on self-reported height and weight. A priori, we determined that, on the few occasions when there would be discrepancy between self-report and lab results (self-report is within target range but lab measurement indicated a score outside of the range), we would allow participation with the plan to control for BMI in our main analyses. There were 11 instances of BMI <18.5, and 19 instances of BMI >29.9.

<sup>a</sup>BMI is reported from lab measurements.

## Measures

*Household Work Equity* scale was used from Mederer [77] to measure the division of tasks and HH management. The scale had 19 questions and responses ranged on a 5-point scale from “I do it all” (spouse rarely) to “My spouse does it all” (rarely me). Higher scores indicated more housework done by spouse. In the present study, this measure demonstrated good internal consistency (Cronbach's  $\alpha = 0.85$ ).

*Childcare Equity* question stems were used from the Mannino and Deutsch [6] scale. This scale had 12 questions which assessed the perceived degree to which tasks were divided between participants and their spouse. The measure was adapted from a 7-point scale to a 5-point scale to be comparable with the Household Work Equity scale. Response items ranged from “I do it all (spouse rarely),” to “spouse does it all (rarely me).” The measure demonstrated good internal consistency in the present study (Cronbach's  $\alpha = 0.80$ ). Higher scores indicated more CC done by spouse.

*Social Relationships Index (SRI)* measured participants' marital relationship quality dimensions of positivity and negativity [45]. Participants rated their spouse's behavior in terms of how positive and how upsetting their spouse is on a

1 = not at all, to 6 = extremely scale during support seeking behavior. For the current study, the SRI evidenced acceptable internal consistency for positivity (Cronbach's  $\alpha = 0.76$ ) and negativity (Cronbach's  $\alpha = 0.72$ ).

Relationship quality dimensions were transformed into dummy codes of supportive (dummy code 0) or ambivalent (dummy code 1) for each participant. A spouse was coded as supportive if they were rated as a “2” or greater on positivity and only a “1” on upsetting, whereas a spouse was coded as ambivalent if they are rated a “2” or greater on both positivity and upsetting. These cutoff points have been used consistently in prior work and are based on a broad relationship framework [46]. We used this analytical approach rather than a Positivity × Negativity interaction with continuous ratings as there are typically no spouses rated as aversive (only negative) or indifferent (both low positivity and low negativity). Thus, by treating spousal ratings as continuous variables, these relationship types would be seriously underrepresented. Other relationships might be appropriate for this type of examination (e.g., family relationships, coworkers, neighbors), but this approach would be inconsistent with the model and analytical approach used in prior studies. Indeed, there were only

six instances of indifferent or aversive relationships in our sample. Each of these were removed prior to analysis.

*Baseline Blood Pressure* was assessed with the Dinamap Model 100 Pro monitor. Assessments were obtained via a properly sized occluding cuff positioned on the nondominant upper arm. Three readings were taken, each spaced 1 min apart. These three readings were averaged together to create a baseline to increase reliability.

*Ambulatory Blood Pressure* was assessed with the Oscar 2 (Suntech Medical Instruments, Raleigh, NC). The Oscar 2 was designed specifically for ABP assessment and has been validated for both systolic and diastolic blood pressure by international guidelines [78]. Participants wore a properly sized occluding cuff positioned on their nondominant upper arm. The monitor was attached by a belt on the participant's waist to allow for mobility.

*Perceived Stress Scale* assessed stress over the prior month with 10 items on a 0 = Never, to 4 = Very often [79]. Example items include “in the last month how often have felt nervous or stressed?” and “in the last month, how often have you felt you were unable to control the important things in your life?” Higher scores indicated more stress. This scale evidenced good internal reliability in the present study (Cronbach's  $\alpha = 0.87$ ).

*Ambulatory Diary Record (ADR)*. Blood pressure is influenced by many different bodily processes such as movement, crossing arms or legs, talking, stress, being physically or mentally uncomfortable, cognitive load, etc. To ensure statistical control in our ABP measures, we had participants complete the ADR for each blood pressure reading. We include these variables in our final statistical model as control variables. Doing so ensures confidence that our findings would be due to our predictor variables of interest and not random noise or some other bodily process. The ADR was adapted from the diary developed by Hedges et al. [80]. The ADR was completed through Qualtrics survey software via electronic device (i.e., computer, smart phone, etc.) after each ABP reading. Participants were asked to report on each of the following variables: time, posture, activity, talking, location, temperature, exercise, everyday problem, and difficult/unique problem. The ADR was relatively easy and quick to complete (about 2 min).

*Demographic Questionnaire* was used to assess standard variables including age, child(ren) age(s), income, education, and occupational status.

## Data Analysis Plan

As part of our a priori plan (see preregistration here: <https://osf.io/t8ydu>), any ADR survey that was not completed within 10 min of its ABP reading was discarded. Additionally, we removed any Oscar 2 error codes that may have indicated unreliable artifact readings (there were 29 total error coded scores that were removed). In total, 437 of the 5,425 readings (12.4%) of matched ambulatory and ADR survey data were discarded. We fenced outlier data to be within the range of two interquartile scores. Systolic high and low scores were fenced to 188 and 69, respectively ( $n = 52$ , 0.68%) and diastolic high and low scores were fenced to 113 and 36, respectively ( $n = 201$ , 3.25%). All dependent variable residuals were normally distributed, and multicollinearity tests indicated no variance inflation issues with the model's predictor variables (all Variance Inflation Factors < 2.6).

To assess the hypotheses in this study, we conducted multilevel mixed model analyses. Importantly, due to the

correlational nature of our repeated measures dependent variables (i.e., systolic and diastolic ABP), we accounted for the temporal correlations between each blood pressure reading. We used the MIXED command (Stata) in order to examine both fixed and random effects on ABP across the day. The MIXED command allowed us to model the unstructured covariance for repeated measures factor of measurement occasion (i.e., ABP reading and ADR variables) using the direct (Kronecker) product [81]. Each model contained all predictor variables and their interactions in a single model thus controlling for increased Type I error. We ran one model for each of our two dependent variables (systolic and diastolic ABP). Statistical significance was determined by field standard  $p$ -values ( $p < .05$ ) and confidence intervals (95%).

Our a priori analytical process started with a model that included all the ADR covariance variables as random effects. Modeling a high number random effect variables prevented model convergence. This was anticipated and we removed one random effect variable at a time until the model would converge. We tried all possible combinations that allowed for convergence and the best model fit. The final models included random intercepts for each participant, as well as nested, random by-participant slopes for within-participant variables (time, activity level, and posture). The fixed effects included each of the hypothesized variables (CC, HH, and relationship quality) and control variables (time, BMI, baseline blood pressure, stress, group, income; as well as all ADR variables: posture, activity, talking, location, temperature, exercise, everyday problem, and difficult/unique problem).

To ensure that removing some of the ADR variables as random effect that were not statistically significant resulted in the best model fit, we conducted post estimation commands of each model comparing Akaike's information criteria (AIC) and Bayesian information criteria (BIC). Final models indicated the smallest values for each and were retained as the most appropriate model for the data (systolic model output AIC = 43,585.95, BIC = 43,783.55; diastolic model output AIC = 41,313.39, BIC = 41,510.99). Additionally, we used the likelihood ratio test to justify removing the interaction terms for HH and to test if the more parsimonious model fit the data better (final models still included HH as a main effect for statistical control). The likelihood ratio test compared two models (one nested in the other) with the null hypothesis that the smaller model is more parsimonious and fits our data better. Results indicated that we could not reject the null ( $\chi^2(1) = 1.34$ ,  $p = .248$ ). The final model's intraclass correlation was calculated providing significant evidence that it was necessary to nest by participant as it accounted for approximately 63% of the total residual variance (ICC = 0.63,  $SE = 0.04$ , 95% CI [0.56, 0.70]).

## Results

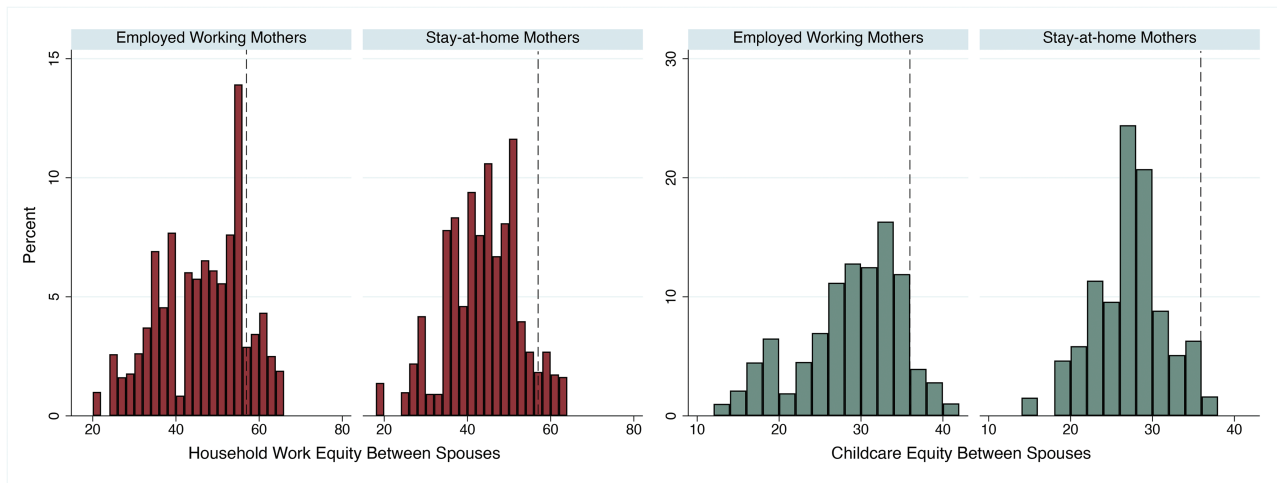
Lab assessed baseline blood pressure for all mothers in the study was  $M_{\text{SBP}} = 115.30$  ( $SD = 11.56$ ) mm Hg/ $M_{\text{DBP}} = 71.47$  ( $SD = 7.35$ ) mm Hg. Combining all ABP readings into one composite score yielded  $M_{\text{SBP}} = 128.71$  ( $SD = 21.88$ ) mm Hg/ $M_{\text{DBP}} = 76.13$  ( $SD = 15.36$ ) mm Hg. A total of 113 (51%) mothers reported their relationship to be ambivalent and 111 (49%) supportive, which is a similar rate found in prior studies [52]. Evaluating mothers' perceived CC

and HH work equity with their husbands indicated that mothers are doing the majority of the CC and HH work. The mean of all mothers for CC was 27.49 ( $SD = 5.39$ ) and for HH work was 44.33 ( $SD = 9.93$ ). Both these mean scores are well below the median of equal sharing between spouses for their respective scales (36 for CC and 57 for HH). Separating perceived CC and HH work by marital quality revealed mothers in ambivalent marriages performed slightly more of the CC ( $M_{CC} = 26.39$  [ $SD = 5.89$ ]) and HH ( $M_{HH} = 43.54$  [ $SD = 10.16$ ]) tasks compared with mothers in supportive marriages ( $M_{CC} = 28.55$  [ $SD = 4.56$ ];  $M_{HH} = 45.46$  [ $SD = 9.29$ ]). To investigate these associations further, ad hoc we separated mothers working outside of the home from stay-at-home mothers. Perhaps the perceived CC and HH work equity would be more balanced if both spouses had job responsibilities. These parceled results indicated that this was not the case. Whether employed or not, mothers perceive that they are doing the majority of the CC and HH work (see Fig. 1). Employed mother's  $M_{CC} = 28.22$  ( $SD = 6.17$ ) and stay-at-home mother's  $M_{CC} = 26.8$  ( $SD = 4.4$ ), with employed mother's  $M_{HH} = 45.57$  ( $SD = 10.51$ ) and stay-at-home mother's  $M_{HH} = 43.11$  ( $SD = 9.21$ ). CC and HH work were moderately positively correlated (Pearson's  $r = .502$ ,  $p < .05$ ). Correlations between other predictor and control variables can be found in Table 2.

## Hypotheses Results

The average number of ABP readings per participant was 24.84 ( $SD = 3.85$ , Range = 6–39). Full model output is located in Table 3. Following our preregistered plan for evaluating our hypotheses, mothers who reported more equity in the amount of CC (but not HH) responsibilities with their husband (*H1a* and *H1b*) demonstrated lower systolic ABP ( $b = -0.47$ ,  $SE = 0.22$ ,  $p = .03$ ) but not diastolic ABP ( $b = -0.22$ ,  $SE = 0.12$ ,  $p = .06$ ). Additionally, mothers who reported having an ambivalent marital relationship, compared with mothers reporting a supportive marital relationship, (*H2*) had higher systolic ( $b = -25.77$ ,  $SE = 9.5$ ,  $p = .005$ ) and diastolic blood pressure ( $b = -13.41$ ,  $SE = 5.3$ ,  $p = .01$ ).

Our final hypothesis, that there would be a significant interaction between equity of CC work and marital relationship quality on ABP (*H3*), was supported in a crossover interaction for both systolic ( $b = 0.94$ ,  $SE = 0.33$ ,  $p = .005$ ) and diastolic ( $b = 0.48$ ,  $SE = 0.18$ ,  $p = .01$ ) ABP. The interaction is depicted graphically in Fig. 2 (only systolic is represented graphically as diastolic is nearly identical in form). The difference between ambivalent and supportive relationships may or may not be significantly different for varying values of CC equity. Thus, we performed a regions of significance analysis by investigating the marginal means for the



**Fig. 1.** Figure shows the mothers' perceived equity between spouses for both childcare and household work. CC scale ranges from 12 to 60, HH work scale ranges from 19 to 95. The dotted vertical lines represent the median of 36 for CC and 57 for HH work, which indicates equal sharing of responsibilities between spouses. *CC* childcare; *HH* household.

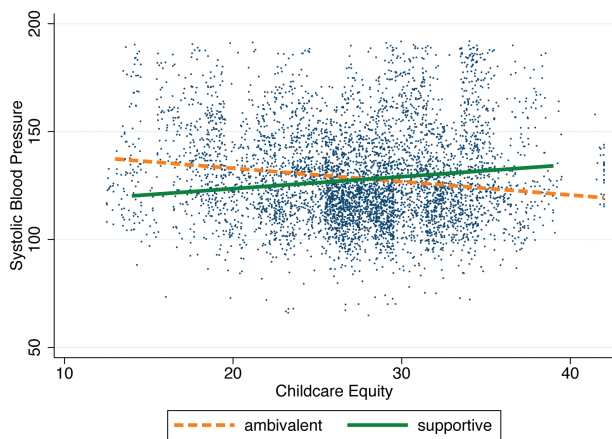
**Table 2** Pearson Correlation Table

Variable	1	2	3	4	5	6	7	8	9
1. Resting Systolic Blood Pressure	–								
2. Resting Diastolic Blood Pressure	0.661	–							
3. Perceived Stress Scale	–0.065	–0.002	–						
4. Social Relationship Index	–0.039	–0.044	0.053	–					
5. Household Work Equity	0.002	–0.024	0.017	0.098	–				
6. Childcare Equity	0.019	–0.115	0.006	0.201	0.502	–			
7. Education	–0.064	–0.162	0.051	0.132	0.039	0.111	–		
8. Income	0.055	–0.044	–0.034	–0.042	0.062	0.151	0.341	–	
9. Age	0.191	0.151	–0.164	–0.164	–0.069	–0.043	0.121	0.008	–

**Table 3** Ambulatory Blood Pressure Multilevel Mixed Model Output

Fixed effects	Systolic			Diastolic		
	Coef.	SE	95% CI	Coef.	SE	95% CI
(Intercept)	2.62	14.24	−25.29, 30.52	−11.00	8.71	−28.07, 6.06
Childcare	−0.47*	0.22	−0.89, −0.05	−0.22	0.12	−0.46, 0.02
Relationship quality	−25.77*	9.50	−44.31, −7.24	−13.41*	5.30	−23.80, −3.01
Relationship quality × childcare	0.94*	0.33	0.29, 1.60	0.48*	0.18	0.11, 0.84
Household work	−0.05	0.09	−0.24, 0.150	−0.01	0.06	−0.12, 0.10
Control variables						
Time	0.09*	0.04	0.02, 0.15	−0.10*	0.02	−0.14, −0.05
BMI	0.90*	0.24	0.42, 1.40	0.69*	0.12	0.45, 0.93
Baseline blood pressure	0.77*	0.08	0.61, 0.94	0.80*	0.07	0.67, 0.93
Stress	0.35	0.28	−0.19, 0.90	0.12	0.16	−0.18, 0.43
Group	4.80*	2.00	0.90, 8.60	−1.79	0.10	−3.95, 0.36
Income	1.43*	0.67	0.11, 2.74	0.46	0.38	−0.27, 1.20
Position	4.77*	0.47	3.84, 5.69	5.80*	0.42	4.94, 6.6
Activity	1.37*	0.42	0.55, 2.19	0.53	0.30	−0.06, 1.13
Talking	−1.21*	0.39	−1.98, −0.43	−1.50*	0.33	−2.14, −0.90
Location	0.30	0.28	−0.25, 0.84	0.54*	0.23	0.11, 0.98
Temperature	0.10	0.60	−1.08, 1.27	−1.05*	0.49	−2.00, −0.08
Exercise	0.45	2.79	−5.03, 5.91	3.70	2.27	−0.76, 8.14
Everyday problem	0.24	0.45	−0.64, 1.11	−0.31	0.36	−1.03, 0.40
Difficult/unique problem	1.77*	0.64	0.51, 3.02	0.91	0.53	−0.12, 1.94

Note. Model output showing statistical significance for hypothesized predictor variables including all control, fixed effects variables. Additionally, this model output results includes the random effects of Time, Activity, and Posture. *BMI* body mass index.  $p < .05$ .



**Fig. 2.** This figure depicts the crossover interaction of relationship quality and childcare equity. At lower levels of CC work performed by the husband, the effect on ABP is worse for mothers in an ambivalent compared with a supportive relationship. However, at higher levels of CC work performed by the husband (just slightly above “equal”) the effect on ABP is better for ambivalent compared with supportive relationships. *ABP* ambulatory blood pressure; *CC* childcare.

ambivalent-supportive difference. We varied CC from our sample’s mean (27.4) and standard deviation (5.4) and the range of responses  $-3$  *SD* below the mean and  $+3$  *SD* above the mean (CC raw scores of 12 and 44). Results indicated that the difference between mothers in supportive and ambivalent relationships is significant for CC scores at or below 1 *SD* from the mean and at or above 2 *SD* from the mean (CC raw scores of below 20 and above 32). For scores greater than  $-1$

*SD* below the mean and less than  $+2$  *SD* above the mean (raw scores between 21 and 31) the effect is not significant. The systolic value for ambivalent at CC equity  $-3$  *SD* (raw score of 12; meaning the mother does all the work) was 135.25 mm Hg whereas the same value for supportive was 120.8 mm Hg (see Table 4). Demonstrating that when a mother does all the CC work but has a supportive marital relationship her systolic is 14.44 mm Hg lower than if she had an ambivalent marital relationship. The systolic score for ambivalent at CC equity  $+3$  *SD* (raw score of 44; meaning the husband contributes slightly more CC work) was 120.12 mm Hg whereas the same value for supportive was 135.87 mm Hg. This shows that when there is more equity (with slightly more CC work done by the husband) her systolic ABP is 15.75 mm Hg lower if she has an ambivalent marital relationship compared with a supportive marital relationship. Marginal mean differences at all levels of CC equity for both systolic and diastolic can be found in Table 4 and systolic is represented graphically in Fig. 2.

## Discussion

The purpose of this preregistered project was to investigate CC and HH work and marital relationship quality influences on ABP on a sample of married mothers. Results indicated that the perception of equity in the division of CC responsibilities between mothers and their husbands significantly contributed to lower systolic ABP. Relationships containing high positivity and low negativity (supportive) had lower systolic and diastolic ABP than those which contained simultaneously high positivity and negativity

**Table 4** Marginal Mean Ambulatory Blood Pressure Differences Between Ambivalent and Supportive Marital Relationships at Varying Levels of Childcare Equity

SD units from mean (CC equity score)	Systolic			Diastolic		
	Mean difference	SE	95% CI	Mean difference	SE	95% CI
-3 SD (12)	-14.44*	5.56	-25.34, -3.55	-7.67*	3.12	-13.78, -1.55
-2 SD (17)	-9.73*	4.00	-17.57, -1.88	-5.28*	2.25	-9.68, -0.87
-1 SD (22)	-5.01*	2.59	-10.09, 0.07	-2.88*	1.46	-5.74, -0.03
Mean (27)	-0.29	1.73	-3.67, 3.10	-0.49	0.97	-2.39, 1.41
+1 SD (33)	5.37	2.42	0.62, 10.12	-2.38	1.35	-0.28, 5.03
+2 SD (38)	10.09*	3.80	2.65, 17.54	4.77*	2.12	0.61, 8.93
+3 SD (44)	15.75*	5.66	4.66, 26.85	7.64*	3.17	1.43, 13.84

Note. Scale scores rounded to the nearest digit. The Mean of the Childcare Equity scale is 27.4 ( $SD = 5.4$ ). A Childcare Equity score of -3 SD below the mean (a raw score of 12) indicates that the mother does all the work, +7 SD above the mean (a raw score of 60) would indicate that the husband does all the work. A score of nearly +2 SD above the mean (a raw score of 36) indicates equal sharing of the work between spouses. Ambivalent is the base comparison, thus mean difference coefficients represent the change from ambivalent to supportive relationships. CC childcare. \*  $p < .05$ .

(ambivalent). Additionally, the effect of relationship quality on both systolic and diastolic ABP was moderated by the perception of equity in the division of CC responsibilities between spouses.

### CC and HH Equity

As noted in the literature, married women spend about twice as much time on CC and HH responsibilities than their husbands [4–7]. In the present study, this trend was similarly apparent for CC. Indeed, less than 10% of this sample reported the husband completing an equal amount of CC. The sample was a bit more balanced regarding HH responsibilities. Investigating the perceived equity in CC and HH work by relationship quality revealed that mothers in an ambivalent marital relationship are doing slightly more CC and HH work than mothers in supportive relationships; although in both of these groups, the majority of this work was still completed by the mother. When we investigated this further by comparing working mothers to nonworking mothers, this pattern still held—and is consistent with the literature [8]. This demonstrates that even if both spouses are working, the mother is still doing the majority of the CC and HH tasks.

Per our hypotheses, we expected to see greater inequity for both CC and HH constructs to significantly influence ABP. We found that CC equity was a significant contributor to higher systolic ABP (but not diastolic), but that HH equity did not significantly influence ABP. This finding is consistent with prior research [10]. Although these two variables had a moderate positive correlation, the final model's multicollinearity tests demonstrated that statistical validity was not an issue; each predictor (including CC and HH tasks) independently contributed to the model's variance. Perhaps, the routine responsibilities of caring for the upbringing and development of a child is fundamentally central for mothers more so than important HH chores. Additionally, the effect of CC equity was significant even while controlling for HH responsibilities. This demonstrates that accounting for CC equity is an important aspect and is separate from HH responsibilities.

This finding is interesting as it highlights the importance of CC responsibilities within a family. The quality of the parental care in child raising is important for the development of the child but the responsibility of carrying the majority of this load has direct health implications for the mother; mothers who perceived that they were doing the majority of

this work had higher systolic blood pressure. HH responsibilities were shown to be similarly imbalanced between mothers and fathers but CC tasks were the driving influence behind the health associations.

### Relationship Quality

As hypothesized, women who reported a supportive marital relationship demonstrated lower systolic and diastolic ABP than those in an ambivalent relationship. This, too, is consistent with literature showing spouses in supportive relationships exhibit lower blood pressure.

Over half of the mothers in our study reported an ambivalent relationship with their spouse. This finding is consistent with previous studies where the slight majority of recruited couples typically report their marital relationship quality as ambivalent [52]. Mothers in supportive marital relationships demonstrated a substantial 25.77 mm Hg decrease in systolic ABP than mothers in ambivalent relationships. Although the high positivity in ambivalent relationships may be sources of comfort and support, the high negativity is clearly taking a toll on the mothers' ABP.

### Interaction of CC Equity and Relationship Quality on ABP

Our results indicate that the systolic and diastolic ABP reducing effects are contingent upon both the perceived CC equity and the marital relationship quality of the couple, as shown in Fig. 2 and Table 4. ABP seems to be protective for mothers in supportive relationships who perceive themselves as doing all the CC tasks. However, the more these mothers perceive equal sharing of CC tasks, the more their ABP increases. Additionally, mothers in ambivalent relationships have higher ABP when she perceives to be doing all the CC tasks. However, the more she perceives that the husband contributes to CC tasks, the more these mother's ABP decreases. In fact, when CC equity is low, with the mother performing the majority of the tasks, mothers in supportive relationships have lower ABP by -14.44/-7.67 mm Hg. When CC equity is more perceived equal between partners, mothers in supportive relationships have higher ABP by 15.75/7.64 mm Hg.

The linear association between ambivalent marriages and perceived CC equity on ABP makes intuitive sense; in an ambivalent relationship that contains highly negative aspects, the less the husband contributes to the CC duties, the more



adversely impacted the mother's ABP health. In this same context of a highly ambivalent relationship situation, as partners are perceived to perform more of an equal share of the CC tasks, the effect on ABP is less pronounced. Decreasing mothers' CC tasks, which can sometimes be monotonous routine, could directly benefit mothers in various ways such as more personal time, or even just a reprieve from routine, thus contributing to her health. Additionally, husbands' investment in family processes and routine tasks can directly display their love and devotion to the family. Thus, even in ambivalent marital relationships, the husband's commitment to family is not in question. In this sense, actions really do speak louder than words.

Whereas the ambivalent linear relation is intuitive, the linear association between supportive marriages and perceived CC equity on ABP is less so. These results reveal that in supportive marital (low negativity and high positivity) relationships, mothers demonstrate lower ABP. However, as partners are perceived to perform more of an equal share of the CC tasks the effect on ABP becomes increasingly higher. As indicated, the effect size of relationship quality is quite large. Thus, at lower levels of perceived CC equity where there is less CC tasks performed by husbands, it seems that being in a highly supportive and positive marriage acts as a protective factor, despite the majority of CC responsibilities falling on the mother. One potential explanation for the increase in ABP when the CC tasks become more equitable for supportive marital relationships could be beliefs regarding gender roles. Despite the recent societal departure from traditional gender roles [82], many families still hold these values. Possibly, mothers who believe that CC duties are her sole responsibility, are at odds with the equitable responsibilities. The incongruent clash of behavior and ideology is not a new phenomenon. Indeed, cognitive dissonance theory [83] has been said to be one of the most influential theories in social psychology [84]. According to this theory, the more our thoughts and behaviors are in competition, the more one of these needs to give or cognitive dissonance ensues and brings about negative consequences including physiological effects [85]. It may be that some mothers are experiencing cognitive dissonance if they feel that their husbands are contributing more to the CC responsibilities than their held belief. Along these lines, the couple's marital satisfaction could be a result of these gender roles being upheld by the mother perceiving that she is performing most of the CC tasks. For example, when a couple hold these traditional gender roles, and the mother perceives she is performing the majority of the CC tasks, their marital satisfaction is higher because family processes are functioning appropriately for their held values (i.e., cognitive dissonance is low because values and behaviors are congruent).

This interaction demonstrates that the influences that marital relationship quality and perceived CC equity have on mothers' ABP are interconnected as well as nuanced. As noted in the literature, unequal CC responsibilities can negatively affect the marital relationship [29–31]. The more that partners participate equally, the more satisfied couples are with overall sex life, cuddling, relationship quality, and the amount of passion in their marital relationship. This lends evidence to the idea that there is likely a cyclical aspect to relationship processes such as CC tasks and marital relationship quality [86]. Perceived equity in CC may contribute to a better relationship which leads to more satisfaction with relationships processes. This, in turn, could contribute to mothers' healthier ABP.

## Limitations and Future Directions

There are several limitations of the current study that should be noted. Our measures of both CC and HH work equity and relationship quality produced a *perceived* construct from the mothers' point of view rather than an objective construct. Most investigations of HH and CC equity have used subjective measures rather than an actual time use measures of equity. When compared, the methods are not always similar. Thus, future research should collect this information using both methods. Further data could be collected from the husband and compare answers to these questions between spouses. This is not to discount the power of perception [87]. The reality of the CC and HH work division and the marital relationship quality may not be as important as what the participant perceives as reality. As Thurston et al. [12] states "the perception of responsibility for these household tasks may be more important for health than the time spent doing them" (p. 2). The important point in both constructs is how much of the at-home responsibilities the mother *thinks* and *feels* she is doing and how much positivity and negativity does she *feel she experiences* in the marriage. Future research should also include both equity and fairness in the evaluation of CC and HH work.

The parenting stage of the mother is an important aspect, as having a child under the age of 6 years is fundamentally different than one who is over the age of 18 years and no longer living in the home. To assess this, we used a staged child age question that had mothers select each of the categories that described their current parenting stage. Participants selected from the options of "child under the age of 6," "child between the ages of 6 and 12," and "child between the ages of 12 and 18." Indeed, the majority, nearly 81%, reported having a child under the age of six. However, this question only allowed us to assess the general parenting stage rather than exact child age. It could be that ABP differs between mothers parenting a newborn child compared with a child 5 years of age. We were unable to assess this important aspect in the present study. Future research should assess the child's exact age in order to have a more precise measurement of the parenting stage. Additionally, our measure was conflated as to the number of children the mother has. It has been shown in the literature that number of children is positively associated with blood pressure and greater marital dissatisfaction [54, 88]. The question "how many children do you have" was not included in the present study. This is an aspect that should be included in future research. Finally, while we believe there are no physiological differences between biological versus mothers with adopted children, it might be something that could warrant further examination.

Research in the division of CC and HH responsibilities suggests that both equity and fairness are important factors to account for in both relationship and health outcomes. In the present study we had the mothers indicate which tasks, and how much of each task, was typically completed by her compared with her husband. This gave us a good perceived equity scale from the mother's perspective. However, we did not account for *fairness* in the division of work. Results indicated that mothers are doing most of the work with regard to CC and HH responsibilities. However, we have no indication of how the participant mother feels toward this division. It could be that although she is doing all the work, she may feel it a fair division. Conversely, it could also be that a couple

divides their CC and HH work evenly between themselves, but the mother considers this unfair (either to herself or her husband).

Finally, most of our participants were White (88%), healthy, and educated—the majority having completed at least some college education (81%). We only sampled heterosexual legally married mothers, so it is unclear how these data apply to same-sex and/or cohabiting/dating mothers. Because of the homogeneity of this sample, we should exercise caution in generalizing beyond the current sample. Future research should investigate couples including dyadic data rather than perceptions from only one partner and should include same-sex and nontraditional relationships.

Despite these limitations, our study has several strengths that lend justification to our conclusions. We followed our a priori preregistered plan for data analysis which allows others to transparently evaluate the severity of our hypothesis tests and conclusions. Combined with the large number of participants and the high number of ABP readings ( $M = 24$ ) for each of those participants, this study was appropriately powered to detect our hypothesized predictions at the 95% confidence level. Our analytical strategy was appropriate for the data; we used a multilevel mixed model that specifically accounted for the within-subject variability as well as the between-subject fixed effects.

These findings highlight areas of direct application: removing some of the CC burden from mothers could have an immediate impact in reducing a mother's diurnal blood pressure. Additionally, the marital relationship quality finding has a clear and distinct message—spouses should prioritize their marital relationship and work to nurture the supportive aspects.

## Acknowledgment

Not Applicable.

## Compliance with Ethical Standards

**Authors' Statement of Conflict of Interest and Adherence to Ethical Standards** Tyler Graff, Wendy Birmingham, Lori L. Wadsworth, and Man Hung declare that they have no conflict of interest.

**Authors' Contributions** Tyler C Graff (Conceptualization [equal], Data curation [lead], Formal analysis [lead], Investigation [lead], Methodology [equal], Project administration [equal], Resources [equal], Software [lead], Supervision [lead], Validation [lead], Visualization [lead], Writing – original draft [lead], Writing – review & editing [lead]), Wendy Birmingham (Conceptualization [lead], Data curation [equal], Funding acquisition [lead], Investigation [equal], Methodology [equal], Project administration [lead], Resources [equal], Supervision [lead], Validation [equal], Writing – review & editing [equal]), Lori Wadsworth (Conceptualization [equal], Data curation [supporting], Funding acquisition [equal], Methodology [supporting], Project administration [supporting], Resources [supporting], Supervision [equal], Validation [supporting], Writing – review & editing [equal]), and Man Hung (Conceptualization [equal], Formal analysis [supporting], Funding acquisition [supporting], Methodology [equal], Writing – review & editing [equal])

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the

ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

**Open Science Transparency Statements** (1) study registration: <https://osf.io/t8ydu>, (2) analytic plan registration: <https://osf.io/t8ydu>, (3) availability of data: <https://osf.io/nkfp/>, (4) availability of analytic code: <https://osf.io/nkfp/>, and (5) availability of materials: <https://osf.io/nkfp/>.

## References

- Lachance-grzela M, Bouchard G. Why do women do the lion's share of housework? A decade of research. *Sex Roles*. 2010;63(11):767–780.
- Polachek AJ, Wallace JE. Unfair to me or unfair to my spouse: men's and women's perceptions of domestic equity and how they relate to mental and physical health. *Marriage Fam Rev*. 2015;51(3):205–228.
- Hochschild A, Machung A. *The Second Shift: Working Families and the Revolution at Home*. New York: Penguin; 2012.
- Bianchi SM, Sayer LC, Milkie MA, Robinson JP. Housework: who did, does or will do it, and how much does it matter? *Soc Forces*. 2012;91(1):55–63.
- Coltrane S. Research on household labor: modeling and measuring the social embeddedness of routine family work. *J Marriage Fam*. 2000;62(4):1208–1233.
- Mannino CA, Deutsch FM. Changing the division of household labor: a negotiated process between partners. *Sex Roles*. 2007;56(5-6):309–324.
- Poortman A-R, Van Der Lippe T. Attitudes toward housework and child care and the gendered division of labor. *J Marriage Fam*. 2009;71(3):526–541.
- Dempsey KC. Men and women's power relationships and the persisting inequitable division of housework. *J Fam Stud*. 2000;6(1):7–24.
- Khawaja M, Habib RR. Husbands' involvement in housework and women's psychosocial health: findings from a population-based study in Lebanon. *Am J Public Health*. 2007;97(5):860–866.
- Goldberg AE, Perry-Jenkins M. Division of labor and working-class women's well-being across the transition to parenthood. *J Fam Psychol*. 2004;18(1):225–236.
- Eek F, Axmon A. Gender inequality at home is associated with poorer health for women. *Scand J Public Health*. 2015;43(2):176–182.
- Thurston RC, Sherwood A, Matthews KA, Blumenthal JA. Household responsibilities, income, and ambulatory blood pressure among working men and women. *Psychosom Med*. 2011;73(2):200–205.
- Boszormenyi-Nagy I. *Foundations of Contextual Therapy. Collected Papers of Ivan Boszormenyi-Nagy*. New York: Brunner. Mazel Publishers; 1987.
- Strandberg TE. Blood pressure in a 100-year perspective. *Circulation*. 2019;140(2):101–102.
- Benjamin EJ, Virani SS, Callaway CW, et al.; American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2018 update: a report from the American Heart Association. *Circulation*. 2018;137(12):e67–e492.
- Perloff D, Sokolow M, Cowan R. The prognostic value of ambulatory blood pressures. *JAMA*. 1983;249(20):2792–2798.
- Pickering TG, Shimbo D, Haas D. Ambulatory blood-pressure monitoring. *N Engl J Med*. 2006;354(22):2368–2374.
- Marler MR, Jacob RG, Lehoczyk JP, Shapiro AP. The statistical analysis of treatment effects in 24-hour ambulatory blood pressure recordings. *Stat Med*. 1988;7(6):697–716.
- Perry-Jenkins M, Newkirk K, Ghunney AK. Family work through time and space: an ecological perspective. *J Fam Theor Rev*. 2013;5(2):105–123.

20. Tao W, Janzen BL, Abonyi S. Gender, division of unpaid family work and psychological distress in dual-earner families. *Clin Pract Epidemiol Ment Health*. 2010;6:36–46.
21. Barnett RC, Shen Y-C. Gender, high- and low-schedule-control housework tasks, and psychological distress: a study of dual-earner couples. *J Fam Issues*. 1997;18(4):403–428.
22. Almeida DM, Maggs JL, Galambos NL. Wives' employment hours and spousal participation in family work. *J Fam Psychol*. 1993;7(2):233–244.
23. Grames HA, Miller RB, Robinson WD, Higgins DJ, Hinton WJ. A test of contextual theory: the relationship among relational ethics, marital satisfaction, health problems, and depression. *Contemp Fam Ther*. 2008;30(4):183–198.
24. Claffey ST, Mickelson KD. Division of household labor and distress: the role of perceived fairness for employed mothers. *Sex Roles*. 2009;60(11-12):819–831.
25. Voydanoff P, Donnelly BW. The intersection of time in activities and perceived unfairness in relation to psychological distress and marital quality. *J Marriage Fam*. 1999;61(3):739–751.
26. Harryson L, Strandh M, Hammarström A. domestic work and psychological distress—what is the importance of relative socioeconomic position and gender inequality in the couple relationship? *PLoS One*. 2012;7(6):e38484.
27. Sperlich S, Geyer S. The impact of social and family-related factors on women's stress experience in household and family work. *Int J Public Health*. 2015;60(3):375–387.
28. Waldron I, Herold J, Dunn D. How valid are self-report measures for evaluating relationships between women's: health and labor force participation? *Women Health*. 1982;7(2):53–66.
29. Newkirk K, Perry-Jenkins M, Sayer AG. Division of household and childcare labor and relationship conflict among low-income new parents. *Sex Roles*. 2017;76(5):319–333.
30. Frisco ML, Williams K. Perceived housework equity, marital happiness, and divorce in dual-earner households. *J Fam Issues*. 2003;24(1):51–73.
31. Barstad A. Equality is bliss? Relationship quality and the gender division of household labor. *J Fam Issues*. 2014;35(7):972–992.
32. Orbuch TL, Eyster SL. Division of household labor among Black couples and White couples. *Social Forces*. 1997;76(1):301–332.
33. Lye DN, Biblarz TJ. The effects of attitudes toward family life and gender roles on marital satisfaction. *J Fam Issues*. 1993;14(2):157–188.
34. Helms HM, Walls JK, Crouter AC, McHale SM. Provider role attitudes, marital satisfaction, role overload, and housework: a dyadic approach. *J Fam Psychol*. 2010;24(5):568–577.
35. Hoffman L, Hoffman LN, Youngblade L. *Mothers at Work: Effects on Children's Well-being*. Cambridge: Cambridge University Press; 1999.
36. Gottman JM, Silver N. *The Seven Principles for Making Marriage Work: A Practical Guide from the Country's Foremost Relationship Expert*. New York: Harmony; 2015.
37. Tai T-o, Baxter J. Perceptions of fairness and housework disagreement: a comparative analysis. *J Fam Issues*. 2018;39(8):2461–2485.
38. Stohs JH. Multicultural women's experience of household labor, conflicts, and equity. *Sex Roles*. 2000;42(5):339–361.
39. Birmingham W, Uchino BN, Smith TW, Light KC, Butner J. It's complicated: marital ambivalence on ambulatory blood pressure and daily interpersonal functioning. *Ann Behav Med*. 2015;49(5):743–753.
40. Holt-Lunstad J, Birmingham W, Jones BQ. Is there something unique about marriage? The relative impact of marital status, relationship quality, and network social support on ambulatory blood pressure and mental health. *Ann Behav Med*. 2008;35(2):239–244.
41. Newsom JT, Mahan TL, Rook KS, Krause N. 'Stable negative social exchanges and health': correction to Newsom *et al.* (2008). *Health Psychol*. 2008;27(3):357.
42. Uchino BN. *Social Support and Physical Health: Understanding the Health Consequences of Our Relationships*. New Haven, CT: Yale University Press; 2004.
43. Kiecolt-Glaser JK, Newton T, Cacioppo JT, MacCallum RC, Glaser R, Malarkey WB. Marital conflict and endocrine function: are men really more physiologically affected than women? *J Consult Clin Psychol*. 1996;64(2):324–332.
44. Umberson D, Williams K, Powers DA, Liu H, Needham B. You make me sick: marital quality and health over the life course. *J Health Soc Behav*. 2006;47(1):1–16.
45. Campo RA, Uchino BN, Holt-Lunstad J, Vaughn A, Reblin M, Smith TW. The assessment of positivity and negativity in social networks: the reliability and validity of the social relationships index. *J Community Psychol*. 2009;37(4):471–486.
46. Uchino BN, Holt-Lunstad J, Uno D, Flinders JB. Heterogeneity in the social networks of young and older adults: prediction of mental health and cardiovascular reactivity during acute stress. *J Behav Med*. 2001;24(4):361–382.
47. Burg MM, Seeman TE. Families and health: the negative side of social ties. *Ann Behav Med*. 1994;16(2):109–115.
48. Rook KS. Social networks in later life: weighing positive and negative effects on health and well-being. *Curr Dir Psychol Sci*. 2015;24(1):45–51.
49. Brooks KP, Dunkel Schetter C. Social negativity and health: conceptual and measurement issues. *Soc Personal Psychol Compass*. 2011;5(11):904–918.
50. Fincham FD, Linfield KJ. A new look at marital quality: can spouses feel positive and negative about their marriage? *J Fam Psychol*. 1997;11(4):489–502.
51. Robles TF, Slatcher RB, Trombello JM, McGinn MM. Marital quality and health: a meta-analytic review. *Psychol Bull*. 2014;140(1):140–187.
52. Uchino BN, Smith TW, Berg CA. Spousal relationship quality and cardiovascular risk: dyadic perceptions of relationship ambivalence are associated with coronary-artery calcification. *Psychol Sci*. 2014;25(4):1037–1042.
53. Reblin M, Vaughn AA, Birmingham WC, Smith TW, Uchino BN, Spahr CM. Complex assessment of relationship quality within dyads. *J Community Psychol*. 2020;48(7):2221–2237.
54. Twenge JM, Campbell WK, Foster CA. Parenthood and marital satisfaction: a meta-analytic review. *J Marriage Fam*. 2003;65(3):574–583.
55. Meijer AM, van den Wittenboer GLH. Contribution of infants' sleep and crying to marital relationship of first-time parent couples in the 1st year after childbirth. *J Fam Psychol*. 2007;21(1):49–57.
56. Perren S, von Wyl A, Burgin D, Simoni H, von Klitzing K. Depressive symptoms and psychosocial stress across the transition to parenthood: associations with parental psychopathology and child difficulty. *J Psychosom Obstet Gynaecol*. 2005;26(3):173–183.
57. Mitnick DM, Heyman RE, Smith Slep AM. Changes in relationship satisfaction across the transition to parenthood: a meta-analysis. *J Fam Psychol*. 2009;23(6):848–852.
58. Karney BR, Bradbury TN. Research on marital satisfaction and stability in the 2010s: challenging conventional wisdom. *J Marriage Fam*. 2020;82(1):100–116.
59. Don BP, Mickelson KD. Relationship satisfaction trajectories across the transition to parenthood among low-risk parents. *J Marriage Fam*. 2014;76(3):677–692.
60. Don BP, Eller J, Simpson JA, et al. New parental positivity: the role of positive emotions in promoting relational adjustment during the transition to parenthood. *J Pers Soc Psychol*. 2022;123:84–106.
61. Grunow D, Schulz F, Blossfeld H-P. What determines change in the division of housework over the course of marriage? *Int Sociol*. 2012;27(3):289–307.
62. Fokkema T. Combining a job and children: contrasting the health of married and divorced women in the Netherlands? *Soc Sci Med*. 2002;54(5):741–752.
63. Kostiaainen E, Martelin T, Kestilä L, Martikainen P, Koskinen S. Employee, partner, and mother: woman's three roles and their implications for health. *J Fam Issues*. 2009;30(8):1122–1150.
64. Light KC, Smith TE, Johns JM, Brownley KA, Hofheimer JA, Amico JA. Oxytocin responsivity in mothers of infants: a preliminary

- study of relationships with blood pressure during laboratory stress and normal ambulatory activity. *Health Psychol.* 2000;19(6):560–567.
65. Kendig H, Dykstra PA, van Gaalen RI, Melkas T. Health of aging parents and childless individuals. *J Fam Issues.* 2007;28(11):1457–1486.
  66. Holt-Lunstad J, Birmingham W, Howard AM, Thoman D. Married with children: the influence of parental status and gender on ambulatory blood pressure. *Ann Behav Med.* 2009;38(3):170–179.
  67. Arendell T. Conceiving and investigating motherhood: the Decade's scholarship. *J Marriage Fam.* 2000;62(4):1192–1207.
  68. Ross CE, Mirowsky J, Goldsteen K. The impact of the family on health: the decade in review. *J Marriage Fam.* 1990;52(4):1059–1078.
  69. Ituarte PHG, Kamarck TW, Thompson HS, Bacanu S. Psychosocial mediators of racial differences in nighttime blood pressure dipping among normotensive adults. *Health Psychol.* 1999;18(4):393–402.
  70. Bures RM, Koropecjy-Cox T, Loree M. Childlessness, parenthood, and depressive symptoms among middle-aged and older adults. *J Fam Issues.* 2009;30(5):670–687.
  71. Simon RW, Caputo J. The costs and benefits of parenthood for mental and physical health in the United States: the importance of parenting stage. *Soc Ment Health.* 2018;9:296–315.
  72. Nomaguchi KM, Milkie MA. Costs and rewards of children: the effects of becoming a parent on adults' lives. *J Marriage Fam.* 2003;65(2):356–374.
  73. Cacioppo JT, Malarkey WB, Kiecolt-Glaser JK, et al. Heterogeneity in neuroendocrine and immune responses to brief psychological stressors as a function of autonomic cardiac activation. *Psychosom Med.* 1995;57(2):154–164.
  74. Thompson ML, Williams MA, Miller RS. Modelling the association of blood pressure during pregnancy with gestational age and body mass index. *Paediatr Perinat Epidemiol.* 2009;23(3):254–263.
  75. Czernichow S, Castetbon K, Salanave B, et al. Determinants of blood pressure treatment and control in obese people: evidence from the general population. *J Hypertens.* 2012;30(12):2338–2344.
  76. Shihab HM, Meoni LA, Chu AY, et al. Body mass index and risk of incident hypertension over the life course: the Johns Hopkins Precursors Study. *Circulation.* 2012.
  77. Mederer HJ. Division of labor in two-earner homes: task accomplishment versus household management as critical variables in perceptions about family work. *J Marriage Fam.* 1993;55(1):133–145.
  78. Goodwin J, Bilous M, Winship S, Finn P, Jones SC. Validation of the Oscar 2 oscillometric 24-h ambulatory blood pressure monitor according to the British Hypertension Society protocol. *Blood Press Monit.* 2007;12(2):113–117.
  79. Cohen S, Williamson G. Perceived stress in a probability sample of the United States. In: Spacapan S, Oskamp S, eds. *The Social Psychology of Health.* Newbury Park: Sage; 1988.
  80. Hedges SM, Krantz DS, Contrada RJ, Rozanski AR. Development of a diary for use with ambulatory monitoring of mood, activities, and physiological function. *J Psychopathol Behav Assess.* 1990;12(3):203–217.
  81. Park T, Lee YJ. Covariance models for nested repeated measures data: analysis of ovarian steroid secretion data. *Stat Med.* 2002;21(1):143–164.
  82. Eagly AH, Wood W. Explaining sex differences in social behavior: a meta-analytic perspective. *Pers Soc Psychol Bull.* 1991;17(3):306–315.
  83. Festinger L. *A Theory of Cognitive Dissonance.* Stanford: Stanford University Press; 1957.
  84. Cooper J. *Cognitive Dissonance: 50 Years of a Classic Theory.* London: Sage; 2007.
  85. Croyle RT, Cooper J. Dissonance arousal: physiological evidence. *J Pers Soc Psychol.* 1983;45(4):782–791.
  86. McNulty JK, Wenner CA, Fisher TD. Longitudinal associations among relationship satisfaction, sexual satisfaction, and frequency of sex in early marriage. *Arch Sex Behav.* 2016;45(1):85–97.
  87. Adjzen I, Fishbein M. *Understanding Attitudes and Predicting Social Behaviour.* Englewood Cliffs, NJ: Prentice Hall; 1980.
  88. Brisson C, Laflamme N, Moisan J, Milot A, Mâsse B, Vézina M. Effect of family responsibilities and job strain on ambulatory blood pressure among white-collar women. *Psychosom Med.* 1999;61(2):205–213.