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Marital Factors Associated with Weight-Related Behavior in Bariatric Surgery Patients

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Abstract

Obesity is a major health concern in the United States. Whereas bariatric surgery is effective, 10-40% of post-operative patients struggle to reach or maintain their goal weight (Elder & Wolfe, 2007). The current study investigated the within-person relations between marital quality and weight-related behaviors using a daily diary design. Length of relationship, time since surgery, and participant sex were explored as moderators. Participants were 94 post-operative bariatric surgery patients. Eligible participants completed an online baseline questionnaire, followed by a one-week online daily diary in which they responded to questions about the quality of their marriage, whether they engaged in physical activity, and whether they adhered to their diet that day. Multilevel models were used to test for same-day and next-day associations. A within-person positive, bidirectional association between marital satisfaction and physical activity on the same day and on the following day was found; however, after correcting for multiple tests, only physical activity predicting marital satisfaction on the same day remained significant. There was a between-person negative, bidirectional association between average levels of marital satisfaction and grazing behavior. Lastly, there was a between-person negative association between spousal reinforcing support and grazing and eating past the point of feeling full on the same day. Relationship length moderated the relation between meal planning and reinforcing support on the same day, as well as physical activity and constructive communication on the following day. Sex differences were found for the relation between physical activity and marital satisfaction on the same day, as well as sexual activity and physical activity on the next day. Findings from this study provide support for bidirectional relations between marital quality and weight-related behavior and provide preliminary support for treatments that target improving marital quality in conjunction with weight-specific treatments.

Marital Factors Associated with Weight-Related Behavior in Bariatric Surgery Patients

Obesity is a major health concern across the United States. In a recent study, it was estimated that 37.7% of U.S. adults are obese, and this number has been steadily increasing over the past decade (Flegal, Kruszon-Moran, Carroll, Fryar, & Ogden, 2016). Further, it is expected that 51% of adults will be obese by 2030 (Finkelstein et al., 2012). Obesity is associated with increased morbidity, including diabetes, heart disease, hypertension, stroke, and cancer (CDC, 2015; Initiative N.O.E., 2010). Additionally, obesity is associated with mental health outcomes such as lower self-esteem, increased self-reported stress, body image disturbance, lower quality of life, anxiety, depression, and substance use (see Papadopoulos & Brennan, 2015 for review). Given the physical and mental health outcomes associated with obesity, identifying factors associated with weight loss and maintenance success is a significant public health concern.

There are several methods through which individuals can lose weight including behavioral interventions, pharmacological agents, and surgical interventions. Behavioral interventions include changes to diet and increased physical activity. This is recommended for individuals with body mass index (BMI) greater than 30 or greater than 25 with co-morbid health conditions (e.g., hypertension, diabetes). It is estimated that behavioral interventions alone result in approximately 7-10% total body weight loss (Wadden, Butryn, & Byrne, 2004). Pharmacological agents may be added as an adjunct to behavioral interventions for those individuals with BMI greater than 30 who have had difficulty maintaining weight loss in the past. Pharmacological agents work by reducing appetite or fat absorption. It is estimated that pharmacological agents added as an adjunct to behavioral interventions results in an average of 12% total body weight loss (Jeffery et al., 2000). Lastly, surgical interventions for weight loss are recommended for individuals with BMI greater than 40 or greater than 35 with comorbid

health conditions. Surgical interventions work by altering an individual's anatomy in order to reduce food intake. It is estimated that surgical interventions result in approximately 20-32% initial body weight loss (Courcoulas et al., 2013; Sjöström, Lissner, Wedel, & Sjöström, 1999).

The most effective method of weight loss for obese individuals in terms of initial weight loss and long-term maintenance is surgical interventions or bariatric surgery (Sarwer, Dilks, & West-Smith, 2011). Approximately 10-40% of bariatric surgery patients, however, do not achieve long-term weight loss success (Elder & Wolfe, 2007). Results from the Swedish Obese Subjects study and the Longitudinal Assessment of Bariatric Surgery suggest that most patients lose a significant portion of weight in the first year following surgery and then regain some or all of the weight two to ten years after surgery, highlighting the importance of identifying factors associated with weight maintenance success (Courcoulas et al., 2013; Sjöström et al., 2007).

Several factors are associated with weight maintenance following bariatric surgery such as amount of initial weight lost, self-monitoring of weight-related behaviors (e.g., food logging, weighing), unplanned grazing behaviors, binge eating behaviors, eating past the point of feeling full, and physical activity levels (Elfhag & Rossner, 2005; Mitchell et al., 2016). Indeed, in a sample of post-operative bariatric surgery patients, not weighing regularly, eating past the point of feeling full, and unplanned grazing behavior accounted for 16% of the variance in weight change three years post-operation (Mitchell et al., 2016). This highlights the importance of patients making regular, daily behavioral changes in diet and exercise after surgery. This is when patients should be establishing new behavioral patterns that are in line with post-operative recommendations and will eventually lead to their weight loss goals. Examining individuals' daily eating and exercise patterns after surgery is especially important to begin to understand

factors that predict an individual's engagement in these behaviors and establishment of new behaviors.

One important yet less studied factor associated with weight loss outcomes is the quality of the marital relationship (Bocchieri, Meana, & Fisher, 2002). In general, being married is associated with better health outcomes such as lower rates of morbidity and mortality, cancer, and heart disease, suggesting that marriage may be a protective factor for adverse health conditions (Kiecolt-Glaser & Newton, 2001). Further, marital quality has been shown to be associated with a range of medical outcomes, such as cancer complications, chronic pain, cardiovascular reactivity, and immune system functioning (Baucom et al., 2009; Burman & Margolin, 1992; Leonard, Cano, & Johansen, 2006). This literature suggests that spouses may play an important role in health outcomes and engagement in health behaviors. For example, when an individual expresses being in pain to his or her spouse, the spouse might respond supportively, encouraging the individual to engage in physical therapy exercises or take medication; however, the spouse might also respond negatively, minimizing the individual's experience of pain and invalidating his or her experience. Similarly, examining the role of marital factors in weight loss specifically is supported by the fact that spouses may have opportunities to help or hinder dietary and lifestyle changes. For example, if an individual's spouse adopts the same diet regimen, then the spouse is less likely to bring tempting foods into the house.

Several theories provide a framework for understanding the association between marriage and weight-related behaviors. Social learning theory posits that when human behavior is reinforced or punished, that behavior is more or less likely, respectively, to occur in the future (Bandura, 1977). Extending this theory to eating behavior, several studies have found that

negative mood states such as sadness or anxiety trigger maladaptive eating behaviors (e.g., binge eating) because eating results in distraction or interruption of negative mood (Agras & Telch, 1998; Ashmore, Friedman, Reichmann, & Musante, 2008; Telch & Agras, 1996). This would indicate that eating in this context is negatively reinforced and has been described as a "dysfunctional mood modulatory behavior" by Fairburn and colleagues (Fairburn, Cooper, & Shafran, 2003). This theory suggests a unidirectional pathway in which marital functioning predicts weight-related behavior. That is, negative interactions with one's spouse leads to psychological distress, which then leads to the urge to eat to reduce or distract from negative emotions; thereby, negatively reinforcing the maladaptive eating behavior.

A central tenet of family systems theory is that one member of a family cannot be studied or treated in isolation because the behavior of other family members influences an individual's behavior (Bowen, 1993). In other words, understanding how individuals function within the context of the family environment has important treatment implications such that families can communicate and behave in ways that either exacerbate or improve an individual's symptoms (Bowen, 1974; Peleg-Popko, 2002). This theory suggests that failing to consider other family members' behavior would miss important information about the individual and his or her behavior. Extending this theory to weight, obesity is related to the diet and lifestyle of the home environment such that family members are more likely to gain weight when other individuals in the home are unhealthy and inactive (Macchi, Russell, & White, 2013). When a family member has a weight problem, the family can either help or hinder the individual's efforts to manage his or her weight. Alternatively, family members may initially support the individual's weight loss efforts, but as the individual's new lifestyle has an impact on other family members (e.g., not allowing certain foods in the house, not attending family functions where tempting foods are

present, spending time exercising instead of with family), there may be some resistance from the family to continue providing support. This theory suggests a bidirectional association between marital functioning and weight such that family members' behaviors can impact an individual's success or failure at weight loss and weight-related behavior can impact family members' relationships.

Despite the association between marital factors and weight-related behaviors being rooted in theory, previous research has found mixed results. A recent systematic review found that weight loss programs that include spouses are more effective than treatment alone programs, and married individuals report eating healthier than single individuals (see Ellison, Kouros, Ashmore, & Baldwin, in prep, for review). On the other hand, married individuals are also more likely to be overweight than single individuals (44.3% versus 31.6% in men and 27.4% versus 22.7% in women; Klos & Sobal, 2013).

Studies that have examined specific marital factors beyond marital status alone, such as marital satisfaction and marital communication, found that the association between marital *satisfaction* and weight is also mixed. The majority of studies suggest that being overweight is associated with decreased marital and sexual satisfaction (Boyes & Latner, 2009; Hafner et al., 1990; Kouvonen et al., 2011; Macias, Leal, Lopez-Ibor, Rubio, & Caballero, 2004; Meltzer et al., 2011); however, one study found that being happily married is associated with increased weight (Meltzer et al., 2013). The association between marital *communication* and weight is more consistent across studies: Negative communication is associated with higher weight, lower diet adherence, higher calorie intake, and body dissatisfaction (Jaremka et al., 2016; Novak & Webster, 2011; Pole, Crowther, & Schell, 2004). For example, Jaremka et al. (2016) found that obese partners who had more negative affect, conflictual communication, and poor listening

skills during a marital discussion had higher post-meal ghrelin and poorer diet quality than those with less distressed discussions.

Of note, previous research has found evidence for sex differences suggesting that wives' weight may be more strongly related to marital satisfaction and communication than husbands' weight. Higher BMI was related to lower relationship satisfaction for wives but not husbands (Boyes & Latner, 2009), and lower marital quality was related to unhealthy dieting behaviors for wives only (Markey et al., 2001). Meltzer and colleagues (2011) found evidence of sex differences in a sample of newlyweds such that heavier wives became less satisfied with their relationship over the first four years of marriage, whereas husbands' weight was unrelated to his satisfaction. Further, husbands were more satisfied over the course of the study if his wife maintained a BMI lower than his own.

The association between marital quality and weight outcomes in bariatric surgery patients has been less studied. Indeed, only 8 out of 68 studies included in Ellison et al.'s (in prep) review included bariatric surgery patients. Results from these studies suggested that married individuals were more likely to be successful following bariatric surgery than single individuals (Wedin et al., 2014), and lower marital satisfaction was associated with weight regain following surgery (Hafner, Rogers, & Watts, 1990). Further, weight loss after surgery was associated with increased marital and sexual satisfaction and decreased marital conflict (Assimakopoulos et al., 2011; Goble, Rand, & Kuldau, 1986; Macias et al., 2004; Rand, Kowalske, & Kuldau, 1984). One study, however, found no change in marital satisfaction from pre- to post-operation (Porter & Wampler, 2000); and another found increased incidence of divorce following surgery (Bruze et al., 2018). Given the sparse and mixed findings of previous research, there is a gap in the field

on the extent to which marital quality is associated with weight-related behavior in a bariatric surgery sample.

There are several limitations of previous research that may contribute to these mixed findings on how marital quality and weight-related behavior are related. One limitation is that studies have typically only examined one domain of the marital relationship at a time (e.g., marital satisfaction, communication), which limits the ability to hone in on which specific dimensions of the marital relationship are most important for weight-related behavior. Research with several marital factors included in one study will allow for results to indicate if a specific area of the marital relationship uniquely predicts weight-related behavior over and above the effects of other marital factors. For example, communication may better predict fluctuations in eating habits than marital satisfaction because marital satisfaction is a broader, less specific domain. Poor communication, on the other hand, could serve as an immediate stressor that leads to maladaptive eating as a way to disrupt or distract from negative emotions, consistent with social learning theory.

Another limitation of previous research is that most samples include individuals in the normal weight to slightly overweight range. Studying these factors in normal weight to slightly overweight participants may restrict the range at which you can examine weight-related behavior. Additionally, these participants may not be motivated to lose weight and may not be suffering the negative health outcomes associated with weight. In comparison, studying predictors of weight-related behavior in bariatric surgery participants provides a unique way to examine the association between relationship functioning and weight. Patients' anatomy is altered during surgery; therefore, they cannot drop out of the intervention prematurely as they might with behavioral interventions. Since patients' anatomy is permanently changed, they

should continue to lose or maintain weight following surgery; thus, we can identify the marital factors that are associated with weight-related behavior (e.g., grazing, eating past the point of full) and may contribute to weight regain. Studying patients after bariatric surgery provides a quasi-experimental study design to examine the link between weight-related behavior and marital factors, allowing for more cogent conclusions about their causal relation.

A final limitation of previous research is the primary focus has been on between-person comparisons of weight and marital factors. Studies that utilize this type of design give information about which individuals are more or less likely to succeed or fail at weight loss given their marital functioning or which individuals are more or less likely to have marital problems based on weight-related behavior. Whereas this information is a first step toward understanding the association between marriage and weight, it is important to recognize that both weight-related behavior and marital quality can fluctuate within-person. For example, it is likely that spouses communicate better on some days than others, and individuals adhere to their diet better on some days than others. Given that weight loss success following surgery is highly behaviorally based (e.g., daily weighing, not grazing or eating past full; Mitchell et al., 2016), findings from diary studies may help researchers and clinicians better understand what predicts an individual's likelihood of engaging in weight-related behaviors each day. By only examining between-person associations, researchers miss valuable information about fluctuations in marital functioning and weight factors and how these variables are temporally related on a daily basis. Thus, research that captures day-to-day fluctuations in weight and marital factors and examines their within-person association will extend existing research that has broadly examined these factors and focused on between-person differences.

Few studies have examined the association between weight-related behaviors and marital factors using daily diary designs, and results have been mixed. Dailey et al. (2016) and Novak and Webster (2011) examined daily marital interactions and adherence to weight-related behaviors for two weeks. Results from these studies indicated that specific behaviors (e.g., warmth, acceptance, reinforcing support, instrumental support) are associated with better adherence to weight-related behaviors (e.g., engagement in physical activity, deviation from planned diet). Doumas, Margolin, and John (2003) examined daily marital interactions and health behaviors for six weeks and found that increased positive interactions were associated with increased number of meals eaten on the same day. These mixed findings may be due to differences in methodology. Both Dailey et al. (2016) and Novak and Webster (2011) recruited samples that were actively attempting to manage their weight, whereas Doumas et al. (2003) did not assess if participants were attempting to lose weight at the time of study participation.

Current Study

Extending previous research, the current study examined within- and between-person associations between marital quality and weight-related behavior using a one week daily diary study design. Multiple domains of marital quality were assessed, including marital satisfaction, constructive communication, sexual activity, and spousal reinforcing behaviors. Weight-related behaviors were assessed by examining whether or not the participant engaged in the following behaviors: grazing, eating past the point of feeling full, consuming carbonated beverages, planning meals and snacks, counting calories, and physical activity.

The first aim of the current study was to test the within-person association between marital quality and weight-related behaviors on the same day and the next day. Based on the social learning theory, we expected that lower marital satisfaction, lower constructive

communication, not engaging in sexual activity, and lower spousal reinforcing behaviors would predict a higher likelihood of grazing, eating past the point of feeling full, consuming carbonated beverages, and a lower likelihood of planning meals, counting calories, and engaging in physical activity both on the same day and the next day. Based on family systems theory, we also expected that the relation between marital quality and weight-related behaviors would be bidirectional such that grazing, eating past the point of feeling full, and consuming carbonated beverages would predict lower marital satisfaction, lower constructive communication, less likelihood of sexual activity, and lower spousal reinforcing behaviors on both the same day and the next day. Planning meals and snacks, counting calories, and physical activity would predict higher marital satisfaction, higher constructive communication, higher likelihood of sexual activity, and higher spousal reinforcing behaviors on both the same day and the next day.

The second aim was to explore length of the relationship, time since surgery, and biological sex as moderators of these associations. Based on previous studies, we expected that the association between marital quality and weight-related behaviors would be stronger for females (Boyes & Latner, 2009; Markey et al., 2001; Meltzer et al., 2011). Length of relationship and time since surgery, to our knowledge, have never been tested as moderators of the association between marital quality and weight-related behaviors; thus, these analyses were exploratory. Based on family systems theory, we believed that marriage and diet would be more closely associated the longer a couple had been together. Therefore, we hypothesized that couples who had been together longer would show a stronger negative relation between marital quality and grazing, eating past the point of feeling full, and consuming carbonated beverages and a stronger positive relation between marital quality and planning meals, counting calories, and engaging in physical activity both on the same day and the next day. Additionally, we

hypothesized that the association between lower marital quality and not engaging in positive weight-related behavior would be stronger for those individuals farther out from surgery because patients tend to reintroduce pre-operative eating habits (e.g., larger meals, calorie-dense meals and snacks) in the two to ten years following surgery; therefore, they may be more likely to eat in response to marital stress consistent with social learning theory (Colles, Dixon, & O'brien, 2008; Courcoulas et al., 2013; Sjöström et al., 2007).

Method

Participants

The total sample included 101 post-operative bariatric surgery patients. Participants were recruited from weight loss clinics in the DFW area and online weight loss forums. Inclusion criteria for participation included: (a) Participant was married or cohabitating with a romantic partner, (b) participant had bariatric surgery more than four months prior to completing baseline measures, and (c) participant could complete measures in English. All study procedures were approved by the Institutional Review Board at SMU.

Ninety-four of the 101 participants completed the daily diary phase of the study and were included in current study analyses. The following statistics refer to the diary sample and can be found in Table 1. Eighty-eight percent of participants were female (N = 83) and 12% of participants were male (N = 11). Participants' mean age was 45.12 (SD = 10.60). The average time since surgery was 3.83 years (SD = 16.32). Ninety-four percent of couples were married and 6% were cohabitating; the average relationship length was 17.21 years (SD = 11.39). Most participants (43%) reported a college degree; approximately 1% of participants reported less than a high school education, 12% reported a high school diploma or GED, 25% reported some college, and 19% reported a graduate degree. The median yearly household income was between

$100,000 and $150,000; 3% reported an income under $30,000; 10% reported an income between $40,000 and $60,000; 9% reported an income between $60,000 and $80,000; 20% reported an income between $80,000 and $100,000; 37% reported an income between $100,000 and $150,000; 20% reported an income over $150,000; and one participant did not report income. Approximately 87% of participants were European American, 6% were African American, 3% were Hispanic, 1% were Asian, 1% were Native American, and 1% were biracial.

Procedure

Participants were recruited from weight loss clinics in the DFW area through presentations and informational emails about the study sent out by administrative staff. Additionally, participants were recruited by word of mouth and participants posting about the study on online weight loss forums. Interested individuals contacted the principal investigator, who determined if the individual was eligible to participate based on inclusion criteria. Eligible individuals were emailed a unique online link to complete a baseline questionnaire, which began with an electronic consent form. After signing the electronic informed consent, participants continued to the rest of the baseline questionnaires. After completing baseline questionnaires, participants were emailed instructions for completing the daily diaries. Starting the next day, participants were emailed a unique online link every night for seven nights to access their daily diary. They were instructed to complete the diary before bed in order to gain as much information as possible about health behaviors and marital factors for that day. If a participant did not complete a diary, he or she received a follow-up text the next morning as a reminder to complete yesterday's diary. Participants had until 10AM to complete the prior day's diary. Participants who completed all procedures were entered in a drawing to win one of eight $50 gift cards.

Measures

Baseline questionnaires. Baseline measures were delivered to participants electronically and took approximately 20 minutes to complete. Only measures pertinent to the current study are described below.

Demographic information. Participants reported on individual characteristics, such as age, ethnicity, height, weight, education, income, length of relationship, and date of surgery on a questionnaire designed for the current study.

Health questionnaire. Participants reported on health factors related to weight on a questionnaire designed for the study. Participants reported on the average number of days per week (0 to 7) they engaged in grazing behavior, consumed carbonated beverages, ate past the point of feeling full, and participated in physical activity.

Marital satisfaction. Participants completed the Couples Satisfaction Index-16 (CSI; Funk & Rogge, 2007), which is a 16-item measure that assesses spouses' relationship quality and happiness. Sample items include "Our relationship is strong" and "My relationship with my partner makes me happy," which are rated on a Likert scale ranging from 0 (*Not at all true*) to 5 (*Completely true*). Funk and Rogge (2007) reported that the CSI has strong convergent validity with existing measures of marital quality and high internal consistency ($\alpha = .98$). Cronbach's alpha for the current sample was .98.

Weight related quality of life. The Impact of Weight on Quality of Life-Lite scale (IWQOL; Kolotkin, Crosby, Kosloski, & Williams, 2001) was used to assess several areas of functioning that may be impacted by weight. The current study examined the impact of weight on sexual functioning subscale. A sample item is "Because of my weight, I have little or no sexual desire." Participants rated each item on a scale from 1 (*Never true*) to 5 (*Always true*).

The IWQOL-Lite has been shown to have excellent psychometric properties. Cronbach's alpha for the impact of weight on sexual functioning subscale in the original sample was .93 (Kolotkin et al., 2001). Cronbach's alpha for the current sample was .95.

Diary questionnaires. The diary was delivered electronically to participants and took approximately seven minutes to complete. Participants were instructed "For all questions, think about your day today (from the time you woke up)." Only measures pertinent to the current study are described below.

Weight-related behaviors. Participants reported on weight-related behaviors on a questionnaire designed for the study. Participants reported whether they engaged in physical activity that day and, if so, what type of exercise, how many minutes, and intensity of their physical activity. Less than half of participants reported engaging in physical activity (range across diary days 30.9 - 48.9%); therefore, we only examined whether or not the participant engaged in physical activity by indicating *Yes* (1) or *No* (0) rather than examining total minutes or intensity of exercise (see Table 2 for daily frequency counts of all weight-related behaviors). Similarly, approximately half of our sample counted calories on each day of the diary (range 45.7%- 59. 6%), thus, we examined whether or not the participant counted calories by indicating *Yes* (1) or *No* (0) rather than examining the numerical calorie count.

Participants also indicated *Yes* (1) or *No* (0) on the following questions: "Did you have any carbonated beverages today?," "Were your meals and snacks today pre-planned?," "Did you graze (picking at or nibbling on food without thinking too much about it) today?," and "Did you eat past the point of feeling full today?" (see Table 2 for daily frequency counts).

Counting calories, consuming carbonated beverages, planning meals and snacks, grazing, and eating past the point of feeling full were added together to create a composite score to reflect

diet adherence. Consuming carbonated beverages, grazing, and eating past the point of feeling full were reverse scored; therefore, higher summed scores reflect more adherence to diet. Reliability estimates for the diet adherence composite were R_{1F} = .63 and R_c = .28 (Table 3). Due to the low reliability estimates, in particular, the low within-person reliability (i.e., R_C, reliability to estimate within-person change; Cranford et al., 2006), each diet adherence variable was analyzed individually. Physical activity was analyzed as a separate dependent variable.

Marital satisfaction. Participants answered one item from the Couples Satisfaction Index (CSI; Funk & Rogge, 2007) to assess general marital satisfaction for that day. The question asked, "Please indicate the degree of happiness, all things considered, of your relationship today." Participants responded on a scale of *Extremely Unhappy* (0) to *Perfect* (6). A range of 71.3-84.0% of participants responded with a 3 (*Happy*) or higher to this question across diary days, indicating that this sample was generally well-adjusted in terms of marital satisfaction.

Marital communication patterns. The Communication Patterns Questionnaire (CPQ; Christensen & Sullaway, 1984) was revised for this study to include eight items assessing constructive communication. Participants reported on the number of disagreements they had with their spouse that day, as well as whether or not either spouse engaged in a variety of conflict behaviors. Reliability estimates for the constructive communication composite were R_{1F} = .62 and R_c = .43 (Table 3). Due to low reliability scores for the composite measure, the following item was used individually to assess for constructive communication in analyses, "My partner and I suggested possible solutions and compromises." This item was selected because it was most consistent with previous research examining constructive conflict behavior (Cummings, Goeke-Morey, & Papp, 2003).

Sexual activity. Participants were asked if they engaged in sexual activity with their spouse that day with the following question from the Frequency and Acceptability of Positive Behaviors questionnaire (Doss & Christensen, 2006), "Check if your partner did today: engaged in sexual activity with me (e.g., can include sexual intercourse or any other significant sexual activity, whether initiated by you or your partner)." Participants were asked to indicate either *Yes* (1) or *No* (0) (see Table 2 for daily frequency counts). A range of 14.9 – 24.5% of participants responded "Yes" to this question across diary days; 56.4% of participants responded "Yes" on at least one day of the diary.

Spousal support and control of weight-related behaviors. Spousal support and control of weight-related behaviors were assessed using a scale developed by Novak and Webster (2011). This scale measures three domains of spousal support: reinforcing support (e.g., "Complimented your weight loss progress"), instrumental support (e.g., "Avoided eating or buying unhealthy food around you"), and monitoring control support (e.g., "Told you that you need to lose weight"). Participants indicated whether or not their spouse engaged in the behavior that day by indicating either *Yes* (1) or *No* (0). Items were summed to create composite scores for each support behavior. Between-person reliability estimates (R_{1F}) for the current sample were .52 for monitoring, .66 for instrumental, and .82 for reinforcing. The within-person reliability estimates (R_c) were .29 for monitoring, .46 for instrumental, and .72 for reinforcing (Table 3). Due to low reliability estimates for monitoring and instrumental behaviors, only reinforcing behavior was examined at the within-person level. The monitoring and instrumental behavior composites were only included as Level 2 variables, reflecting that our measure may not have been able to capture within-person change across the week.

Analysis Plan

Hierarchical linear modeling using HLM 7.0 was used to account for the nested structure of diary data (i.e., multiple days per person). The Level 1 model included within-person values such that this model estimated within-person associations between marital quality and weight-related behaviors for the same day and the next day. Time was centered at the mid-point of the week; therefore, all participants had time values ranging from -3 to 3. The Level 2 model aggregated within-person values and provided parameter estimates for the average within-person association between marital quality and weight maintenance behavior for the sample. Following centering guidelines for teasing apart within- and between-person relations (Bolger & Laurenceau, 2013), the Level 1 predictors were person-centered (PC) to represent within-person deviations from his or her typical level of that variable. Additionally, each person's average level of the Level 1 predictors across the diary days were added as predictors of the intercept at Level 2 (grand mean-centered). For dichotomous dependent variables, we used hierarchical generalized linear modeling (HGLM), which tests the likelihood of a participant responding "Yes" on the dependent variable.

Marital quality variables as predictors of weight-related behavior. Marital quality variables were separated into two models in order to gain enough degrees of freedom necessary for including moderators and time-lagged variables. Marital satisfaction, constructive communication, and sexual activity were grouped as predictors in one model to reflect general marital quality; whereas, reinforcing support, instrumental support, and monitoring control support behaviors were grouped as predictors into a second model to reflect weight-specific spousal behaviors.

A sample model for examining same day relations between marital quality and weight-related behaviors is presented below, with physical activity used as the dependent variable for

illustrative purposes. Since physical activity is a dichotomous variable, an HGLM was run in which the outcome was the likelihood of engaging in physical activity that day.

Level 1:

$$\text{Prob}(\text{Physical activity} = 1 \mid B) = P$$

$$\text{Log}[P/(1-P)] = \beta_0 + \beta_1(day) + \beta_2(marital\ satisfaction\_{PC}) + \beta_3(constructive\ communication\_{PC}) + \beta_4(sexual\ activity\_{PC}) + R$$

Level 2:

$$\beta_0 = \gamma_{00} + \gamma_{01}(average\ marital\ satisfaction) + \gamma_{02}(average\ constructive\ communication) + \gamma_{03}(average\ sexual\ activity) + U_0$$

$$\beta_1 = \gamma_{10} + U_1$$

$$\beta_2 = \gamma_{20} + U_2$$

$$\beta_3 = \gamma_{30} + U_3$$

$$\beta_4 = \gamma_{40} + U_4$$

Level 1 predictors were entered into the model person-centered, and their average level across the diary days were entered grand mean-centered as predictors of the intercept at Level 2. The parameters γ_{20} to γ_{40} are the parameters of interest and represent the average within-person association between the marital quality factor and likelihood of engaging in physical activity that day. For example, γ_{20} represents the average within-person relation between marital satisfaction and physical activity controlling for the other marital quality variables. A positive coefficient would indicate that marital satisfaction that was higher than usual predicted a higher likelihood of engaging in physical activity that same day; whereas a negative coefficient would indicate that marital satisfaction that was higher than usual predicted a lower likelihood of engaging in physical activity that same day.

Similarly, a sample model for the weight-specific spousal behaviors is shown below to illustrate the second model tested in analyses.

Level 1:

Prob(Physical activity = 1 | B) = P

Log[P/(1-P)] = = $\beta_0 + \beta_1(day) + \beta_2(reinforcing\ support\_PC)$

Level 2:

$\beta_0 = \gamma_{00} + \gamma_{01}(average\ reinforcing\ support) + \gamma_{02}(average\ instrumental\ support) + \gamma_{03}(average\ monitoring\ control) + U_0$

$\beta_1 = \gamma_{10} + U_1$

$\beta_2 = \gamma_{20} + U_2$

In this model, the parameter γ_{20} represents the within-person association between reinforcing support and physical activity. A positive coefficient would indicate that reinforcing support that was higher than usual predicted a higher likelihood of engaging in physical activity that same day; whereas a negative coefficient would indicate that reinforcing support that was higher than usual predicted a lower likelihood of engaging in physical activity that same day. Instrumental support and monitoring control were added as Level 2 variables and test the between-person relation between instrumental support and monitoring control and physical activity. A positive γ_{02}, for example, would indicate that people who report more instrumental support, on average, have a greater likelihood of engaging in physical activity.

A total of 16 tests were run per weight-related behavior outcome—one model testing general marital behaviors as the predictors, one model testing support behaviors as predictors, three models testing each moderator in the model with general marital behaviors as predictors, three models testing each moderator in the model with support behaviors as predictors; all

models were repeated for time lagged effects (see section below on *Correction for Multiple Tests*).

Weight-related behavior variables as predictors of marital quality. Marital satisfaction and reinforcing support were continuous variables and were run as HLM models in which the outcome reflected a higher or lower level of the variable. Constructive communication and sexual activity were dichotomous variables and were run as HGLM in which the outcome was the likelihood of engaging in constructive communication or sexual activity that day. Diet adherence variables were individually tested in order to gain enough degrees of freedom necessary for including moderators and time-lagged variables. Thus, a total of five diet adherence behaviors (grazing, meal planning, eating past point of feeling full, consuming carbonated beverages, and counting calories) were tested as individual predictors of each marital outcome. Any diet adherence variables found to be a significant predictor of one of the marital quality outcomes were then tested together in a final model with physical activity. If no diet adherence behaviors were found to predict the marital outcome, physical activity was tested as an individual predictor.

A total of 18 tests were run per marital quality outcome—five models individually testing diet adherence behaviors predicting same day marital outcomes, one model that combined significant diet adherence results with physical activity (i.e., combined predictor model), three models testing each moderator of the combined predictor model; all models were repeated for time-lagged effects (see section below on *Correction for Multiple Tests*).

Moderators. To test length of relationship, time since surgery, and sex (male, female) as moderators of the relation between marital quality and weight-related behaviors, each of these variables were added individually as Level 2 predictors. Specifically, they were added as

predictors of the individual's intercept and slope. Below is a sample model with sex as a moderator.

Level 1:

Prob(Physical activity = 1 | B) = P

$$\text{Log}[P/(1-P)] = \beta_0 + \beta_1(\textit{day}) + \beta_2(\textit{marital satisfaction\_PC}) + \beta_3(\textit{constructive communication\_PC}) + \beta_4(\textit{sexual activity\_PC}) + R$$

Level 2:

$$\beta_0 = \gamma_{00} + \gamma_{01}(\textit{average marital satisfaction}) + \gamma_{02}(\textit{average constructive communication}) + \gamma_{03}(\textit{average sexual activity}) + \gamma_{04}(\textit{sex}) + U_0$$

$$\beta_1 = \gamma_{10} + U_1$$

$$\beta_2 = \gamma_{20} + \gamma_{21}(\textit{sex}) + U_2$$

$$\beta_3 = \gamma_{30} + \gamma_{31}(\textit{sex}) + U_3$$

$$\beta_4 = \gamma_{40} + \gamma_{41}(\textit{sex}) + U_4$$

The parameter $\gamma_{21,}$ for example, tests sex as a moderator of the association between marital satisfaction and physical activity (i.e., does the within-person relation between marital satisfaction and physical activity differ for males as compared to females).

Time lagged effects. To test for time lagged associations, weight-related behaviors were predicted by the previous day's rating of marital variables, controlling for the autoregressive effects of weight-related behaviors the previous day (parameter β_5 below). Similarly, marital quality was predicted by the previous day's weight-related behaviors, controlling for the previous day's marital quality. For example, the parameter γ_{20} in the sample equation below represents the average within-person relation between marital satisfaction and subsequent (or change in) likelihood of engaging in physical activity on the next day:

Level 1:

Prob(Physical activity $_{t+1}$ = 1 | B) = P

$$\text{Log}[P/(1-P)] = \beta_0 + \beta_1(day) + \beta_2(\textit{marital satisfaction}_t) + \beta_3(\textit{constructive communication}_t) + \beta_4(\textit{sexual activity}_t) + \beta_5(\textit{physical activity}_t) + R$$

Level 2:

$$\beta_0 = \gamma_{00} + \gamma_{01}(\textit{average marital satisfaction}_t) + \gamma_{02}(\textit{average constructive communication}_t) + \gamma_{03}(\textit{average sexual activity}_t) + \gamma_{04}\,(\textit{average physical activity}_t) + U_0$$

$$\beta_1 = \gamma_{10} + U_1$$

$$\beta_2 = \gamma_{20} + U_2$$

$$\beta_3 = \gamma_{30} + U_3$$

$$\beta_4 = \gamma_{40} + U_4$$

$$\beta_5 = \gamma_{50} + U_5$$

Correction for Multiple Tests

Given the multiple tests that were conducted in this study, we applied Benjamini-Hochberg's false discovery rate correction (Benjamini & Hochberg, 1995) to our findings (maintaining an alpha at .05). This method controls for the expected proportion of false positives (i.e., incorrectly rejecting the null hypothesis) by adjusting the *p*-value based on the number of significant results in a family of tests. Tests were grouped together such that all models testing the same dependent variable (10 dependent variables in total) were grouped as a family of tests, once for same day and once for time-lagged effects. This resulted in a total of 20 families of tests (with nine tests per the five marital quality outcomes and eight tests per the five weight-related behavior outcome). Results that remained significant after correction are bolded in following results sections, as well as Tables 7-14.

Results

Preliminary Analyses

ICC. Intraclass correlations (ICC) were calculated for each study variable and are presented in Table 3. The ICC indicates the proportion of variance between people. For example, the ICC of .20 for physical activity indicates that 20% of the variability in physical activity during the week was between-person, and 80% of the variability was within-person. The ICCs from the current study are somewhat higher than ICCs typically reported in diary studies (.2-.4; Bolger & Laurenceau, 2013).

Missing data. On average, participants completed 6.63 days of diaries (*SD* = 0.82; range 3-7), providing 623 total observations. Seventy-two participants (76.6%) completed all seven days.

One participant did not report income on the baseline questionnaire. We conducted Little's MCAR test the extent to which this was missing at random; results indicated that it was missing at random, χ^2 (86) = 67.56, p = .929. We conducted one imputation in SPSS to fill in this missing data point.

Systematic Change across Day. As preliminary analyses, we first tested the extent to which the study variables systematically changed across day during the diary week and if there was significant variability in study variables between study participants. We also tested whether there were mean differences in the dependent variables between diary entries completed on a weekend versus a weekday. In order to examine this, we ran models for each dependent variable with day and a dummy coded variable for weekend versus weekday as the only predictors. The weekend versus weekday variable was coded such that weekend days were coded as 1 and

weekdays were coded as 0. This model is illustrated below using daily marital satisfaction as the outcome:

Level 1:

$$\text{Marital satisfaction} = \beta_0 + \beta_1(day) + \beta_2(\text{weekday0})$$

Level 2:

$$\beta_0 = \gamma_{00} + U_0$$

$$\beta_1 = \gamma_{10} + U_1$$

$$\beta_2 = \gamma_{20} + U_2$$

A significant γ_{10} coefficient would indicate that, on average, the outcome variable is systematically changing across day. For example, a positive γ_{10} for the example model above would indicate a participant reported higher marital satisfaction the longer he or she completed the daily diaries. A significant γ_{20} coefficient would indicate that, on average, marital satisfaction levels significantly differed weekends versus weekdays.

Results from these preliminary models are presented in Table 4. Results indicated the marital satisfaction and spousal reinforcing behavior systematically changed across diary day. Specifically, marital satisfaction increased and spousal reinforcing behavior decreased during the week. Levels of spousal reinforcing behavior and whether participants engaged in meal planning significantly differed on weekends as compared to weekdays. Specifically, reinforcing behavior increased and the likelihood of meal planning decreased on weekends. Additionally, marital satisfaction varied significantly between study participants on the dummy coded weekday variable. Based on these results, diary day was added as a covariate in models predicting marital satisfaction and spousal reinforcing behavior, and the dummy coded weekend variable was

added as a covariate in models predicting marital satisfaction, spousal reinforcing behaviors, and meal planning.

Additional predictors of the intercept. Correlations between age, ethnicity, income, education, and BMI from the baseline survey and the diary variables *averaged across the seven days* can be found in Table 5. Correlations between age, ethnicity, income, education, and BMI from the baseline survey and *daily* study variables can be found in Appendix A. Any of these demographic variables found to be significantly correlated with the dependent variables were added as additional predictors of the intercept at Level 2 (grand mean-centered).

Correlations between study variables. Correlations between the daily marital quality variables and weight-related behaviors, averaged across the seven days, can be found in Table 6.

Models Testing Same Day Results

Predicting weight-related behavior. Results from multilevel models predicting weight-related behavior are presented in Table 7 (marital satisfaction, communication, sexual activity as predictors) and Table 8 (spousal support behavior as predictors).

***Physical activity*.** Marital satisfaction positively predicted the likelihood of engaging in physical activity on the same day, $b = 0.27$, $SE = 0.12$, $p = .02$, OR = 1.30, 95% CI [1.03, 1.65] (Table 7), indicating that when an individual is more satisfied in the marriage than usual, he or she is more likely to engage in physical activity that day, over and above the effects of constructive communication and sexual activity. No other within- or between-person relations were significant. Further, relationship length, time since surgery, and participant biological sex did not moderate within-person relations between marital satisfaction, communication, and sexual activity and physical activity.

***Grazing*.** Constructive communication positively predicted grazing (reverse scored) on the same day, *b* = 0.66, *SE* = 0.30, *p* = .03, OR = 1.94, 95% CI [1.07, 3.52] (Table 7), indicating that on days when participants engaged in more constructive communication than usual, they were less likely to graze, over and above the effects of marital satisfaction and sexual activity. Between-person effects indicated that, on average, individuals with higher levels of marital satisfaction were less likely to engage in grazing behavior during the week, **b = 0.43, *SE* = 0.15, *p* = .006**, **OR = 1.54, 95% CI [1.14, 2.08**]. Individuals who reported higher levels of spousal reinforcing support were less likely to engage in grazing behavior during the week**, b = 0.50, *SE* = 0.17, *p* = .004, OR = 1.82 , 95% CI [1.28, 2.58]** (Table 8). There was no significant moderation by length of relationship, time since surgery, or biological sex.

***Planning*.** No within- or between-person relations between the marital variables and planning were significant (Tables 7-8). Length of relationship, however, moderated the association between reinforcing behaviors and planning, *b* = -0.001, *SE* = 0.001, *p* = .045, OR = 1.00, 95% CI [.99, 1.00]. This interaction is depicted in Figure 1. Inconsistent with our hypothesis, reinforcing spousal support was related to a lower likelihood of planning meals among couples in longer-term relationships, whereas there was no significant relation between reinforcing spousal support and meal planning among those in shorter-term relationships (Regions of significance indicate the interaction is significant -1.31 SD below the mean and 15.41 SD above the mean).

***Drinking carbonated beverages*.** No within- or between-person relations were significant when predicting the likelihood of drinking carbonated beverages (Tables 7-8), nor was significant moderation by relationship length, time since surgery, or participant sex found.

Eating past full. Sexual activity predicted eating past the point of feeling full (reverse scored) on the same day, b = -0.71, SE = 0.32, p = .027, OR = 0.49, 95% CI [.26, .92] (Table 7); that is a greater likelihood of engaging in sexual activity than usual was related to a greater likelihood of eating past the point of feeling full that same day, over and above the effects of marital satisfaction and constructive communication. Between-person relations indicated that individuals with higher average levels of marital satisfaction were, on average, less likely to report eating past the point of feeling full, b = 0.27, SE = 0.11, p = .018, OR = 1.31, 95% CI [1.05, 1.64] (Table 7), over and above the effects of constructive communication and sexual activity. A significant between-person relation was also found such that individuals who reported higher average levels of spousal reinforcing support were less likely to eat past the point of feeling full during the week, **b = 0.39, *SE* = .13, *p* = .005, OR = 1.47, 95% CI [1.13, 1.92]** (Table 8), over and above the effects of average levels of instrumental support and monitoring behaviors. No other within- or between-person relations between the marital variables and eating past the point of feeing full were significant, nor did length of relationship, time since surgery, or participant sex moderate any of these relations.

***Counting calories*.** No within- or between-person relations were significant when predicting the likelihood of participants counting their calories that day (Tables 7-8), nor was significant moderation by relationship length, time since surgery, or participant sex found.

Predicting marital factors. Each weight-related behavior was individually tested as a predictor of each marital factor. Results from those models are presented in Table 9. Any weight-related behavior found to significantly predict a marital outcome was included in a combined model with physical activity. Results from combined multilevel models predicting marital factors are presented in Table 10.

***Marital satisfaction*.** No within-person relations between daily fluctuations in diet adherence and same-day marital satisfaction were found when tested individually (Table 9). Between-person relations, however, were found. Specifically, individuals who on average are less likely to graze, $b = 1.73$, $SE = 0.39$, $p < .001$, or eat past feeling full, $b = 1.53$, $SE = 0.67$, $p = .02$, and more likely to meal plan, $b = .70$, $SE = 0.34$, $p = .04$, report higher average levels of marital satisfaction (Table 9); therefore, they were included as Level 2 predictors in a model with physical activity (Table 10). Results from this model showed a significant within-person association between physical activity and marital satisfaction on the same day, ***b* = 0.25, *SE* = 0.10, *p* = .01**, indicating that a greater likelihood of engaging in physical activity than usual predicted higher marital satisfaction that day. This relation was moderated by sex, $b = 0.71$, $SE = 0.31$, $p = .024$, such that this effect was only significant for women (Figure 2). Only the between-person relation between grazing and marital satisfaction remained significant in this combined model, ***b* = 1.50, *SE* = 0.42, *p* = .001** (Table 10).

***Constructive communication*.** There were no significant within- or between-person relations between diet adherence behaviors and same-day constructive communication when tested individually; therefore, the diet adherence variables were not included in the model with physical activity (Table 9). Further, physical activity also did not predict constructive communication (Table 10), nor was significant moderation by relationship length, time since surgery, or participant sex found.

***Sexual activity*.** Eating past the point of feeling full (reverse scored) significantly predicted the likelihood of sexual activity that day, $b = -0.60$, $SE = 0.30$, $p = .045$, OR = 0.55, 95% CI [.30, .99] (Table 9); thus, on days when individuals ate past the point of feeling full (more than usual), they were also more likely to engage in sexual activity. When included in a

model with physical activity, eating past the point of feeling full remained significant, b = -0.57, SE = 0.29, p = .049, OR = 0.56, 95% CI [.32, .10] (Table 10). No other within- or between-person relations were significant when predicting sexual activity, nor was significant moderation by relationship length, time since surgery, or participant sex found.

Reinforcing support. No within-person relations between daily fluctuations in diet adherence and same-day reinforcing spousal support were found when tested individually (Table 9). Between-person relations, however, were found. Individuals who on average were less likely to graze, b = 1.58, SE = 0.45, p = .001, drink carbonated beverages, b = 1.11, SE = 0.51, p = .032, and eat past feeling full, b = 1.50, SE = .71, p = .036, and more likely to meal plan, b = 1.04, SE = 0.37, p = .006, reported higher average levels of reinforcing spousal support (Table 9), these variables were included as Level 2 predictors in the model with physical activity. No within-person relations were significant for predicting reinforcing support; however, the between-person relation between grazing and reinforcing behaviors, b = 1.12, SE = .49, p = .024 remained significant (Table 10). No significant moderation by relationship length, time since surgery, or participant sex was found.

Models Testing Time Lagged, Next Day Results

Predicting weight-related behavior. Results from multilevel models predicting next-day weight-related behavior are presented in Table 11 (marital satisfaction, communication, sexual activity as predictors) and Table 12 (spousal support behavior as predictors).

***Physical activity*.** No within- or between-person relations between the marital variables and next-day physical activity were significant (Tables 11-12). Participant sex, however, moderated the association between sexual activity and physical activity on the next day, b = -4.80, SE = 1.53, p = .002, OR = 0.01, 95% CI [.00, .17]. This interaction is depicted in Figure 3.

For females, engaging in sexual activity predicted a lower likelihood of engaging in physical activity the following day, whereas for males, engaging in sexual activity predicted a higher likelihood of engaging in physical activity the following day (Figure 3).

Grazing. No within- or between-person relations between the marital variables and grazing behavior were significant (Tables 11-12), nor was significant moderation by relationship length, time since surgery, or participant sex found.

Planning. No within- or between-person relations between the marital variables and planning were significant (Tables 11-12), nor was significant moderation by relationship length, time since surgery, or participant sex found.

***Drinking carbonated beverages*.** No within- or between-person relations between the marital variables and drinking carbonated beverages were significant (Tables 11-12), nor was significant moderation by relationship length, time since surgery, or participant sex found.

Eating past full. No within- or between-person relations between the marital variables and eating past full were significant (Tables 11-12), nor was significant moderation by relationship length, time since surgery, or participant sex found.

***Counting calories*.** No within- or between-person relations between the marital variables and counting calories were significant (Tables 11-12), nor was significant moderation by relationship length, time since surgery, or participant sex found.

Predicting marital outcomes. Each weight-related behavior was individually tested as a predictor of each time-lagged marital factor. Results from those models are presented in Table 13. Any weight-related behavior found to significantly predict a marital outcome was included in a combined model with physical activity. Results from multilevel models predicting next-day marital factors are presented in Table 14.

***Marital satisfaction*.** No within- or between-person relations between daily fluctuations in diet adherence and next-day marital satisfaction were found (Table 13); therefore, these variables were not included in the model with physical activity. A significant within-person relation was found between physical activity and marital satisfaction on the next day, $b = 0.21$, $SE = 0.10$, $p = .036$ (Table 14), indicating that an increased likelihood of engaging in physical activity compared to usual was related to an increase in marital satisfaction from one day to the next. This relation was moderated by sex, $b = 0.73$, $SE = 0.33$, $p = .029$, such that this effect was only significant for females (Figure 4).

***Constructive communication*.** A significant within-person relation between grazing (reverse scored) and next-day constructive communication was found, $b = -1.08$, $SE = 0.48$, $p = .026$, OR = 0.34, 95% CI [0.13, 0.88] (Table 13); therefore, grazing and physical activity were included in a combined model. The within-person relation between grazing and constructive communication remained significant, $b = -0.97$, $SE = .46$, $p = .038$, OR = 0.38, 95% CI [.15, .95] (Table 14); however, contrary to our hypothesis, a greater likelihood of grazing behavior predicted a *higher* likelihood of constructive communication the next day over and above the effects of physical activity. No other within- or between-person effects were significant for constructive communication. Length of relationship was found to moderate the association between physical activity and constructive communication on the next day, $b = -0.01$, $SE = 0.002$, $p = .014$, OR = 0.99, 95% CI [.99, 1.00] (Figure 5). Engaging in physical activity was related to a lower likelihood of engaging in constructive communication the next day, and this relation was stronger for individuals in longer-term relationships.

***Sexual activity*.** No significant within- or between-person relations were found predicting next-day likelihood of sexual activity (Table 14), nor was significant moderation by relationship length, time since surgery, or participant sex found.

***Reinforcing support*.** No significant within- or between-person relations were found predicting reinforcing spousal support the next day (Table 14), nor was significant moderation by relationship length, time since surgery, or participant sex found.

Post-hoc Analyses

Results from primary study analyses examining within-person associations provided limited evidence for the bidirectional association between weight-related behaviors and marital quality. One factor that may have contributed to null findings was several measures were changed from the original measures when included in the diary in an effort to reduce the time burden on participants. Several of these diary variables, therefore, yielded low within-person reliability scores and were reduced to one item for analyses (e.g., diet adherence, constructive communication) or were only included at Level 2 when selecting a one item measure was not clear (instrumental support and monitoring behaviors). Therefore, we examined the association between marital quality and weight-related behaviors using responses on the baseline questionnaires to determine if between-person effects more accurately captured the association between weight-related behaviors and marital quality. The limitation of examining baseline questionnaires is that data is cross-sectional and correlation; therefore, cogent conclusions on temporal associations cannot be fully assessed.

Regarding weight-related behaviors, the following behaviors were examined from the baseline health questionnaire: average days per week the individual engaged in grazing behavior, consumed carbonated beverages, ate past the point of feeling full, and participated in physical

activity. The average days per week individuals planned their meals and counted calories were not assessed on the baseline survey. The following marital quality variables were examined: impact of weight on sexual functioning (IWQOL; Kolotkin et al., 2001) and marital satisfaction (CSI; Funk & Rogge, 2007). Constructive communication, reinforcing and instrumental support, and monitoring control were not assessed on the baseline survey. The same 94 study participants were included in analyses. Correlations between study variables and age, ethnicity, education, income, and BMI were assessed. BMI was found to be positively correlated with impact of weight on sexual functioning, $r = .25$, $p = .015$; therefore, BMI was included in regression equations when impact of weight on sexual functioning was the dependent variable. Length of relationship, time since surgery, and sex were included in models as moderators.

Similar to original study hypotheses, we hypothesized that 1) higher levels of marital satisfaction and lower impact of weight on sexual functioning would predict lower levels of grazing, consuming carbonated beverages, and eating past the point of feeling full and higher levels of physical activity; and 2) higher levels of grazing, consuming carbonated beverages, eating past the point of feeling full and lower levels of physical activity would predict lower levels of marital satisfaction and higher impact of weight on sexual functioning. When examining moderators, we hypothesized that these associations would be stronger for those individuals in longer relationships, individuals farther out from surgery, and females, consistent with primary analyses.

Regression equations. Regression equations were used to test hypotheses. Below is an example model for the weight-related behavior of grazing:

$$\text{Grazing} = \beta_0 + \beta_1 (\textit{Marital Satisfaction}) + \beta_2 (\textit{Sexual Functioning})$$

Below is an example model for marital satisfaction :

Marital satisfaction = β_0 + β_1 (*Grazing*) + β_2 (*Planning*) + β_3 (*Carbonated Beverages*) + β_4 (*Physical Activity*)

Below is an example model testing for moderation by sex:

Grazing = β_0 + β_1 (*Marital Satisfaction*) + β_2 (*Sexual Functioning*) + β_3 (*Sex*) + β_4 (*Marital Satisfaction x Sex*) + β_5 (*Sexual Functioning x Sex*)

Results. A significant main effect was found indicating that higher levels of marital satisfaction predicted higher levels of physical activity, b = 0.04, SE = .02, p = .03. Also, time since surgery moderated the association between impact of weight on sexual functioning and physical activity, b = -0.001, SE = 0.001, p = .029. That is, higher impact of weight on sexual functioning predicted lower levels of physical activity; however, this effect was weakened the farther out an individual was from surgery. No other significant main effects or interactions were found for any models.

Discussion

Obesity is a major health concern in the U.S. Given the physical and mental health correlates of obesity, understanding factors associated with weight-related behaviors is warranted. It has been established that married individuals tend to weigh more and exercise less than singles (see Ellison, et al., in prep, for review); however, little is known about the day-to-day fluctuations in marital quality that may be associated with weight-related behaviors. The current study aimed to address this gap in the literature by examining the association between weight-related behaviors and marital factors utilizing a daily diary design.

The current study contributed to the literature in two novel ways. First, the study utilized a daily diary method which enabled us to more clearly examine day-to-day fluctuations in weight-related behaviors and marital quality. This allowed us to assess *within*-person

associations compared to previous research which primarily relied on *between*-person associations. Between-person designs allow for the examination of which people do better or worse compared to other people, whereas within-person designs allow for the examination of why a particular individual may do better or worse on a given day. Because weight-related behaviors, such as grazing and eating past the point of feeling full, and domains of the marital relationship, such as communication, may fluctuate day-to-day, a within-person study design more appropriately captured these processes. Second, the current study examined several different aspects of the quality of the marital relationship in the same model. By examining several marital variables simultaneously, we were better able to understand which specific domains of marital quality uniquely predicted weight-related behaviors, and which weight-related behaviors uniquely predicted marital quality.

Previous research has found evidence for a positive between-person association between marital factors and physical activity (Knoll et al., 2017; Sher et al., 2014). The current study supports and extends previous work by finding a significant within-person association between physical activity and marital satisfaction on the same day. A higher likelihood of engaging in physical activity than usual predicted higher marital satisfaction on the same day. At the same time, when an individual was more satisfied in their marriage, he or she was more likely to engage in physical activity that day, above and beyond the effects of constructive communication and sexual activity. There was also evidence that engaging in physical activity predicted an increase in marital satisfaction from one day to the next, particularly for women. These results suggest that the relation between physical activity and marital satisfaction may be bidirectional; however, after accounting for multiple tests, only the within-person relation of physical activity predicting marital satisfaction on the same day remained significant.

It is important to note that positive affect may be a confounding factor in this association. Previous research has found a positive association between physical activity and positive affect (e.g., Lyubomirsky, King, & Diener, 2005; Watson, 1988); therefore, it could be that the significant association between marital satisfaction and physical activity in this study is actually capturing an association between positive affect and marital satisfaction. Indeed, previous research has found that positive affect is associated with higher marital satisfaction (e.g., Fincham, Garnier, Gano-Phillips, & Osborne, 1995), a phenomenon known as sentiment override (Weiss, 1980). Future research should account for positive affect when examining the association between physical activity and marital factors to ensure that findings are not simply an artifact of positive mood.

Several other within-person associations emerged as significant, however, they did not remain significant after correcting for multiple tests and should, therefore, be interpreted with caution. A bidirectional relation was found between constructive communication and grazing in partial support of hypotheses. Previous diary research has found that positive behaviors and affect during marital interactions predicted better adherence to diet (Dailey et al., 2016; Jaremka et al., 2016; Novak & Webster, 2011). Similarly, the current study found that engaging in constructive communication was related to a lower likelihood of grazing that day, above and beyond the effects of marital satisfaction and sexual activity. In contrast to hypothesis, however, the results also indicated that a greater likelihood of grazing behavior predicted a higher likelihood of constructive communication on the next day, above and beyond the effects of physical activity. One possible explanation for why next-day relations were in the opposite direction compared to the same-day association is that grazing may be used to mitigate negative mood on the same day (perhaps due to less constructive communication that day). In turn, this

could prevent negative mood states from spilling over into conversations on the next day, and thereby lead to better communication on the next day.

In addition, a bidirectional relation was found between sexual activity and eating past the point of feeling full. That is, a greater likelihood of engaging in sexual activity was related to a greater likelihood of eating past the point of feeling full on the same day, above and beyond the effects of marital satisfaction and constructive communication, and eating past the point of feeling full predicted a greater likelihood of sexual activity on the same day, above and beyond the effects of physical activity. No studies, to our knowledge, have examined the association between eating behaviors and sexual activity. One potential explanation could be that overeating and sexual activity occur on days when couples spend more time together. Previous research has indicated that individuals eat more when with their spouses than when eating with friends (De Castro, 1994), and increased time spent together may lead to more opportunities to engage in sexual activity.

Several between-person associations between weight-related behavior and marital quality were also found, after accounting for multiple tests. First, individuals with higher average levels of marital satisfaction were less likely, on average, to engage in grazing behavior during the week, controlling for constructive communication and sexual activity, and individuals who were less likely to engage in grazing behaviors during the week reported higher levels of marital satisfaction, controlling for physical activity, meal planning, and eating past full. These findings would suggest that treatments aimed at improving marital satisfaction may also help decrease grazing behavior and vice versa. A possible mechanism underlying this association may also be negative mood. Similar to physical activity, lower levels of marital satisfaction may lead to negative mood, which in turn, results in grazing behavior to mitigate negative mood. Grazing

may occur either be in response to negative mood or may itself elicit negative mood (e.g., guilt about breaking diet), which in turn, spills over into relationship satisfaction.

Similarly, between-person associations found that individuals with lower levels of marital satisfaction are, on average, more likely to report eating past the point of feeling full, controlling for constructive communication and sexual activity. Perhaps lower marital satisfaction predicts eating past the point of feeling full as a way to decrease negative mood. These findings did not remain significant after controlling for multiple tests, however, and should, therefore, be interpreted with caution. Lastly, individuals with lower levels of spousal reinforcing support were, on average, more likely to graze and eat past the point of feeling full on the same day, controlling for instrumental support and monitoring control. At the same time, a higher likelihood of grazing, on average, was related to lower levels of reinforcing support on the same day, controlling for physical activity, meal planning, consuming carbonated beverages, and eating past full.

After accounting for multiple tests, however, only the associations between spousal reinforcing support predicting grazing and eating past the point of feeling full remained significant. Spousal reinforcing support included behaviors such as complimenting progress or appearance. Spousal reinforcing behaviors may provide an external motivator and sense of positive reinforcement for participants to not graze or eat past the point of feeling full. For those participants who have lower levels of spousal reinforcing support, they may not have this added level of motivation and reinforcement. This is supported by a previous study that found that spousal support behaviors (e.g., showing pride in partner's activity, complimenting physical activity) predicted engagement in exercise over and above the individual's own intention, self-efficacy, and planning (Ranby & Aiken, 2016). The current study extends these previous

findings to eating behaviors. To test this possible explanation, future research should consider the role of motivation in the link between spousal support and eating behaviors.

Our findings indicate that those individuals in satisfied marriages and with higher levels of spousal support behaviors engage in less grazing behavior and are less likely to eat past the point of feeling full; these findings are in opposition to the mating market model (Sobal, 1984). This model suggests that weight maintenance is motivated by the desire to attract a mate. When an individual is satisfied in the marriage, he or she gains weight because there is no longer a need to attract a mate; however, when an individual is dissatisfied in his or her marriage, he or she will lose weight in order to begin attracting other mates. Indeed, research by Meltzer and colleagues (2013) found that higher weight or BMI was associated with higher marital satisfaction. One potential explanation for why our findings differ from Meltzer and colleagues is differences in methodology. Meltzer and colleagues (2013) followed couples every six months for four years, whereas, this study examined the short-term association between these factors. It could be that in the short-term lower marital quality may be related to negative weight-related behaviors; however, over time, this may switch and being dissatisfied for longer periods may motivate an individual to engage in positive weight-related behaviors in order to attract a mate.

We also found evidence of moderation by length of relationship and participant sex, although these findings, too, should be interpreted with caution given they did not remain significant after accounting for multiple tests. Results indicated that those individuals who had been in their relationship longer were more likely to plan meals and snacks on the same day, but only when they reported lower levels of partner reinforcing support behavior. There was no significant relation between meal planning and partner reinforcing support for couples in shorter-

term relationships. It could be that when a long-term partner offers compliments on progress, an individual may feel they are doing so well that they can "cheat" and not meal plan that day.

Similarly, a higher likelihood of engaging in physical activity was associated with a lower likelihood of engaging in constructive communication on the following day and this effect was stronger for individuals who have been in relationships longer. Consistent with family systems theory (Bowen, 1993), these results suggest that spouses who have been together longer may have difficulty adapting to post-operative lifestyle changes and may (inadvertently) hinder an individual's efforts to engage in weight-related behaviors. For example, when an individual engages in physical activity, his/her partner may become frustrated that that time is not instead spent with them, and they may be less likely to engage in constructive communication the next day. Together, the results show an inverse relation between better marital quality and engaging in positive weight-related behavior for couples who have been together longer. Thus, for couples in longer-term relationships, perhaps factors outside of the relationship may play a more positive role in promoting marital quality and weight-related behavior.

The results from testing sex as a moderator were consistent with previous research suggesting that the association between weight and marital factors is stronger for females (Boyes & Latner, 2009; Markey et al., 2001; Meltzer et al., 2011). For example, engaging in physical activity predicted higher satisfaction that day and on the following day for females. Also, a higher likelihood of engaging in sexual activity predicted a lower likelihood of engaging in physical activity the following day for females, but a higher likelihood of physical activity for males. This could be due to differing perceptions of sexual activity. Males may find sexual activity to be a motivator for physical activity, whereas females may perceive sexual activity as exercise itself and may be less motivated to engage in physical activity the following day. Future

research is needed to examine sexual activity as a motivator for physical activity in both sexes. Moderation by participant sex, however, should be interpreted with caution due to the fact that the current sample was primarily female (88%).

Time since surgery did not emerge as a significant moderator of within-person associations between weight-related behavior and marital quality. This could be due to the fact that the majority of our sample was less than two years out from surgery (74.5%); thus, there may not have been enough variability in time since surgery to detect meaningful differences between individuals based on time since surgery. Previous research has found that the majority of patients experience a weight plateau around 18-24 months post-operation, followed by weight regain in the two to ten years following surgery (Courcoulas et al., 2013; Magro et al., 2008; Sjöström et al., 2007; White et al., 2010). One factor that may contribute to weight regain at this time is an increase in ghrelin levels. Ghrelin, also called "the hunger hormone," is primarily secreted by the stomach and is drastically reduced following surgery. Previous studies, however, have indicated that ghrelin levels slowly begin to rise one year following surgery (Buzga et al., 2014; Peterli et al., 2012). Without consistent weight loss as a daily positive reinforcement, combined with increased feelings of hunger, individuals may begin to fall back on pre-operative habits (e.g., grazing, eating past full) at the 18-24 month mark. Consistent with previous work, findings from the current study indicated that time since surgery was positively correlated with grazing, eating past full, and drinking carbonated beverages, and negatively related to counting calories. Taken together, these findings highlight the importance of considering timing into future research. Examining patients during this plateau period may be especially important for improving the long-term effectiveness of bariatric surgery. It would allow for the examination of environmental factors (e.g., marital quality) that predict which individuals are at risk for

regaining weight by engaging in maladaptive weight-related behavior as compared to those individuals who continue to adhere to their diet and maintain their weight loss.

Due to limited evidence for within-person associations using daily diary data, post-hoc analyses examined the association between marital factors and weight-related behaviors using baseline data. Results were consistent with diary data in that higher levels of marital satisfaction predicted higher levels of physical activity. Further, results indicated higher impact of weight on sexual functioning predicted lower levels of physical activity; however, this effect was weakened the farther out an individual was from surgery. This finding may suggest that as individuals lose weight from surgery, the impact of weight on sexual functioning lessens; thus, it does not predict physical activity engagement as strongly. These results are cross-sectional, however, and should be interpreted with caution due to the fact that all variables were measured at one time point, which may have artificially inflated correlations.

There were several limitations of the current study that provide future research directions. First, the sample was predominantly female (88%). While previous research has shown that the association between marriage and weight is stronger for females (Boyes & Latner, 2009; Markey et al., 2001; Meltzer et al., 2011), significant moderation by participant sex in the current study should be interpreted with caution given the small number of male participants. Previous research has shown, however, that bariatric surgery is more common for females, with surgery estimates of approximately 70-85% being female (e.g., Buchwald et al., 2004; Courcoulas et al., 2013; Mitchell et al., 2016). Future research should examine these associations in samples with equal numbers of males and females to better capture sex differences. Second, the participants in this sample self-selected into the study by responding to information posted at weight loss clinics in the DFW area and on online weight loss forums. As a result, this sample may not generalize to

individuals who would not participate in research studies. It is possible that the individuals included in this study were more likely to seek information and support and adhere to their diet post-operatively given they were recruited from weight loss clinics and online support forums.

Third, the data and results are correlational and may be subject to the influence of a third variable, such as stress spillover. That is, stress from other life domains, such as work stress, may impact marital factors and engagement in weight-related behaviors (Judge & Ilies, 2004; Heller & Watson, 2005; Williams & Alliger, 1994). Future research should examine different types of stress (e.g., work stress, parent-child relationship stress) simultaneously in order to better understand how different domains of stress predict engagement in weight-related behaviors above and beyond low marital quality.

Fourth, we did not assess how much time spouses spent together throughout the day. It could be that spouses who spend more time together are more likely to experience help or hindrance with weight-related behaviors by their partner. Fifth, several of our measures had to be modified or reduced to one item in order to shorten the time it took participants to complete the diaries or because reliability estimates fell below acceptable estimates of at least 0.60. Short and single-item measures, however, are common in diary studies and are necessary to prevent participant burden or attrition. Sixth, the current sample examined post-operative bariatric surgery patients and, therefore, results may not extend to pre-operative patients or to a non-surgical population of couples.

Lastly, the current study did not control for positive affect. Given the association between physical activity and positive affect (e.g., Watson, 1988), it could be that significant findings are simply an artifact of positive mood. Future research should control for positive affect to draw

more cogent conclusions on the association between marital factors and weight-related behaviors.

Ethical and Diversity Issues Related to Bariatric Surgery Patients

Working with individuals with obesity requires being aware of several unique issues. First, patients pursuing bariatric surgery are at increased risk for psychopathology such as depression and may be at increased risk for suicide following surgery (Mitchell et al., 2014; Tindle et al., 2010). It is possible that this increased risk is associated with the disability associated with the chronic disease of obesity as well as the stigmatizing effects of overweight and obesity. Indeed, stigmatization has been associated with psychological distress and binge eating behavior among patients presenting for weight loss treatment (Ashmore et al., 2008; Friedman, Ashmore, & Applegate, 2008). Second, patient's culture may influence body image, food preferences, physical activity, desire to lose weight, and health beliefs (Kumanyika, 2008). These differences may influence patient's expectations of surgical outcome and willingness to follow peri-operative medical and behavioral recommendations. As such, being mindful of cultural differences must be taken into consideration during the assessment so that appropriate education and treatments can be recommended.

Theoretical and Clinical Implications

The present study extends our understanding of the relation between marital functioning and weight-related behaviors by examining day-to-day relationship factors and engagement in weight-related behaviors. Findings from this study have important theoretical and clinical implications. Theoretically, previous work has long documented the association between marital quality and weight (see Ellison et al., in prep, for review); however, little work has been done to examine several dimensions of the marital relationship and weight-related behaviors within one

study using a daily diary design. The current study addressed this gap in the literature. Results from this study provide further support for family systems theory (Bowen, 1993), indicating that there is a bidirectional association between marriage and weight-related behaviors; in particular between marital satisfaction and physical activity and grazing and between reinforcing support and grazing and eating past the point of feeling full. Previous research has primarily focused on the unidirectional association from marital functioning to weight outcomes; however, the current study found evidence for the opposite direction, such that physical activity, grazing, and eating past the point of feeling full predicted marital satisfaction, sexual activity, and reinforcing support behaviors. Across results, we found more support for same day associations rather than time-lagged associations. Perhaps decisions to adhere to one's diet or engage in physical activity are predicted by one's immediate social environment and are less predicted by something that happened the day before.

These findings can also be extended to clinical work, such that treatments aimed at improving marital satisfaction, communication, and reinforcing support may have implications for adherence to weight-related behaviors following bariatric surgery. This is consistent with previous research showing positive behaviors during marital interactions, such as positive affect and complimenting weight loss progress, were related to diet adherence and higher physical activity levels (e.g., Dailey et al., 2016; Gallagher et al., 2013; Novak & Webster, 2011). Similarly, treatments aimed at improving adherence to weight-related behaviors following surgery may improve marital functioning. This is consistent with previous research that has found improvements in marital and sexual functioning following bariatric surgery (Assimakopoulos et al., 2011; Rand, Kowalske, & Kuldau, 1984). Extending previous work, findings from the current study suggest that marital quality and diet and exercise fluctuate day-

to-day, and even though these fluctuations may be small, they can still impact each other. Whereas previous research showed that improving your marriage, for example, can have a positive benefit for adherence to one's diet, small, daily changes in marital quality can also have an effect on weight-related behavior. Starting with small, daily changes in diet adherence or small, daily improvements in marital quality may lead to long-lasting behavior change.

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Table 1

Means and Standard Deviations of Demographic Variables for Current Study Sample versus Total Sample

	Age *M* (*SD*)	Biological Sex	Length of Relationship *M* (*SD*)	Time since Surgery *M* (*SD*)	% Married	Ethnicity	Median Yearly Household Income	Median Education	BMI *M* (*SD*)
Current study sample (*N*=94)	45.12 (10.60)	88% Female 12% Male	17.21 (11.39)	3.83 (16.32)	94%	87% European-American 6% Black 3% Hispanic	$100,000-$150,000	College degree	33.32 (7.12)
Total sample (*N*=101)	45.24 (10.59)	89% Female 11% Male	17.16 (11.53)	3.65 (15.82)	93%	83% European American 7% Black 6% Hispanic	$100,000-$150,000	College degree	33.19 (7.09)

Table 2
Descriptive Statistics of Study Variables by Diary Day

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
	M (*SD*)						
Marital satisfaction	3.70 (1.50)	3.60 (1.64)	3.82 (1.42)	3.93 (1.41)	3.98 (1.48)	4.01 (1.44)	4.15 (1.28)
Reinforcing behaviors	1.86 (1.67)	1.31 (1.54)	1.17 (1.51)	1.44 (1.61)	1.28 (1.53)	1.25 (1.54)	1.10 (1.48)
Instrumental behaviors	1.22 (1.33)	1.08 (1.35)	1.03 (1.21)	1.41 (1.40)	1.19 (1.44)	1.14 (1.31)	1.17 (1.29)
Monitoring behaviors	0.40 (0.69)	0.18 (0.49)	0.20 (0.61)	0.20 (0.50)	0.22 (0.66)	0.14 (0.35)	0.27 (0.73)
Diet adherence[a]	3.46 (1.18)	3.66 (1.21)	3.38 (1.12)	3.39 (1.25)	3.29 (1.25)	3.54 (1.23)	3.46 (1.12)
	Percent "Yes"						
Constructive communication	34.0%	25.5%	24.5%	34.0%	28.7%	28.7%	29.8%
Sexual activity	24.5%	14.9%	14.9%	20.2%	14.9%	16.0%	20.2%
Grazing*	74.5%	78.7%	74.5%	74.5%	71.3%	72.3%	75.5%
Meal planning	37.2%	37.2%	27.7%	34.0%	27.7%	35.1%	37.2%
Carbonated beverages*	88.3%	86.2%	81.9%	78.7%	79.8%	84.0%	87.2%
Eating past full*	85.1%	80.9%	80.9%	76.6%	73.4%	78.7%	77.7%
Count calories	57.4%	59.6%	51.1%	50.0%	45.7%	50.0%	50.0%
Physical activity	48.9%	40.4%	31.9%	30.9%	37.2%	45.7%	36.2%

Note. [a]Diet adherence composite was created by summing grazing, meal planning, consuming carbonated beverages, eating past full, and counting calories (composite not used in analyses). Items marked with asterisk were reverse scored to indicate *not* engaging in this behavior, thus, indicating a higher diet adherence.

Table 3

Reliability and ICC of Study Variables

	Marital satisfaction	Constructive communication	Sexual activity	Reinforcing behaviors	Instrumental behaviors	Monitoring behaviors	Diet adherence*	Physical activity
R_c	--	--	--	.72	.46	.29	.28	--
R_{IF}	--	--	--	.82	.66	.52	.63	--
ICC	.53	.50	.24	.55	.51	.47	.55	.20

	Diet Adherence Variables				
	Grazing	Meal Planning	Carbonated beverages	Eating past full	Count calories
ICC	.37	.41	.13	.64	.57

Note. Reliability of 1-item measures not calculated. Given low reliability scores of diet adherence behavior composite, the ICC of each diet adherence variable is presented below. Given low reliability scores of reinforcing and instrumental behaviors, these variables were only included in models as Level 2 predictors.

Table 4

Test of Systematic Change in Study Variables over Time

	Outcome									
	Marital satisfaction	Constructive communication	Sexual activity	Reinforcing behaviors	Grazing	Meal planning	Carbonated beverages	Eating past full	Count calories	Physical Activity
	Fixed Effects									
	b (SE)	OR [95% CI]	OR [95% CI]	b (SE)	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]
Intercept	3.64 (0.15)**	0.45 [0.28, 0.72]*	0.24 [0.16, 0.36]**	1.55 (0.15)**	3.52 [2.42, 5.15]**	0.69 [0.47, 1.01]	5.94 [3.65, 9.66]**	5.65 [4.28, 7.46]**	1.31 [0.76, 2.26]	-0.73 [0.50, 1.08]
Level 1										
Day	0.08 (0.02)**	1.00 [0.91, 1.09]	0.97 [0.89, 1.08]	-0.09 (0.03)**	1.01 [0.93, 1.11]	1.02 [0.94, .1.11]	1.02 [0.94, 1.12]	0.95 [0.86, 1.06]	0.95 [0.87, 1.04]	0.99 [0.91, 1.08]
Weekday	0.04 (0.10)	1.26 [0.86, 1.85]	1.40 [0.94, 2.08]	.31 (0.10)**	1.10 [0.72, 1.66]	.50 [0.34, 0.73]**	0.93 [0.64, 1.37]	.78 [0.50, 1.21]	.81 [0.56, 1.17]	1.01 [0.67, 1.51]
	Variance									
Level 2										
Intercept	1.24**	4.28**	1.11	1.60**	2.43**	2.73**	4.62**	.46	6.19**	1.41*
Day	0.02**	0.03	0.06	0.03**	0.01	0.02	0.00	0.01	0.04	0.02
Weekday	0.22*	0.36	0.06	0.27**	0.45	0.06	0.01	0.11	0.06	0.68

Note. Fixed-effects are from population specific models for dichotomous variables; random-effects are from unit-specific models. ** $p < .01$, * $p < .05$, † $p < .10$.

Table 5

Correlations between Aggregated Study Variables and Demographic Variables

	Age	Ethnicity	Income	Education	BMI
Marital satisfaction	-.14**	-.10**	.24**	.13**	-.01
Constructive communication	-.07	-.07	-.02	.22**	-.06
Sexual activity	-.19**	.24**	.03	-.15**	-.10**
Reinforcing behaviors	-.09-	-.04	.13**	-.05	.04
Grazing*	.05	-.03	.22**	-.07	-.05
Meal planning	.17**	.05	.16**	-.10**	.03
Carbonated beverages*	.01	.04	.11**	.09*	-.17***
Eating past full*	.13**	.03	.33**	-.04	-.10**
Count calories	.10**	-.11**	.12**	-.09*	.09*
Physical activity	.16	-.05	.05	-.07	-.08

Note. Items marked with asterisk were reverse scored to indicate *not* engaging in this behavior, thus, indicating a higher diet adherence. *p<.05, **p <.01, $^{\dagger}p$ < .10.

Table 6

Correlations between Daily Weight-related Behavior and Marital Variables Averaged across the Seven Days

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Marital satisfaction	--									
2. Constructive communication	.05	--								
3. Sexual activity	.17**	-.03	--							
4. Reinforcing behaviors	.41**	.29**	.29**	--						
5. Grazing*	.42**	-.07	.16**	.34**	--					
6. Meal planning	.23**	-.02	.02	.28**	.32**	--				
7. Carbonated beverages*	.08*	.10**	-.10*	.22**	.22**	.23**	--			
8. Eating past full*	.27**	-.08	.06	.19**	.28**	.34*	.10**	--		
9. Count calories	.02	.06	-.09*	.14**	.20**	.32**	.30**	.17**	--	
10. Physical activity	-.01	-.14**	-.12**	.10**	.24**	.29**	.05	.20**	.06	--

Note. Items marked with asterisk were reverse scored to indicate *not* engaging in this behavior, thus, indicating a higher diet adherence.
*p<.05, **p <.01, $^{\dagger}p$ < .10.

Table 7

Results from HLMs Predicting Same Day Weight Behaviors from General Marital Factors

	Outcome					
	Physical activity	Grazing	Meal planning	Carbonated beverages	Eating past full	Count calories
	Fixed Effects					
	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]
Intercept	**.70 [.55, .91]****	**3.76 [2.65, 5.33]****	.69 [.47, 1.03]	**5.41 [3.38, 8.68]****	**5.14 [3.98, 6.66]****	1.24 [.72, 2.16]
Level 1 (within)						
Day	--	--	--	--	--	--
Weekday	--	--	**.49 [.33, .72]****	--	--	--
Marital satisfaction	1.30 [1.03, 1.65]*	.98 [.80, 1.21]	1.09 [.89, 1.33]	1.00 [.83, 1.20]	1.02 [.82, 1.28]	1.00 [.83, 1.19]
Constructive communication	.94 [.53, 1.67]	1.94 [1.07, 3.52]*	1.30 [.73, 2.31]	.77 [.44, 1.35]	.96 [.43, 2.13]	1.11 [.64, 1.92]
Sexual activity	1.30 [.77, 2.20]	.70 [.40, 1.22]	.97 [.59, 1.62]	1.22 [.73, 2.04]	.49 [.26, .92]*	1.26 [.73, 2.16]
Level 2 (between)						
Age	1.01 [.99, 1.04]	--	1.03 [.99, 1.07]	--	1.01 [.98, 1.03]	--
Education	--	--	--	--	--	--
Income	.99 [.84, 1.18]	1.07 [.87, 1.31]	1.04 [.81, 1.32]	--	1.14 [.98, 1.33] †	1.22 [.89, 1.69]
Ethnicity	--	.91 [.33, 2.50]	--	--	1.26 [.59, 2.68]	--
BMI	--	.99 [.94, 1.04]	--	.98 [.91, 1.04]	--	--
Marital satisfaction	1.05 [.83, 1.34]	**1.54 [1.14, 2.08]****	1.30 [.93, 1.83]	1.12 [.74, 1.71]	1.31 [1.05, 1.64]*	1.02 [.63, 1.65]
Constructive communication	.70 [.34, 1.43]	.64 [.25, 1.62]	1.05 [.38, 2.92]	1.33 [.35, 5.08]	.76 [.39, 1.51]	1.43 [.32, 6.30]
Sexual activity	.58 [.18, 1.93]	1.92 [.40, 9.22]	1.19 [.22, 6.41]	.59 [.07, 5.13]	1.29 [.40, 4.18]	.29 [.03, 3.26]

Note. Only demographic variables found to be correlated with outcome variables were included in the models. Those not included are marked with —. Bolded items indicate that result remained significant after correcting for multiple tests. *p<.05, **p <.01, †p < .10.

Table 7 (continued)

Results from HLMs Predicting Same Day Weight Behaviors from General Marital Factors

					Variance	
Intercept	.87**	1.78**	2.78**	4.63**	.43	6.59
Day	--	--	--	--	--	--
Weekday	--	--	.23	--	--	--
Marital satisfaction	.14	.04	.04	.001	.05	.003
Constructive communication	.35	.35	.51	.18	3.75	.22
Sexual activity	.31	.43	.06	.07	.14	.62

Note. *p<.05, **p <.01, $^{\dagger}p$ < .10.

Table 8

Results from HLMs Predicting Same Day Weight Behaviors from Support and Control Behaviors

	Outcome					
	Physical activity	Grazing	Meal planning	Carbonated beverages	Eating past full	Count calories
	Fixed Effects					
	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]
Intercept	**.71 [.55, .91]****	**5.67 [3.88, 8.28]****	.68 [.47, .99]	**8.59 [5.25, 14.05]****	**5.56 [4.24, 7.28]****	1.25 [.73, 2.15]
Level 1 (within)						
Day	--	--	--	--	--	--
Weekday	--	--	**.47 [.32, .70]****	--	--	--
Reinforcing support	1.10 [.91, 1.34]	1.05 [.80, 1.39]	1.05 [.87, 1.26]	.98 [.80, 1.21]	1.01 [.80, 1.29]	1.00 [.85, 1.19]
Level 2 (between)						
Age	1.02[.99, 1.04]	--	1.03 [.99, 1.07]	--	1.01 [.98, 1.04]	--
Education	--	--	--	--	--	--
Income	.99 [.83, 1.18]	1.10 [.92, 1.33]	1.06 [.83, 1.36]	--	1.44 [.97, 1.35]†	1.15 [.82, 1.64]
Ethnicity	--	1.07 [.32, 3.61]	--	--	1.37 [.62, 3.03]	--
BMI	--	1.01 [.94, 1.07]	--	.97 [.90, 1.05]	--	--
Reinforcing support	1.07 [.84, 1.37]	**1.82 [1.28, 2.58]****	1.29 [.92, 1.81]	1.29 [.81, 2.05]	**1.47 [1.13, 1.92]****	1.20 [.72, 2.00]
Instrumental support	1.12 [.85, 1.48]	1.20 [.70, 2.08]	1.19 [.80, 1.76]	1.73 [.95, 3.14]†	.88 [.67, 1.17]	.89 [.49, 1.61]
Monitoring control	.99 [.53, 1.86]	.58 [.18, 1.89]	1.03 [.44, 2.42]	.87 [.25, 2.97]	.72 [.40, 1.32]	1.42 [.40, 5.11]
	Variance					
Intercept	.89**	1.80**	2.45**	4.64**	.37	6.28**
Day	--	--	--	--	--	--
Weekday	--	--	.04	--	--	--
Reinforcing support	.14*	.16	.07	.002	.10	.03

Note. Only demographic variables found to be correlated with outcome variables were included in the models. Those not included are marked with —. Bolded items indicate that result remained significant after correcting for multiple tests. *p<.05, **p <.01, $^{\dagger}p$ < .10.

Table 9

Regression Coefficients from HLMs Predicting Same Day Marital Outcomes from Individual Weight-Related Behaviors

	Outcome			
	Marital satisfaction	Constructive communication	Sexual activity	Reinforcing behaviors
	Fixed Effects			
	b (SE)	OR [95% CI]	OR [95% CI]	b (SE)
Level 1 (within)				
Model 1: Grazing	0.01 (0.14)	1.78 [0.96, 3.28]	0.67 [0.35, 1.27]	-0.02 (0.17)
Model 2: Meal planning	0.06 (0.12)	1.08 [0.67, 1.75]	0.89 [0.51, 1.53]	0.13 (0.14)
Model 3: Eat past full	0.02 (0.12)	0.97 [0.53, 1.75]	0.55 [0.30, 0.99]*	0.08 (0.14)
Model 4: Carbonated bev.	-0.07 (0.25)	0.61 [0.21, 1.77]	1.65 [0.54, 5.07]	0.02 (0.23)
Model 5: Count calories	0.11 (0.15)	1.19 [0.64, 2.22]	1.54 [0.74, 3.23]	0.04 (0.16)
Level 2 (between)				
Model 1: Grazing	1.73 (0.39)**	0.66 [0.15, 2.93]	2.93 [0.98, 8.80]	1.58 (0.45)**
Model 2: Meal planning	0.70 (0.34)*	1.05 [0.31, 3.60]	1.07 [0.46, 2.53]	1.04 (0.37)**
Model 3: Eat past full	1.53 (0.67)*	0.65 [0.07, 6.56]	2.83 [0.51, 15.65]	1.50 (0.71)*
Model 4: Carbonated bev.	0.27 (0.46)	2.05 [0.39, 10.77]	0.59 [0.19, 1.83]	1.11 (0.51)*
Model 5: Count calories	0.06 (0.28)	1.33 [0.50, 3.55]	0.75 [0.37, 1.49]	0.44 (0.31)

Note. Carbonated bev. = Carbonated beverages. Each diet adherence behavior predicting each marital factor was run as an individual model. Models were run with appropriate demographic, systematic change over time, and weekday versus weekend predictors; however, only results from diet adherence behavior predictors are presented to illustrate which variables were included in subsequent main models with physical activity. *p<.05, **p <.01, $^{\dagger}p$ < .10.

Table 10

Results from HLMs Predicting Same Day Marital Factors from Weight Behaviors

	Outcome			
	Marital satisfaction	Constructive communication	Sexual activity	Reinforcing behaviors
	Fixed Effects			
	b (SE)	OR [95% CI]	OR [95% CI]	b (SE)
Intercept	**3.87 (.11)****	**.45 [.31, .70]****	**.22 [.16, .29]****	**1.28 (.12)****
Level 1 (within)				
Day	**.07 (.02)****	--	--	**-.09 (.03)****
Weekday	.03 (.10)	--	--	**.30 (.10)****
Physical activity	**.25 (.10)***	.57 [.13, 2.49]	1.33 [.85, 2.07]	.14 (.11), .23
Eat past full	--	--	.56 [.32, .10]*	--
Level 2 (between)				
Age	--	--	--	--
Ethnicity	--	--	2.18 [.96, 4.97]†	--
Education	.18 (.11)	1.42 [.93, 2.17]	--	--
Income	.07 (.07)	--	--	--
BMI	--	--	1.02 [.98, 1.06]	--
Physical activity	-.37 (.40)	.95 [.62, 1.44]	.58 [.20, 1.67]	-.06 (.46)
Grazing	**1.50 (.42)****	--	--	1.12 (.49)*
Meal planning	.31 (.34)	--	--	.59 (.41)
Carbonated bev	--	--	--	.61 (.51)
Eat past full	1.01 (.66)	--	2.98 [.55, 16.09]	.43 (.75)

Note. Carbonated bev. = Carbonated beverages. Only demographic variables found to be correlated with outcome variables were included in the models. Those not included are marked with —. Bolded items indicate that result remained significant after correcting for multiple tests. *p<.05, **p <.01, †p < .10.

Table 10 (continued)

Results from HLMs Predicting Same Day Marital Factors from Weight Behaviors

			Variance	
Intercept	.89**	3.27**	1.07**	1.22**
Day	.02**	--	--	.03*
Weekday	.22	--	--	.25
Physical activity	.02	.23	.01	.28
Eat past full	--	--	.01	--

Note. *p<.05, **p <.01, $^{\dagger}p$ < .10.

Table 11

Results from HLMs Predicting Next Day Weight Behaviors from General Marital Factors

	Outcome					
	Physical activity (T+1)	Grazing (T+1)	Meal planning (T+1)	Carbonated beverages (T+1)	Eating past full (T+1)	Count calories (T+1)
	Fixed Effects					
	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]
Intercept	**.57 [.46, .71]****	**5.73 [4.18, 7.85]****	**.49 [37, .64]****	**13.74 [9.08, 20.78]****	6.07 [4.34, 7.95]	1.38 [1.02, 1.86]*
Level 1 (within)						
Day	--	--	--	--	--	--
Weekday	--	--	.99 [.57, 1.73]	--	--	--
Prev day weight factor	.70 [.41, 1.20]	.61 [.27, 1.41]	.88 [.47, 1.65]	.53 [.14, 1.98]	.51 [.24, 1.07]†	1.49 [.66, 3.67]
Marital satisfaction	.98 [.74,.1.28]	.95 [.71, 1.27]	1.31 [.99, 1.71]†	1.15 [.80, 1.66]	1.02 [.72, 1.44]	1.00 [.73, 1.38]
Constructive communication	1.40 [.66, 2.98]	.78 [.33, 1.84]	.89 [.39, 1.99]	1.51 [.41, 5.63]	.74 [.32, 1.71]	.86 [.33, 2.23]
Sexual activity	1.48 [.72, 3.07]	.78 [.31, 1.97]	.95 [.44, 2.08]	.91 [.30, 2.76]	.67 [.28, 1.58]	.86 [.35, 2.12]
Level 2 (between)						
Age	1.01 [.98, 1.03]	--	1.01 [.98, 1.04]	--	1.00 [.97, 1.03]	--
Education	--	--	--	--	--	--
Income	.98 [.85, 1.14]	.99 [.85, 1.16]	1.00 [.85, 1.17]	--	1.00 [.86, 1.18]	1.05 [.86, 1.28]
Ethnicity	--	1.04 [.41, 2.59]	--	--	.93 [.43, 1.99]	--
BMI	--	.99 [.95, 1.04]	--	1.01 [.95, 1.07]	--	--
Prev day weight factor	**357.11 [123.85, 1029.65]****	**780.09 [189.14, 3217.44]****	**175.24 [79.97, 384.02]****	**879.56 [203.24, 3806.49]****	**528.84 [113.24, 2469.66]****	**649.59 [267.76, 1575.92]****
Marital satisfaction	.86 [.69, 1.06]	1.05 [.81, 1.37]	1.04 [.83, 1.30]	1.13 [.79, 1.63]	1.08 [.86, 1.37]	1.00 [.46, 2.36]
Constructive communication	1.10 [.59, 2.06]	1.38 [.58, 3.29]	.86 [.46, 1.62]	1.05 [.35, 3.23]	.96 [.47, 1.97]	1.05 [.46, 2.36]
Sexual activity	1.02 [.34, 3.08]	2.86 [.67, 12.25]	.92 [.32, 2.61]	.71 [.12, 4.20]	.73 [.23, 2.32]	.89 [.23, 3.51]

Note. Only demographic variables found to be correlated with outcome variables were included in the models. Those not included are marked with —. Bolded items indicate that result remained significant after correcting for multiple tests. *p<.05, **p <.01, $^{\dagger}p$ < .10.

Table 11 (continued)

Results from HLMs Predicting Next Day Weight Behaviors from General Marital Factors

				Variance		
Intercept	.001	.01	.07	.04	.01	.01
Day	--	--	--	--	--	--
Weekday	--	--	1.26	--	--	--
Prev day marital factor	1.01	1.63	.39	.36	1.01	.44
Marital satisfaction	.15	.04	.15	.10	.46†	.05
Constructive communication	.39	1.31	2.03	.28	1.94	.58
Sexual activity	1.03*	.03	2.58	4.96	3.09	2.46

Note. *p<.05, **p <.01, $^{\dagger}p$ < .10.

Table 12

Results from HLMs Predicting Next Day Weight Behaviors from Support and Control Behaviors

	Outcome					
	Physical activity (T+1)	Grazing (T+1)	Meal planning (T+1)	Carbonated beverages (T+1)	Eating past full (T+1)	Count calories (T+1)
	Fixed Effects					
	OR 95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]	OR [95% CI]
Intercept	**.57 [.45, .72]****	**5.59 [4.10, 7.63]****	**.43 [.31, .59]****	**59.67 [23.12, 154.01]****	**8.41 [5.92, 11.97]****	1.40 [1.00, 1.95]
Level 1 (within)						
Day	--	--	--	--	--	--
Weekday	--	--	1.04 [.58, 1.88]	--	--	--
Prev day weight factor	.67 [.40, 1.12]	.57 [.23, 1.38]	.88 [.47, 1.68]	.35 [.09, 1.37]	.44 [.20, .97]*	1.64 [.72, 3.74]
Reinforcing support	1.05 [.80, 1.38]	.98 [.72, 1.34]	.96 [.74, 1.25]	1.38 [.83, 2.27]	1.01 [.74, 1.36]	.94 [.68, 1.31]
Level 2 (between)						
Age	1.01 [.99, 1.03]	--	1.01 [.98, 1.03]	--	.99 [.96, 1.02]	--
Education	--	--	--	--	--	--
Income	.96 [.83, 1.11]	1.02 [.87, 1.21]	1.00 [.85, 1.19]	--	1.01 [.85, 1.21]	1.04 [.82, 1.32]
Ethnicity	--	1.29 [.53, 3.19]	--	--	.80 [.34, 1.90]	--
BMI	--	.99 [.95, 1.04]	--		--	--
Prev day weight factor	**314.56 [108.74, 909.93]****	**639.23 [168.99, 2417.93]****	**365.64 [143.44, 932.08]****	**41603.57 [2142.76, 808817.15]****	**1994.00 [311.88, 12748.58]****	**1891.69 [593.90, 6025.42]****
Reinforcing support	.94 [.75, 1.17]	1.09 [.79, 1.50]	.92 [.72, 1.16]	.95 [.53, 1.72]	1.13 [.79, 1.61]	.95 [.68, 1.34]
Instrumental support	1.02 [.80, 1.30]	1.07 [.78, 1.48]	.99 [.76, 1.29]	1.71 [.54, 1.72]	1.13 [.82, 1.55]	1.06 [.75, 1.48]
Monitoring control	1.03 [.46, 2.27]	1.32 [.39, 4.49]	.87 [.38, 1.99]	7.76 [.40, 14.07]	1.17 [.37, 3.76]	.85 [.27, 2.71]

Note. Only demographic variables found to be correlated with outcome variables were included in the models. Those not included are marked with —. Bolded items indicate that result remained significant after correcting for multiple tests. *p<.05, **p <.01, $^{\dagger}p$ < .10.

Table 12 (continued)

Results from HLMs Predicting Next Day Weight Behaviors from Support and Control Behaviors

				Variance		
Intercept	.001	.01	.10	.09†	.002	.01
Day	--	--	--	--	--	--
Weekday	--	--	1.83	--	--	--
Prev day marital factor	.15	2.20	.18	.32	.31	.29
Reinforcing support	.40*	70.01**	.14	.01†	.10**	.15

Note. *p<.05, **p <.01, †p < .10.

Table 13

Regression Coefficients from HLMs Predicting Next Day Marital Outcomes from Individual Weight-Related Behaviors

	Outcome			
	Marital satisfaction (T+1)	Constructive communication (T+1)	Sexual activity (T+1)	Reinforcing behaviors (T+1)
	Fixed Effects			
	b (SE)	OR [95% CI]	OR [95% CI]	b (SE)
Level 1 (within)				
Model 1: Grazing	0.18 (0.14)	0.34 [0.13, 0.88]*	0.70 [0.26, 1.94]	0.23 (0.16)
Model 2: Meal planning	-0.16 (0.15)	0.66 [0.27, 1.61]	0.64 [0.26, 1.08]	-0.19 (0.14)
Model 3: Eat past full	0.19 (0.12)	0.87 [0.34, 2.24]	0.91 [0.34, 2.27]	-0.09 (0.14)
Model 4: Carbonated bev.	0.06 (0.22)	0.54 [0.10, 2.77]	0.41 [0.08, 2.03]	-0.21 (0.33)
Model 5: Count calories	0.03 (0.14)	1.74 [0.55, 5.51]	0.54 [0.18, 1.64]	-0.04 (0.17)
Level 2 (between)				
Model 1: Grazing	-0.02 (0.13)	1.16 [0.37, 3.63]	1.19 [0.32, 4.50]	-0.09 (0.14)
Model 2: Meal planning	-0.01 (0.08)	1.02 [0.40, 2.61]	1.16 [0.49, 2.82]	-0.07 (0.12)
Model 3: Eat past full	0.20 (0.21)	0.91 [0.15, 5.37]	1.44 [0.23, 8.85]	-0.03 (0.23)
Model 4: Carbonated bev.	-0.02 (0.13)	0.91 [0.22, 3.76]	1.15 [0.39, 3.36]	0.01 (0.15)
Model 5: Count calories	0.01 (0.08)	0.56 [0.26, 1.22]	1.11 [0.55, 2.28]	-0.07 (0.09)

Note. Carbonated bev. = Carbonated beverages. Each diet adherence behavior predicting each marital factor was run as an individual model. Models were run with appropriate demographic, systematic change over time, and weekday versus weekend predictors; however, only results from diet adherence behavior predictors are presented to illustrate which variables were included in subsequent main models with physical activity. *p<.05, **p <.01, $^{\dagger}p$ < .10.

Table 14

Results from HLMs Predicting Next Day Marital Factors from Weight Behaviors

	Outcome			
	Marital satisfaction (T+1)	Constructive communication (T+1)	Sexual activity (T+1)	Reinforcing behaviors (T+1)
	Fixed Effects			
	b (SE)	OR [95% CI]	OR [95% CI]	b (SE)
Intercept	**3.94 (.04)****	**.27 [.20, .37]****	**.11 [.08, .16]****	**1.26 (.05)****
Level 1 (within)				
Day	**.09 (.03)****	--	--	-.05 (.03)†
Weekday	.02 (.09)	--	--	.03 (.10)
Prev day marital factor	**-.30 (.05)****	**.33 [.14, .80]***	.53 [.26, 1.07]†	-.10 (.05)*
Physical activity	.21 (.10)*	.61 [.29, 1.28]	1.12 [.54, 2.30]	.09 (.10)
Grazing	--	.38 [.15, .95]*	--	--
Level 2 (between)				
Age	--	--	--	--
Ethnicity	--	--	1.08 [.50, 2.30]	--
Education	.01 (.03)	1.05 [.75, 1.47]	--	--
Income	.01 (.02)	--	--	--
BMI	--	--	.99 [.94, 1.03]	--
Prev day marital factor	**1.01 (.03)****	**952.92 [334.13, 2717.70]****	**2016.17 [458.85, 8858.93]****	**1.01 (.03)****
Physical activity	.02 (.11)	2.44 [.73, 8.12]	1.06 [.37, 3.04]	-.11 (.14)
Grazing	--	.96 [.31, 2.96]	--	--
	Variance			
Intercept	.02	.05	.002	.04†
Day	.07**	--	--	.15*
Weekday	.18	--	--	.61**
Prev day marital factor	.04	1.44	.34	.18†
Physical activity	.23	1.30	.84	.23†
Grazing	--	1.51	--	--

Note. Only demographic variables found to be correlated with outcome variables were included in the models. Those not included are marked with —. Bolded items indicate that result remained significant after correcting for multiple tests. *p<.05, **p <.01, †p < .10.

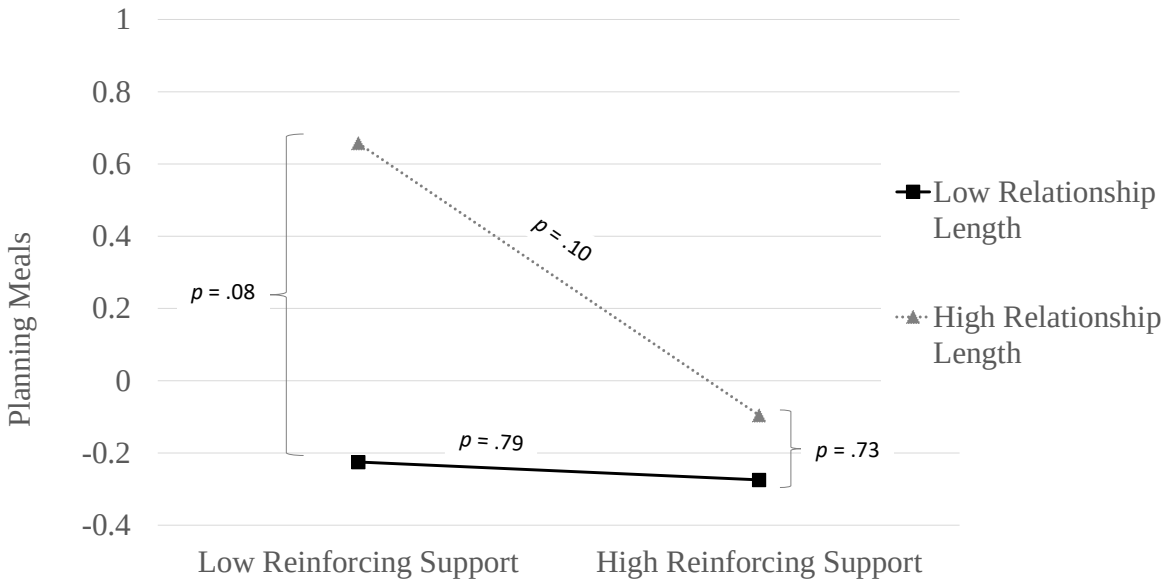

Figure 1. Length of relationship as a moderator of the relation between spousal reinforcing support behaviors and planning meals and snacks on the same day.

Note. Analyses controlled for whether the diary was filled out on a weekend versus weekday, participant age, and income. Lines for low and high reinforcing support behaviors, and low and high length of relationship, are plotted at -1 SD and +1 SD, respectively, from the mean (Regions of significance indicate the interaction is significant -1.31 SD below the mean and 15.41 SD above the mean).

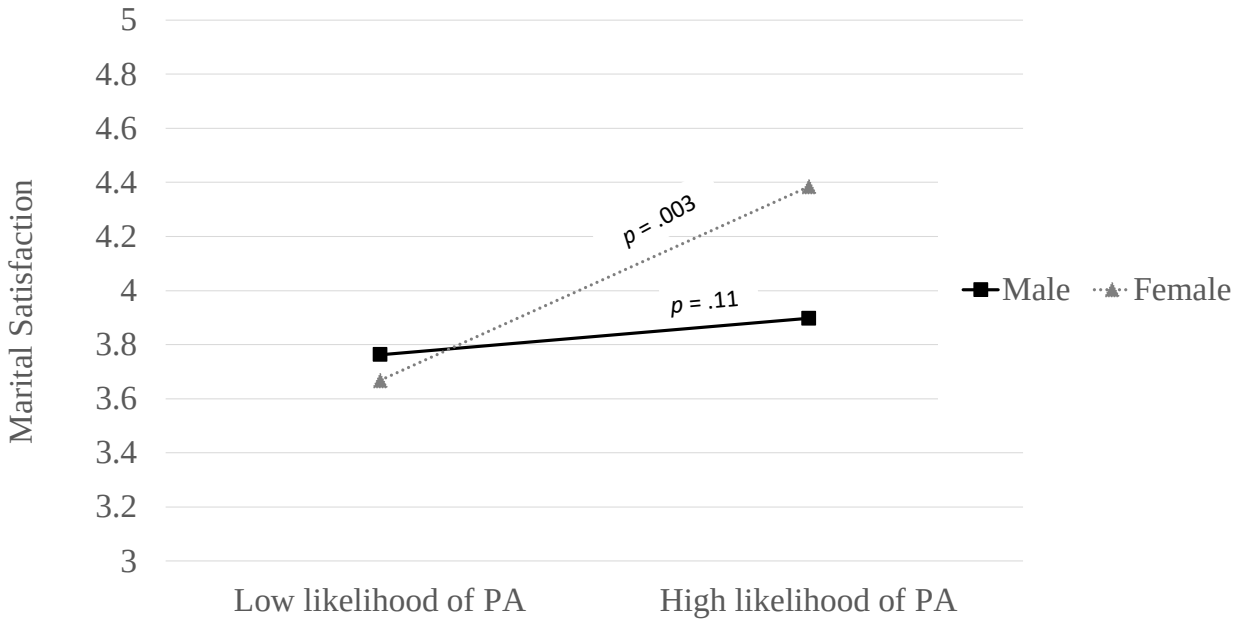

Figure 2. Biological sex as a moderator of the relation between physical activity and marital satisfaction on the same day.

Note. PA = physical activity. Analyses controlled for systematic change across diary day, whether the diary was filled out on a weekend versus weekday, participant income, and education. Lines for low and high likelihood of engaging in physical activity are plotted at -1 SD and +1 SD, respectively, from the mean.

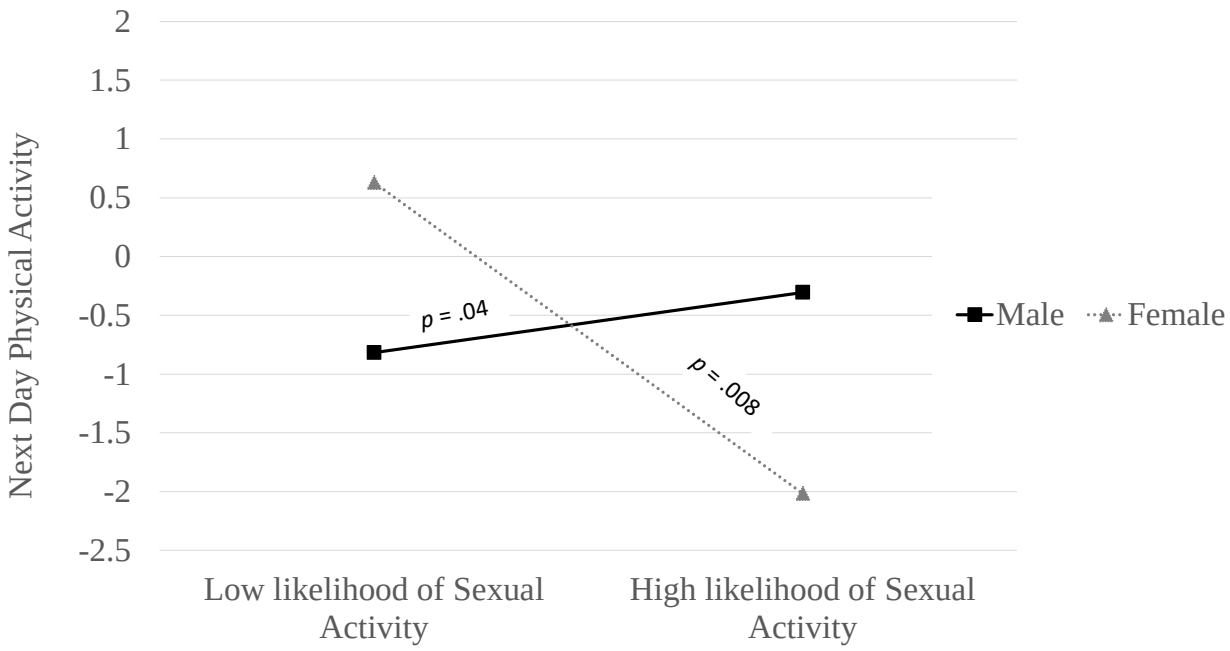

Figure 3. Biological sex as a moderator of the relation between sexual activity and physical activity on the next day.

Note. Analyses controlled for participant age and income. Lines for low and high likelihood of engaging in sexual activity are plotted at -1 SD and +1 SD, respectively, from the mean.

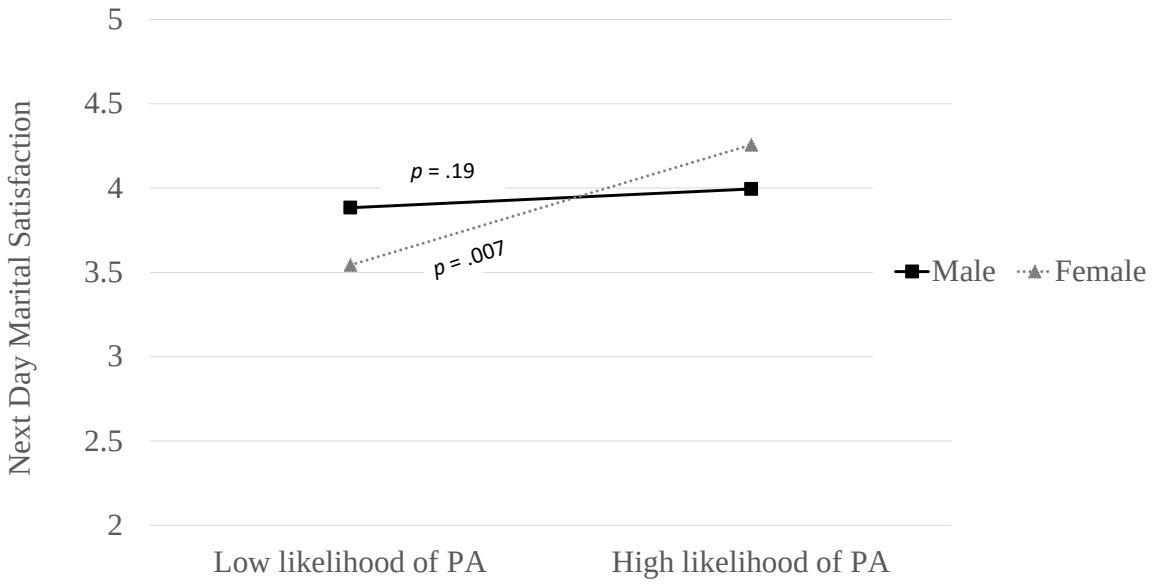

Figure 4. Biological sex as a moderator of the relation between physical activity and marital satisfaction on the next day.

Note. PA = physical activity. Analyses controlled for systematic change across diary day, whether the diary was filled out on a weekend versus weekday, participant income, and education. Lines for low and high likelihood of engaging in physical activity are plotted at -1 SD and +1 SD, respectively, from the mean.

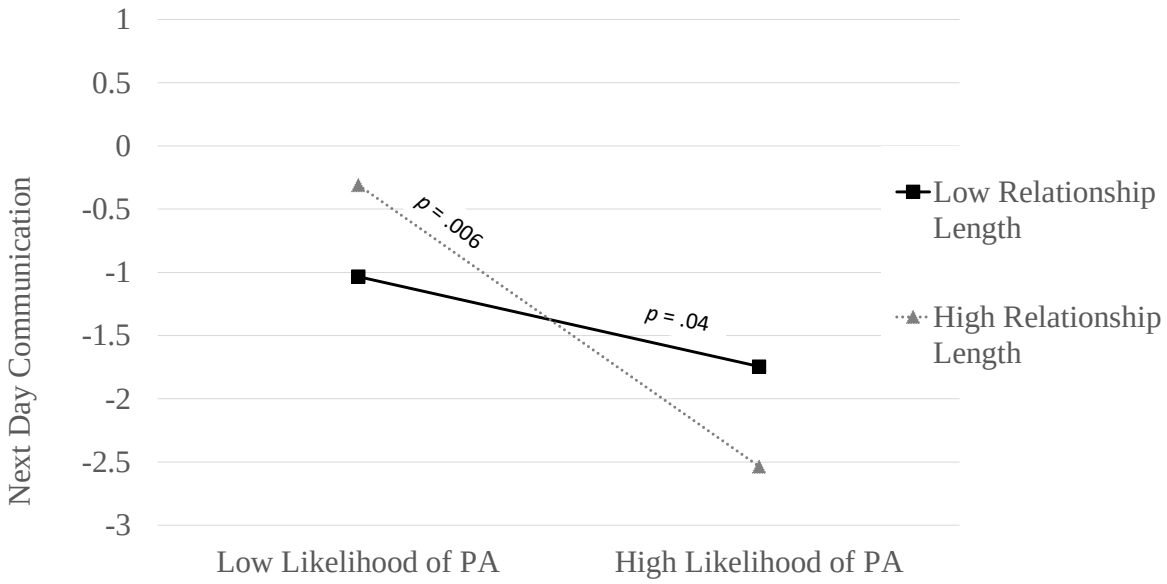

Figure 5. Length of relationship as a moderator of the relation between physical activity and constructive communication on the next day.

Note. PA = physical activity. Analyses controlled for participant education. Lines for low and high likelihood of engaging in physical activity, and low and high length of relationship, are plotted at -1 SD and +1 SD, respectively, from the mean.

Appendix A

Correlation of Study Variables and Demographic Variables by Day

	Day 1					Day 2				
	Age	Ethnicity	Income	Education	BMI	Age	Ethnicity	Income	Education	BMI
Marital satisfaction	-.14	.06	.07	.04	.00	-.03	.03	.27**	-.01	-.09
Constructive communication	.04	-.09	.04	.15	.03	.02	-.09	.10	.13	.10
Sexual activity	-.10	-.04	.16	.01	.08	-.08	.25*	-.04	-.07	.28**
Reinforcing behaviors	-.15	-.05	-.08	-.03	.07	-.04	-.10	.17	.10	-.07
Grazing*	-.04	.13	.09	-.06	-.07	-.04	.12	.12	-.09	-.22*
Meal planning	-.06	.04	.03	-.09	-.02	.15	.06	.10	-.10	-.04
Carbonated beverages*	.02	.08	.10	-.01	-.17	-.05	.08	.12	.11	-.26*
Eating past full*	.12	.08	.08	-.10	-.07	.12	-.12	.27*	.00	-.10
Count calories	.01	-.09	.04	-.15	.08	.05	.04	.04	-.17	.00
Physical activity	-.06	-.12	.02	.05	.04	.00	.00	-.12	-.07	-.01

Note. Items marked with asterisk were reverse scored to indicate *not* engaging in this behavior, thus, indicating a higher diet adherence.
* = p<.05, ** = p <.01, $^{\dagger}p < .10$.

Appendix A (continued)

Correlation of Study Variables and Demographic Variables by Day

	Day 3					Day 4				
	Age	Ethnicity	Income	Education	BMI	Age	Ethnicity	Income	Education	BMI
Marital satisfaction	-.08	.01	.22*	.04	.04	-.11	-.08	.22*	.10	.01
Constructive communication	-.16	.12	-.05	.13	-.10	-.07	.00	.01	.17	.13
Sexual activity	-.05	-.16	.09	-.18	-.03	-.05	-.12	.12	-.15	-.16
Reinforcing behaviors	-.01	-.08	.10	-.18	.00	-.10	-.10	.11	.03	.06
Grazing*	.02	.09	-.01	-.08	-.07	.31	.04	.11	-.06	.08
Meal planning	.15	.14	.21*	-.07	.10	.31**	-.12	.18	-.06	-.05
Carbonated beverages*	.05	.08	.07	.05	-.11	.14	.08	.13	.14	-.10
Eating past full*	.05	-.08	.00	-.06	-.05	.22*	-.09	.17	-.02	-.07
Count calories	-.04	-.14	.04	-.11	.06	.06	-.05	.10	.08	.15
Physical activity	.09	.15	.03	-.04	-.16	.30**	-.15	.26*	-.02	-.12

Note. Items marked with asterisk were reverse scored to indicate *not* engaging in this behavior, thus, indicating a higher diet adherence.
* = p<.05, ** = p <.01, $^{\dagger}p < .10$.

Appendix A (continued)

Correlation of Study Variables and Demographic Variables by Day

	Day 5					Day 6				
	Age	Ethnicity	Income	Education	BMI	Age	Ethnicity	Income	Education	BMI
Marital satisfaction	-.21	-.01	.03	.14	.03	.02	.03	.24*	.31**	.01
Constructive communication	-.06	.14	.01	.21	-.21	-.11	.10	-.14	.22*	.03
Sexual activity	-.19	.17	-.20	-.12	.01	-.09	.02	.14	-.04	.06
Reinforcing behaviors	-.07	.00	.20	.01	-.07	-.08	.16	.15	-.06	.01
Grazing*	.13	.05	.39**	.04	-.06	.14	-.22*	.06	-.17	.07
Meal planning	.32**	-.06	.21	-.05	-.01	.04	.00	.05	-.12	.08
Carbonated beverages*	-.02	.08	.07	.00	-.16	-.08	-.08	.01	.12	-.17
Eating past full*	-.29**	-.32**	.13	.16	-.02	-.09	.00	.19	.01	.15
Count calories	.19	.00	.29**	-.05	.00	.06	-.09	.21	-.02	.07
Physical activity	.18	.15	-.05	-.03	.01	.03	.19	-.07	-.05	-.06

Note. Items marked with asterisk were reverse scored to indicate *not* engaging in this behavior, thus, indicating a higher diet adherence. * = p<.05, ** = p <.01, $^{\dagger}p < .10$.

Appendix A (continued)

Correlation of Study Variables and Demographic Variables by Day

	Day 7				
	Age	Ethnicity	Income	Education	BMI
Marital satisfaction	.00	.02	.26*	.04	.00
Constructive communication	-.03	-.03	.07	.16	-.13
Sexual activity	-.12	-.06	.00	-.15	.08
Reinforcing behaviors	.07	.02	.13	-.19	.06
Grazing*	-.05	.06	.13	.02	-.02
Meal planning	.07	.01	.15	-.03	.03
Carbonated beverages*	-.05	.04	.12	.08	-.19
Eating past full*	.18	-.08	.18	-.15	-.13
Count calories	.09	-.07	.19	-.16	.07
Physical activity	.08	.18	.13	-.06	-.01

Note. Items marked with asterisk were reverse scored to indicate *not* engaging in this behavior, thus, indicating a higher diet adherence. * = p<.05, ** = p <.01, $^{\dagger}p < .10$.