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Spousal Social Control During a Weight Loss Attempt: A Daily Diary Study

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Abstract

We investigated perceptions of spousal social control and the partners' behavior, affect, and relationship satisfaction at the start of a weight loss attempt. Gender and body mass index (BMI) were explored as moderators. In order to examine the short-term effects of social control, participants completed daily assessments reporting spouses' influence and their own behavior and well-being. Instrumental and reinforcing social control were associated with better health behavior, well-being, and relationship satisfaction, but showed no impact over time. Monitoring control was inconsistently associated with health behavior and well-being. BMI moderated some of the relations between social control strategies, health behavior, and well-being. Findings suggest spouses can contribute to partners' weight loss attempts with influence strategies, but considering weight status may determine which strategies are the most beneficial.

Keywords

social control; marriage; BMI; weight loss; daily diary research

People wage personalized health campaigns within their close relationships every day. Wives try to motivate their husbands to turn off the television and exercise, brothers persuade their sisters to stop smoking, and many parents devise elaborate schemes to get their children to eat their fruits and vegetables. Though these informal health interventions are common, researchers know relatively little about the strategies people use to influence and regulate their loved ones' health habits and the impact of these attempts for the targets' health behavior and psychological well-being.

Over the past few decades, evidence has linked personal relationships, and particularly marriage, with good health (Berkman & Syme, 1979; House, Robbins, & Metzner, 1982). Social support is a common explanation for this finding because a social network gives people resources to help them cope with life's challenges. However, other aspects of relationships may facilitate good health as well (Sarason & Sarason, 2001). Health-related social control, or the way that people in relationships attempt to influence and regulate each other's health behavior, may also contribute to the health benefits of close relationships (Hughes & Gove, 1981; Umberson, 1987). Social control attempts may be perceived as supportive, but they are not necessarily so. Studies have indicated that social support and social control are related, yet distinct, interpersonal constructs (Lewis, Butterfield, Darbes, & Johnston-Brooks, 2004; Tucker, 2002).

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Previous research has investigated whether social control creates the desired health behavior change and its consequences for psychological well-being. Though findings are mixed, research on social control within married couples has indicated that these influence attempts can succeed in facilitating health behavior changes in some contexts, but there may also be a psychological cost to the effort (Helgeson, Novak, Lepore, & Eton, 2004; Lewis & Rook, 1999; Tucker & Anders, 2001).

One reason for the mixed results may be the broad array of influence tactics that have been assessed under the umbrella of health-related social control. Researchers have noted the importance of distinguishing between different types of partner influence strategies (Cohen & Lichtenstein, 1990; Lewis & Rook, 1999). The primary distinction has been drawn between positive social control, including the use of modeling, positive reinforcement and logic, and negative social control, which includes expressions of negative emotions and attempts to make the target feel bad for his or her health behavior (Lewis & Butterfield, 2005; Tucker & Anders, 2001).

The simple categorization into positive and negative social control tactics has generally led to more consistent findings for behavioral and affective outcomes. In a cross-sectional study of relatively young, healthy married couples reporting about attempts to change each others' specific health behaviors over the previous six months, Tucker and Anders (2001) found that perceptions of positive social control were associated with efforts to engage in the targeted behavior and with positive affect. In contrast, reports of negative social control were associated with ignoring the partner's attempts, doing the opposite of what the partner wanted, hiding the unhealthy behavior, and negative affect.

More recently, a longitudinal study of adults with type 1 diabetes asked participants to describe a situation in which a specific person (spouse, parent, friend, or other relative) tried to change their health behavior (Thorpe, Lewis, & Sterba, 2008). Negative social control was related to less behavior change, fewer positive and more negative thoughts, and decreases in psychological adjustment after six months, though positive social control was only associated with more positive and less negative emotional responses, and only cross-sectionally. Findings from these studies suggest that positive and negative social control should be considered separately as they may differentially affect behavior and well-being. However, the simple distinction between positive and negative social control strategies may obscure the understanding of behaviors that are more ambiguous, such as monitoring the partner's behavior or leaving reminders. Considering additional categorization schemes may contribute to our understanding of effective and beneficial social control strategies.

In addition to the diverse types of influence tactics, another potential explanation for the mixed effects of social control is that moderators may alter the impact of these attempts to regulate health behavior. It may be that social control is more effective or more detrimental within certain contexts, such as different types of relationships or different health conditions. In the current study, we explored gender and body mass index (BMI) as potential moderators of the impact of weight-related social control. Previous research has indicated that social control may be provided and perceived differently by men and women, and may be more beneficial to men than women (Umberson, 1992; Westmaas, Wild, & Ferrence, 2002). Also, because the focus of this study is weight-related behavior, it is important to consider whether the target's weight status alters the perception and impact of social control. Though all of the participants in the current investigation embarked on a new weight loss program, it is possible that those with higher BMI levels would perceive more frequent control attempts from their partners out of concern for physical appearance and the increased awareness of health risks associated with excess weight. However, these attempts at regulation, especially those that are more negative or intrusive, may be less effective and

more emotionally hurtful for adults who struggle with their weight to a greater degree and for whom weight loss may be a tougher or more emotionally fraught goal.

None of the extant research on social control has focused explicitly on diet, exercise, and weight loss, though large-scale studies have indicated that the U.S. is experiencing an epidemic of excess weight (Hedley et al., 2004), which has serious ramifications for health. Two studies that have examined spousal social control targeting a range of health behaviors have shown that diet, exercise, and weight loss are among the most common behaviors that partners to attempt to influence (Lewis & Butterfield, 2007; Tucker & Anders, 2001). This makes sense as shared meals, routines, and home environments provide many opportunities for spouses to observe and participate in their partners' weight-related habits.

Because eating and exercise are such fleeting, high-frequency behaviors, if social control attempts were effective, their impact would probably be seen immediately or over a few days. Whereas most studies in this area have examined social control retrospectively and cross-sectionally, or longitudinally over several months of time, we examined the impact of positive and negative social control over a two-week period through daily assessments in order to capture the immediate and short-term effects of partner influence attempts.

The first goal of this investigation was to understand the factor structure of health-related social control behaviors in couples' everyday lives in an effort to go beyond the simple distinction between positive and negative strategies. The second goal was to examine the relations among different domains of social control and health behaviors relevant to weight loss, as well as affect and relationship satisfaction. These relations were explored using both synchronous (same-day) and lagged (prior-day-to-present-day) analyses. Social control behaviors that fostered more positive emotions and were more reinforcing, as well as those that provided constructive, instrumental help were expected to have a positive effect on behavior, affect, and satisfaction with spouses, but social control that focused on monitoring and "nagging" was expected to have detrimental effects.

The third goal of this research was to explore the role of two potential moderators, gender and BMI, on the relationship between social control and the health outcome measures. Gender was important because men and women are often exposed to different social norms and cultural expectations regarding diet and exercise behavior (e.g., Boyes & Latner, 2009; Schafer, Schafer, Dunbar & Keith, 1999). As noted previously, gender may moderate the perception and effect of social control from a spouse. Stricter appearance pressures are communicated to women through the culture at large. Women may be more sensitive to their husbands' weight-related monitoring, criticism, or encouragement, and thus experience more benefit or harm from it.

BMI was examined as another potential moderator because people with different BMIs might react differently to partners' attempts to influence their diet and exercise behavior. For example, one could imagine that people with relatively low BMIs may be more receptive to social control given that they are trying to avoid becoming overweight and approach a smaller or more limited problem. However, one might also expect that people with high BMIs may react more adaptively to social control given that they have more to gain from successful weight loss in terms of physical health and well-being. Because the direction of BMI's moderation was difficult to predict a prioi, we examined these issues on an exploratory basis.

Method

Participants

Married adults planning to start a new weight loss program were recruited from the community. Potential participants were excluded (a) if they did not speak English, (b) if either spouse had a major chronic illness, as an illness regimen might alter social control provision and perception could be different for couples coping with an illness regimen, (c) if both spouses were attempting to lose weight together, because having a shared goal of weight loss could change the nature and meaning of couple interactions around weight loss, or (d) if they were not in the contemplation stage of the transtheoretical ("stages of change") model, as adults who are working to maintain an on-going health behavior change could differ from adults initiating a new regimen. For the latter criterion, screening questions adapted from the work of Armitage and colleagues were used, and only those who were in the contemplation stage (e.g., "I am not currently trying to lose weight, but I am thinking about starting") were included (Armitage, Sheeran, Conner, & Arden, 2004).

Although 64 adult volunteers met all of the criteria for inclusion, only 61 (38 women, 23 men) participated in all parts of the study. Daily diary data from two female participants were lost due to a technical problem. Due to sporadic missing data at the daily and trait levels, sample sizes for analyses ranged from 62 to 58; these are reflected in the degrees of freedom. The average age of participants was 40.8 years (SD = 12.3; range = 24 to 71). The majority (72.6%) was white, 14.5% were African American, and 12.9% were Asian American. The median household income reported was $60,000, and the median response for highest level of education completed was "Some college credits or vocational school." The average BMI at baseline was 29.9 (SD = 5.35, range = 19.5 to 46.8). By BMI category, the sample was 20.7% normal, 31.0% overweight, 32.8% class I obese, 10.3% class II obese, and 5.2% class III obese. Because men had marginally higher baseline BMIs (n = 23, M = 31.4, SD = 3.51) than women (n = 37, M = 29.0, SD = 6.01) on average, $t(58) = 1.71$, $p < .10$, $r = .22$, $d = 0.45$, we controlled for each variable (gender or BMI) when examining the other. Each participant was compensated $100 for complete participation.

Procedure

Recruitment ads were placed in local newspapers and online. Potential participants were screened for exclusion criteria, and those who met the criteria scheduled a meeting with an experimenter in person before starting their new weight loss programs. Specifically, these baseline meetings were scheduled approximately one week before each participant elected to start his or her weight loss attempt. During this meeting, the participant signed a consent form, completed a baseline questionnaire, and was trained to use the daily diary data collection method. Starting on the day they began their new weight loss programs, participants completed diary measures once a day for two weeks using (a) a secure Internet website (69.5%), (b) a palm pilot personal digital assistant provided by the experimenter (5.1%), or (c) paper copies of the survey (25.4%). Compliance with the two-week schedule was excellent; the average person completed 13.5 daily reports (SD = 1.37, Mdn = 14.0, Mode = 14.0, minimum = 9 days), and no differences based on diary collection method were observed. A follow-up meeting with an experimenter was scheduled to occur approximately 30 days after each participant began the weight loss attempt, and a follow-up weight measurement was collected at that time.

Measures

Demographics—The baseline questionnaire asked for demographic information including gender, age, and height. Participants were privately weighed on the experimenter's scale to

calculate BMI, and reassessed the same way after 30 days. Other aspects of this baseline questionnaire are described in a separate report (Novak, 2006).

Exercise—Three items asked participants about their exercise over the past 24 hours. These items asked how long they participated in strenuous, moderate, and mild exercise activities or sports. Examples of each level of activity were provided, and participants reported amounts of time in 15-minute increments, from "0" to "75 minutes plus." Strenuous (*running*, *swimming laps*, *moving furniture*; weighted 1.0) and moderate (*brisk walking*, *weight lifting*, *scrubbing floors*; weighted 0.5) strenuous and moderate exercise were combined to form one measure of physical activity because conceptually they represent a greater effort to change health behavior compared to mild (*slow walking*, *dusting*, *gardening*; weighted 0.0) exercise. For example, a person who reported 15, 30, and 45 min of strenuous, moderate, and mild exercise, respectively, would have received a score of 30 min of total exercise for that day (i.e., $15 \times 1.0 + 30 \times 0.5 + 45 \times 0.0 = 30$).

Diet adherence—Because participants embarked on diverse diet programs, three items were used to assess the extent to which eating behavior adhered to the individual participants' chosen regimen ($\alpha = .78$), each of which was measured on a five-point scale: "How much did you follow your diet today?" (from *not at all* to *completely*), "How often did you eat foods that were not part of your diet today?" and "How often did you eat larger portions than your diet recommends today?" (both responses ranged from *never* to *very often*).

Social control—In order to generate a list of strategies spouses could use to try to influence their partners' weight-related health behavior, common social control tactics identified in previous research were tailored to be specific to diet, exercise, and weight (e.g., "Showed interest in your weight loss," "Pointed out someone who had lost weight," "Exercised with you;" Lewis & Rook, 1999; Tucker & Mueller, 2000). For each of the 25 items, participants responded yes or no to indicate whether or not their spouse had engaged in each of 25 social control strategies within the past 24 hours. The list of specific strategies was prefaced by the question "Has your spouse said or done anything to try to get you to lose weight?" in order to make the regulatory intent of the social control strategies clearer.

Affect—Participants completed a reduced version of the Profile of Mood States (POMS; Usala & Hertzog, 1989). This measure consisted of 25 adjectives that tapped into seven mood states, including anger, anxiety, depression, vigor, well-being, calm, and fatigue. Participants indicated the extent to which they were currently experiencing each adjective on a scale of 1 (*not at all*) to 5 (*extremely*).

Relationship satisfaction—This item asked "How satisfied were you with your relationship today?" with responses ranging from 1 *(not at all satisfied*) to 4 (*very satisfied*).

Results

Preliminary Analyses

Data reduction—To reduce the number of social control items into manageable sets and learn about the underlying consistency among social control strategies, we conducted a multilevel principal components analysis (MPCA). This was done by running a three-level multilevel model (MLM), with social control items nested within the social control scale nested within participants (see Raudenbush & Bryk, 2002, pp. 245-251). Because social control behaviors were dichotomous at the day level (i.e., a participant's partner either did or did not display each social control behavior on a given day), this model took the form of a

three-level, binary-logistic MLM. This model produced two item-level correlation matrices —one within-person and one between-person. Each matrix was then modeled using an oblique-rotation principal components analysis (PCA). Both the within- and between-person PCAs produced scree plots that implied a three-factor solution (Table 1). Given the observed pattern of social control item clustering, the three principal components were labeled *instrumental social control* (instrumental SC), *monitoring social control* (monitoring SC) and *reinforcing social control* (reinforcing SC). Correlations among these three principal components were moderate (|*r*|s < .40) at both the within- and between-person levels. Based on these analyses, four items were inconsistent at the within- and between-person levels; these were dropped and the remaining items formed the subscales for the three social control domains (Table 2): instrumental SC (5 items, α = .75), monitoring SC (8 items, α = .81), and reinforcing SC (4 items, α = .74). The item-level means, *SD*s, and interclass correlation coefficients (ICCs) are also shown in Table 2. For example, Item 3 ("Cooked less food") has a mean of 0.20 (*SD* = 0.40), which means that this spousal control variable was observed at least once every fifth day, on average, for the average participant—or, alternatively, that it was observed by roughly 20% of participants on any given day. Although Table 2 suggests there was quite a range in the social control strategies spouses used, it is also clear that spouses were indeed using all three types of social control on a fairly frequent basis.

A similar analysis of the seven POMS subscales produced a three-factor solution (not shown), which was labeled negative affect (NA; i.e., *anger, anxiety, and sadness*; α = .87), positive affect (PA; *well-being, vigor, and calm*; α = .87), and fatigue (single item). Correlations among these three principal components were moderate (|*r*|s ≤ .30). Because our hypotheses did not concern fatigue, it is not discussed further.

Descriptive statistics—See Table 3 for descriptive statistics of the daily measures. The amounts of social control reported did not differ based on BMI. A gender difference was found for instrumental SC, with men reporting more frequent experiences of instrumental SC (*M* = 2.11) than women (*M* = 0.97; coef. = 1.14, *t*(57) = 3.60, *p* = .001, *r* = .43, d = 0.95).

At the start of the study, participants had a mean weight of 190.2 pounds (*SD* = 44.8) and a mean BMI of 29.85 (*SD* = 5.35). By the end of the study approximately 30 days after weight loss attempts began, they had a mean weight of 187.9 pounds (*SD* = 44.6) and a mean BMI of 29.48 (*SD* = 5.28). Both weight (*t*(57) = −4.52, *p* < .001, *d* = −1.20) and BMI (*t*(57) = −4.72, *p* < .001, *d* = −1.25) decreased a small, but significant, amount over the course of the study. Participant gender did not affect change in BMI over time (*p* > .95). Daily diet adherence was significantly related to decreases in BMI (*r* = −.36, *p* < .01), suggesting that explaining variance in diet adherence may be key to understanding BMI change. Diet adherence decreased significantly over the two weeks of assessment for the average participant (coef. = −0.024, *t*(57) = −3.03, *p* < .005, *r* = −.37); however, other outcome variables did not change significantly over time. Consequently, we controlled for the linear effect of time when modeling diet adherence.

Multilevel Modeling

We examined two types of day-level (within-person) relationships: synchronous and lagged. Synchronous relationships are those that exist concurrently at a given time ("When people receive a lot of reinforcing social control from their partners on Day *t*, are they more likely to adhere to their diets on Day *t*?"). Lagged relationships exist across adjacent time periods ("When people receive a lot of reinforcing social control from their partners on Day *t*-1, are they more likely to adhere to their diets on Day *t*?"). A series of multilevel models was used to test our predictions (see Nezlek, 2001; Raudenbush & Bryk, 2002). In multilevel modeling terms, this involved modeling temporal, within-person variation at level 1 and

between-person variation at level 2. For example, to test the synchronous relationships between social control (within-person mean-centered) and dieting behavior, as well as the extent to which they were moderated by BMI, the level-1 model was:

$$\text{Diet adherence}_{ti}=\pi_{0i}+\pi_{1i}(\text{Instrumental SC})_{ti} +\pi_{2i}(\text{Monitoring SC})_{ti}+\pi_{3i}(\text{Reinforcing SC})_{ti}+\pi_{4i}(\text{Day})_{ti}+e_{ti}.$$

To test (a) whether the within-person Diet-SC slopes were significantly different from zero for people with the average BMI (grand-mean-centered) and (b) whether these within-person slopes were moderated by between-person differences in BMI, the level-2 (between-person) model was:

$$\pi_{0i}=\beta_{00}+\beta_{01}(\text{BMI})_i+r_{0i},$$
$$\pi_{1i}=\beta_{10}+\beta_{11}(\text{BMI})_i+r_{1i},$$
$$\pi_{2i}=\beta_{20}+\beta_{21}(\text{BMI})_i+r_{2i},$$
$$\pi_{3i}=\beta_{30}+\beta_{31}(\text{BMI})_i+r_{3i},$$
$$\pi_{3i}=\beta_{40}+\beta_{41}(\text{BMI})_i+r_{4i}.$$

In this example, there are two sets of random coefficients of central interest. The first set is β_{10}, β_{20}, and β_{30}, which describe the mean of the within-person slopes for the three Diet-SC relationships, respectively, for a person of average BMI. The second set is β_{11}, β_{21}, and β_{31}, which describe the extent to which the within-person Diet-SC slopes are respectively moderated by between-person differences in BMI. For example, β_{21} addresses the question of whether the same-day relationship between monitoring SC and diet adherence is more negative among people with higher BMIs. We tested lagged multilevel models in a similar fashion, using the prior day's predicator(s) and outcome (to control for autocorrelation; predictors were grand-mean-centered) to predict the current day's outcome (i.e., a prospective prediction model; see Reis & Gosling, 2010; West & Hepworth, 1991).

Synchronous Relations

We first examined synchronous (i.e., same-day or concurrent) relations among the variables. For example, what is the relationship between the social control variables on day *t* and diet adherence on day *t*? We begin by reporting the synchronous relations for the average participant, and then describe the extent to which these relations were moderated by BMI and gender. For brevity, in the text we report only results that are significant or result from a significant interaction (*p*s ≤ .05).

Average participant—In this subsection, we report relations for the average participant. In MLM terms, this means the only predictor at the between-person level (Level 2) is the intercept, which represents the within-person relation for the average person. We present results in order of increasing complexity, moving from simpler (Table 4) to more complex (Table 5) models.

Synchronous analyses indicated that instrumental SC was positively related to diet adherence (Table 4), both independently of the other two SC variables ("separate models") and after controlling for the other two SC variables ("simultaneous models"). Reinforcing SC was also a positive predictor of diet adherence in separate models, but it was reduced to marginal significance ($p < .10$) in the simultaneous models. Monitoring SC was negatively related to diet adherence, but only after controlling for the other two SC variables.

Reinforcing SC was positively related to minutes spent exercising, but only after controlling for the other two SC variables; it was marginally related to exercise on its own. Neither instrumental SC nor monitoring SC was associated with exercise behavior.

Reinforcing SC was also positively related to PA in both the separate and simultaneous models. Monitoring SC was marginally and negatively related to PA, but only after controlling for the other SC variables. Both instrumental SC and reinforcing SC were positively related to relationship satisfaction in both separate and simultaneous models.

We next tested another series of models in which daily affect (NA & PA) was added as predictor to clarify the role of mood in determining the associations among social control strategies and health behavior (Table 5). Controlling for daily affect was important because it could potentially be confounded with daily diet and exercise behavior. For example, when people had days high in negative affect, they may have been less likely to adhere to their diet or exercise regimen. We controlled for affect to see if spousal social control could predict these behaviors over and above affect. Controlling for SC, PA was positively related to both diet adherence and minutes spent exercising regardless of whether NA was controlled. Controlling for affect, instrumental SC was positively related to diet adherence regardless of whether the other two SC variables were controlled. Controlling for affect, reinforcing SC was positively related to exercise, but only when the other two SC variables were controlled.

Moderation by Body Mass and Gender—The moderating effects of BMI on synchronous relations were decomposed by testing simple effects at 1 *SD* below ("low BMI") and above ("high BMI") the BMI sample mean, which corresponded to BMI scores of 24.5 (near the normal-overweight threshold of 25.0) and 35.2 (near the Class I-II Obese threshold of 35.0), respectively (see Cohen, Cohen, West, & Aiken, 2003; Judd, McClelland, & Ryan, 2009).

Controlling for gender, time (day), instrumental SC, and reinforcing SC, BMI moderated the synchronous relation between monitoring SC and diet adherence (coef. = −0.011, $t(54) = -2.24$, $p < .05$, $r_p = -.29$), such that the simple relationship between monitoring SC and diet adherence was significantly negative for high-BMI participants (coef. = −0.12, $t(54) = -3.40$, $p < .01$, $r_p = -.42$), but non-significant for low-BMI participants (coef. = −0.0069, $t(54) = -0.16$, $p > .87$, $r_p = -.02$; Figure 1).

Controlling for gender, time (day), instrumental SC, reinforcing SC, *and affect*, BMI still moderated the synchronous relation between monitoring SC and diet adherence (coef. = −0.013, $t(54) = -2.42$, $p < .05$, $r_p = -.31$), such that the simple relationship between monitoring SC and diet adherence was significantly negative for high-BMI participants (coef. = −0.14, $t(54) = -3.90$, $p < .001$, $r_p = -.47$), but non-significant for low-BMI participants (coef. = −0.0059, $t(54) = -0.12$, $p > .90$, $r_p = -.02$; not shown; similar to Figure 1).

Controlling for gender and reinforcing SC, BMI also moderated the synchronous relations between both instrumental SC and NA (coef. = −0.0060, $t(55) = -2.18$, $p < .05$, $r_p = -.28$), and between monitoring SC and NA (coef. = 0.0094, $t(55) = 1.93$, $p < .06$, $r_p = .25$). First, the relationship between instrumental SC and NA was significantly negative for high-BMI participants (coef. = −0.049, $t(55) = -2.14$, $p < .05$, $r_p = -.28$), but non-significant for low-BMI participants (coef. = 0.015, $t(55) = 0.61$, $p > .50$, $r_p = .08$; Figure 2). Second, the relationship between monitoring SC and NA was non-significant for high-BMI participants (coef. = 0.061, $t(55) = 1.52$, $p > .10$, $r_p = .20$), whereas a marginally significant negative

relationship was shown for low-BMI participants (coef. = −0.040, $t(55) = -1.75$, $p < .09$, $r_p = -.23$; Figure 3).

Lagged Relations

We next examined lagged relations among the variables. For example, what is the relationship between the social control variables on day *t* and diet adherence on day *t*+1? We begin by reporting the lagged relations for the average participant, and then describe the extent to which these relations were moderated by BMI and gender. For brevity, in the text we report only results that are significant or result from a significant interaction (*p*s ≤ .05).

Average Participant—Lagged models for the average participant produced only one significant effect: controlling for the prior day's instrumental SC, reinforcing SC, and exercise, the prior day's monitoring SC positively predicted the current day's exercise; however, this was not the case when the prior day's monitoring SC was modeled separately (Table 6). The prior day's monitoring SC also negatively predicted the current day's relationship satisfaction, albeit marginally; however, this marginal effect persisted regardless of whether the lagged effects of the other two SC variable were controlled. In addition, when affect was controlled, monitoring SC positively predicted diet adherence, but only when modeled separately (Table 7). Most of the effects of interest in the lagged analyses depended on individual differences in BMI and gender, described next.

Moderation by Body Mass and Gender—Controlling for gender as well as prior day's exercise, instrumental SC, and reinforcing SC, BMI moderated the lagged relation between the previous day's monitoring SC and the current day's exercise (coef. = −0.24, $t(54) = -2.42$, $p < .02$, $r_p = -.31$), such that monitoring SC preceded a significant increase in exercise for those with low BMIs (coef. = 2.51, $t(54) = 3.68$, $p = .001$, $r_p = .45$), but not for those with high BMIs (coef. = −0.11, $t(54) = -0.14$, $p < .88$, $r_p = -.02$; Figure 4).

Controlling for gender as well as the prior day's NA, instrumental SC and monitoring SC, BMI moderated the relation between the prior day's reinforcing SC and the current day's NA (coef. = −0.010, $t(55) = -2.33$, $p < .05$, $r_p = -.30$), such that reinforcing SC preceded a marginal decrease in NA for those with high BMIs (coef. = −0.066, $t(55) = -1.90$, $p = .06$, $r_p = -.25$), but not for those with low BMIs (coef. = 0.043, $t(55) = 1.27$, $p = .61$, $r_p = .17$; Figure 5).

Controlling for gender as well as the prior day's relationship satisfaction, monitoring SC, and reinforcing SC, BMI moderated the relation between the prior day's instrumental SC and the current day's relationship satisfaction (coef. = 0.0075, $t(55) = 1.91$, $p = .06$, $r_p = .25$), such that instrumental SC preceded a significant decrease in relationship satisfaction for those with low BMIs (coef. = −0.068, $t(55) = -2.02$, $p < .05$, $r_p = -.26$), but not for those with high BMIs (coef. = 0.012, $t(55) = 0.55$, $p > .58$, $r_p = .07$; Figure 6).

Discussion

The results suggested distinctions among the three factors underlying the weight-loss related spousal control behaviors, which have been labeled instrumental SC, monitoring SC, and reinforcing SC. Overall, many links were found between participants' perceptions of their spouses' social control, their efforts to change health behaviors, as well as their daily affect and relationship satisfaction. However, both the type of social control reported and the participants' BMI level determined the nature of these associations. The following discussion integrates the results from each of the types of analysis for each outcome in order to facilitate a better understanding of the associations between the three types of social control and contemporaneous or subsequent health behavior and well-being.

Social Control and Diet Adherence

The synchronous analyses revealed that all three types of social control strategy were significantly associated with diet adherence, which is especially important as adherence to diet was the only variable found to be a significant predictor of actual weight loss over the course of follow-up. Whereas both instrumental SC and reinforcing SC were associated with greater adherence, suggesting they may contribute to this behavior change, monitoring SC showed a negative association, potentially backfiring. This pattern resembles that of previous studies which found that positive social control strategies were associated with more positive health behavior, whereas negative strategies were associated with behavioral reactance (Tucker & Anders, 2001; Tucker, Orlando, Elliott & Klein, 2006). However, in contrast to the work of Tucker and colleagues, the analyses linking social control and diet largely remained significant when PA and NA were included, indicating that the associations between social control and diet adherence are not merely an effect of social control engendering PA or NA. However, because these synchronous relations are similar to correlations, they do not give us insight into the direction of causality. It may be that spouses' perceptions of social control had immediate—though ephemeral—influences on diet adherence, improving (via instrumental and reinforcing SC) or undermining (via monitoring SC) adherence for one day at a time. It is also possible that social control was a reaction to the participants' diet, with spouses only providing more reinforcing or instrumental SC on days when their partners engaged in good dietary behavior, and displaying more intrusive monitoring SC when partners' dietary adherence was poor.

The temporal sequence of lagged analyses could help disentangle these questions of causality, though none of the social control variables were found to be predictors of changes in diet adherence the following day. Interestingly, BMI significantly moderated the negative association between monitoring SC and diet adherence showing that participants with higher BMIs were likely to have poor dietary adherence on days when they perceived monitoring SC. Again, the question of causality remains, but this pattern suggests that monitoring SC is especially ineffective for spouses who are overweight. This may mean that participants with more weight to lose were more likely to have poor adherence, contributing to their partners' intrusive efforts, or that their partners' monitoring was counterproductive.

Social Control and Exercise

Only reinforcing SC was significantly associated with increased exercise behavior in synchronous tests, and this finding remained when PA and NA were examined as covariates. Though this may indicate that more positive social control strategies contributed to participants' increased levels of exercise, it is also possible that engaging in more strenuous exercise gave the spouses something concrete to praise and support. Again, no evidence for a lagged effect of reinforcing SC on exercise was found to help disentangle this synchronous association.

However, monitoring SC was shown to be a significant lagged predictor of increased exercise the following day, which is somewhat surprising given the negative association observed between monitoring SC and diet adherence. This lagged effect is further explained by the significant moderation by BMI, which indicated that monitoring SC is primarily contributing to increased exercise among participants with low BMI levels, and shows no consistent relation for those with higher BMIs. Thus, the longer-lasting positive influence of partners' attempts to monitor, remind, and even criticize their spouses into healthier behavior appear to me most effective for low-BMI participants who have the least excess weight to lose. It should be noted that although social control does not appear to contribute substantially to high-BMI participants' health behavior a change from one day to the next, it does not appear to undermine it, either. This was a concern as weight-related health behavior

changes could have been more fraught for this group and could have promoted psychological reactance, as evidenced in previous studies (e.g., Tucker & Anders, 2001).

No associations between instrumental SC and exercise behavior were observed, but the specific items in this SC factor may explain the lack of association. As shown in Table 2, all of the items in this factor focus on concrete regulatory efforts promoting healthy eating, not exercise. The broader set of SC items from which these factors were derived included similar items targeting exercise (e.g., “Exercised with you,”), but those items did not cohere in the data reduction analysis. Therefore, we cannot address whether these types of regulatory behaviors would influence spouses’ exercise habits, and future research should examine instrumental SC focused on both diet and exercise.

Social Control, Affect, and Relationship Satisfaction

The results exploring the potential for differential effects of social control on emotional well-being and relationship satisfaction also provided mixed support. Synchronous associations were observed between SC variables and emotional well-being such that both reinforcing SC and monitoring SC were associated with PA in synchronous analyses, though in opposite directions. Reinforcing SC, which includes spousal control behaviors likely to engender positive feelings, was significantly, and unsurprisingly, associated with greater PA. Monitoring SC was marginally associated with lower PA, suggesting the possible undermining role of this type of SC, though the previously mentioned caveats about causal inference apply to these results as well.

No simple synchronous associations were observed for NA, though BMI significantly moderated synchronous associations of instrumental SC, monitoring SC, and NA, with each demonstrating a different pattern. Instrumental SC was shown to be associated with lower levels of NA, but only for participants with higher BMIs, whereas monitoring SC was associated with lower levels of NA among low BMI participants. An additional marginally significant effect of BMI as a moderator was shown for reinforcing SC predicting decreased NA the following day, and this association was only apparent for high BMI participants. These results highlight the value of examining distinct types of social control, suggesting that different types of SC are a better fit in different contexts. Echoing previous studies (e.g., Thorpe et al., 2009) the more positive SC strategies were associated with well-being, and more negative SC strategies appeared to undermine well-being. However, we also see that the BMI level of the target alters the experience of spousal social control. Whereas instrumental and reinforcing SC may contribute to well-being for people with higher BMI levels, monitoring SC may be perceived more positively by those with lower BMI levels. Targets’ perceptions of the different types of social control strategies could be examined more explicitly in future work.

Finally, we found that instrumental and reinforcing SC were associated with higher levels of relationship satisfaction in synchronous analyses, and monitoring SC showed a marginally significant negative association with relationship satisfaction in lagged analyses. In addition, BMI moderated a significant lagged effect of instrumental SC predicting decreased relationship satisfaction the following day, but this pattern was only found for low-BMI participants.

Though monitoring SC was expected to have negative associations with the psychological variables examined, only limited support for this hypothesis was found. Furthermore, the moderation analysis indicated that monitoring SC was associated with lower levels of NA for low-BMI participants, suggesting that even potentially intrusive spousal control may be welcome or helpful to certain people. It may be that slimmer participants were less

threatened by their partners' monitoring SC, or that their partners communicated the same messages in a way that lead them to perceive them more positively.

Instrumental and reinforcing SC were expected to have more beneficial effects on well-being, and evidence from synchronous relations with PA and relationship satisfaction supported this. Interactions with BMI indicated that both types of strategies were associated with lower levels of NA, especially for high-BMI participants. Thus, the more positive, constructive SC strategies were linked with positive emotions and relationship satisfaction, suggesting benefits from these types of partner involvement, albeit short-lived benefits. Again, causal directions are unknown, so it is also possible that participants may be more likely to recognize their spouses' positive influence attempts when they are not distressed and feel good about themselves and their partners (Murray, Holmes, MacDonald, & Ellsworth, 1998; Reis, Clark, & Holmes, 2004).

Taken together, these results suggest that participants' weight status affects their perception of their spouses' attempts to influence their weight-related behavior. However, it is interesting to note that gender was never a significant moderator of the relations among SC variables, health behaviors, and well-being. Previous research has suggested that men may experience more SC from their wives and benefit more from their wives' SC attempts (e.g., Umberson, 1987), but that was not observed in this investigation. Only one significant gender difference was found for instrumental SC, and it was in the direction of men perceiving more than women. The lack of gender moderation could be a result of the context —attempts to lose weight—or the short-term daily reports reducing the problems of longer-term retrospective reporting.

Implications and Future Directions

As documented in previous studies, spouses became involved in their partners' weight loss attempts and tried to influence their diet and exercise habits for the better. The impact of spousal influence appears to hinge on the types of strategies that spouses employ, as well as the targets' weight status. Whereas the more positive social control tactics that provided instrumental help or reinforcing encouragement were associated with some reported benefits to health behavior change and well-being, this was not universally the case. More intrusive SC tactics, which we have called monitoring SC were even more divisive. Whereas they showed no benefit to participants with higher BMI levels, monitoring from the spouse appears to have been more effective and positive for those with lower BMIs. Thus, it is important to consider the individual and the context when determining whether certain influence strategies will do more good than harm.

The limitations of the current investigation should be taken into consideration. First, because only the spouse who was attempting to lose weight participated, it is not possible to corroborate the participants' reports of social control. Previous studies have reported high correspondence between spouses' reports of their perceptions of social control and their partners' reports of providing social control (Helgeson, et al. 2004; Lewis et al., 2004), but future investigations may consider including both spouses in order to gain the providers' perspective.

Another limitation is that participants in this study were chosen according to strict inclusion criteria, so the results of this study may not generalize to all married adults who are attempting to lose weight. Participants had to be married to a person who was not trying to lose weight because the experience of social control could be different and potentially more positive if weight loss were a shared goal. Participants also had to be planning a new weight loss program that had not yet begun; thus, all participants were in the early stages. The

salience and impact of social control may change with time as spouses move from behavior change initiation to maintenance.

Future investigations may benefit from including both partners, broadening the sample to include couples who are both attempting to lose weight, and examining social control with extended longitudinal designs. Although the daily diary method used in the current investigation provided a valuable opportunity to explore the more transient experiences of social control during a weight loss attempt, follow-ups over a longer timeframe will help to determine whether these short-term patterns continue over several months or dissipate.

In addition, the classification of health-related influence tactics proposed in this investigation, examining instrumental, reinforcing, and monitoring behaviors separately, could be directly compared with categorization systems used in other domains. For example, research on social support has made use of the distinctions among emotional, tangible, and informational support (Cohen, Underwood & Gottlieb, 2000). In a separate vein, Orina and colleagues have examined influence attempts within dating and married couples by focusing on specific verbal tactics, which they classified as “relationship referencing,” “coercion,” and “logic and reasoning” (Orina, Simpson, Ickes, Asada, & Fitzpatrick, 2008; Orina, Wood, & Simpson, 2002). Perhaps the work on health-related social control could benefit from greater consideration of more detailed categorization schemes.

Finally, the current investigation has implications for adults who are attempting to lose weight and the health professionals who advise them. Though people may get a temporary boost from their spouses’ use of more positively valnced social control strategies, there is no apparent benefit from negative social control. This investigation suggests that spouses, especially those of overweight and obese individuals, would be more helpful if they avoided using monitoring social control strategies, as these attempts may be both counterproductive and potentially harmful. Future investigations should consider an even more detailed analysis of influence strategies that can promote appropriate health behavior without undermining well-being or relationship satisfaction. We must also learn more about ways that spouses who are suffering from their partners’ misguided influence attempts can persuade their partners to use more adaptive techniques or to curtail spousal involvement in the weight loss effort.

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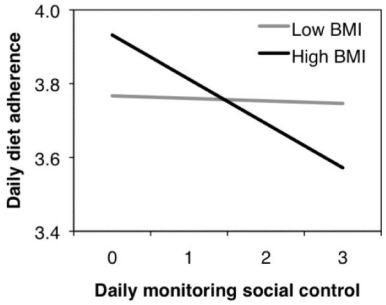

Figure 1.
Daily diet adherence as a function of BMI and daily monitoring social control.

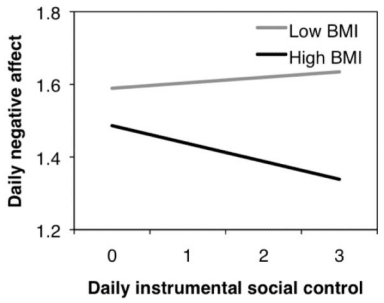

Figure 2.
Daily negative affect as a function of BMI and daily instrumental social control.

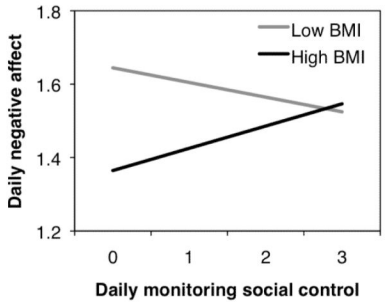

Figure 3.
Daily negative affect as a function of BMI and daily monitoring social control.

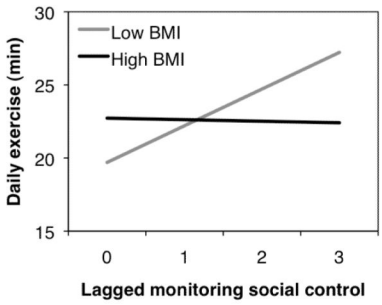

Figure 4.
Daily exercise as a function of BMI and lagged (prior day's) monitoring social control.

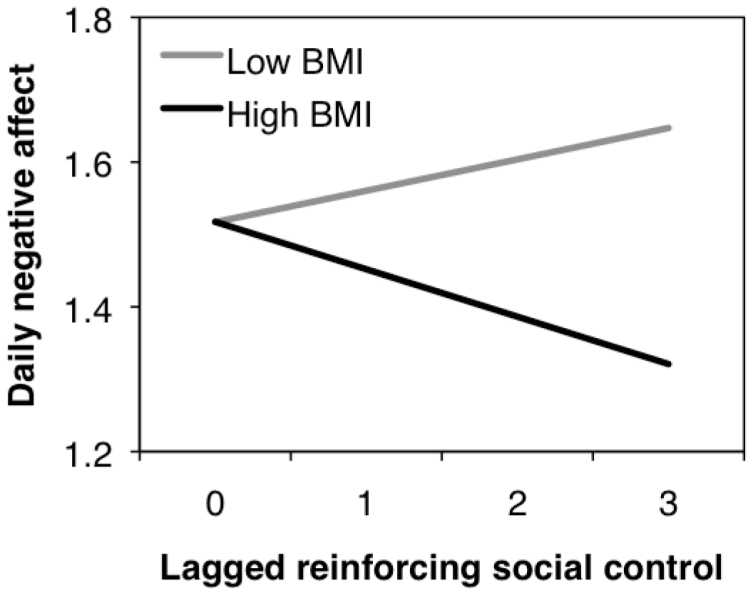

Figure 5.
Daily negative affect as a function of BMI and lagged (prior day's) reinforcing social control.

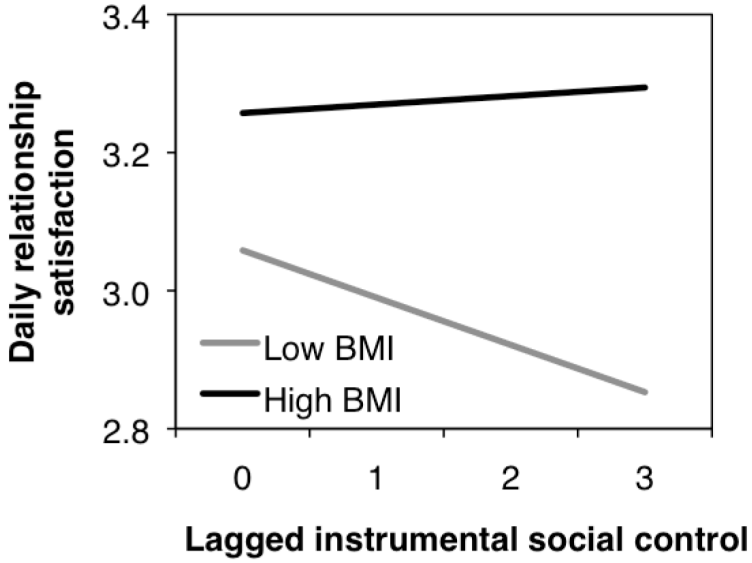

Figure 6.
Daily relationship satisfaction as a function of BMI and lagged (prior day's) instrumental social control.

Table 1

Results of Principal Components Analysis (Oblique Rotation) for Social Control Items

		Within-person			Between-person		
No.	**Social control behavior**	**I**	**M**	**R**	**M**	**I**	**R**
3	Cooked less food.	**.89**	−.12	−.09	.34	**.83**	.08
9	Eaten healthy food with you.	**.87**	.01	.20	−.17	**.83**	−.16
4	Cooked healthier food.	**.86**	−.04	.11	−.06	**.96**	.00
19	Avoided eating or buying unhealthy food around you.	**.82**	.12	.30	−.03	**.85**	−.07
24	Planned meals with you.	**.79**	−.24	.16	.33	**.66**	−.04
20	Bought you exercise equipment or a gym membership.	**.78**	−.19	.05	.43	.20	− **.51**
14	Told you that other people thought you needed to lose weight.	.22	− **.96**	−.24	**.79**	.16	−.05
21	Noticed or commented when you broke your diet or exercise plans.	.16	− **.92**	−.08	**.80**	.07	−.19
2	Questioned or commented on how much you were eating.	.32	− **.88**	−.16	**.89**	.04	.15
23	Left notes or reminders that you should eat healthy foods or avoid unhealthy foods.	−.20	− **.88**	.11	**.97**	.01	.04
13	Told you that you need to lose weight.	−.06	− **.85**	.27	**.93**	.10	.18
1	Questioned or commented on what you were eating.	.36	− **.83**	.00	**.93**	−.08	.07
10	Questioned or commented on the way your clothing fit.	.03	− **.77**	.14	**.76**	−.14	−.39
22	Left notes or reminders that you should exercise.	−.24	− **.74**	.31	**.86**	.09	−.13
15	Complimented your weight loss progress.	.19	.14	**.91**	−.12	.16	− **.95**
25	Celebrated your progress with you.	.27	−.04	**.84**	−.04	.09	− **.95**
11	Pointed out someone who had lost weight or looked good.	.06	−.06	**.80**	**.84**	−.23	−.28
18	Showed interest in your weight loss.	.16	−.25	**.78**	−.03	.39	− **.67**
17	Gave you information about the benefits of diet or exercise.	−.24	−.41	**.76**	**.51**	**.51**	−.14
16	Complimented your appearance.	.40	.18	**.68**	.26	−.19	− **.76**
12	Talked to you about the health benefits of weight loss.	.14	−.47	**.57**	**.51**	.32	−.37

Note. I=Instrumental social control. M=Monitoring social control. R=Reinforcing social control. Bold = Factor loadings ≥ .40. We excluded 4 items due to low factor loadings (< .40) in a preliminary analysis. Underlined items were consistent at the within- and between-person levels.

Table 2

Item-Level Descriptive Statistics for Social Control Measures

No.	Social control behavior	M	SD	ICC
	Instrumental social control			
3	Cooked less food.	0.20	0.40	.47
9	Eaten healthy food with you.	0.44	0.50	.34
4	Cooked healthier food.	0.31	0.46	.40
19	Avoided eating or buying unhealthy food around you.	0.23	0.42	.43
24	Planned meals with you.	0.28	0.45	.33
	Monitoring social control			
14	Told you that other people thought you needed to lose weight.	0.03	0.17	.65
21	Noticed or commented when you broke your diet or exercise plans.	0.14	0.34	.31
2	Questioned or commented on how much you were eating.	0.15	0.35	.27
23	Left notes or reminders that you should eat healthy foods or avoid unhealthy foods.	0.03	0.18	.47
13	Told you that you need to lose weight.	0.06	0.24	.43
1	Questioned or commented on what you were eating.	0.23	0.42	.34
10	Questioned or commented on the way your clothing fit.	0.07	0.25	.26
22	Left notes or reminders that you should exercise.	0.03	0.18	.57
	Reinforcing social control			
15	Complimented your weight loss progress.	0.17	0.38	.39
25	Celebrated your progress with you.	0.12	0.33	.53
18	Showed interest in your weight loss.	0.35	0.48	.37
16	Complimented your appearance.	0.24	0.43	.40

Note. ICC = Interclass correlation coefficient; proportion of between-person variance divided by total variance (i.e., between-person variance plus within-person variance).

Table 3

Descriptive Statistics for Daily Measures

Measure	Mean	SD	Min.	Max.	ICC
Diet adherence	3.83	0.88	1.00	5.00	.40
Exercise behavior (min)	22.52	24.97	0.00	112.50	.46
Negative affect	1.51	0.68	1.00	4.83	.47
Positive affect	2.89	0.85	1.00	5.00	.54
Relationship satisfaction	3.11	0.88	1.00	4.00	.61
Instrumental social control	1.44	1.57	0.00	5.00	.57
Monitoring social control	0.82	1.54	0.00	8.00	.57
Reinforcing social control	0.87	1.19	0.00	4.00	.55

Note. ICC = Interclass correlation coefficient; proportion of between-person variance divided by total variance (i.e., between-person variance plus within-person variance).

Table 4

Synchronous Correlates of Social Control

	Separate models			Simultaneous models		
Variable	**Coef.**	**t**	**r_p**	**Coef.**	**t**	**r_p**
Diet adherence, controlling for linear time (day)						
Instrumental SC	0.131	4.85***	.54	0.136	5.59***	.60
Monitoring SC	−0.034	−1.11	−.15	−0.064	−2.01*	−.26
Reinforcing SC	0.081	2.76**	.34	0.054	1.79†	.23
Exercise Behavior						
Instrumental SC	0.902	1.10	.14	0.867	1.14	.15
Monitoring SC	−0.698	−0.68	−.09	−1.116	−1.19	−.16
Reinforcing SC	2.171	1.66†	.21	2.552	2.32*	.29
Positive affect						
Instrumental SC	0.022	0.90	.12	0.006	0.27	.04
Monitoring SC	−0.022	−0.88	−.11	−0.041	−1.74†	−.22
Reinforcing SC	0.086	2.68*	.33	0.095	2.93**	.36
Relationship satisfaction						
Instrumental SC	0.113	4.25***	.49	0.080	3.49***	.42
Monitoring SC	0.053	1.84†	.23	0.009	0.34	.04
Reinforcing SC	0.154	3.73***	.44	0.133	3.98***	.46

Note. Coef. = Unstandardized regression coefficient. r_p = Partial correlation. SC = Social control.

† $p \leq .10$.

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$.

Table 5

Synchronous Correlates of Affect and Social Control

	Separate models						Simultaneous models		
	Affect, controlling for social control			Social control, controlling for affect					
Variable	**Coef.**	**t**	**r_p**	**Coef.**	**t**	**r_p**	**Coef.**	**t**	**r_p**
Diet adherence, controlling for linear time									
Negative affect	−0.094	−1.78†	−.23				−0.012	−0.15	−.02
Positive affect	0.176	2.94**	.36				0.146	2.11*	.27
Instrumental SC				0.118	4.28***	.49	0.122	5.07***	.56
Monitoring SC				−0.039	−1.22	−.16	−0.061	−1.89†	−.24
Reinforcing SC				0.073	2.12*	.27	0.050	1.57	.20
Exercise behavior (min)									
Negative affect	−2.20	−1.32	−.17				0.35	0.21	.03
Positive affect	4.77	3.11**	.38				5.33	3.62***	.43
Instrumental SC				0.65	0.80	.11	0.67	0.92	.12
Monitoring SC				−0.66	−0.78	−.10	−0.73	−0.86	−.11
Reinforcing SC				1.46	1.29	.17	1.97	2.37*	.30

Note. Coef. = Unstandardized regression coefficient. r_p = Partial correlation. SC = Social control.

$^{\dagger}p \leq .10$.

$^{*}p \leq .05$.

$^{**}p \leq .01$.

$^{***}p \leq .001$.

Table 6

Lagged Correlates of Social Control

	Separate models			Simultaneous models		
Variable	**Coef.**	**t**	**r_p**	**Coef.**	**t**	**r_p**
Diet adherence, controlling for linear time (day)						
Instrumental SC	0.018	0.87	.11	0.013	0.65	.09
Monitoring SC	0.036	1.70†	.22	0.031	1.40	.18
Reinforcing SC	0.022	0.81	.11	0.006	0.23	.03
Exercise						
Instrumental SC	−0.934	−1.12	−.15	−0.526	−0.70	−.09
Monitoring SC	0.668	1.14	.15	1.157	2.48*	.31
Reinforcing SC	−0.210	−0.30	−.04	−0.869	−1.32	−.17
Relationship satisfaction						
Instrumental SC	−0.014	−0.78	−.10	−0.018	−1.00	−.13
Monitoring SC	−0.032	−1.71†	−.22	−0.032	−1.70†	−.22
Reinforcing SC	0.025	0.92	.12	0.035	1.24	.16

Note. Coef. = Unstandardized regression coefficient. r_p = Partial correlation. SC = Social control.

† $p \leq .10$.

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$.

Table 7

Lagged Correlates of Affect and Social Control

	Separate models						Simultaneous models		
	Affect, controlling for social control			Social control, controlling for affect					
Lagged variable	**Coef.**	**t**	**r_p**	**Coef.**	**t**	**r_p**	**Coef.**	**t**	**r_p**
Diet adherence, controlling for linear time									
Negative affect	−0.088	−1.70†	−.22				−0.087	−1.56	−.20
Positive affect	0.021	0.50	.07				−0.002	−0.04	−.01
Instrumental SC				0.023	1.12	.15	0.019	0.92	.12
Monitoring SC				0.041	2.05*	.26	0.032	1.48	.19
Reinforcing SC				0.022	0.75	.10	0.004	0.13	.02
Exercise behavior (min)									
Negative affect	2.17	1.40	.18				2.44	1.52	.20
Positive affect	0.23	0.21	.03				0.99	0.88	.12
Instrumental SC				−0.33	−0.49	−.06	−0.43	−0.62	−.08
Monitoring SC				0.70	1.54	.20	1.04	2.38*	.30
Reinforcing SC				−0.33	−0.45	−.06	−0.97	−1.40	−.18

Note. Coef. = Unstandardized regression coefficient. r_p = Partial correlation.

† $p \leq .10$.

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$.