

Expanding the Mediational Model of the Effects of Health-Related Social Control

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Abstract

Tucker and colleagues (2006) proposed that the associations between social control attempts and health behaviors are mediated by affects. The evidence is mixed regarding whether affects fully mediate these associations. In a sample of 317 college students involved in heterosexual dating relationships, we tested Tucker's mediational model and an expanded mediational model that incorporated the action readiness component of emotions (motivation to change and reactance). Full mediation of the associations between (a) positive social control and health behavior change; and (b) negative social control and hiding unhealthy behavior were found only when motivation to change and reactance were included in the model. Unexpectedly, reactance and negative social control exerted direct effects on health behavior change.

Expanding the Mediational Model of the Effects of Health-Related Social Control

A growing body of research is aimed at exploring the role that social relationships play in promoting health and well-being (Cohen, 1988; House, Landis & Umberson, 1988). However, the social control function of relationships has received relatively little attention from researchers studying how interpersonal processes influence health (Lewis, Butterfield, Darbes, & Johnston-Brooks, 2004).

Social support refers to attempts by others to help an individual by providing aid (instrumental forms of assistance such as money and information), affect (expressions of liking and loving the person), and affirmation (agreeing with, or acknowledging the appropriateness of, the attitudes and actions of another person) (Kahn & Antonucci, 1980). In contrast, social control involves intentional efforts to change the behavior of an individual. Thus, social control is posited to influence health via the regulation of a target's unacceptable health behavior as perceived by the agent(s) of influence (Rook, 1995). Furthermore, studies have shown that social support and social control are distinct processes (Helgeson, Novak, Lepore, & Elton, 2004). Therefore, it is useful to explore the mechanisms by which social control influences health behavior. To date, tests of mediation of the associations between social control attempts and health behaviors have focused exclusively on affects (Tucker, Orlando, Elliott, & Klein, 2006). The present study examines the utility of expanding the mediational model of health-related social control by incorporating the action readiness component of emotions (Frijda, 1988). In a sample of college students, we examined affect, action readiness, and behavioral responses to a specific social control situation in which an opposite-sex dating partner

tried to influence the participant to change a health behavior such as exercising more frequently, drinking less alcohol, or reducing cigarette smoking.

Social control strategies can be classified along a number of dimensions (Butterfield & Lewis, 2002). One dimension that social control strategies vary on is whether the social control attempts are positive or negative (Lewis & Rook, 1999). Offering to do things in order to make it easier for a dating partner to eat healthier is an example of a positive social control strategy. On the other hand, denigrating one's dating partner for the amount of food consumed at a party is an example of a negative social control strategy. In the present study, we focus on direct positive and negative social control strategies, which involve explicit prompts by dating partners to change a health behavior.

Conceptual Frameworks Applied to the Study of Health-Related Social Control

Okun, Huff, August, and Rook (2007) recently culled four different models from the literature on the effects of social control. They referred to these models as the dual effects model, the contextual model, the domain-specific effects model, and the mediational model. The dual effects model predicts that social control leads to the benefit of enhancing a target's health behavior. However, the model also predicts that social control may increase relationship distress by eliciting in the target feelings such as such as resentment and irritation (Hughs & Gove 1981).

The contextual model (Tucker, 2002) proposes that the effects of social control on health behavior may be moderated by relational, target, and agent characteristics. For example, older adults who experienced more direct social control reported more frequent hiding of unhealthy behavior if they had low satisfaction with their social network

relationships (Tucker, 2002) and adults who experienced more positive social control did not report more attempts to change their health behaviors if they were high in neuroticism (Tucker, Elliott, & Klein, 2006).

The domain-specificity of effects model (Tucker, 2002) emphasizes the distinctive associations of positive social control with positive affect and negative social control with negative affect. This model predicts that within-domain effects will be significant whereas cross-domain effects will not be significant (hence, domain-specific effects). Consistent with these hypotheses, in a study of married couples, Tucker and Anders (2001) reported that (a) positive social control was significantly related to positive, but not negative, affect and (b) negative social control was significantly related to negative, but not positive, affect.

The final model—the mediational model—extends the domain-specificity of effects model by developing a more elaborate set of hypothesized relations among social control, affect, and health behaviors. Recently, Tucker et al. (2006) proposed that positive social control evokes positive affect (e.g., inspired) whereas negative social control elicits negative affect (e.g., irritated). Positive affect, in turn, is postulated to promote positive health behavior and negative affect, in turn, is postulated to foster negative health behavior. Furthermore, according to the mediational model, cross-domain effect should not be observed, that is, positive social control should be unrelated to hiding unhealthy behavior and negative social control should be unrelated to health behavior change.

The mediational model recognizes that responses to social control attempts may be either compliant or noncompliant, and that noncompliant responses may take several

forms. In response to social control attempts, individuals may engage in the healthy behavior, thus complying with the wishes of their significant others. Alternatively, individuals may decline to comply with the social control attempts of significant others by ignoring the attempts, persevering overtly in the unhealthy behavior, or engaging covertly in (hiding) the unhealthy behavior (Tucker & Anders, 2001). In a study of older adults, Tucker (2002) found that there was no association between engaging in healthy behaviors and hiding unhealthy behaviors indicating that engaging in and hiding a health behavior may be independent (Tucker, 2002).

According to the mediational model, positive affects are posited to account for the relation between positive social control and health behavior change and negative affects are posited to explain the relation between negative social control and hiding unhealthy behavior. Previous tests of the mediational model have shown that positive affect consistently mediates the relation between positive social control and health behavior change and that negative affect consistently mediates the relation between negative social control and hiding unhealthy behavior (Okun et al., 2007; Tucker & Anders, 2001; Tucker et al., 2006). However, the findings regarding *full* mediation have been mixed. Full mediation requires that (a) the indirect effects of social control on health behavior via affect be significant; and (b) the direct effects of social control on health behavior be non-significant.

With respect to positive affect, Tucker and Anders (2001) reported full mediation in a study in which spouses were the social control agents. In another study of adults with diverse social control agents, Tucker et al. (2006) also found in analyses of the total sample that positive affect fully mediated the relation between positive social control and

engaging in healthy behavior. In the Tucker et al. (2006) study, the most common social control agents were spouses, followed by parents and friends. In contrast, in a study of college students in which dating partners were the social control agents, Okun et al. (2007) observed that positive affect only partially mediated the relation between positive social control strategies and engaging in healthy behavior. Full mediation by negative affect of the relation between negative social control and hiding unhealthy behavior was reported by Tucker et al. (2006) in their study with diverse social control agents. However, negative affect only partially mediated the relation between negative social control strategies and hiding unhealthy behavior when the social control agents were spouses (Tucker & Anders, 2001) or dating partners (Okun et al., 2007).

Expanding the Mediational Model

In light of the evidence that partial mediation occurs among college students when dating partners are the social control agents, we expanded Tucker's mediational model (Tucker & Anders, 2001; Tucker et al., 2006). We were guided by Frijda's (2007) conceptualization of emotions. According to his framework, emotions are responses to events that are important to the individual's concerns. A concern is a motive, need, goal, or value that imbues an event with its emotional meaning. For example, an event can be appraised as a threat if it jeopardizes goal attainment or as satisfying if it promotes goal attainment. Although it is possible for events to elicit emotions directly, Frijda (2007) contends that events related to one's concerns typically evoke on-line appraisals. He proposes that the generation of a new emotional response begins while the appraisal process is still occurring.

The emotion response is conceived of as multi-componential (Fridja, 2007). One component of the emotion response is affect. Affects are viewed as feelings of pleasure or pain, combined with a state of activation. The second component of the emotion response, arousal, represents the pattern of physiological change that prepares the body for action. The final component of the emotion response is action readiness. According to Fridja (2007, p. 126), “emotions are not just states of pleasure or pain, of affect, but involves changes in action readiness.” States of action readiness involve motives to achieve a particular aim. For example, motivated by the desire to protect self-esteem, a worker may seek to withdraw from a supervisor who is berating him or her. Application of Fridja’s theory of emotions to health-related social control suggests that social control attempts can be construed as events that can be appraised positively (e. g., “my dating partner want to help me get healthier”) or negatively (e.g., “my dating partner wants to control me”). In turn, social control attempts can elicit emotional responses, including negative or positive affect, physiological arousal, and action readiness states, such as the desire to resist or the desire to undertake action to overcome an obstacle.

The mediational model developed by Tucker and Anders (2001) emphasizes the affect component of the emotional response. In the present study, we added the action readiness component of the emotion response to the mediational model. We chose to focus on the action readiness component rather than the arousal component of the emotion response because Fridja (2007, p. 26) argues that states of action readiness form the core of most emotions. Specifically, we incorporated motivation to change and reactance as two types of action readiness.

Positive emotions such as optimism evoked by positive social control attempts are associated with increased motivation to pursue goals (Carver & Scheier, 1998).

Motivational readiness, in turn, increases the likelihood of making progress on goals (Lam, Chan, Chan, Leung, Ho, & Chan, 2006). Negative emotions such as resentment elicited by negative social control attempts may be linked to a motivational state known as reactance (Brehm, 1966; Brehm & Brehm, 1981). Reactance refers to “an impulse to restore behavioral freedoms that are perceived to have been threatened or lost.” (Brehm, 2000, p. 10). Because individuals seek to reduce reactance, they are likely to engage in behaviors that restore the freedom that has been questioned (Brehm, 1999). In a study of married couples, Butterfield and Lewis (2002) found that negative social control tactics from agents were associated with more psychological reactance from the targets.

According to the expanded mediational model, positive social control attempts by dating partners are posited to elicit positive affects such as gratefulness and optimism and a greater desire to change the health behavior in the direction advocated by their dating partner. Being motivated to change in the direction advocated by their dating partner in conjunction with positive affect is proposed to account fully for the association between positive social control and health behavior change. In a parallel fashion, negative social control attempts by dating partners are posited to elicit negative affects such as anger and resentment as well as reactance. Reactance in conjunction with negative affect is proposed to explain fully the relation between negative social control and hiding unhealthy behavior.

In summary, we examined two sets of hypotheses in a sample of college students with dating partners as social control agents. First, based on the findings of Okun et al.

(2007) who studied the same types of social control agents and targets, in the test of the original mediational model, we hypothesized that the association between positive social control and health behavior change would be partially mediated by positive affect and the association between negative social control and hiding unhealthy behavior would be partially mediated by negative affect. Second, in the test of the expanded mediational model, we predicted that the association between positive social control and health behavior change would be fully mediated by motivation to change and positive affect and that the association between negative social control and hiding unhealthy behavior would be fully mediated by reactance and negative affect.

Method

Procedure

The participants for the present study consisted of students enrolled in an introduction to psychology course at a large Southwestern university. To fulfill a course requirement, participants were recruited via a website containing a description of all available studies. The present study was described as exploring personality characteristics and social control in dating relationships. Prior to signing up for this study, the students were informed of the eligibility requirements. To participate, students had to be single, dating a person of the opposite sex, involved with their dating partner for three months or longer, and in contact with their dating partner during the past 30 days.

Sample

Three-hundred-and-twenty-seven students participated in the study. The questionnaire included items that assessed the eligibility criteria and demographics as

well as the main study variables. Eight students were excluded from the study because they did not meet all of the eligibility criteria and two students were excluded due to missing data. Thus, the analyses were based on a sample size of 317.

The gender composition of the sample was 78% female and 22% male. Fifty percent of the participants were Caucasian, 13% were Hispanic, 4% were Asian, 3% were Native American, 2% were African American, and the remaining 28% of the participants were of other ethnicities or were of mixed heritage. Most of the participants were younger than 19 years old (63%), 30% were 19-20 years old, and the remaining 7% were between the ages of 21 and 29 years old. Additionally, most of the participants rated their health as “good” or “very good” (75%), 17% indicated that their health was “excellent,” and the remaining 8% reported that their health was “fair” or “poor.”

Measures

Eligibility Screen. Participants were asked if: (1) they had been dating their partner for 3 months or longer; (2) they had been in contact with their dating partner during the past 30 days; (3) their partner is of the opposite sex; (4) their marital status is single. Respondents who did not answer “yes” to all of these questions were excluded from the study.

Demographics and self-rated health. Participants were asked to indicate their sex, ethnicity, and age and to rate their health on a 5-point scale with anchor points of *poor* (1) and *excellent* (5).

Relational characteristics. Participants were asked questions about the duration of their relationship with a dating partner, frequency and duration of contact with their

dating partner, whether they had an exclusive relationship with their dating partner, and whether they lived with their dating partner.

Situational characteristics. In line with the elicitation procedure used by Lewis and Rook (1999) and Okun et al. (2007), participants were asked to indicate a health behavior that their dating partner wanted them to change during the past three months. In addition, participants were questions regarding the duration, frequency, and the recency of social influence attempts by their dating partner.

Social control. Positive and negative social control strategies were measured with 10 items developed by Lewis and Rook (1999). Participants were told to think about during the past three months how their dating partner tried to influence them to change their health behavior. Participants rated how true or untrue it was that their dating partner used each strategy to get them to change the target health behavior. The items were rated on a 5-point scale with anchor points of *false* (0) and *true* (4). Six of the items tapped into positive social control (e.g., my dating partner offered to help me change the health behavior) and four of the items tapped into negative social control (e.g., my dating partner tried to make me feel guilty). Scores on these scales were computed by averaging the responses to the appropriate items. The coefficient alphas for the positive and negative social control scales were .65 and .73, respectively.

Affect aroused by social control attempts. The affective responses aroused by their dating partner's social control attempts were measured using items developed by Lewis and Rook (1999). Participants were instructed to rate how strongly they experienced different emotions on a 5-point scale with anchor points of *very weakly* (0) and *very strongly* (4). Five of the items assessed negative affects (angry, bitter, irritated,

resentful, and tense) and seven of the items assessed positive affect (appreciative, grateful, happy, hopeful, optimistic, pleased, and satisfied). Scores on these scales were computed by averaging the responses to the appropriate items. For both the positive and negative affect scales, the coefficient alpha was .89.

Action readiness variables. Reactance in response to the dating partner's social control efforts was assessed with a measure developed by Lewis (1992). This measure was adapted from the Merz Psychological Reactance Scale (Mertz, 1983). Participants were asked to indicate the extent to which each of four statements was true or untrue in reference to their reactions in response to their dating partner's social control attempts (e.g., this dating partner's efforts made me feel like I had less control over this behavior). The items were rated on a 5-point scale with anchor points of *false* (0) and *true* (4). Scores on this scale was computed by averaging the responses to the items. The coefficient alpha for the reactance scale was .72.

Motivation to change was measured with a single item used by Butterfield and Lewis (2002). Participants were asked, "How much do you want to change this health behavior?" Responses were made on a 7-point Likert rating scale with anchors of "don't want to change at all" (0) and "want to change very much" (6).

Health Behavior. We included measures of health behavior change and hiding of unhealthy behavior in response to the dating partner's social control attempts. To assess health behavior change, participants were asked to indicate whether in response to their dating partner's social control attempts, they had changed the health behavior in the direction advocated by the dating partner, had changed their health behavior in the direction opposite to that advocated by their dating partner, or had not changed their

health behavior at all (Lewis & Rook, 1999). Then, utilizing a 15-point continuum, participants were asked to indicate the extent to which they had changed their health behavior. They were asked to circle 0 on the continuum if they had not changed their health behavior at all in response to the dating partner's attempts. If participants changed in the direction advocated by their dating partner, they were asked to indicate how much they changed their health behavior utilizing the positive side of the continuum (1 = changed a little in the direction my dating partner wanted, 7 = changed a lot in the direction my dating partner wanted). If the participants changed in the direction opposite to that advocated by their dating partner, they were asked to indicate the extent of their change utilizing the negative side of the continuum (-7 = changed a lot in the direction opposite to what my dating partner wanted, -1 = changed a little in the direction opposite to what my dating partner wanted). Thus, scores had a possible range of -7 to 7, with higher scores indicated greater health behavior change in the direction advocated by the dating partner.

Utilizing a measure developed by Tucker (2002), participants were asked to indicate on a 4-point scale how often they hid the unhealthy behavior from their dating partner, with anchor points of *never* (0) and *often* (3). Higher scores indicate greater hiding of the unhealthy behavior from their dating partner.

Results

Preliminary Analyses

Relational characteristics. With respect to duration of the relationship, the majority had been dating their partner for longer than 1 year (52%), 20% for 7-12 months, and 28% for 3-6 months. In terms of number of days of contact during the past

month, the majority had been in contact with their dating partner 28-30 days (63%), 29% for 10-27 days, and 8% for 1-9 days. On days when they had contact with their dating partner, the mode for number of hours of contact was 2-3 hours (33%), 27% had 4-6 hours of contact, 20% had 10 or more hours of contact, 13% had 7-9 hours of contact, and 7% had 1 hour of contact. Ninety-four percent of the respondents reported that they were in exclusive relationships and 12 percent reported that they were living together.

Situational characteristics. The responses to the health-related situation described by participants were coded into one of 12 types of health behaviors. Four independent raters coded 50 protocols with respect to type of health behavior targeted for change. The Kappas for pairs of coders ranged from .64 to .69, which according to Orwin (1994) represents good inter-coder reliability. The situations described by participants involved exercise (19%), quality of eating (14%), alcohol consumption (12%), smoking (12%), relaxation/stress reduction (11%), sleep habits (6%), weight (5%), driving safely (4%), "other" (4%), drugs (2%), and vitamins (1%).

Participants were asked how long their dating partner had been attempting to influence them to change their health behavior. The responses were one month or less (16%), between 1 and 3 months (38%), greater than 3 months up to 6 months (23%), and greater than 6 months (23%). With respect to recency of an influence attempt by their dating partner, the responses were 1 week or less (42%), more than 1 week but less than 1 month (31%), between 1 and 2 months (20%) and greater than 2 months up to 3 months (7%). In terms of frequency of influence attempts by their dating partner, the responses in descending order of frequency were 2-3 times a month (25%), once a week (22%),

several times a week (17%), about once a month (14%), twice (11%), once (6%), and daily (5%).

Correlational Analyses among the Main Study Variables

The correlations among the main study variables and descriptive statistics are presented in Table 1. As expected, (a) negative social control was positively related

Insert Table 1 about here

to negative affect, reactance, and hiding unhealthy behavior; (b) negative affect was positively related to reactance and hiding unhealthy behavior; and (c) reactance was positively related to hiding unhealthy behavior. In a parallel fashion, the associations among positive social control, positive affect, motivation to change, and health behavior change were all positive. Finally, health behavior change was unrelated to hiding unhealthy behavior.

Test of the Original Mediation Model

We used structural equation modeling to test our hypotheses that positive affect would partially mediate the association between positive social control and health behavior change and that negative social control would partially mediate the association between negative social control and hiding unhealthy behavior. All analyses were performed using LISREL v8.54 (Joreskog & Sorbom, 2003). Chi-square was used to assess the extent to which the specified model reproduced the observed covariance matrix, however because chi-square is sensitive to sample size three additional goodness-of-fit indices were used to assess model fit: Root Mean Square Error of Approximation

(RMSEA), Akaike Information Criterion (AIC), and the Comparative Fit Index (CFI). RMSEA is relatively insensitive to sample size and penalizes for lack of parsimony. Typically, an RMSEA of less than .08 represents adequate model fit and less than .05 good model fit. AIC is based on information theory and is used to assess fit relative to an alternative model; preference is given to the model with the lower AIC value. Finally, we included the CFI which gauges the lack of fit relative to a *null* model. Generally, CFI values above .90 indicate acceptable model fit.

Table 2 presents model fit statistics and nested model tests for the *original*

Insert Table 2 about here

mediational model. Based on the zero-order correlations, in each model, we included the covariation (a) between the exogenous variables and (b) between the mediators. The full model (Table 2, Model 1) includes all possible effects except for the covariation among the unique variance terms (ζ) between health behavior change and hiding. The full model provided an adequate fit to the data, $\chi^2(317, 1) = .02, p = .90$, RMSEA = .00, AIC = 40.02, CFI = 1.00. Nevertheless, in the full model, the direct effect of positive affect on hiding unhealthy behavior ($\beta = -.07, p = .25$), and the direct effect of negative affect on health behavior change ($\beta = .00, p = .98$) were not significant.

Therefore, we trimmed the full model by eliminating the cross-domain direct effects of positive affect on hiding unhealthy behavior and of negative affect on health behavior change (Table 2, Model 2). Removing both pathways as a set revealed no degradation in model fit, $\chi^2(2) = 1.35, p = .51$. In Model 2, neither the direct effect of

positive social control on hiding unhealthy behavior ($\beta = .67, p = .50$) nor the direct effect of negative social control on health behavior change ($\beta = .24, p = .053$) was significant.

Thus, in Model 3, we removed the cross-domain direct effects of positive social control on hiding unhealthy behavior and negative social control on health behavior change. Elimination of these direct effects did not significantly reduce model fit, $\chi^2(2) = 4.18, p = .12$. Finally, we tested whether the within-domain direct effects of positive social control on healthy behavior change and negative social control on hiding unhealthy behavior were fully mediated by positive and negative affect. This was done in Model 4 by dropping the direct effect of positive social control on health behavior change and the direct effect of negative social control on hiding unhealthy behavior. When these within-domain direct effects were removed as a set, significant degradation in model fit occurred, $\chi^2(2) = 19.13, p < .001$.

Figure 1 presents the final version of the original model (Table 1, Model 3) with

Insert Figure 1 about here

both standardized and unstandardized path coefficients. The model provided excellent fit to the data, $\chi^2(317, 5) = 5.55, p = .35$, RMSEA = .02, AIC = 37.52, CFI = 1.00. The model accounted for 14% of the variation in health behavior change and 13% of variation in hiding unhealthy behavior. We found significant direct effects for positive social control on health behavior change, ($\beta = .14, p < .05$) and for negative social control on hiding unhealthy behavior, ($\beta = .22, p < .001$). We also found significant cross-domain

pathways between positive social control and negative affect, ($\beta = -.24, p < .001$) and between negative social control and positive affect ($\beta = -.19, p < .001$).

Using the Sobel procedure (MacKinnon, Warsi, & Dwyer, 1995), within the final model we examined four indirect effects (see Table 3). As expected, positive affect

Insert Table 3 about here

mediated the path from positive social control to health behavior change, $z = 2.83, p < .01$, and negative affect mediated the path from negative social control to hiding unhealthy behavior, $z = 3.18, p < .01$. Thus, consistent with our first set of hypotheses pertaining to the original mediational model, the within-domain effects of positive and negative social control were partially mediated. In addition, the relation between positive social control and hiding unhealthy behavior was mediated by negative affect, $z = -2.48, p < .05$. However, the path from negative social control to health behavior change was not mediated by positive affect, $z = -1.45, p = .15$.

Test of the Expanded Mediation Model

In testing the expanded mediation model, we followed a similar analytic plan to the one employed to test the original mediational model. Table 4 presents model fit

Insert Table 4 about here

statistics and nested model tests for the *expanded* mediational model. We included the covariation (a) between the exogenous variables and (b) between the mediators. The full

model (Table 4, Model 1) includes all possible effects except for the covariation among the unique variance terms (ζ) between health behavior change and hiding. The full model provided an adequate fit to the data, $\chi^2(317, 3) = 0.59, p = .44, RMSEA = .00, AIC = 70.59, CFI = 1.00$. In the full model, nonsignificant covariation was observed among the unique variance (ζ) terms between motivation to change and (a) negative affect ($\psi = .01, p = .86$); and (b) reactance ($\psi = -.09, p = .10$).

In the next model (Table 4, Model 2), we deleted these two nonsignificant relations amongst the unique variance terms for these mediators. Removing these relations as a set revealed no degradation in model fit, $\chi^2(317, 2) = 3.68, p = .16$. In Model 2, non-significant paths were observed from positive affect and motivation to change to hiding unhealthy behaviors, ($\beta = -.02, p = .71, \beta = .02, p = .54$, respectively) and from negative affect to health behavior change and hiding unhealthy behavior ($\beta = .08, p = .56, \beta = .04, p = .48$).

Therefore, we trimmed Model 2 by eliminating these four non-significant pathways between the mediators and health behavior change and hiding unhealthy behavior (Table 4, Model 3). Removing these pathways as a set revealed no degradation in model fit, $\chi^2(4) = 1.46, p = .83$. In Model 3, only the direct effect of negative social control on health behavior change was significant ($\beta = .49, p < .001$). When we removed the remaining non-significant direct effect of negative social control on hiding unhealthy behavior and the non-significant direct effects of positive social control on health behavior change and hiding unhealthy behavior (Table 4, Model 4), the model fit was not significantly reduced, $\chi^2(3) = 6.76, p = .08$.

Figure 2 presents the final model (Table 4, Model 4) with both standardized and

Insert Figure 2 about here

unstandardized path coefficients. The model provided excellent fit to the data, $\chi^2(317, 10) = 12.49, p = .25, RMSEA = .03, AIC = 64.67, CFI = 1.00$. The model accounted for 18% of the variation in health behavior change and 19% of the variation in hiding unhealthy behavior. In support of our set of hypotheses pertaining to the expanded mediational model, the within-domain direct effects of both positive and negative social control were fully mediated when motivation to change and reactance as well as the affect variables were included in the model. However, we found a significant cross-domain direct effect of negative social control on health behavior change, ($\beta = .22, p < .001$). In addition, we observed significant cross-domain pathways from positive social control to negative affect, ($\beta = -.24, p < .001$) and to reactance ($\beta = -.25, p < .001$), and from negative social control to positive affect ($\beta = -.19, p < .001$) and to motivation to change ($\beta = -.18, p < .001$). The model accounted for 18% of the variation in health behavior change and 19% of the variation in hiding unhealthy behavior.

Within the final model, we examined eight indirect effects (see Table 5). Both

Insert Table 5 about here

positive affect, $z = 2.61, p < .01$, and motivation to change, $z = 3.40, p < .001$, mediated the relation between positive social control and health behavior change. Reactance mediated the path from negative social control to hiding unhealthy behavior, $z = 2.14, p <$

.05. Unexpectedly, reactance mediated the paths from (a) positive social control to hiding unhealthy behavior, $z = -3.93, p < .001$, and (b) negative social control to health behavior change, $z = -2.05, p < .05$. Finally, motivation to change, $z = -2.64, p < .01$, mediated the relation between negative social control and health behavior change. However, reactance did not mediate the relation between positive social control and health behavior change, $z = 1.51, p = .13$, and positive affect did not mediate relation between negative social control and health behavior change, $z = -1.34, p = .18$.

Discussion

Initial attempts to investigate the mechanisms that account for the associations between positive social control and health behavior change and negative social control and hiding unhealthy behavior focused exclusively on positive and negative affect (Tucker & Anders, 2001; Tucker et al., 2006). The contention that affects fully mediate these associations has not been supported among college students involved in dating relationships (Okun et al., 2007). Based on these findings, we hypothesized that positive affect would partially mediate the relation between positive social control and health behavior change and that negative affect would partially mediate the relation between negative social control and hiding unhealthy behavior. Drawing upon Frijda's (2007) theory of emotions, we expanded the mediational model by distinguishing between the affective and action readiness components of emotions. We proposed that motivation to change in conjunction with positive affect would fully mediate the relation between positive social control and health behavior change and that reactance in conjunction with negative affect would fully mediate the relation between negative social control and hiding unhealthy behavior.

Findings Related to the Original Mediation Model

Some studies have found that affects fully mediate the associations between (a) positive social control and health behavior change (Tucker & Anders, 2001); and (b) negative social control and hiding unhealthy behavior (Tucker et al., 2006). In contrast, in the present study, positive social control exerted a direct effect on health behavior change and negative social control exerted a direct effect on hiding unhealthy behavior.

What may account for the discrepancy across studies in the extent of mediation by positive affect and negative affect? Whereas Tucker and Anders' (2001) studied spouses as social control agents and Tucker et al. (2006) studied various types of adult social control agents, including spouses, parents, and friends, the participants in the Okun et al. (2007) study and in the present study were college-aged dating couples. In the present study, almost half of the participants reported that they had been dating their partner for one year or less. One possibility is that the strength of the pathways from positive social control → positive affect → health behavior and from negative social control → negative affect → hiding unhealthy behavior is weaker when college students are targets and their boy/girlfriends are agents. Perhaps, these relationships involve less investment than say adult spousal relationships and less investment weakens the links among social control, affect and health behavior.

Findings Related to the Expanded Mediation Model

In the present study, we conceptualized motivation to change and reactance as mediators of the associations between positive social control and health behavior change and negative social control and hiding unhealthy behavior, respectively. In support of the expanded mediational model, the direct effects of positive social control on health

behavior change and negative social control on hiding unhealthy behavior were not significant when motivation to change and reactance were included in the model.

Motivation to change and positive affect both contributed to mediating the association between positive social control and health behavior change. Consistent with previous research (Gebhardt & Maes, 2001), relative to individuals unmotivated to change, individuals motivated to change made more progress toward their health goals. As motivation increases, individuals may increase their effort to attain their health goals and may be more persistent in the face of barriers. Whether positive social control enhances health behavior change depends, in part, on whether it enhances motivation to change as well as positive affect. Thus, positive social control strategies are likely to be more effective not only when they elicit positive affect but also when they predispose the target to take positive actions.

When psychological reactance was included in the mediational model, negative social control exerted direct effects on both reactance and negative affect. However, the path from negative affect to hiding unhealthy behavior was not significant. Instead, reactance by itself was a powerful mediator, fully accounting for the relation between negative social control and hiding unhealthy behavior. The theory of psychological reactance proposes that constraints on behavioral freedom constitute threats to perceptions of freedom and control (Brehm, 1966; Brehm & Brehm, 1981). Furthermore, to restore control, individuals are motivated to engage in the prohibited behavior. In the present context, negative social control strategies may evoke reactance in targets and, in turn, targets may seek to restore their sense of control by covertly engaging in the unhealthy behavior. Paradoxically, hiding the unhealthy behavior may actually increase

rather than decrease the negative affective reactions elicited by negative social control. For example, by deceiving their partners and hiding unhealthy behaviors, targets may experience more guilt, one type of negative affect.

On the one hand, it is difficult to envision high reactance in the absence of negative affect. Although we attempted to minimize the overlap in the items used to assess of negative affect and reactance, a readiness to act in such a way as to reestablish control is likely to have been accompanied by negative emotions. For example, being pressured by an agent to change an unhealthy behavior is likely to result in both resentment and reactance. On the other hand, it is possible to envision positive social control strategies that result in high motivation to change without high positive affect. For example, being given information by an agent regarding how to change a negative health behavior may motivate the target to reduce the frequency of the unhealthy behavior without evoking positive affect in the target. This contention is supported by the finding that the association between negative affect and psychological reactance ($r = .62$) was much stronger than the association between positive affect and motivation to change ($r = .35$).

Unanticipated “Cross-Domain” Effects

The findings of the present study indicate that in the original mediation model, the conceptualization of the dynamics by which social control influences affect and health behavior may have been too simple. This model posits within-domain pathways: (a) positive social control → positive affect → health behavior change; and (b) negative social control → negative affect → hiding unhealthy behavior. However in testing this model, Tucker and her colleagues (2006) found cross-domain effects. For example,

negative social control predicted positive affect in the total sample, positive social control predicted negative affect in the young adult sub-sample, negative affect predicted engaging in healthy behavior in the male sub-sample, and positive affect predicted hiding unhealthy behavior in the older adult sub-sample. In the present study, in the expanded mediational model, we observed cross-domain effects with respect to the paths from (a) the social control variables to the affect and action readiness variables; (b) reactance to health behavior change; and (c) negative social control to health behavior change.

Of these six cross-domain effects, the two that are most at odds with the original mediational model involve the direct effects of reactance and negative social control on health behavior change. Why should reactance be both a negative predictor of health behavior change and a positive predictor of hiding unhealthy even though the two outcome variables were unrelated? Perhaps, reactance exhibited a cross-domain effect because our measure of health behavior change permitted respondents to indicate whether they (a) engaged in the healthy behavior that their dating partner wanted them to do, (b) did not change their health behavior; or (c) did the opposite of what the agent wanted them to do. It stands to reason that targets experiencing reactance may try to restore their behavioral freedom by either overtly doing the opposite of what their dating partners want or by covertly hiding unhealthy behavior from their dating partner. When experiencing reactance, targets' preference for hiding unhealthy behavior versus openly engage in oppositional health behaviors may depend on whether they desire to maintain the relationship with their dating partner (Hughes & Gove, 1981).

The most surprising finding of the present study was that in the expanded mediational model, negative social control was *positively* related to health behavior

change. As expected, the zero-order correlation between negative social control and health behavior change was not significant ($r = -.00$). However, the lack of a bivariate relation between negative social control and health behavior change appears to mask the fact that negative social control has a positive direct effect on health behavior change and a negative indirect effect via reactance on health behavior change. On the one hand, the standardized partial regression coefficient for predicting health behavior change from negative social control was $.22$ ($p < .001$). On the other hand, the indirect effect for the path from negative social control \rightarrow reactance \rightarrow health behavior change was $-.22$ ($p < .05$). These findings suggest that the relation between negative social control on health behavior is suppressed, that is, it emerges only when participants are equated on reactance.

Limitations

The present study has several limitations. The first limitation of the present study is that we did not assess the arousal component of the emotion response. Second, our findings are limited by our cross-sectional, correlational design that cannot capture reciprocal or causal processes. For example, although we have conceptualized motivation to change as a mediator of the relation between positive social control and health behavior variable, it also can be postulated to be an antecedent of social control (i.e., agent's use social control when they perceive the target as being unmotivated to change the health behavior in question) or as a moderator of relations (i.e., the association between positive social control and health behavior change increases as the target's motivation to change increases). Third, because our data are based solely on self-report from the target, some associations may be inflated due to shared reporter variance.

Finally, our findings may not generalize to other populations and types of relationships. With respect to this last limitation, it is important to note that college students warrant study because they are considered to be an at-risk population with respect to many health behaviors including alcohol and substance abuse, eating disorders, lack of exercise, poor nutrition, poor sleep habits, and unsafe sex practices (Leslie, Owen, Salmon, Bauman, Sallis, & Lo, 1999; Sands, Archer, & Puleo, 1998).

Directions for Future Research

The findings of the present study suggest that Fridja's (2007) theory of emotions is a useful point of departure for enriching mediational models of the effects of health-related social control. Tucker et al. (2006) called for research that examines how social control can backfire, that is reduce health behavior change and lead to hiding unhealthy behaviors. We showed that reactance can contribute to our understanding of the dynamics by which negative social control strategies influence health behaviors. Negative social control strategies can elicit reactance in targets which, in turn, leads to less positive health behavior change and more hiding of unhealthy behaviors. Therefore future research should attempt to increase our understanding of the mechanisms that account for this effect. For example, in laboratory research, the impact of negative social control strategies on arousal, affect, and reactance can be studied and linked to the hiding of unhealthy behavior. Furthermore, Tucker et al. (2006) found that, relative to individuals who were low in neuroticism, individuals high in neuroticism have a more negative affective reaction to social influence attempts. Neuroticism, in turn, has been shown to be inversely related to emotion-regulation skills (Kokkonen & Pulkkinen, 2001). Thus, it may be useful in future research to examine emotion regulation--a

construct also included in Fridja's (2007) theory of emotions--as a moderator of the effects of negative social control strategies.

Implications for Changing Health Behaviors

Most attempts to change the health behaviors of others occur outside of the context of the provision of physical and mental health services. Agents often intervene when they perceive that people with whom they have a close personal relationship either cannot or will not self-regulate an unhealthy behavior that can have negative consequences. Under these circumstances, it is easy to envision scenarios where health behaviors, such as reducing or stopping the consumption of alcohol, become a major source of conflict between dyadic members.

The findings of the present study indicate that positive social control attempts may exert a positive influence on health behavior change by increasing positive affect and motivation to change and by reducing reactance and that by reducing reactance, positive social control attempts also may contribute to reducing the hiding of unhealthy behaviors. Conversely, negative social control attempts may increase hiding of unhealthy behavior by increasing reactance. Furthermore negative social control attempts exhibit a complex relation with health behavior change because they decrease motivation to change and increase reactance but when college students are equated on psychological reactance, negative social control attempts appear to increase health behavior change.

These findings suggest that interventions designed to increase health behavior change in the context of dyadic relationships could focus on two components. First, health education programs could teach *agents* to focus on using positive social control strategies. Second health education programs could teach *targets* strategies for regulating

their negative affect and psychological reactance in response to negative social control attempts.

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Table 1

Means, Standard Deviations and Interrelations among the Variables

Variables	1	2	3	4	5	6	7	8
1. Health Behavior Change								
2. Hiding Unhealthy Behavior	-.03							
3. Motivation to Change	.31**	-.08						
4. Reactance	-.21**	.44**	-.29**					
5. Positive Affect	.34**	-.18**	.35**	-.41**				
6. Negative Affect	-.12*	.31**	-.20**	.62**	-.41**			
7. Positive Social Control	.25**	-.07	.38**	-.35**	-.36**	-.33**		
8. Negative Social Control	-.00	.32**	-.24**	.60**	-.25**	.53**	-.19**	
<i>M</i>	2.95	0.98	4.21	0.83	2.25	1.37	2.67	1.25
<i>SD</i>	2.30	0.98	1.53	0.91	0.98	1.11	0.85	1.00

* $p < .05$; ** $p < .01$

Table 2.
Model Fit Statistics and Nested Model Tests for Original Mediation Model of Social Control

Model	χ^2	<i>df</i>	exact <i>p</i>	RMSEA	AIC	CFI
1. Full Model ^a	.02	1	.90	.00	40.02	1.00
2. Cross-Domain Endogenous Paths Removed	1.37	3	.71	.00	37.37	1.00
3. Cross-Domain Direct Effects Removed	5.55	5	.35	.02	37.52	1.00
4. Within-Domain Direct-Effects Removed	24.68	7	.00 ^b	.09	52.51	.95
Difference Tests						
1 vs 2	1.35	2	.51			
2 vs 3	4.18	2	.12			
3 vs 4	19.13	2	.00 ^b			

^a Model excludes covariation among unique variance terms between health behavior change and hiding unhealthy behavior

^b Exact *p*-values: Model 4, *p* = .0008; 3 vs 4, *p* = .0001

Table 3.
Indirect Effects Tested from Original Mediation Model

Path	$\alpha\beta$	SE $_{\alpha\beta}$	Z
<i>Within-Domain</i>			
PSC→PA→HBC	.26	.09	2.83**
NSC→NA→HUB	.09	.03	3.18**
<i>Cross-Domain</i>			
PSC→NA→HUB	-.05	.02	-2.84**
NSC→PA→HBC	-.13	.09	-1.45

** $p < .01$

Note. PSC = Positive social control, PA = Positive affect,

NSC = Negative social control, NA = Negative affect,

HBC = Health behavior change, and HUB = Hiding unhealthy behavior.

Table 4.

Model Fit Statistics and Nested Model Tests for Expanded Mediational Model of Social Control

Model	χ^2	<i>df</i>	exact <i>p</i>	RMSEA	AIC	CFI
1. Full Model ^a	.59	1	.44	.00	70.59	1.00
2. Covariation Removed	4.27	3	.23	.04	70.25	1.00
3. Endogenous Paths Removed	5.73	7	.57	.00	63.78	1.00
4. Direct Effects Removed	12.49	10	.25	.03	64.67	1.00
Difference Tests						
1 vs 2	3.68	2	.16			
2 vs 3	1.46	4	.83			
3 vs 4	6.76	3	.08			

^aModel excludes covariation among unique variance terms between health behavior change and hiding unhealthy behavior

Table 5.
Indirect Effects Tested from Expanded Mediation Model

Path	$\alpha\beta$	SE $_{\alpha\beta}$	Z
<i>Within-Domain</i>			
PSC→PA→HBC	.22	.08	2.61**
PSC→MTC→HBC	.21	.06	3.40***
NSC→REACT→HUB	.24	.11	2.14*
<i>Cross-Domain</i>			
PSC→REACT→HUB	-.12	.03	-3.93***
PSC→REACT→HBC	.11	.07	1.51
NSC→PA→HBC	-.11	.08	-1.34
NSC→MTC→HBC	-.09	.03	-2.64**
NSC→REACT→HBC	-.22	.10	-2.05*

* $p < .05$; ** $p < .01$, *** $p < .001$

Note. PSC = Positive social control, PA = Positive affect,

NSC = Negative social control, NA = Negative affect,

MTC = Motivation to change, REACT = Reactance

HBC = Health behavior change, and HUB = Hiding unhealthy behavior.

Figure Captions

Figure 1. Final version of the original mediational model. (Unstandardized estimates are inside the parentheses, * $p < .05$; ** $p < .01$, *** $p < .001$.)

Figure 2. Final version of the expanded mediational model. (Unstandardized estimates are inside the parentheses, * $p < .05$; ** $p < .01$, *** $p < .001$.)

Figure 1.

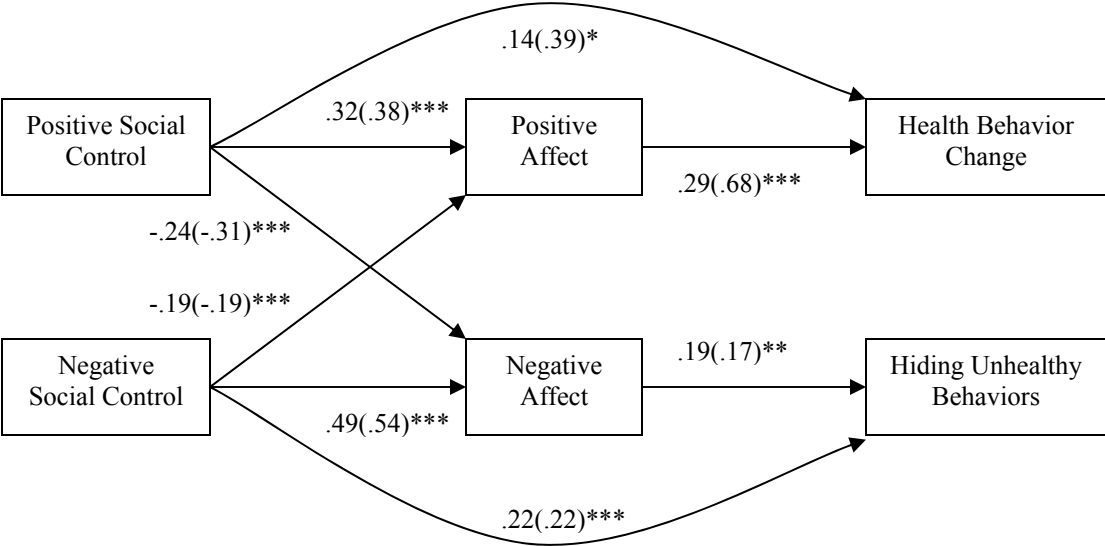


Figure 2.

